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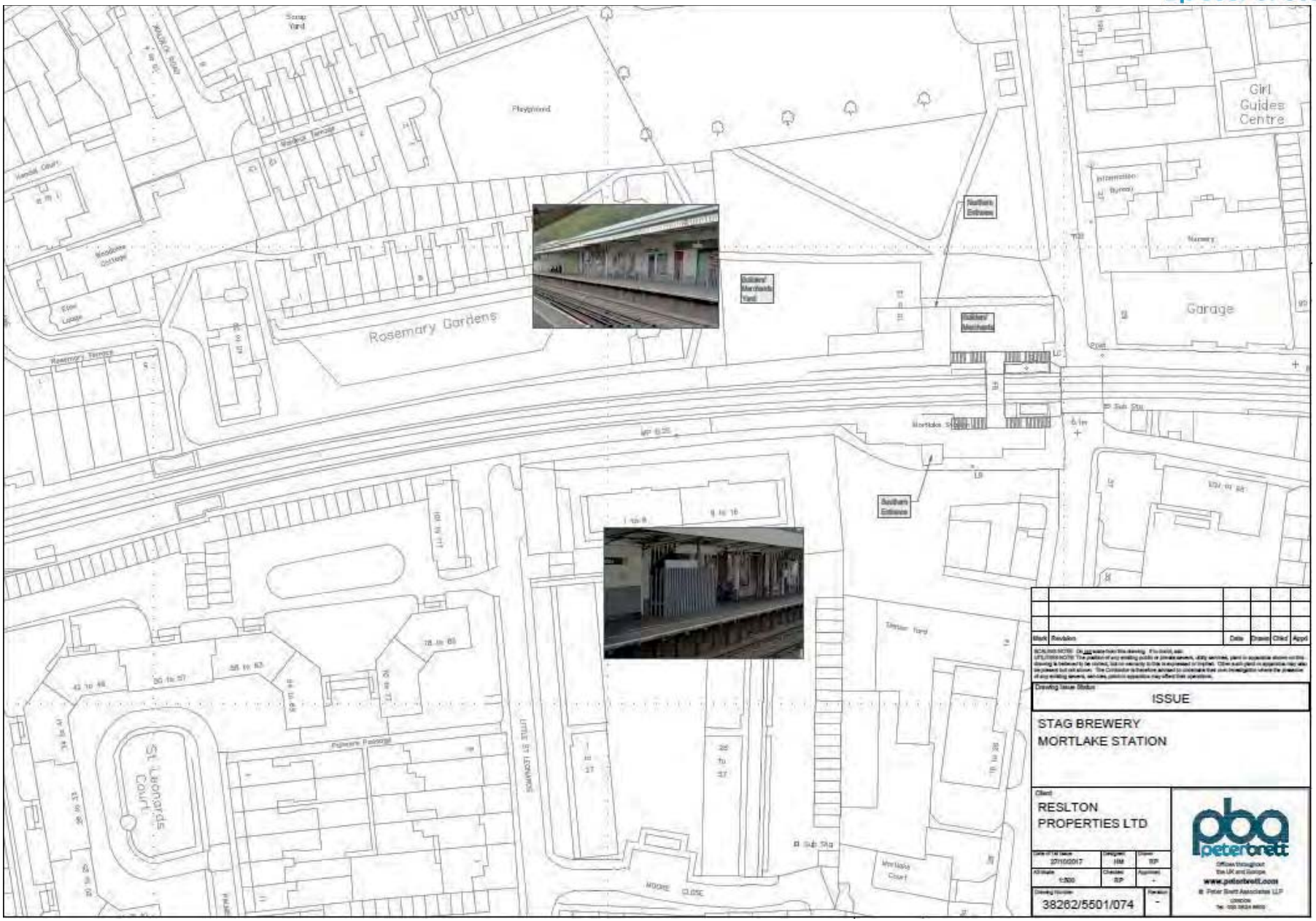

Figure 2.14: Mortlake Station Layout

2.3 Facilities

2.3.1 The station is manned during the hours shown in Table 2.1. At these times, the station ticket office is open and the gates between the footbridges dividing line are open as shown in Figure 2.13.

Table 2.1: Manned Hours

Day	Manned Hours
Monday – Friday	0625 - 1950
Saturday	0830 - 1900
Sunday	0930 - 1600

2.3.2 The station contains customer “help points” on the platforms which allows customers to make enquires regarding train services. There are no ticket gates to enter or exit the station. There is a lost property facility and CCTV throughout the station as shown in Figure 2.15. Both platforms benefit from Dot Matrix Indicators (DMIs) which are passenger information screens which act as a customer information system.

Figure 2.15: CCTV cameras on the Westbound Platform

2.3.3 The platforms are slightly curved and have large covered canopies that extend to approximately the mid-way points of the platforms. These canopies span the entire width of the platform and allow for unaffected boarding conditions during inclement weather conditions. In addition, there are baffles on the platforms as passengers enter from both the north and south entrance as shown in Figure 2.16. On the westbound platform, there is also a small area of grass towards the western most extremity of the platform which reduces the platform width at that point as shown in Figure 2.17.

2.3.4 There is a café (“Giordano 14”) abutting the east-bound platform which includes an internal seating area and a vending machine on the west-bound platform. There is some seating provided on both platforms.

2.3.5 Note that the footbridge and staircases are covered. There is a station car park with 13 parking bays abutting the southern platform as well as 132 cycle spaces. The majority of these are located outside the southern entrance with a several Sheffield stands located on the eastbound platform underneath the footbridge.

Figure 2.16: The Platform Baffles As Passengers Enter the Eastbound Platform

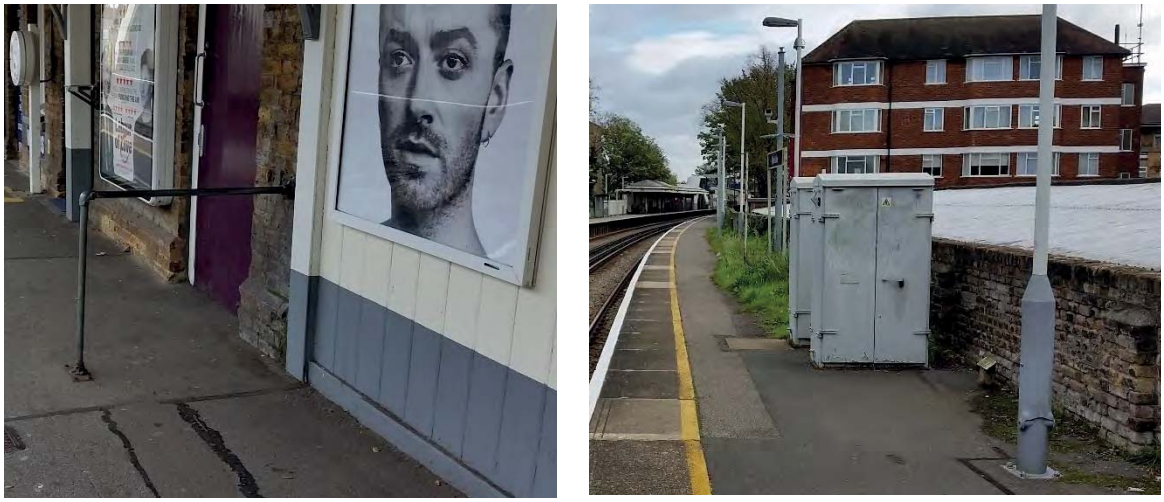

Figure 2.17: Some Obstructions to Movement Along the Westbound Platform

2.4 Train Services

2.4.1 The passenger train services at Mortlake are operated exclusively by the South Western Trains franchise (owned by FirstMTR). At present the station benefits from 4 trains per hour that travel directly to London Waterloo and a further 4 trains per hour travelling from Waterloo towards Richmond. Note, that these services towards Richmond subsequently travel along either the Hounslow Loop or the Kingston Loop and return to Waterloo, however, their journey times are approximately double that on the direct train services and so are not anticipated to be used by passengers traveling to central London.

2.4.2 At present, South Western Trains is introducing 10-car trains on all services calling at Mortlake station. These comprise a range of Class 455, Class 456, Class 458 and Class 707 until 2019 when a new homogenous fleet of Bombardier built 10-car trains will be introduced. Thus, throughout this analysis 10-car trains are assumed to be operating at Mortlake station.

3 Existing and Future Station Capacity Analysis

3.1 Station Usage

3.1.1 Mortlake Station is classed by Network Rail (NR) as a Category C2, "Important Feeder"[2] station. The station lies within Zone 3 and is a heavily used commuter station. The annual entries and exits from the station between 2011 and 2016 are produced by the Office of Road and Rail (ORR)[3] and shown in Table 3.1 below.

Table 3.1: Annual Entries and Exits at Mortlake Station

Year	Annual Entries and Exits	Change on Previous Year	Change on Previous Year (%)
2011-12	2,031,000	n/a	n/a
2012-13	2,131,000	100,000	5%
2013-14	2,157,000	26,000	1%
2014-15	2,245,000	88,000	4%
2015-16	1,932,000	-313,000	-14%

3.1.2 This shows a trend of increasing patronage to 2014-15, followed by a sharp decline in 2015-16, as shown in Figure 3.1. This decline has been attributed by Steer Davies Gleave who compiled the figures for NR, to a change in the methodology of computing the expected station patronage from travelcard users.

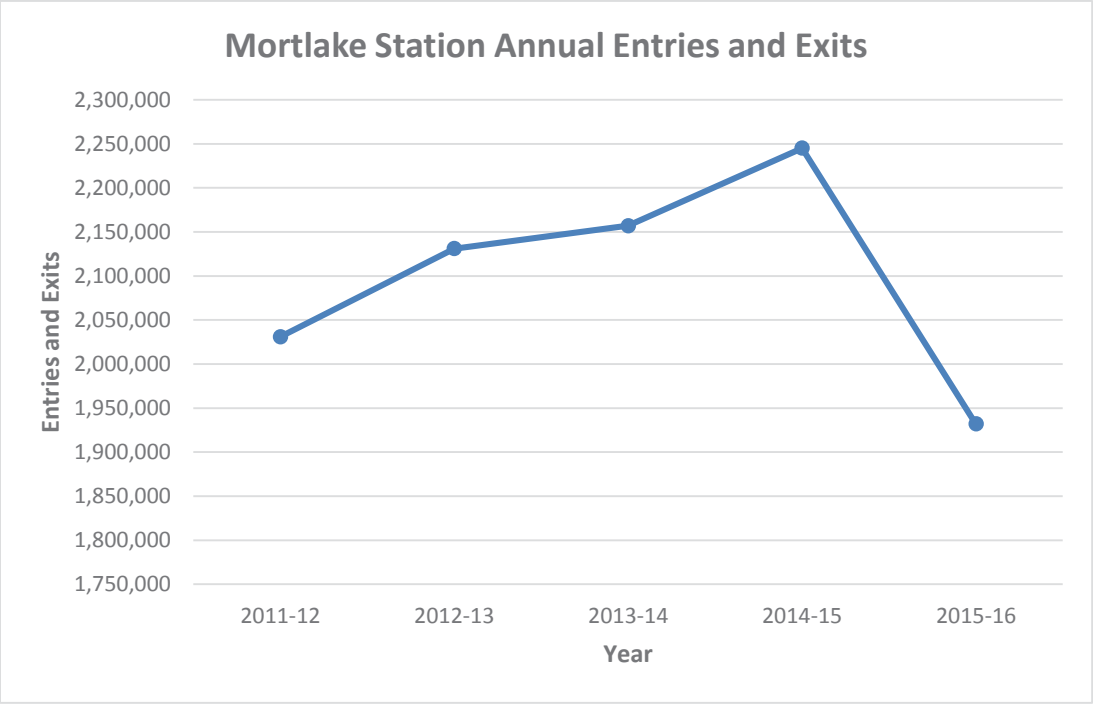

Figure 3.1: Mortlake Station Annual Entries and Exits

[2] Network Rail (2011). *Station Capacity Assessment Guidance*, Milton Keynes: Network Rail Infrastructure Limited (GB)

[3] Office of Road and Rail (2016). *Station Usage Estimates*, London: Office of Road and Rail

3.2 Passenger Movements Along Platforms

3.2.1 The movement of passengers in Mortlake station follows a simple bi-directional model with only limited cross-movement possible which only occurs between the brief interactions between passengers alighting trains and those boarding. This lack of cross-movement is due to the layout of the station platforms and entrance points which all lie at the eastern most point of the platforms. As such, there is no cross-movement of passengers alighting from trains and then moving in either the east of west direction or passengers entering the station and moving either east or west along the platforms. Instead, there is only one movement of passengers that is possible. Upon entering the station, passengers can only move westwards along the platforms and upon alighting a train can only move eastwards towards the exit.

3.2.2 This bi-direction flow of passengers is unchanged by any other considerations because there is no station through movement and no connecting passengers transferring to and from services. This is due to the nature of the services calling at Mortlake station such that no passengers are anticipated to travel to Mortlake in order to alight from their train, wait at the platforms and then join a subsequent train. Furthermore, both station platforms function as cul-de-sacs with no members of the public moving through the platforms in order to reach a local destination or another part of the station building. It is noted that there are no station toilet facilities that can be used by members of the public. The bi-directional flow of passengers increases passenger flows through the station areas as compared to stations with:

- Multiple entry and exit points;
- Passengers making connections; and/or,
- Using the station as a pedestrian through-route.

3.2.3 The movement of pedestrians is also not impeded by gatelines. In sum, this means the movement of pedestrians in Mortlake station should be significantly more free-flowing than for a typical station that NR's guidance is based on. The station also benefits from clear lines of sight that are unimpeded throughout both platforms.

3.2.4 In summary, this means Mortlake station is likely to provide a better passenger experience and easier movement of passengers than NR's station guidance would imply. The simplicity of the flow model also implies the minor impediments to flow shown in Figure 2.17 on the platforms are unlikely to significantly affect platform flows.

3.2.5 Despite this, there is likely to a high degree of passenger bunching towards the eastern ends of both platforms. This was observed during the Site visit on the eastbound platform as shown in Figure 3.2 below.

Figure 3.2: Passengers Waiting to Board and then Boarding a Waterloo Bound Train

3.2.6 This bunching occurs due to the location of both platform entrances being at the eastern most part of both platforms, the canopies limited extent, location of the DMIs and the convenience of joining the leading carriages on Waterloo-bound trains and the last carriage on Richmond-bound trains from Waterloo.

3.3 Station Loadi ng

3.3.1 Network Rail has provided data on passenger numbers at Mortlake station in order to inform station requirement calculations. It is understood that these are based upon recorded boardings and alightings at the nearby Putney Station since there was no actual survey information available for Mortlake. PBA commissioned surveys of the numbers of pedestrians entering and leaving the station which were conducted on Wednesday, 15th June, 2016 and since these surveys indicated higher numbers of passengers at the station than the estimates provided by NR these have been used as the basis for estimating existing demand.

3.3.2 To account for uneven platform loading the platforms are divided into carriage blocks corresponding to individual train cars. The required width of the platform is then calculated according to the busiest carriage block -which is assumed to the easternmost carriage (i.e. the carriage closest to Waterloo). The degree of spreading between carriages by passengers has been assumed to be as shown in Table 3.2 for an 8-car and a 10-car train where the carriage denoted 1 is the leading carriage at the head of the train which enters the station first and carriage 10 is the last carriage entering the station. These assumptions are based on observations during the site visit of passenger boarding habits. The critical train carriage receives 20% of the total train loading for both 8-car and 10-car trains.

Table 3.2: Loading Proportions Per Carriage for an 8-car train and 10-car train

	Proportion (%)	
Carriage	**8-car**	**10-car**
1	20%	20%
2	18%	18%
3	16%	16%
4	13%	13%
5	11%	11%
6	10%	9%
7	8%	7%
8	4%	3%
9	-	2%
10	-	1%
Total	**100%**	**100%**

3.3.3 The critical hour for train loading was observed to be currently between 0800-0900 and this continues to be the critical hour when the additional flows from the Stag development are included. As such, this is the period which has been assessed as the worst-case hour to be considered.

3.3.4 The loading in the critical carriage during the morning peak hour is shown in Table 3.3 below.

Table 3.3: Existing Loading into the Critical Carriage During the Morning Peak Hour

Time	Platform 1 - Eastbound			Platform 2 - Westbound		
	Boarding	Alighting	Total	Boarding	Alighting	Total
08:00 - 08:15	63	5	67	31	18	49
08:15 - 08:30	57	4	61	28	16	45
08:30 - 08:45	49	4	53	24	14	38
08:45 - 09:00	29	2	32	15	8	23
08:00 09:00	**196**	**15**	**211**	**98**	**56**	**154**

3.3.5 Using the methodology outlined in the "Level Crossing Analysis" technical note, the future station usage with the development has been calculated. This leads to the loading into the critical carriage shown in Table 3.4. Assuming 20% of passengers join the critical carriage represents a very robust analysis as in practice the train boarding will tend to even out between carriages as the critical carriage area becomes more crowded. Furthermore, the new trains being procured by South Western Trains will have walk through carriages which allows for a more even distribution of loading through the train.

Table 3.4: Total Future Loading into the Critical Carriage During the Peak Hours

Time	Platform 1 - Eastbound			Platform 2 - Westbound		
	Boarding	Alighting	Total	Boarding	Alighting	Total
08:00 - 08:15	67	7	74	33	19	52
08:15 - 08:30	60	7	67	30	17	47
08:30 - 08:45	52	6	58	26	15	41
08:45 - 09:00	31	3	35	15	9	24
08:00 09:00	**209**	**23**	**231**	**103**	**59**	**162**

3.3.6 This gives the highest loading in a fifteen-minute period of 63 persons at present which rises to 67 persons with the Stag Brewery development.

3.4 Critic al Station Pa rameters

3.4.1 The critical section of the station platforms is the section with the highest loading. This occurs in the eastern most carriage on Platform 1 where trains are heading to Waterloo. During the peak loading hour (0800-0900) PBA estimates 979 passengers currently board trains on this section of the platform.

3.4.2 A station plan is shown in Figure 3.3 overleaf. The area selected represents the critical platform width point which is the narrowest section of the platforms in the section of platform where passengers join the most crowded carriage. It is noted that the short section of narrow platform on the west-bound platform whether there is a significant narrowing of platform width due to the vegetation growing on the platform shown in Figure 2.9 has not been considered the critical width because it is towards the western extremity of the Richmond-bound platform and only for a short length. This platform is considered less critical as in the evening peak period passengers returning to Mortlake from Waterloo are spread out over a longer time period than those heading to London Waterloo in the morning peak period.

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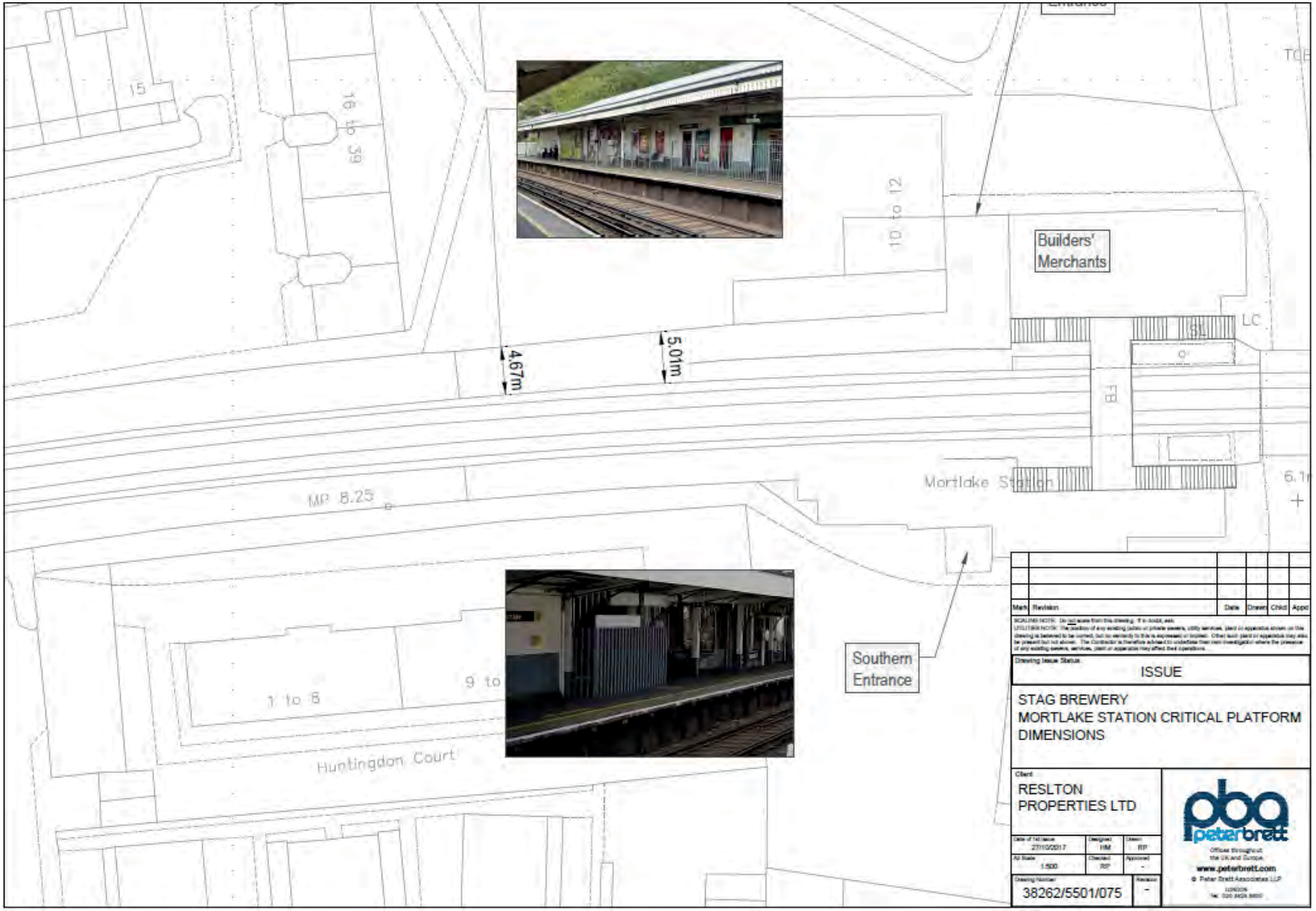

Figure 3.3: Mortlake Station Critical Platform Dimensions

3.4.3 The dimensions of this critical point are laid out in Table 3.5 below. This also shows the larger platform width towards the front of the first carriage.

Table 3.5: Mortlake Station Critical Parameters

	Smallest Critical Dimensions		Largest Critical Dimensions	
Parameter	**Width (m)**	**Length (m)**	**Width (m)**	**Length (m)**
Zone A: Yellow Line Zone	1.00	250	1.00	250
Zone B, C, D	3.67	250	4.01	250
Total	**4.67**	**250**	**5.01**	**250**

3.4.4 It is noted that the platforms already exceed NR's minimum requirement of 2.5m width for stations such as Mortlake where trains pass at less than 100mph. Additionally, all columns and other obstructions (except a portion of the baffles which are designed to prevent access to sections of the platforms) are at least 2.0m clear of the platform edge.

3.5 Platform Width Requirements

Zone A: Yellow Line Zone Requirement

3.5.1 Table 3-4 of NR's guidance[4] requires a yellow line zone of a minimum 1.5m for station with trains passing at a speed of 100mph or more or freight trains moving at greater than 60mph. Neither of these conditions are met at Mortlake station and therefore the minimum of 0.5m is required. In order to provide a robust analysis, however, a minimum width of 1.0m is assumed for this analysis as this is provided at many similar stations.

Zone B: Boarding/ Alighting Zone Requirement

3.5.2 The boarding/alighting zone's required width is given by the following equation:

$$Width\ (m) = \frac{block\ load\ \times 0.93}{block\ length}$$

3.5.3 Here block length is the average car length (20m) and block load is the maximum number of passengers that board and alight the individual train car in that carriage block (63 at present and 67 in future). As there are four direct trains to Waterloo in the peak hour that calling at Mortlake at 0807, 0823, 0837 and 0853 it can be assumed there is one train in each of the fifteen minute blocks in the survey. This gives a required width of 2.91m at present and 3.10 in the future due to the Stag Brewery development.

Zone C: Circulation Zone Requirement

3.5.4 NR's guidance states that the circulation zone is intended for, "passengers using the platform that are not accounted for in the boarding and alighting demand when calculating Zone B"[5]. The guidance goes on to state, "At stations where such circulating movements do not occur, a circulation zone is not required"[6]. As Mortlake station is not an interchange station there is no requirement for a circulation zone.

[4] Network Rail (2011). *Station Capacity Assessment Guidance*, Milton Keynes: Network Rail Infrastructure Limited (GB) p.16

[5] *Ibid.* p.19

[6] *Ibid.* p.19

Zone D: Activity Zone Requirement

3.5.5 The activity zone is required to be a minimum 0.3 wide and this should be "increased to take into account platform furniture". In the critical carriage alighting area, there is a standard NR bench (approximately 0.45m in diameter) leading to a total required width of 0.45m in Zone D.

Total Requirement

3.5.6 In total, the platform width requirements are shown in Table 3.6 below. This gives a minimum requirement of 4.89m.

Table 3.6: Existing and Future Platform Width Requirement

Requirement	Existing Requirement (m)	Future Requirement (m)
Zone A	1.00	1.00
Zone B	2.91	3.10
Zone C	0.00	0.00
Zone D	0.45	0.45
Total	**4.36**	**4.55**

3.5.7 The station currently meets both the existing and future requirements as it has a critical platform width of 4.67m which is 0.12m wider than required for the future scenario.

3.6 Comfort Level Analysis

Staircase Comfort Level Analysis

3.6.1 The analysis of the staircase comfort level is based on the calculations in the Level Crossing Analysis Technical Note. The Fruin Level of Service (LoS) is NR's standard for calculating comfort levels. It provides a range of service levels ranging from A (free flow circulation) to the worst F (complete breakdown in traffic flow). The Fruin LoS includes separate criteria for assessing stairways and passageways.

3.6.2 Section 3.6.3 of NR's Guidance provides the following equation to calculate the notional minimum width of a two-way staircase based on a Fruin LoS C. Note that the average peak minute flow is increased by 25% to take account of delays to train services leading to fluctuations in passenger flows through the station.

$$Notitional\ Two-way\ width\ (m) = \frac{Average\ Peak\ Minute\ Flow}{28} + 0.6$$

The guidance then recommends a minimum width of 1.6m between handrails in circumstances were the notional two-way width required is less than 1.6m. In other circumstances, a wider staircase is required. The notational width for the existing and future scenarios is calculated in Table 3.7 below. The worst-case scenario has been assumed whereby all users of the footbridge use the southern west facing staircases only and do not use the east facing staircases that lead to the platforms. Note that, as explained in the level crossing analysis technical note, the average flows include the train passengers using the staircases to access/egress the platforms.

Table 3.7: Notional and Required Width of the Staircase

Scenario	Average Peak Minute Flow	Notional Two-Way Width (m)	Required Width (m)
Existing	12.67	1.165	1.6
Future – With Development	13.38	1.197	1.6

3.6.3 The staircases are currently 2.00m wide and therefore greater than the minimum 1.6m width required for the existing and both future scenarios. Note, that NR's guidance states that for staircases "No 'edge effects' are to be added when calculating staircase widths as passengers are assumed to walk up against the side handrail"[7] and therefore the handrails width has not been deducted from the measured width of the staircases.

Footbridge Comfort Level Analysis

3.6.4 This analysis of the footbridge comfort level is based on the calculations in the Level Crossing Analysis Technical Note. Section 3.6.1 of NR's Guidance provides the following equation to calculate the notional minimum width of a two-way passageway based on a Fruin LoS C.

$$Notional\ Two-way\ width\ (m) = \frac{Average\ Peak\ Minute\ Flow}{40} + 0.6$$

NR's guidance recommends a minimum passageway width for passageways with a central handrail of 1.6m plus 0.3m (to account for edge effects) either side of the handrail plus the width of the central handrail. This minimum width applies in circumstances where the notional two-way width required is less than this otherwise a wider passageway is required. The notational width for the existing and future scenarios is calculated in Table 3.8 below. The average peak minute flow is the average flow per minute in the peak hour which is then increased by 25% to account for possible delays to trains services leading to fluctuations in passenger flows through the station. This factor is the same as that used to increase train loading at the station in the event of delays. Note that, as explained in the level crossing analysis technical note, the average flows include the train passengers using the footbridge to access/egress the platforms.

Table 3.8: Notional and Required Width of the FB

Scenario	Average Peak Minute Flow	Notional Two-Way Width (m)	Required Width (m)
Existing	18.08	1.165	3.85
Future – With Development	20.11	1.228	3.85

3.6.5 At present the footbridge is 4.00m wide with a central railing at waist height that is approximately 0.05m wide. At all peak times both sides of the footbridge are open to members of the public as the station is manned. Thus, the footbridge is within NR's requirements for both the present and future loadings peak hour loadings.

[7] *Ibid,* p.27

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Northern Station E ntrance

3.6.6 NR has requested that an analysis of passenger flows through the station's northern entrance (shown in Figure 3.4) is conducted. This station access leads to the eastbound platform.

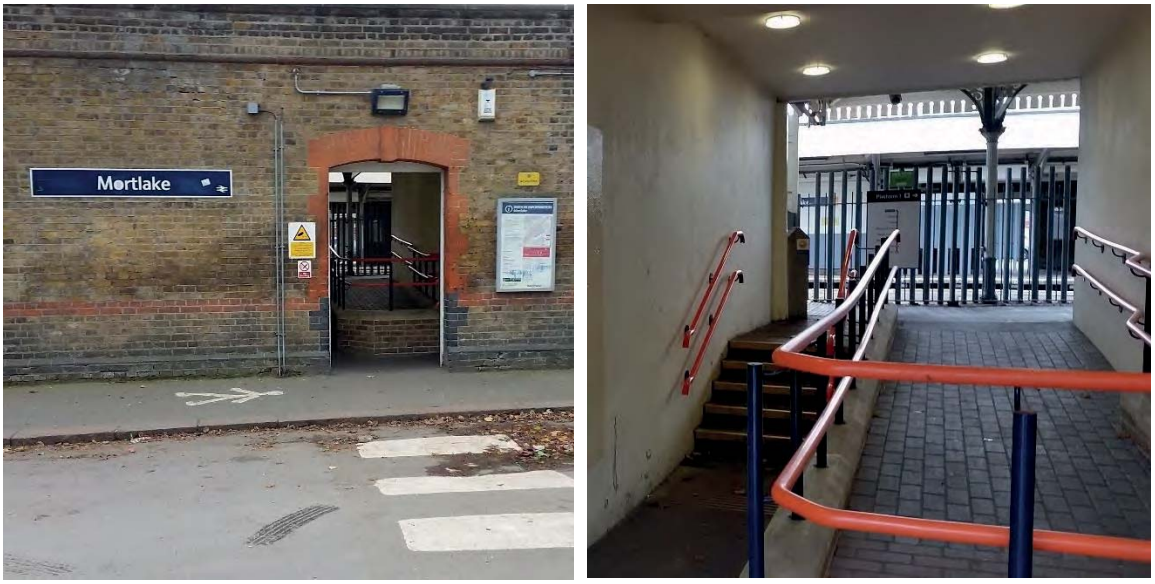

Figure 3.4: Northern Station Entrance

3.6.7 A plan of this entrance is shown in Figure 3.5 overleaf. It shows a critical width of 1.0m at the entrance and its staircase.

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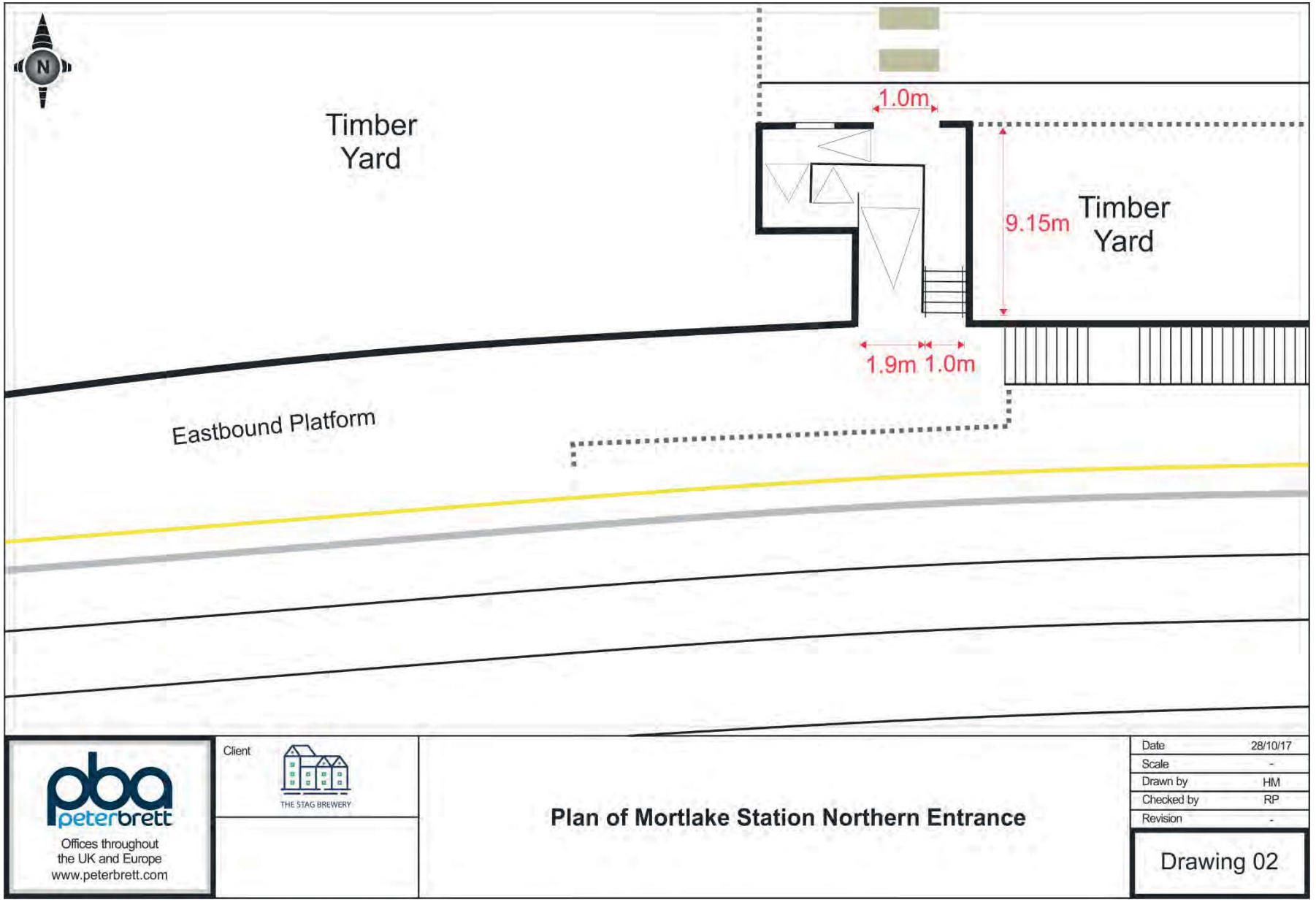

Figure 3.5: Plan of the Northern Entrance

3.6.8 For this analysis, a worst-case scenario has been assumed whereby 75% of passengers on the eastbound platform enter the station through the northern entrance. This is a conservative scenario as passengers are likely to be more evenly split between those who live south of the station and use the footbridge to access the eastbound platform and those who live north of the station and walk through the northern station entrance. The present loading through this entrance during the critical 15-minute period of maximum loading to the platform and also during the peak hour is shown in Table 3.9 below.

Table 3.9: Existing Flow of Passengers Through the Northern Entrance

Parameter	Peak 15-minutes
Entries	184
Exits	14
Total	**198**
Parameter	**Peak 15-minutes**
Entry Flow (persons/sec)	0.204
Exit Flow (person/sec)	0.016
Total Flow (persons/sec)	**0.220**
Parameter	**Peak 15-minutes**
Entry Flow (secs/person)	4.9
Exit Flow (secs/person)	64.0
Total Flow (secs/person)	**4.6**

3.6.9 The future loading through this entrance is shown in Table 3.10 below.

Table 3.10: Future Flow Through the Northern Entrance

Parameter	Peak 15-minutes
Entries	196
Exits	21
Total	**217**
Parameter	**Peak 15-minutes**
Entry Flow (persons/sec)	0.217
Exit Flow (person/sec)	0.024
Total Flow (persons/sec)	**0.241**
Parameter	**Peak 15-minutes**
Entry Flow (secs/person)	4.6

Exit Flow (secs/person)	42.5
Total Flow (secs/person)	**4.2**

3.6.10 This shows the amount of time available for each person to pass through the critical point of the northern station entrance decreases from 4.6 seconds to 4.2 seconds or 9% decrease during the critical 15-minute peak period in the morning (0815-0830).

3.6.11 These changes are considered negligible. Further, as the eastbound platform has been shown to provide a larger than required platform width with good flow characteristics it is deemed that any constriction of flow at the southern station entrance will be quickly dissipated on the platform.

3.7 Line Capacity

3.7.1 Mortlake station lies on the Windsor Lines and in particular the section of track via Richmond. The full extent of the Windsor Lines is shown schematically in Figure 3.6 below and services which call at Mortlake during the peak hour and off-peak times are shown in Figure 3.7 and Figure 3.8.

Figure 3.6: The full extent of the Windsor Lines

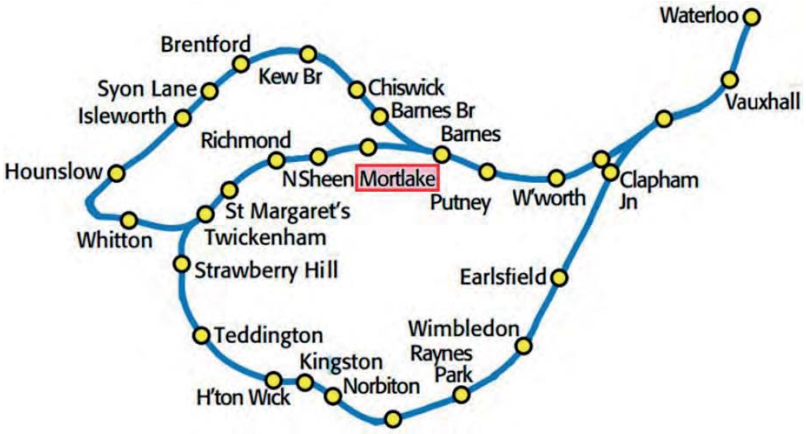

Figure 3.7: Services calling at Mortlake during the off-peak

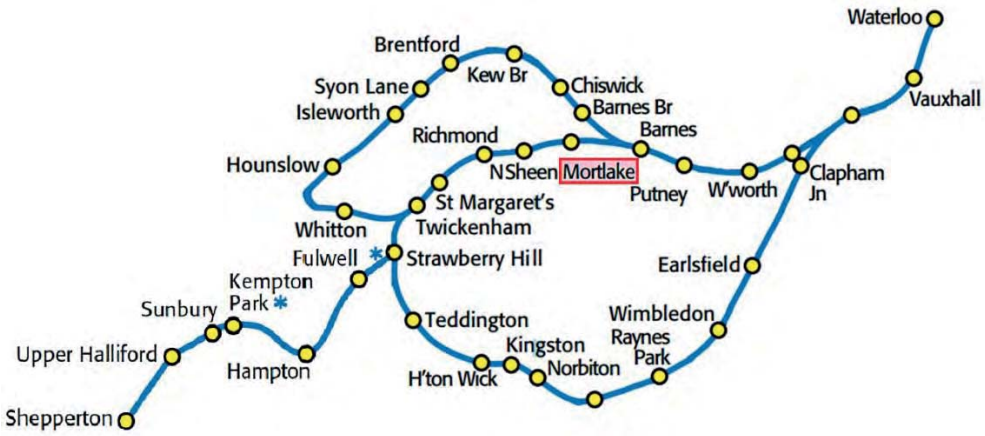

Figure 3.8: Services calling at Mortlake in the morning peak hour

3.7.2 Currently the station is served by 4 trains per hour that travel directly to London Waterloo and a further 4 trains per hour travelling from Waterloo towards Richmond during both the peak and off-peak hours. Note that services on the Kingston and Hounslow loops in the eastbound direction (i.e. services taking the shortest route from Mortlake to Waterloo) are substantially quicker than the westbound loop services that take 31 and 40 minutes longer to Waterloo. In the morning peak hour, 3 trains originate from Shepperton station rather than from London Waterloo.

3.8 Current Train Loading Estimates

3.8.1 Network Rail's Wessex Route Study (August 2015) published observations of passenger loads on the high-peak Windsor Lines is shown in Figure 3.9 with a detail of the area around Mortlake station shown in Figure 3.10Figure 3.11 below. Note that dashed lines represent Waterloo loop trains outward bound from Waterloo and so should be ignored.

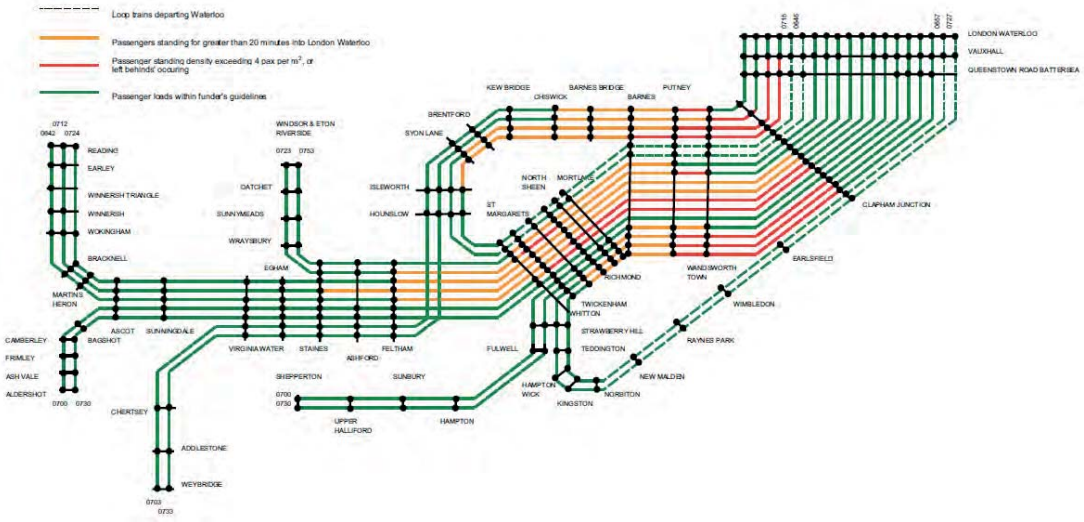

Figure 3.9: Passenger Loads on High-peak Windsor Lines Services (Source: Network Rail)

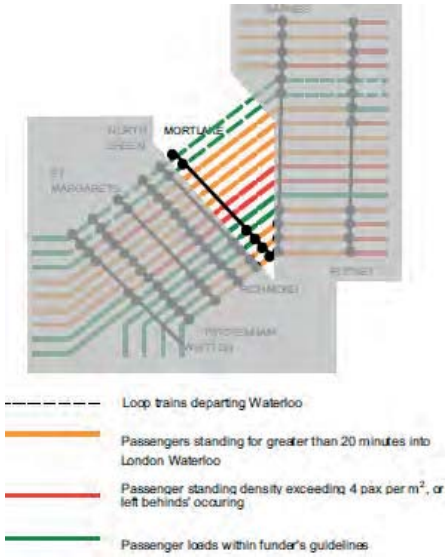

Figure 3.10: Passenger Loads on High-peak Windsor Lines Services Around Mortlake (Source: Network Rail)

3.8.2 This shows that at present one direct service to Waterloo calling at Mortlake is coloured green meaning the service is "within funder's guidelines". The remaining services are red meaning the service requires passengers to stand for "greater than 20 minutes into London Waterloo". None of the services are red meaning passengers standing density is greater than 4 persons per sqm. These observations suggest there is capacity for the additional 64 persons from the Stag Brewery to join the 4 Waterloo bound train services in the morning peak hour. This increase is equivalent to 3 extra persons joining the critical carriage of each train and these persons can be accommodated within a yellow train service.

3.9 Future Line Capacity

3.9.1 South Western Trains is the current franchise holder for all services calling at Mortlake station. The owner, FirstMTR, is delivering a major investment programme of £1.2 billion in its railway. The investments will include new rolling stock and services to utilise the infrastructure improvements made during Control Period 5 (CP5) which ends in 2019.

3.9.2 There are a range of upgrades to the Windsor Lines that are taking place in CP5 that will increase line capacity. These include the following:

- 10-car train lengthening on all Windsor lines peak services by 2017;
- A turn back facility at Hounslow;
- Feltham re-signalling to allow efficient delivery of future infrastructure enhancements;
- Queenstown Road works to re-open platform 1 and segregate the Main Line, Windsor Lines and empty rolling stock movements;
- Re-opening of Waterloo International Terminal's (WIT) five platforms for use by both Windsor Lines and Main Line services;
- Power supply upgrades as part of the South London High Voltage Power Upgrade.

3.9.3 These improvements will allow for an increase in line capacity on the Windsor Lines from 16tph at present, to 18tph in 2019 and then 20tph in 2020. These additional 4 train paths, however, will all be routed via Hounslow as Network Rail is unable to increase line capacity via Richmond due to numerous level crossings, as shown in Figure 3.11 below. This means none of these services will serve Mortlake, but equally, there will be no increase in level crossing downtime.

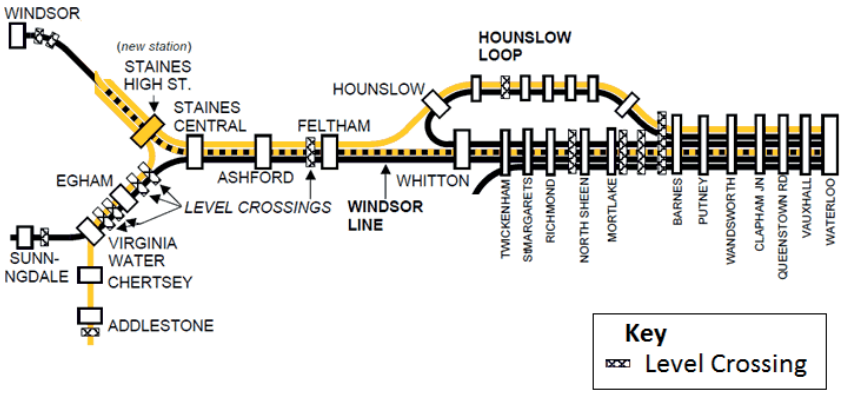

Figure 3.11: Schematic map of level crossings on the Windsor Lines (Source: Trans-trax)

3.9.4 Additionally, the line re-configuration around Queenstown Road will be used to increase Main Line train paths. The Windsor Lines services will benefit indirectly from improved route reliability due to reduced path conflicts with empty rolling stock movements to Clapham Yard.

3.9.5 The planned train services calling at Mortlake during off-peak times post 2020 is shown in the service diagram below.

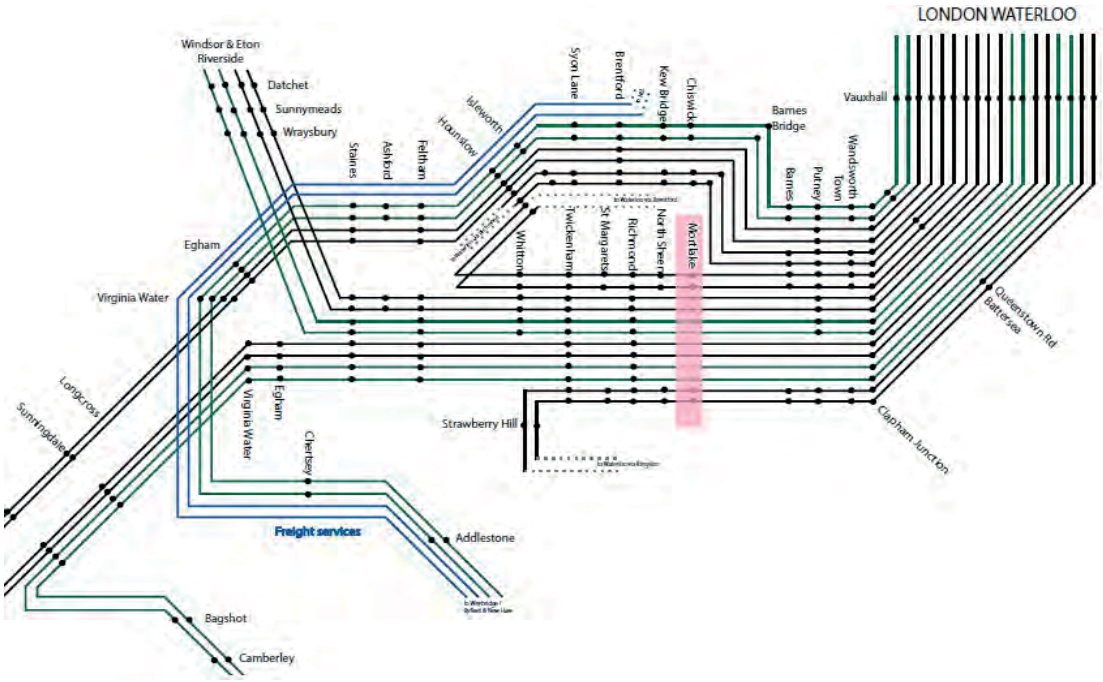

Figure 3.12: The post-2020 planned off-peak train services on the Windsor Lines (Source: Network Rail Wessex Route Study)

3.9.6 The planned peak hour train service will be the same to Mortlake as the off-peak service (i.e. there will be no peak hour only additional trains).

3.10 Future Train Capacity

3.10.1 FirstMTR has announced it will entirely replace the existing fleets of trains operating on the Windsor Lines, including the recently introduced Class 707s, by 2020[8]. FirstMTR has

[8] The previous franchise holder, Stagecoach's South West Trains, who operated the Windsor Line services until 20th August, 2017, ran a mixture of Class 455s, 456s and 458/5s alongside newly built Class 707s on the Windsor Lines. To upgrade the rolling stock, Stagecoach embarked on a £210 million modernisation programme in September, 2014 including ordering and leasing 30 new Class 707s. This was in addition to retrofitting the engines on Class 455s and 456s to increase efficiency and time between servicing. This was required as, in its present state, the mixed fleet of trains could not all be maintained at the Wimbledon Train Care Depot. The construction of an additional or new depot would have been economically unviable thus necessitating the upgrade

announced the trains will be built by Bombardier but further details have not been provided. However, it is known they will be 10-car trains (to make full use of the CP5 platform lengthening) that will provide one homogeneous fleet to operate the Windsor Lines. The expected train capacity has been predicted by assuming the new trains will have the same capacity as Class 700s without First Class provision. Class 700s are being introduced on Thameslink's inner suburban services, which have similar service requirements to the Windsor Lines. This yields the predicted train capacity shown in Table 3.11 below which is compared to the existing capacity. It shows an increase of 96 seats and extra capacity for 147 standing passengers.

Table 3.11: Existing and Estimated Train Loading Capacity

Class	Seated	Standing	Total
New Bombardier (10-car)	568	907	**1,475**
Existing Class 455	472	760	**1,232**

3.10.2 Given the above line capacity of 8tph in the morning peak hour post-2020 the predicted capacity on Waterloo-bound trains calling at Mortlake is given in Table 3.12 below.

Table 3.12: Existing and Estimated Line Loading Capacity

Class	Seated	Standing	Total
8 x Bombardier (10-car)	4,547	7,253	**11,800**
8 x Existing Class 455	3,304	5,320	**8,624**

3.10.3 This shows an increase of 1,243 seats and 1,933 standing passengers which together represent a 37% increase in capacity or 3,176 extra spaces on Waterloo-bound trains from Mortlake in the morning peak hours.

3.11 Future Infrastructu re Improvements

3.11.1 NR has no plans to enhance the station capacity at Mortlake in CP6 or CP7. Beyond this, the physical expansion of the station to cater safely for increased passenger numbers has not been raised in Network Rail documents or by local stakeholders.

3.11.2 There have been various proposals to link Heathrow Airport with the South Western Trains rail network. In December 2015, DfT published the results of its studies of various route options to connect Heathrow Airport with the South Western franchise. At this stage, it is not possible to assess the potential impact of the Heathrow Southern Railway due to the lack of clarity regarding the project.

3.11.3 If there is excess demand on the Windsor Lines in the future, the Wessex Route Study[9] recommends the introduction of 12-car operation on the Windsor Lines. As Mortlake has 250m long platforms it is not likely to require platform lengthening.

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of Class 455s and 456s to extend the length of time between their servicing requirements. It was widely recognized, however, that the new Class 707 trains were on expensive leases and if the refurbished Class 455s and 456s did not meet their required servicing targets then a new depot would be still be required. FirstMTR recognized this risk, alongside the expensive Class 707s leases and the benefits of operating one homogenous range of trains to optimise service performance. In March, 2017 FirstMTR thus decided to entirely replace the existing fleet of trains on the Windsor Lines with 750 purpose built carriages by 2020.

[9] *Ibid,* p.71

3.11.4 The proposed Crossrail 2 line will not provide services to Mortlake, however, it will reduce the loading on trains calling at Mortlake from station son the Kingston loop as passengers there would be expected to make their journeys via Wimbledon in order to take a Crossrail 2 service.

4 Conclusion

Summary

4.1.1 Mortlake station is a suburban feeder station which does not act as an interchange station. The station has a simple design with clear lines of sight along its 250m long platforms. It is only accessed and exited from the eastern most point of each platform where the footbridge and double-aspect staircases are located adjacent to the southern and northern entrances. There are no through movements along the platforms by members of the public as the platforms form cul-de-sacs with no connections to other footbridges, paths, underpasses or roads. In sum, this means the station movements follow a simple bi-directional model where all passengers boarding trains spread westwards along the platforms as they enter the station and all passengers alighting trains move eastwards along the platforms towards the exits. This simple movement pattern reduces the opportunities for conflicting movements between persons on the platforms and allows any bunching to disperse quickly.

4.1.2 At present the station's busiest services are the Waterloo bound trains in the morning peak hour (0800-0900). This situation is expected to persist in the future due to commuter demand to reach central London. The platforms critical point is thus located at the narrowest section of the platform in the area where the eastern most part of a Waterloo bound train arrives at the station.

Conclusion

4.1.3 The platform's critical width meets both the existing and future demand as it is 0.12m wider than required for the future scenario. The surplus space creates a large degree of extra capacity for future passenger growth. The extra space also allows for a smoother circulation of passengers who can more easily avoid obstacles such as passengers with luggage, buggies or litter.

4.1.4 Mortlake station's staircases and footbridge, which are currently 2.0m and 4.0m wide, exceed NR's existing requirements. In the future, the extra usage created by the Stag Brewery will increase these requirements but the current footbridge and staircase are within these bounds.

4.1.5 The increase in passenger flows through the station's northern entrance has been shown to be negligible. Resulting only in a 9% decrease in time available for each passenger to pass through the station entrance door.

4.1.6 A range of future improvements have been suggested by NR to accommodate future patronage growth on the Windsor Lines including 12-car train operation.

4.1.7 In conclusion, the Stag Brewery development will not create extra patronage that exceeds Mortlake station's existing capacity.

Appendix V Technical Note 18 Bus Enhancement Options

TECHNICAL NOTE

Job Name: Stag Brewery

Job No: 38262

Note No: v1.3

Date: 2nd November 2017

Prepared by: Alastair Mackie (Associate)

Checked by: Robert Parker (Director)

Subject: **Bus Service Options**

1. INTRODUCTION

1.1. This note sets out the bus service options to serve development at The Stag Brewery site in Mortlake, and considers, in turn, local bus services and school transport.

1.2. At the time of writing, initial discussions have been held with Transport for London (TfL) regarding the possibility of amending the existing service 209 to cater for the development and providing dedicated buses to serve the needs of the school. These discussions are reported first, before considering options involving other services. TfL's note setting out their proposals are appended.

2. SERVICE 209

2.1. Service 209 currently operates between Hammersmith and Mortlake via Castlenau and Barnes, approaching Mortlake via Mortlake High Street and terminating in Avondale Road. Daytime frequency is every 6 minutes, increasing to every 5 minutes in peaks and reducing to every 10 minutes during evenings and Sundays. The service is operated by 29-seat single decks.

2.2. The initial suggestion was to divert service 209 from Avondale Road and instead to remain on Mortlake High Street, terminating at a new bus stand in the development near the Lower Richmond Road/Williams Lane junction. This would give a very high frequency of service throughout the day for the development.

2.3. TfL have stated that this revision would increase the peak vehicle requirement on the service by 3 buses at an annual cost of £458,531.

3. SERVICE 419

3.1. Service 419 is the other service that operates on Mortlake High Street, operating from Hammersmith via Lonsdale Road to Mortlake and then continuing via Lower Richmond Road to Richmond. Daytime and peak frequency is every 15 minutes, reducing to every 30 minutes during evenings and Sundays. The service is operated by 28-seat single decks.

3.2. Enhancement of the service would probably require a frequency increase to every 10 minutes during the daytime and peak periods. The current service operates on a schedule cycle of 90 minutes which requires 6 buses to deliver the 15-minute frequency. To increase this to every 10 minutes would require 9 buses, an increase of 3 on the current requirement. This is the same as the additional resources on the option for the 209 and so annual cost is likely to be similar, at around £450k per year.

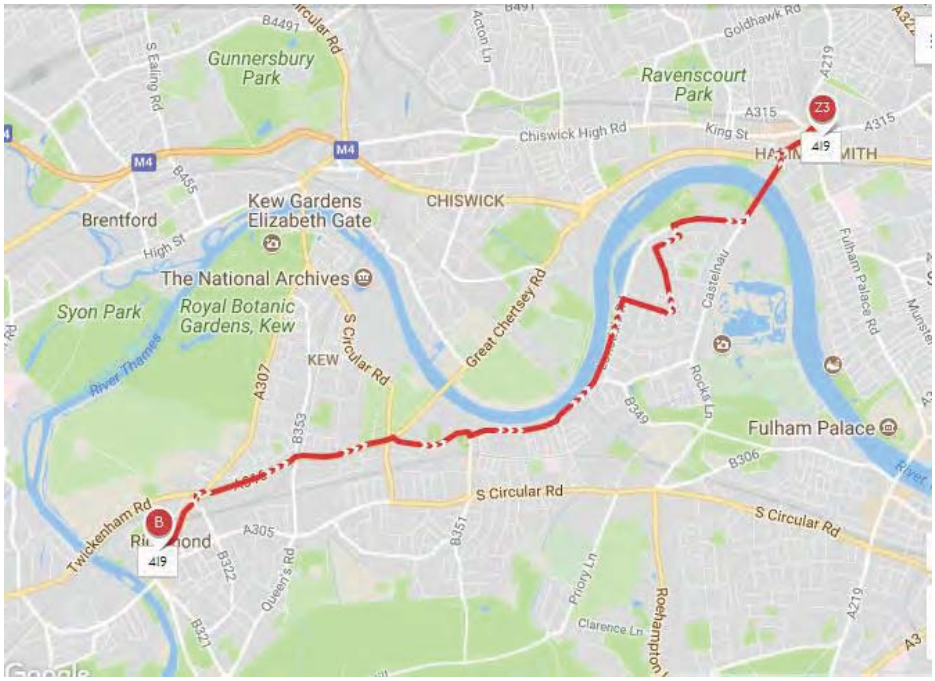
3.3. This option would provide a direct link to both Richmond town centre and Hammersmith. Journey time to/from Hammersmith is similar on both services, at 14-15 minutes (from Mortlake High St stop S) on the 419 and 17 minutes on the 209.

3.4. A lower cost option would be to increase the service to every 12 minutes, i.e. +1 bus per hour. This could be achieved, certainly at inter-peak times, with one extra bus at an annual cost of £150k. The peak timetable would require detailed scheduling and may require two buses.

3.5. Because the 419 operates past the Stag site without terminating, there would be no need to provide a turning facility as part of the development, with consequent infrastructure cost and land savings.

3.6. The route of service 419 is shown in Figure 1.

Figure 1: Service 419 Route



4. SERVICE 190

4.1. Service 190 operates along Clifford Avenue, around 600m west of the western boundary of the development site. Nearest stops are at Mortlake Cemetery, approximately 750m from the development. Service 190 operates between West Brompton and Richmond via Hammersmith and Chiswick, crossing the river over Chiswick Bridge. Daytime and peak frequency is every 15 minutes, reducing to every 20 minutes during evenings and Sundays. The service is operated by 29-seat single decks.

4.2. It is difficult to see how service 190 could be used to serve the main site. Walk distances to current stops are too long and there is no road access from Chiswick Bridge or Clifford Avenue that would allow the route to be amended to take in Ship Lane or the development. The existing stops just south of Chiswick Bridge are however accessible from the school site (approximately 350 metre walking distance).

4.3. A dog-leg via Lower Richmond Road with a turnaround at the development is unlikely to be acceptable to TfL because of the impact on existing passengers. It would also mean a slow journey to Hammersmith, of the order of 26 minutes.

4.4. Service 190 would not be the most effective option to serve the development. It is recommended that service 190 is not considered further as a means of serving the development.

5. OTHER SERVICES

5.1. The current bus networks around Hammersmith and Richmond have been reviewed to see what other more radical options may be possible. Table 1 shows all services from Hammersmith that either operate over Hammersmith Bridge and/or run to Richmond with comment on their suitability to serve the development.

Table 1: Bus Services from Hammersmith

Ser	Route	Comment
33	Hammersmith, Barnes, East Sheen, Richmond, Fulwell	Only link between Hammersmith and Upper Richmond Rd. Diversion would be unacceptable to TfL.
72	East Acton, Shepherds Bush, Hammersmith, Barnes, Roehampton	Would require major recast of routes. Would be unacceptable to TfL.
190	West Brompton, Hammersmith, Chiswick, Richmond	Considered above
209	Hammersmith, Barnes, Mortlake	Considered above
391	Fulham, Hammersmith, Chiswick, Kew, Richmond	Too remote from site; degree of diversion would be unacceptable to TfL
419	Hammersmith, Mortlake, Richmond	Considered above
485	Hammersmith, Barnes, Putney, Wandsworth	Would require major recast of routes. Would be unacceptable to TfL.

5.2. From review of Table 1, there do not appear to be any other options for amending current Hammersmith services that would not involve a major recast of the network in the area.

5.3. Table 2 provides a similar review of current services that terminate in and around Richmond and where extension to Stag Brewery could be considered.

Table 2: Bus Services Terminating in and around Richmond

Ser	Route	Comment
371	Kingston, Norbiton, Richmond, North Sheen, Sainsbury's	One of three services terminating at Manor Rd Retail Park; possible scope to divert.
493	Tooting, Roehampton, East Sheen, Richmond, North Sheen, Homebase	One of three services terminating at Manor Rd Retail Park; possible scope to divert.
H22	Hounslow, Twickenham, Richmond, North Sheen, Manor Circus	Possible extension to development.
H37	Hounslow, St Margaret's, Richmond, North Sheen, Manor Circus	Possible extension to development.
R68	Hampton Court, Teddington, Richmond, North Sheen, Kew Retail Park	Only service to Kew Retail Park. Diversion may not be unacceptable to TfL.
R70	Hanworth, Twickenham, Richmond, North Sheen, Homebase	One of three services terminating at Manor Rd Retail Park; possible scope to divert.

5.4. Table 2 identifies several services that terminate at either Manor Circus or Manor Road Retail Park and that could potentially be extended to the development. It would be easiest to extend one of the Manor Circus services as this would not lead to any reduction in service on Manor Road; alternatively, if one of the current Manor Road services was diverted, it would be possible to then extend one of the Manor Circus services in its place. It may be that the current level of service at Manor Road is sufficiently high that a service could be removed without much detriment.

5.5. From the foregoing, it would appear that any of the five services currently terminating at Manor Circus or Manor Road could be a candidate to serve Stag Brewery. Table 3 sets out the frequencies of each service and the estimated number of additional buses that would be required. This is based on the current service 419 running time between Manor Circus and Sheen Lane/Mortlake Station which is 6 minutes in each direction off-peak and 10 minutes eastbound and 9 minutes westbound in the peak.

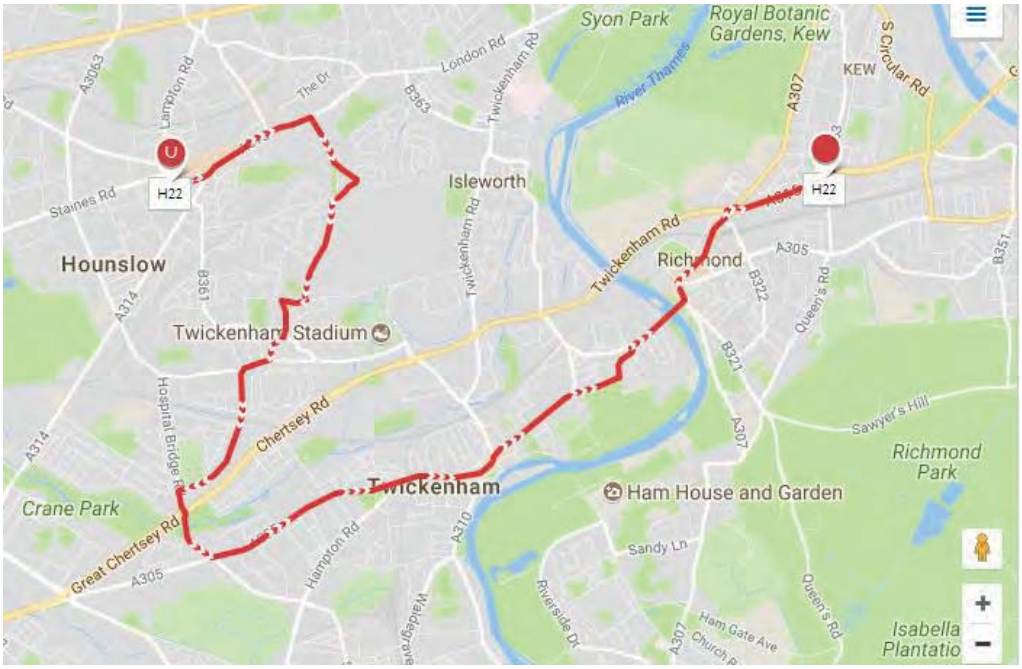
Table 3: Specifications of Services Terminating at Manor Circus/Manor Road Retail Park

Ser	Frequency			Current Journey Time	Buses Required for Extension
	Mon-Sat Daytime	Sunday Daytime	Evening		
371	8.5 mins	12 mins	15 mins	47 mins	2-4
493	12 mins	20 mins	20 mins	74 mins	1-2
H22	12 mins	20 mins	20 mins	45 mins	1-2

H37	6 mins	8 mins	10 mins	30 mins	3-4
R70	10 mins	15 mins	20 mins	55 mins	2

5.6. Extension of either the 493 or H22 would be lower cost than the other options, requiring two additional buses in the peak period and one off-peak. Of the two, it would probably be preferable to extend service H22 as it has a shorter overall journey time than the 493 and reliability should therefore be less of an issue with the extension. Figure 2 below shows the current route of service H22.

Figure 2: Service H22 Route



5.7. All five services are operated by single deckers, seating 28-29 passengers and with standing for circa 28, except service H37 which is operated by 34-seaters.

5.8. The eventual choice of service would also require TfL analysis of demand and operations to inform the decision-making.

5.9. The implications of serving the site by extending a service from the west will need to be taken into account in the design and location of the bus stand and passenger bus stops.

6. SCHOOL BUSES

6.1. In addition to the general local bus service provision, capacity will need to be provided to cater for movements to the secondary school that will be provided on the site. Spreadsheet modelling by PBA has identified 1,162 trips arriving at the school in the 0800 – 0900 AM peak hour. Richmond Council have indicated that the school would largely fulfil the needs of a local catchment with most pupils able to walk or cycle; as a "worst case" test, the travel plan target mode share for other schools in the area (provided by LBRuT) of 45% has been applied, and this would give 523 bus trips arriving by bus in the AM peak with a slightly lower number departing in the PM peak (15:00 to 16:00).

6.2. If all these children were to be accommodated on dedicated buses; this would require six double deckers at a total gross annual cost of circa £450k per year. However, it is likely most children can be accommodated on service buses, depending on the degree of spare capacity available and the proximity of children's home addresses to bus routes.

6.3. A school bus trip distribution has been derived based on 2011 Census non-residential trip distribution for the area and this is summarised in Table 4. The table also shows the bus services that serve each area and the hourly capacity provided (figures assume extension of service H22 to the site).

Table 4: Assumed School Bus Trip Distribution

Catchment Area	Number of Trips	Bus Services	Nearest Stop Walk Distance	Hourly Capacity
Hammersmith	285	419	115m	224
Richmond	112	419, H22	165m	504
Chiswick	92	190	500m	224
Barnes	20	209	435m	672
Kew	14	R68	890m	224
Total	523			1,848

6.4. Table 4 shows that the capacity that will be provided is far in excess of the school demand. Analysis of London Buses BODS passenger loading data will be needed to ascertain the level of existing demand and the net spare capacity that will be available. It is likely, for example, that service H22 will have spare capacity as the proposals described previously involve extending it from Manor Circus to the Stag site, adding five buses per hour to this corridor and with the school movement being contra-flow to commuting demand to Richmond.

6.5. Any demand that cannot be accommodated on the local service network would then require dedicated school buses. Based on the numbers set out in Table 4 it is unlikely that there would be a need for more than two dedicated buses at the most. This also has implications for the size of bus terminal facility for the school.

7. CONCLUSIONS

7.1. TfL has based its costing for the enhancement of bus services to serve the development (excluding the school) on an extension of the existing 209 service at a projected annual cost of circa 450K per annum for a 5 year period i.e. a total cost of around £2.25million. They have suggested that meeting the needs of the school would be dealt with entirely separately by provision of 8 special double decker buses at an annual cost of £600K or £3million over a 5 year period.

7.2. It is considered that the bus strategy for the development and the school needs to be considered in the round. A review of existing bus routes in the area and their potential capacity, when compared with the likely worst case catchment for the school suggests that the current capacity of services is substantially greater than the worst case school demand.

7.3. Three options have been identified for meeting the increased bus demand generated by the development and for increasing the accessibility of the site:

- Extension of the 209 bus service – this is quite an expensive option (£450K per annum) and would require the provision of a new bus turnaround facility within the site. Whilst it would provide a very high service frequency to Hammersmith it would not improve accessibility to any other destination and there would be disbenefits to existing users of the stops at the southern end of Avondale Road;
- Increasing the frequency of the 419 service. This could potentially have a similar cost to the extension of the 209 although a cheaper option of upgrading from a 15 minute to a 12 minute frequency service has also been identified and could be explored. This option would provide better access to Richmond as well as to Hammersmith and would appear to have better potential to meet the needs of the school as well as the other development. It would also not require the provision of the bus stand facility;
- Extending one of the services that currently terminates in and around Richmond, most likely the H22. The costs of this extension would be lower, most likely between circa £150K and £300K per annum and would improve access to the west but offer no improvement towards Hammersmith. These options would require the provision of a new bus facility within the development.

7.4. It is considered that the options for increasing the frequency of the 419 or of extending one of the services currently terminating in Richmond, potentially the H22 should be considered as an alternative to the extension of the 209.

7.5. It is considered that existing bus services, taken together with the proposed enhancement of one of the above services, should meet the needs of the school. As a worst case it is unlikely that more than 2 special buses would need to be provided for the school i.e. maximum additional cost of £300K per annum.

7.6. In overall terms it is considered that the option for increasing the frequency of the 419 bus service is likely to provide the best overall solution to meet the future requirements of the development since would address the requirements of both the school and the other development without a requirement to provide a new bus facility on the development site which has proved unpopular based on the public consultation and also based upon the response from the GLA. The improved frequency of the 419 would also provide benefits to the wider Mortlake community since it would improve access to Richmond, including the District Underground service, which neither of the other options fully achieves.

Appendix – TfL Initial Costings

The Stag Brewery land use schedule is still being finalised but it is anticipated the site will be a mixed use development and is likely to include local employment and community facilities. Based on the development quantum detailed in Technical Note 8b Trip Generation Report the development includes 946 residential units and a proposed secondary school and sixth form college for up to 1,260 pupil school. The proposal also includes within the site a cinema complex, retail space and a hotel however the expected trips for these are low.

The site is served directly by route 490 and a route 190 stop is approximately 640m from the site. Stops for routes 209 and X68 are over 850m from the site. The closest bus stops to the site are Stop Z and this is situated to the south of the site along Lower Richmond to the east and Stop N to the west of Ship Lane – route 490 serves both of these stops.

In terms of the estimated bus trips for the site, the table below summarises this in more detail. I have not included the anticipated trips for the retail, cinema and hotel as the numbers minimal. Most of the trips from the site will be from the secondary school and residential element.

Development type	Modal Share (Bus)	Anticipated trips in AM Peak	PVR Required (double deck)
Residential	10.9%	103	2
Educational	48%	672	8

Table 1: Bus Mode Share (Source: 2011 Census, taken from the TA)
PVR – Peak Vehicle Requirement

LB Richmond have indicated that they would like to see route 209 extended to the site. This would mean the route would not serve the last 2 stops on Avondale Road or stand. This is not an extension but rather a diversion of the service from Avondale Road to Stag Brewery. We have estimated this would cost around £458,531 per year (and over 5 years this would equate to £2,292,655) as the PVR would increase by 3 due to the frequency of the route. The diversion itself is not long (approximately 1.25 miles in length in both directions from the High Street). However, it would break approximately 1,477 trips by diverting the route to Stag Brewery which would need to be addressed in the future.

Based on the 672 two way bus trips in the AM peak hour detailed above, TfL would require approximately 8 double deck return journeys to accommodate the trips generated from the secondary school at a cost of £75,000 per annum for each vehicle. This would cost approximately £3 million in addition to the diversion of route 209.

Justification for new stand at Stag Brewery

TfL has been asked to look at diverting route 209 to the Stag Brewery site. Therefore, to accommodate this request TfL would require a standing space for three vehicles and driver facilities as there is no other alternative standing location for this route nearby. Further to this, there is a need for a high number of school buses to service this site. It is noteworthy that the school routes do not require a stand per se. However, there is a need for a turning point, boarding and a stop for alighting and boarding which is sufficient to accommodate all the services planned for this site.

Earlier discussions have also focussed around the possibility of extending other routes to this site instead of the 209 bus. Although, there are a number of good candidates for extension, at this time there is no one specific route identified. In either case, there is a need standing and driver facilities within the site to ensure any extension is viable and cost effective.

Appendix W School Travel Plan Data

From: Mary Toffi [mailto:Mary.Toffi@richmond.gov.uk]
Sent: 29 November 2016 11:04
To: Robert Parker <rparker@peterbrett.com>
Cc: Greg Callaghan <gcallaghan@peterbrett.com>; 'Guy Duckworth' (GuyDuckworth@dartmouthcapital.co.uk) <GuyDuckworth@dartmouthcapital.co.uk>
Subject: RE: Stag Brewery - Highway Improvements

Bob

I have had a look at the secondary schools we discussed at our meeting and have listed all the information below. Richmond Park Academy does not travel plan so I have not included them.

Christ's School, Queens Road Richmond:
770 Pupils and 90 staff. They have 30 on site spaces.
2015/16:
78 pupils driven as single passengers, 5 car share and 24 park and stride.
38 staff drive as single occupant, 4 car share and 1 parks and strides.

Grey Court School, Sandy Lane Ham:
2014/15
1246 pupils and 146 staff. They have 65 on site spaces.
77 pupils driven as single passengers, 17 car share and 2 park and stride.
79 staff drive as single occupants and 4 car share.

Regards Mary

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Appendix X Level Crossing Capacity Note

Stag Brewery, Mortlake

Technical Note 16 – Level Crossing Analysis

On behalf of **Reselton Properties**

Project Ref: 38262 | Rev: A | Date: November 2017

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For and on behalf of Peter Brett Associates LLP				

Revision	Date	Description	Prepared	Reviewed	Approved
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Appendix A Network Rail's 'Mortlake Level Crossing Risk Assessment' (July 2017) and Letter to Mr Goldsmith MP (26 October 2017)

Appendix B Stag Trip Generation Summary

1 Introduction

1.1.1 Peter Brett Associates LLP (PBA) has been commissioned to provide transport planning advice to support the planning application of the Stag Brewery site, situated in Mortlake, London Borough of Richmond upon Thames (LBRuT). This Note has been prepared to address safety concerns raised by Network Rail (NR) relating to increased usage of the Mortlake level crossing as a result of the proposed Stag Brewery development.

1.1.2 This Note responds to the concerns raised in NR's 'Mortlake Level Crossing Risk Assessment' (July 2017) and NR's letter to Zac Goldsmith MP (26 October 2017), which are included in Appendix A, by discussing the likely impact of the increased demand to be generated by the Stag Brewery development on Mortlake level crossing.

1.1.3 The assessment looks at all modes of movement that would use the crossing. As part of the wider transport assessment of the Stag development proposals, a spreadsheet model has been developed to provide estimates of trips by mode throughout the day. This includes estimates of likely increased use of the Mortlake Railway Station by direction of travel Outputs from this trip generation assessment have been used to estimate increased demand to use the crossing by vehicles, by pedestrians and cycles and by people accessing or departing the stations westbound platform.

1.1.4 Whilst the Stag Brewery ceased trading in December 2015 the buildings have not been demolished and could therefore be returned to a brewery or other use compatible with its use call order. It is understood that when it was working at full capacity, the brewery employed around 250 people, many of whom lived locally. Therefore, a substantial proportion would have walked to work, using the level crossing.

1.1.5 PBA has worked closely with officers of both the London Borough of Richmond upon Thames (LBRuT) and Transport for London (TfL) to agree trip generation estimates and impacts. The traffic impacts of the proposed development have been tested using Transport for London (TfL) strategic SOLHAM model which provides estimates of traffic demand and journey times for journeys across the level crossing.

1.1.6 In assessing pedestrian demand, we have considered the overall demand to cross the railway line between A205 Clifford Avenue (South Circular) and White Hart Lane (the location of the next level crossing to the east) and identified likely usage of the different crossings that are available, based upon a first principles methodology

1.1.7 This remainder of this Note is structured as follows:

- Section 2 describes the existing crossing including existing demand to use both the footbridge and crossing based recent surveys;
- Section 3 provides a review of safety and sets out the concerns expressed by NR in their report and letter;
- Section 4 provides an assessment of the likely increase in demand to use the level crossing by all modes that will occur as a result of the proposed development;
- Section 5 provides an assessment of the likely safety implications that would arise from this increase in demand;
- Section 6 identifies the options for improving the management of pedestrians and traffic at the crossing and for improving safety levels; and
- Section 7 provides a summary and conclusions

2 Mortlake Level Crossing

2.1 Introduction

2.1.1 This section sets out the existing characteristics of the level crossing and the associated Mortlake railway station. The locational context of the crossing in relation to the Stag Development site and the presence of other crossing points is explained together with a description of the physical characteristics of the level crossing. The existing demand, both to cross the rail line and to enter the station are set out based on a number of pedestrian and vehicle surveys.

2.2 Location

2.2.1 The Mortlake level crossing is located on Sheen Lane, a busy high street with numerous shops and local amenities including a library, primary school and health care centre. Figure 2.1 shows the location of Mortlake station and level crossing in relation to its wider surrounding area including the Stag Brewery development site as well as other level crossings and footbridges over the railway tracks. It is subject to a 30 mph speed limit.

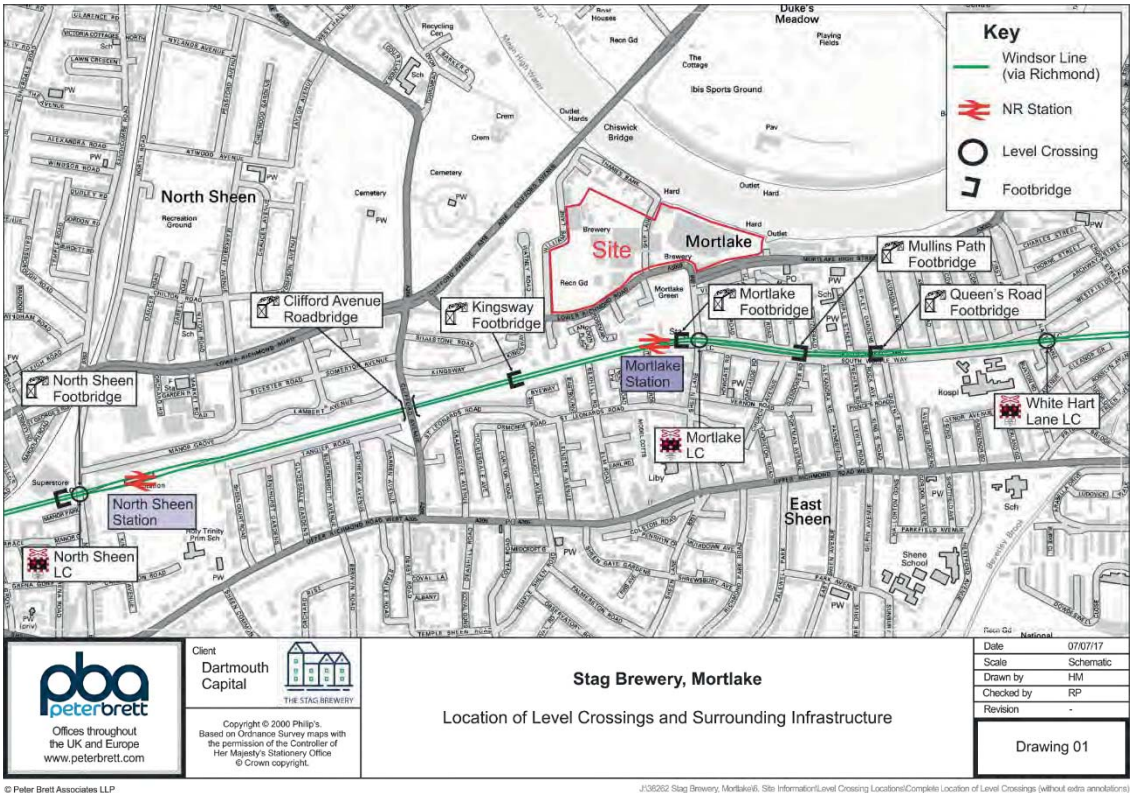

Figure 2.1: Strategic Location Plan

2.2.2 The level crossing itself is crossed in a north-south direction by Sheen Lane which provides a link between the A3003 Lower Richmond Road and the A205 South Circular Road as shown in Figure 2.1. Both roads follow an east-west alignment. The South Circular is a Red Route forming part of London's strategic road network. The A3003 has a mainly local function providing access to Mortlake and Barnes

2.2.3 The figure also shows that there are a number of alternative options for crossing the railway line in addition to the level crossing. From east to west these are as follows:

- White Hart Lane level crossing;
- Queens Road footbridge;
- Mullins Path footbridge;
- Mortlake Level Crossing and footbridge;
- Kingsway footbridge; and
- Clifford Avenue bridge

2.2.4 Whilst Sheen Lane and its crossing provide the most direct access between the development site and the station and to the facilities along Sheen Lane they do not necessarily provide the most direct link between eh residential population that lives to the south of the railway line and the new facilities that would be available within the site. In particular, the Kingsway footbridge will be the most direct access for many wishing to access the western part of the site, including the new school whilst the footbridges to the east of Sheen Lane will be more convenient for many living to the east of the station.

2.3 Rail Services

2.3.1 The Mortlake level crossing lies on the Windsor Lines (via Richmond). The majority of trains using this route are passenger trains operated by the South Western Trains franchise although a small number of freight trains use the route as well. All passenger trains originate at London Waterloo and travel west over the level crossing towards Richmond.

2.3.2 Immediately to the west of the level crossing is Mortlake station where 8 trains per hour call and an additional 4 trains per hour pass through during a typical daytime hour. In total, 349 trains pass through Mortlake on a typical day and all trains are subject to a speed restriction of 60 mph.

2.4 Level Crossing and Station Details

2.4.1 Mortlake Level Crossing is a CCTV monitored crossing that is manually controlled by a signaller in the Feltham signal box. This form of protection is referred to as CCTV-MCB. The four-barrier layout is shown in Figure 2.2 and Figure 2.3.

Figure 2.2: Looking South-East Over the level crossing

Figure 2.3: Looking North-East Over the level crossing

2.4.1 A marked footway runs across the eastern side of the LC and an identical marked footway across the western side of the LC as shown in Figure 2.4.

Figure 2.4: The western footpath across the level crossing

2.4.2 The station includes a footbridge which provides an alternate route for pedestrians to cross the railway line when the barriers at the crossing are down. The footbridge is accessible via staircases off Sheen Lane's western footway adjacent to the level crossing barriers. There are separate stairs down to platform level. The stairways are quite steep and there is no provision for disabled access. The level crossing, in effect, provided step free access between the two platforms.

2.4.3 A detailed plan outlining the dimensions of the level crossing and footbridge is shown in Figure 2.5.

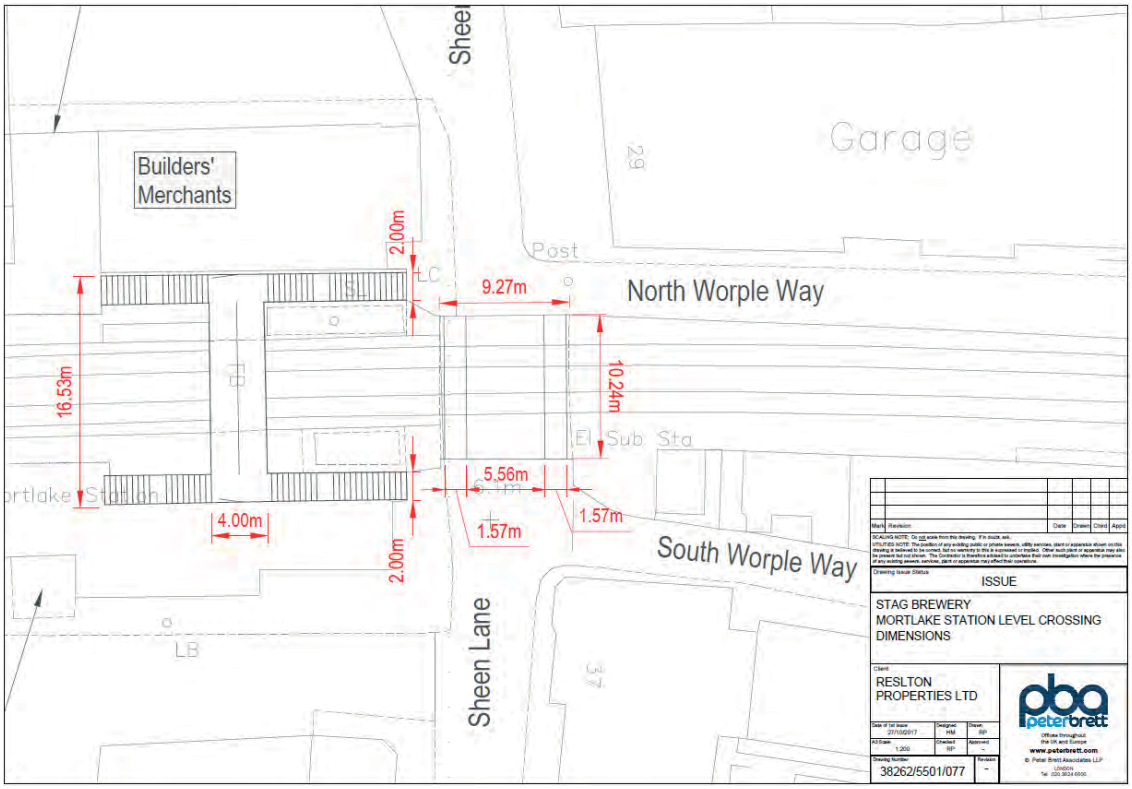

Figure 2.5: Dimensions of Sheen Lane Level Crossing and Footbridge

2.4.4 Table 2.1 summarises the dimensions of the level crossing and Table 2.2 summarises the footbridge dimensions.

Table 2.1: Level Crossing Surface Dimensions (metres)

Dimension	Length (m)
Carriageway Width (including marker footways)	9.27
Length (between barriers)	10.24
Footway Width (Marked)	1.57

Table 2.2: Footbridge Dimensions

Dimension	Length (m)
Length	16.60
Width	4.00
Staircase Width	2.00

2.5 Existing Usage

Traffic Demand

2.5.1 A traffic survey undertaken on 15th June, 2016 indicated a total two-way flow of 491 passenger car units (PCU's) during the AM peak hour (08:00 to 09:00) across the level crossing. The recorded northbound flow (286 pcu's) was slightly higher than the recorded southbound flow (205 pcu's)

Pedestrian Demand

2.5.2 The current usages of both the level crossing and footbridge were recorded in video surveys between 26-27 June 2017. The video camera was located on the north-eastern side of the level crossing looking southwards given the view shown in Figure 2.6.

Figure 2.6: The View from the Camera

2.5.3 This allowed the movements of pedestrians across the level crossing, A separate survey was conducted on 15 June 2016 to capture the volume of pedestrians using the footbridge. Based on these surveys, the number of pedestrians entering the station at each of the four locations or crossing the railway line via the level crossing or footbridge have been identified for the AM peak hour (08:00 to 09:00 as shown in Figure 2.7, The surveys did not specifically record the number of people using the internal stairways as a means of crossing between platforms. It is clear that during the morning peak a substantial number of people enter the station via the main entrance and then use the footbridge to access the eastbound platform. This has been taken into account by adjusting the flow figures to ensure that the total boardings from the eastbound platform are equal to 78% of total station boardings during the AM peak, in line with the data for the station provided by NR.

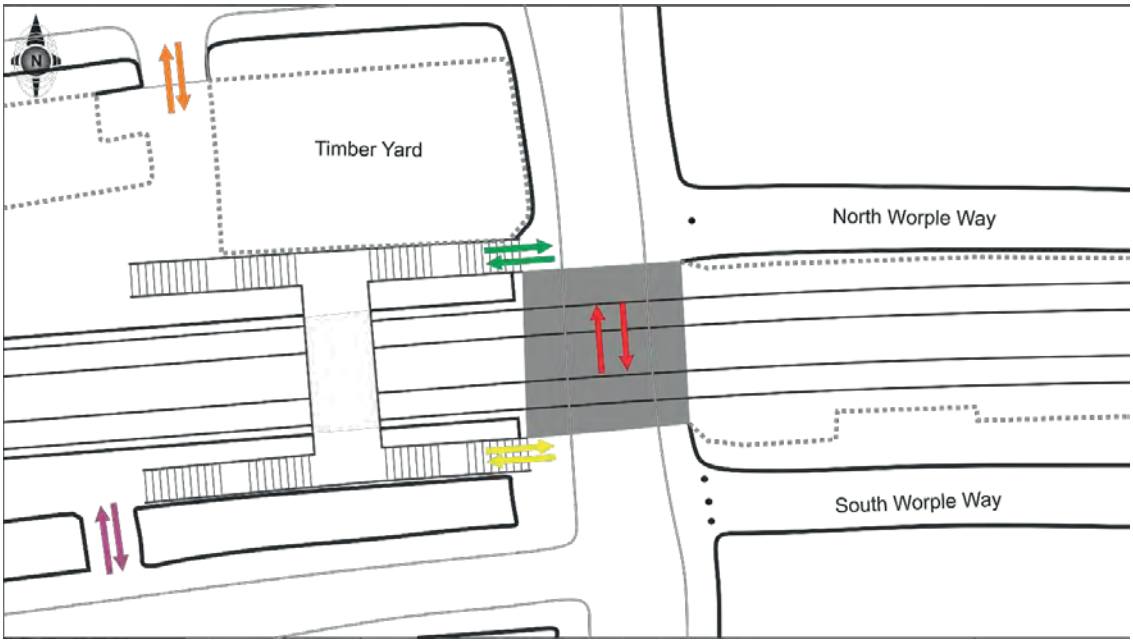

Figure 2.7: Flows Recorded in Video Footage and Pedestrian Survey

2.5.4 Based on this assessment the existing AM peak hour pedestrian flows are shown in Figure 2.8.

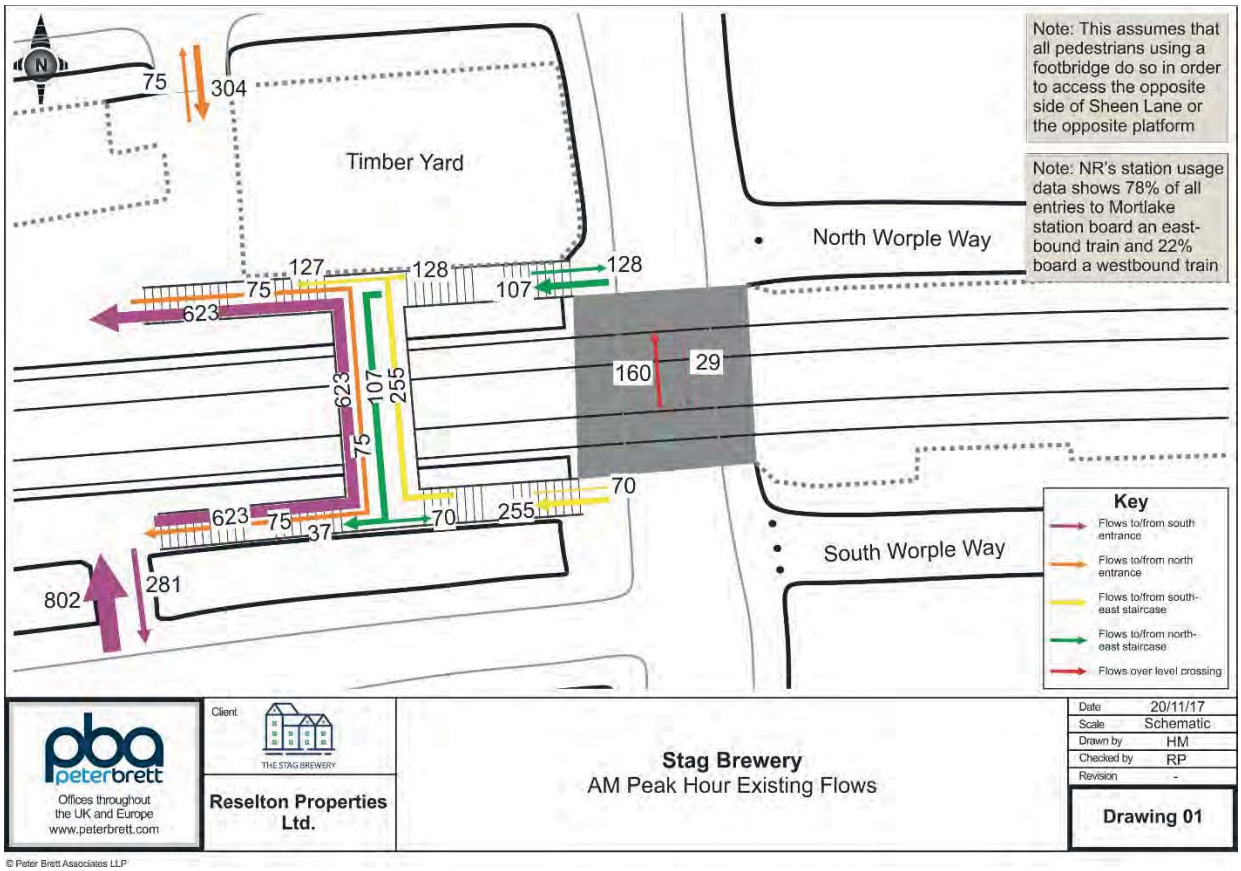

Figure 2.8 Existing AM Peak Hour Flows

2.5.5 Table 2.3 shows the existing AM peak demands at the Mortlake level crossing and footbridge.

Table 2.3: Existing AM Peak Hour Pedestrian Movements at the Level Crossing and Footbridge

Location	Northbound	Southbound	Two-Way
Level Crossing	160	29	189
Footbridge	878	182	1060
North side external stair	128	107	235
South side external stair	255	70	325
North side internal stair	750	75	825
South side internal stair	623	112	735

2.6 Barrier Down-Times

2.6.1 The level crossing barrier down times for daytime hours, as presented in NR's 'Mortlake Level Crossing Risk Assessment' (July 2017), are shown in Table 2.4 below.

Table 2.4: Average Recorded Level Crossing Barrier Down Times During Daytime Hours

Down Time	Full day (mm:ss)	Peak Hour (mm:ss)
Average Barrier Down Time	03:59	04:26
Average Barrier Down Time Per Hour	40:39	46:32

2.6.2 Similar durations, showing very long barrier down times of between 40 and 46 minutes, were also recorded in surveys commissioned by PBA.

3 Safety Review

3.1 Introduction

3.1.1 This section sets out the safety concerns expressed by Network Rail in their report "Mortlake Level Crossing Risk Assessment" dated 26th July 2017 and a subsequent letter dated 28th October 2017 from Stewart Firth, Director of Route Sponsorship, Wessex. The latter was addressed to Mr Goldsmith, Member of Parliament for Richmond Park. Both are attached at Appendix A.

3.1.2 The report and letter also set out potential options for improvement and these are summarised and considered within Section 5.

3.1.3 PBA has also been in direct contact with NR in order to better understand their concerns and a meeting was held with representatives on 4 August 2017. A meeting was also convened by Mr Goldsmith, MP on 15th September 2017, to discuss the matter and options for addressing safety concerns and this was attended by officers of LBRuT, London Buses as well as NR. Representatives of the Stag Development were also present. The outcome of these meetings is also reported

3.1.4 Finally, a summary is provided of reported injury accidents along Sheen Lane in the five years to 31st January 2016 including a review of their potential association with the level crossing

3.2 Network Rail Review of Safety Risks

3.2.1 The NR Risk Assessment provides details of a snapshot survey undertaken by NR to assess existing demand; this was a 30-minute duration survey undertaken from 10:40hrs on 5th October 2016. The report also confirms the number of trains using the crossing on a daily basis as well as an analysis of barrier down time (previously summarised above in paragraph xx).

3.2.2 The report states that deliberate miss use of the crossing, either by vehicles or by pedestrians is "prolific and almost occurs on a daily basis. The report provides two tables of incidents to back this up:

- Table 2.6 provides a table showing recorded incidents between 16 July 2016 and 18 February 2017. This shows details of seven incidents but it is not clear if this is a comprehensive list and how the list has been compiled;

- On pages 8 and 9 there is a list "tasking dates", presumably observation/enforcement by British Transport Police (BTP). This covers the period 6th December 2012 to 12th June 2017with observations on 45 days of between 1:00 hour and 7 hrs 45 minutes (but more typically 3 to 4 hours per visit). It lists the observed numbers of both offending drivers and offending pedestrians.

3.2.3 The BTP data is interesting in that the number of recorded offences appears to have been particularly high during 2014 and 2015 but then reduced significantly during 2016 and 2017, which would include the period after the new extension to Thomson House School (which caters for years 1 to 3) opened just to the north of the rail line. However, the report provides no analysis of this data or explanation of why these trends might have occurred.

3.2.4 The report makes a number of interesting points as follows:

- That the recoded miss-use "is similar to other crossings in the area or, comparable CCTV crossings situated in congested urban environments";

- "The barrier downtime at the crossing is lengthy and thus likely to be a contributory factor in deliberate misuse terms"

3.2.5 The report then gives a summary of its risk assessment. This is based upon its risk assessment model "All level Crossing Risk Model (ALCRM)". This appears to be a highly theoretical assessment of risk which calculates an overall risk score based upon the number of incidents recorded and the number of users of a crossing.

3.2.6 Based on this model, the report states that the crossing is "the 4th riskiest CCTV crossing on the Wessex Route and places it in the high risk category. It notes that the key risk drivers were train frequency, that the crossing is near a station (it does not clarify how this affects the risk factors) and the large number of users. However, it is also noted that the report cautions that "The ALCRAM tool can give a rather limited output of hazards around residual risk or misuse. It is not possible to use ALCRAM to properly assess risk from a wide range of hazards."

3.2.7 Whilst the report states that there are high risks to pedestrians, road users and train passengers it also notes that "the majority of risk is controlled by the full barriers separating road users from trains and the signaller protecting the crossing ensuring that a train cannot approach unless the crossing is clear".

3.2.8 NR clarify their concerns in their conclusions. They state that:

"The main risk is a vehicular risk to pedestrians from general road users and more so road users that deliberately misuse the crossing. This is not helped by the current width of the footpaths on both approaches and specifically user congestion during peak hours."

3.2.9 The subsequent letter from NR simply refers to the above report and provided no further information or clarification regarding the current safety risks. No additional risk information was forthcoming either at the meeting attended by PBA in August or at the meeting convened by Mr Goldsmith MP.

3.3 PBA Accident Data Analysis

3.3.1 PBA has conducted an analysis of road collisions in the study area shown in Figure 3.1 which includes Sheen Lane and the level crossing. Transport for London (TfL) provided PBA with this data which covers the five-year period to 31 January 2016. This demonstrates the preponderance of injury accidents occur along the South Circular road corridor with very few injury accidents recorded along Sheen Lane.

3.3.2 A detailed analysis of the data has shown that one slight accident occurred immediately to the north of the level crossing and one immediately to the south. The first involving a vehicle passenger trapping their foot in the car door while exiting the vehicle and the second a vehicle reversing into another, causing a collision. These accidents reflect poor driver behaviour. The latter could relate to driver frustration relation to the level crossing although this is not clear from the description.

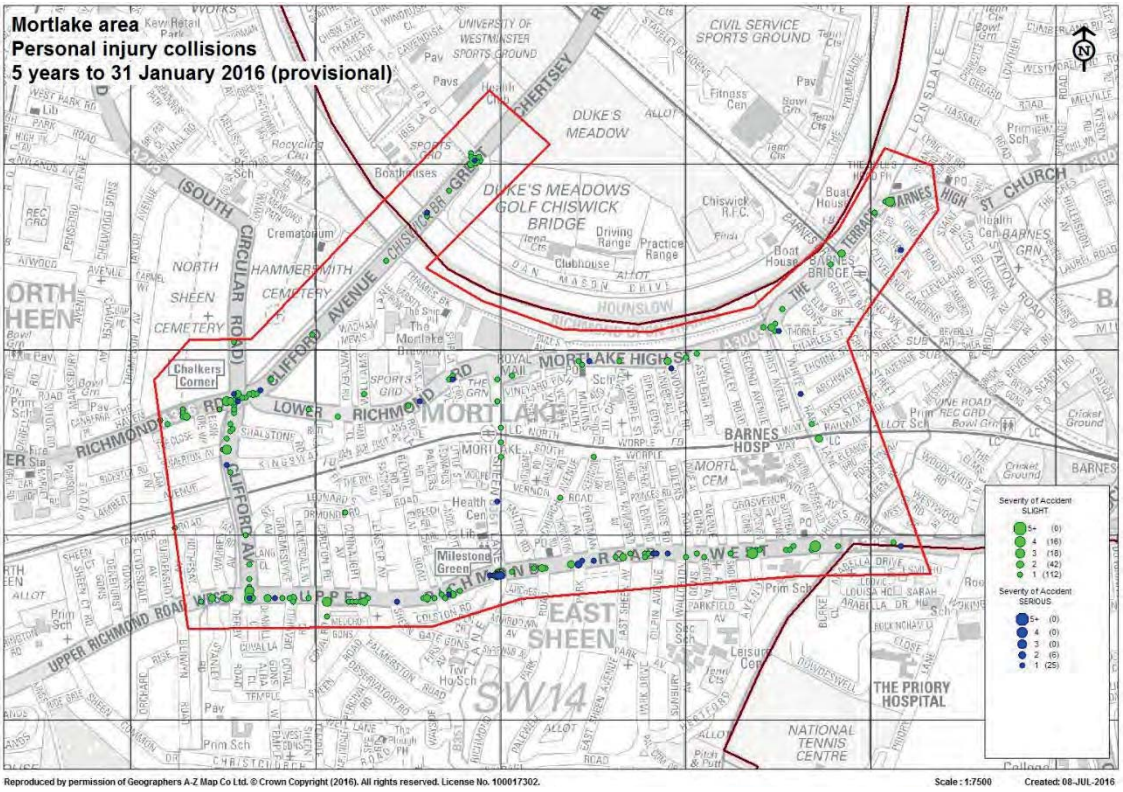

Figure 3.1: Collision Data Study Area

3.4 Future Safety Conditions

3.4.1 Based on their Risk Assessment NR's prime concern appears to relate to the potential for accidents to occur between vehicles and pedestrians, in part related to the deliberate miss-use of the crossing. The Risk Assessment suggest that this is at least in part associated with the long barrier down time and associated frustrations of drivers and pedestrians.

3.4.2 There is also suggestion in NR's recent letter that "pedestrian movement is already near maximum capacity and any further increase would compromise safety in relation to user interaction". However, NR has provided no analysis of existing pedestrian demand at the crossing and consequently this statement is not justified either within the report or the subsequent letter.

3.4.3 NR has provided data relating to recorded incidents. These relate to miss-use of the crossing but no data has been provided which suggests that there have been any casualties associated with the recorded incidents. The analysis of recorded injury accidents for the area undertaken by PBA does not provide any clear evidence of accidents directly related to the crossing including driver behaviour associated with the crossing. Indeed, the recent safety record along Sheen Lane is good.

3.4.4 Whilst future development in the area will likely increase demand to use the level crossing whether that is by pedestrians or vehicles, no clear link appears to have been established between the level of demand and accident risk. Whilst it might be expected that increased demand would at least result in an increase in reported incidents. However, does not appear to have been borne out by the fall in incidents reported by BTP during 2016 and 2017 even though the Thomson House School extension, located immediately to the north of the crossing, was by then in place.

3.4.5 It is not clear how increased pedestrian demand would in itself increase deliberate misuse of the crossing by pedestrians other than a statistical increase relating to increased numbers. Pedestrian misuse relates to the length of time that the barriers are down and the uncertainty that barriers create when down for a significant and unknown time leading to some people deciding the risk of crossing after the red light is shown is worth taking. This problem relates more to the frequency of barrier down time rather than to pedestrian demand. The same would apply to drivers' behaviour.

3.4.6 Therefore, in terms of any safety implications arising from the Stag regeneration proposals, it is considered that these relate primarily to the sufficiency of the width of the marked footways over the level crossing to cater for the existing and proposed demand. The capacity of the existing footbridge is also pertinent since, if this is inadequate, it could deter pedestrians from using the footbridge leading to increased use of the level crossing.

3.4.7 The following chapter therefore provides an assessment of the likely demand that will be generated by the Stag development proposals and then Chapter 5 provides an adequacy of the footbridge width and the width of the marked footways with and without the Stag development.

4 Level Crossing Usage

4.1 Introduction

4.1.1 In order to better understand the impact of the Stag Brewery development on the Mortlake Level crossing, NR requested that PBA provide an assessment of the likely increased use of the level crossing due to the proposed development.

4.1.2 The development will increase demand to cross the railway line for the following reasons:

I. Increased vehicular demand generated by the Stag development;

II. There will be increased demand to access / egress westbound train services from Mortlake Station. This will require use of either the level crossing or its associated footbridge;

III. Residents cross the rail line in order to access facilities located to the south. This would include primary and secondary schools; and

IV. Increased demand from residents living to the south of the railway line to access new facilities within the development. This would include the secondary school as well as the new retail and leisure facilities proposed within the development.

4.1.3 A detailed spreadsheet model has been developed to assess the additional trips that are likely to be generated by the proposed Stag Development. The trip rates used by this model have been agreed by both LBRuT and TfL as being appropriate for the proposed development. The model provides trip estimates for each use by mode and time of day. Outputs from this model have informed the highway impact and public transport assessments as well as the pedestrian demand analysis.

4.1.4 This Chapter provides a summary of the proposed Stag development and the associated trip generation. It then provides a summary of the likely highway impacts so far as they affect traffic using Sheen Lane, based upon the use of the TfL SoLHAM model and assesses the likely additional pedestrian demand to use the level crossing, based on a set of first principles assumptions.

4.2 Stag Brewery Development Proposals

4.2.1 The proposed development at the Stag Brewery site comprises a number of land uses. A breakdown of proposed land uses and their proposed quantum is shown in the following table.

Table 4.1: Stag Brewery Land Uses and Quanta

Land Use	Quanta
Residential	687 units
Retail	584 sqm
Restaurant	1983 sqm
Hotel	16 rooms
Community	854 sqm

Land Use	Quanta
Office	2428 sqm
Cinema	370 seats
Gym	757 sqm
Extra Care	220 units
Health Care	4 consulting rooms
Secondary School	1260 pupils

4.3 Trip Generation

4.3.1 A comprehensive multi-modal trip generation model has been developed for the Stag development proposals. This provides trip numbers by hour for each proposed land use by mode of transport.

4.3.2 The spreadsheet model primarily uses data from the Trip Rate Information Computer Systems (TRICS) database but is supplemented by a first principles model relating to the likely use of the cinema. The trip rates have previously been agreed with TfL and LBRuT. The model also takes account of the number of persons taking a westbound and eastbound train from Mortlake station.

4.3.3 Appendix B provides a summary of the overall trip estimates by mode for the AM peak Hour.

4.4 Highway Impact Assessment

4.4.1 To compare future traffic flows, with and without the proposed development, across the Sheen Lane level crossing, flows have been taken from the TfL SoLHAM model. This is a strategic Saturn traffic model that covers the south east of London and which TfL, has requested be used in order to assess the impacts of the proposed development on the strategic highway network.

4.4.2 Whilst the model provided by TfL had achieved required validation overall, additional local validation was undertaken to ensure that it provided an acceptable replication of local conditions within Mortlake; in particular, that flows, journey times and delays along the lower Richmond Road / Mortlake High Street and Sheen Lane corridors. In order to achieve this, changes were made to the signal timings at the Mortlake level crossing to accurately reflect the average barrier down time as well as local matrix estimation. This process was undertaken in close collaboration with TfL and the resulting base Model has been agreed by TfL.

4.4.3 Initial modelling results are now available and Table 4.2 provides a summary of traffic flows across the level crossing with and without the development whilst Table 4.3 provides a comparison of predicted journey times from the model for trips between Chalkers Corner (in the north west) and the junction of Sheen Lane with the South Circular (to the south). These are trips via the Sheen Lane crossing. The data all relates to the AM peak hour.

4.4.4 The model was used to compare the following future scenarios:

- 2031 with no Stag Development;
- 2031 with Stag Development but no improvements to the highway infrastructure;

- 2031 with Stag Development and local traffic management measures (introduction of a 20 mph zone along part of the Lower Richmond Road and Mortlake High Street corridor and along Sheen Lane together with provision of new pedestrian crossing facilities;

- As above plus the provision of a highway improvement scheme at the Chalkers Corner junction that will provide a modest increase in capacity commensurate with the additional traffic generation of the development together with improvements to pedestrian and cycle facilities.

Table 4.2 AM Peak PCU Flows at Level Crossing (Modelled flows are Actual Flows from 2031 SolHAM model)

Scenario	Northbound	Southbound	Total
June 2016 Survey	286	205	491
2031 Model (No Development)	286	223	509
2031 Model (Development only)	293	263	556
2031 Model (Development + 20mph zone)	293	258	551
2031 Model Development + 20mph zone + Chalkers Corner)	303	260	563

Table 4.3 AM Peak predicted journey times between Chalkers Corner and South Circular via Sheen Lane Level Crossing (source SolHam Model)

Route	2031 Future Base (No Development)	2031 with Development	2031 with Development + 20mph zone	2031 with Development + 20mph zone + CC
Chalkers Corner to Sheen Lane	484	561	582	551
Sheen Lane to Chalkers Corner	1417	1538	1556	1428
Average (both directions)	951	1050	1069	990

4.4.5 The modelling work suggests that traffic flows across the level crossing will remain quite stable with or without the development. Similarly, there is only a small increase in journey times predicted as a result of the development.

4.4.6 Therefore, the modelling work suggests that the introduction of the proposed Stag development, which includes the provision of the proposed Chalkers Corner improvements as an integral part, will have little impact on traffic volumes / travel times for traffic travelling over the Sheen Lane crossing.

4.4.7 It is therefore concluded that from this perspective the development will have no material impact on safety at the level crossing.

4.5 Assessment of Pedestrian Demand

4.5.1 Table 4.4 shows the total pedestrian trip generation for the Stag Brewery development during the morning peak hour. Many of these trips will however be very local and contained within the overall regeneration site, for example trips to the new secondary school and to local shops and other local facilities within the Site. Other trips, for example from Kew and Barnes, will not have to cross the rail line.

Table 4.4 Development Forecast AM Peak Hour Pedestrian and Cycle Trips

Trips	Arrive	Depart	Total
Pedestrian trips	607	313	921
Cycle Trips	37	39	76

4.5.2 It is anticipated that during the AM peak hour the additional demand to cross the rail line as a result of the Stag regeneration will primarily be as a consequence of the following elements:

- Trips to and from the westbound platform of Mortlake Station;
- Trips to and from the new secondary school;
- Trips from the residential development to local primary schools, primarily the years 5 to 7 of Thomson House School that are located to the south of the rail line.
- To a lesser extent trips to the proposed new office and other employment opportunities within the Site.

4.5.3 Not all new pedestrian trips across the rail line will cross at the level crossing since there are a number of alternative crossing points. Indeed, for the secondary school, due to its location within the Site, the main desire line will be to use the Kingsway FB crossing further to the west.

4.5.4 In addition, the proposed development will also result in a number of trips that currently cross the rail line at the level crossing no longer needing to do so. These would be trips made by existing residential properties surrounding the site where existing trips are diverted to the new facilities within the Site. This would include trips to the local shops and other local facilities and the uptake of local job opportunities within the Site. However, the main area of offset would be the reduced need to cross the line to access secondary school places; currently the main local secondary school is the Richmond Park Academy which is located at Park Avenue, approximately a 1,000 metre /13-minute walk from the level crossing.

4.6 Trip Distribution

4.6.1 The pedestrian trips were split between trips expected to cross and not to cross the railway line, as outlined below:

Education - Secondary School

4.6.2 In order to determine the volume of secondary school pupils that are likely to cross the railway line at Mortlake the following methodology has been adopted:

- LBRuT provided catchment areas of primary schools in the local area that will function as feeder schools for the proposed secondary school at the Site. Based on the primary

schools' capacity and the population in the catchment area it has been calculated that 41% live to the north of the railway line and 59% to the south.

- Each school's catchment area south of the railway line was divided into portions of residents that would cross the rail line at Mortlake.

- Based on a proposed school capacity of 1260, this would result in 48 pupils crossing the railway line at Mortlake in a northbound direction in the morning peak hour.

Education – Primary School

4.6.3 The socio-economics assessment undertaken for the proposed development suggests the development will accommodate the following mix of children:

- 150 early year children; and

- 110 primary school age children.

4.6.4 To establish the volume of primary school children that are likely to cross the rail line at Mortlake, the following methodology has been applied:

- It is assumed that the primary school pupils from the development will attend one of the three closest primary schools: Kew Riverside Primary, Thomson House or Barnes Primary. Based on their capacities, primary school children from the proposed development site have been distributed to each school.

- Thomson House school teaches its pupils in Year 5 to 7 in a building south of the railway line whereas all the other schools are located north of the railway. Based on the school's capacity, it is assumed that 19% of the 260 primary school children would attend Thomson House school (years 5 to 7), which equates to 49 pupils crossing the railway line at Mortlake in the morning peak hour, travelling southbound.

- As it is deemed unlikely that children would walk alone, as a worst-case scenario it has been assumed that each child would be accompanied by an adult, who would walk back to the development after dropping off the pupil.

- Based on the above, it is likely that 98 trips would be made in the morning peak hour across the railway line at Mortlake in a southbound direction.

- It has been assumed that adults would return to the development post the morning peak hour, thus these trips have not been taken account of within the detailed analysis.

Rail Trips

4.6.5 In addition to the pedestrian trips, trips will be made to and from Mortlake station (rail trips) on foot. The trip generation model prepared for the development also takes account of the number of persons taking a westbound and eastbound train from Mortlake station.

4.6.6 Only trips to and from the westbound platform at Mortlake station would utilise cross the rail line at Mortlake. These rail trips are shown in the following table. It is considered that, since the majority of people will be seeking to catch a specific train, and therefore not wishing to be delayed by the crossing barriers, the majority of these people will use the footbridge to access the westbound platform.

Table 4.5: Development Forecast AM Peak Hour Rail Trips to Mortlake Westbound Platform

Trips	Arrive	Depart	Total
Rail trips to Mortlake station westbound platform	15	26	41

Bus Trips

4.6.7 There is expected to be a minimal demand from persons walking over the level crossing and FB in order to reach the bus stops on the South Circular Road. This is due to three reasons:

- Good provision of buses along Lower Richmond Road immediately outside the development and along Clifford Avenue. These bus routes (the 419, N22 and 209) run west to Richmond and east to Barnes which is parallel to the routes provided on the South Circular by the 337, 33, 337 and 493 buses.
- The distance to walk to the bus stops on the South Circular is 750m or an approximately 9.5-minute walk from the Site which acts as a disincentive.
- There are more convenient alternative options to these routes for most journeys i.e. the rail service from Mortlake or one of the closer bus services.

4.6.8 Therefore, no walking trips to bus stops have been included in the assessment.

Remaining Trip Types

4.6.9 The remaining pedestrian trips are categorised as either: residential, retail, hotel, office, cinema, gym and community, or, extra care and healthcare trips. Each of these trip types' pedestrian trips are split between journeys to destinations north and south of the railway line. The methodology for splitting each trip types' journeys is explained below.

4.6.10 Those trips on foot to destinations south of the railway line have then been split proportionally between crossing points, except where explained otherwise, according to the catchment area of each zone south of the railway line that is within a 1.0 km radius or a 12.5 m walk from the Stag Brewery as shown in Figure 4.1 below.

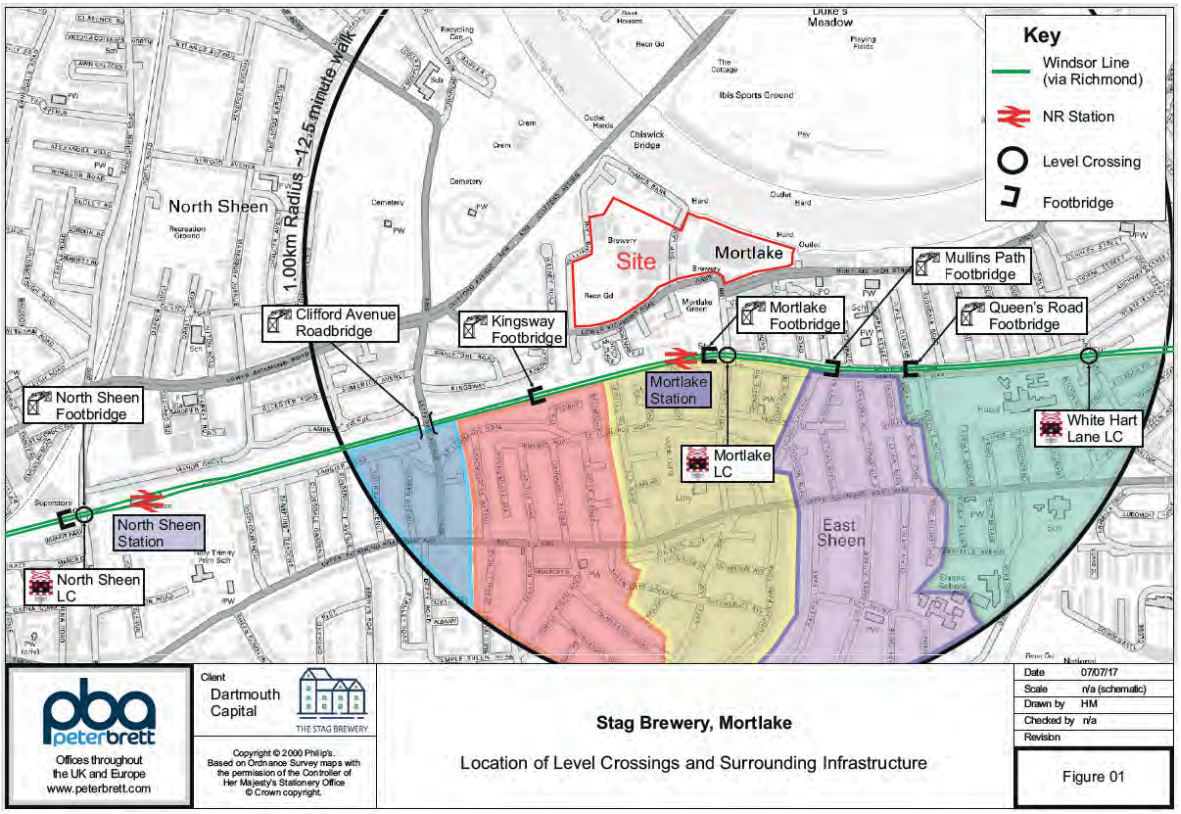

Figure 4.1 Catchment areas (south of the railway) for each crossing

Residential

4.6.11 The trip generation analysis shows that the residential development will generate 100 two-way walking trips during the AM peak hour. Given the amount of school-age children likely to be living on site, it has been assumed that the vast majority of residential walking trips in the morning peak hour are associated with educational and educational escort trips, which have been covered above.

4.6.12 It is also assumed that the remaining pedestrian trips generated by the residential development during the morning peak hour would most likely be very local trips, either internal to the site or to areas immediately surrounding the Site. This includes persons walking along the river embankment and north towards Chiswick and the amenities around the Site. As such, 90% of trips will be to/from destinations north of the railway line. The remaining trips go south of the railway line and are split proportionally between the crossings as explained in 4.6.10.

Retail

4.6.13 The retail trips to the Site are expected to be highly localised and as such there would be a very small number of persons visiting the Site's retail shops who originate from south of the railway line and need to cross the railway line to reach the Stag Brewery site. In fact, there is already a convenience store (Tesco Express) and a wide array of other retail shops located just south of the Level crossing making it unlikely visitors to the Site's retail stores would walk from the south of the railway line during the morning peak hour.

4.6.14 Therefore, the impact of this use on the level crossing is considered to be insignificant and is likely to be outweighed by existing trips that do cross the railway line from the north being diverted to the Stag. As such, 93% of trips will be to/from destinations north of the railway line.

The remaining trips go south of the railway line and are split proportionally between the crossings as explained in 4.6.10.

Hotel

4.6.15 The pedestrian trips related to the proposed hotel development on site are also likely to be very localised but as tourists and visitors would be unfamiliar with the local area they are likely to follow Sheen Lane to the Mortlake level crossing and cross the railway line at that point. This also follows the natural desire line to the main section of shops and restaurants in the area.

4.6.16 The trip generation exercise for the proposed development has forecast that the proposed hotel would generate just one additional pedestrian trip during the morning peak hour. Of the trips generated 50% are to/from destinations north of the railway line. The remaining trips go south of the railway line and are split proportionally between the crossings as explained in 4.6.10 which yields zero trips across the Mortlake crossing.

Office

4.6.17 The trip generation assessment undertaken for the proposed office on site has forecast that a total of 12 two-way morning peak hour trips would be undertaken by foot.

4.6.18 The office trips on foot would mainly be composed of office workers who live within the walking catchment area walking to work in the peak hours. Although it is considered likely that some of the forecast walking trips would be site internal as residents of the proposed development could also work on site. Of the trips generated 50% are to/from destinations north of the railway line with the remainder split proportionally between the crossings as explained in 4.6.10.

Cinema, Gym and Community

4.6.19 The proposed cinema and community use developments on site is not expected to generate any walking trips during the morning peak hour across the rail line.

4.6.20 The proposed gym development is considered to predominantly attract individuals living on site and residents of the local area. The trip generation assessment undertaken for the proposed gym on site has forecast that during the morning peak hour this land use would generate 4 arrival and 5 departure trips undertaken on foot. For the purpose of this assessment and to present a robust case, it has been assumed that 50% of those trips would cross the railway line at Mortlake level crossing /FB, resulting in 2 northbound and 2 southbound pedestrian trips.

Extra Care and Healthcare

4.6.21 The proposed extra care development on site is likely to generate walking trips in the morning peak hour across Mortlake level crossing /FB made by staff. The trip generation model prepared for the proposed extra care development has forecast that 5 arrival and 5 departure trips undertaken on foot would be generated in the morning peak hour. Thus for the purpose of this assessment and to present a robust case, it has been assumed that 50% of the total forecast walking trips in the morning peak would cross the railway line at Mortlake resulting in 1 northbound and 1 southbound trip over the level crossing and 1 northbound and 1 southbound trip over the footbridge.

4.6.22 The proposed healthcare development on site is considered unlikely to generate a significant number of pedestrian trips across the railway line at Mortlake during the morning peak hour, as an existing healthcare centre is located to the south of the railway line. The only pedestrian trips across the railway line are likely to be associated with staff at the healthcare centre.

4.6.23 The trip generation exercise undertaken for the proposed healthcare development has forecast that this land use would generate 6 arrival trips and 1 departure trip during the morning peak

hour undertaken on foot. Thus for the purpose of this assessment and to present a robust case, it has been assumed that 50% of the total forecast walking trips in the morning peak would be to/from destinations north of the railway line. This yields 1 northbound trip over the level crossing and 1 northbound trip over the footbridge.

4.7 Summary of Pedestrian Trips Across Mortlake Level Crossing /footbridge

4.7.1 Figure 4.2 and Table 4.6 summarise the likely pedestrian trips across Mortlake level crossing and FB in the morning peak hour generated by the proposed development on the Stag Brewery site. The split between the at-grade level crossing level crossing and footbridge is based on the proportions observed in the video footage for persons making through-trips and those accessing a station platform respectively. An exception to this for persons departing the development in order to join a train from the westbound platform -these journeys are time critical so all these persons are assumed to use the footbridge rather than waiting at the level crossing.

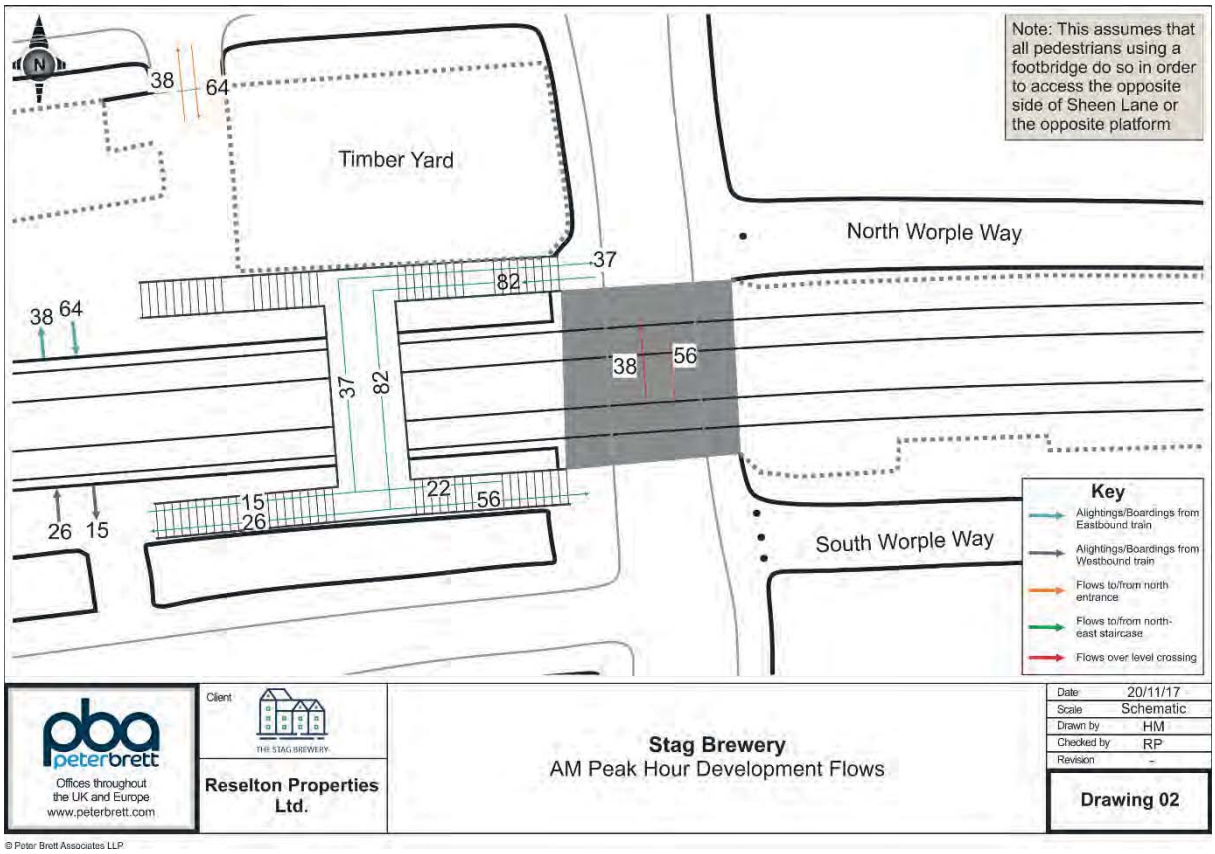

Figure 4.2 Development Flows

Table 4.6: Summary of Development Walking Trips Across Mortlake Level Crossing and Footbridge (AM Peak Hour)

	Southbound		Northbound	
Land Use	**Level Crossing**	**Footbridge**	**Level Crossing**	**Footbridge**
Residential	2	2	0	0
Educational (Secondary School)	2	2	24	24
Educational (Primary School)	49	49	0	0
Retail	2	2	2	2
Hotel	0	0	0	0
Office	0	0	1	1
Cinema, Gym, Community	1	1	1	1
Extra Care, Healthcare	1	1	2	2
Rail Trips	0	26	8	7
Total	**56**	**82**	**38**	**37**
	138		**75**	

**Note: discrepancy in total due to rounding error*

5 Impact Assessment

5.1 Introduction

5.1.1 This chapter provides a review of the likely impact of the Stag development proposals on the Mortlake level crossing based on the trip estimates set out in Chapter 4.

5.1.2 It is noted in the previous chapter that, based on the highway modelling undertaken using the TfL strategic modelling, the proposed development should have no material impact on traffic flow or journey times for traffic travelling across the level crossing. Therefore, this impact assessment has focussed on two main aspects:

- Does the existing footbridge provide sufficient capacity to accommodate the additional demand that will be generated, both by through pedestrian movements along Sheen Lane but also taking account of the increased demand to use the footbridge to access the station platforms; and

- Will the footways, including the marked pedestrian crossing areas within the level crossing, have sufficient capacity to accommodate pedestrian demand.

5.1.3 This assessment is carried out at the request of NR. As discussed previously, it is far from clear that there is any direct link between pedestrian demand to use the crossing and safety.

5.2 Pedestrian Demand Flows

5.2.1 Figure 4.2 shows the anticipated additional pedestrian flows due to the development at the Mortlake crossing based on the trip assessment undertaken within Chapter 4 and summarised within Table 4.6. Figure 5.1 then sets out the revised total demand flows taking account of existing observed demand as previously identified within Figure 2.8.

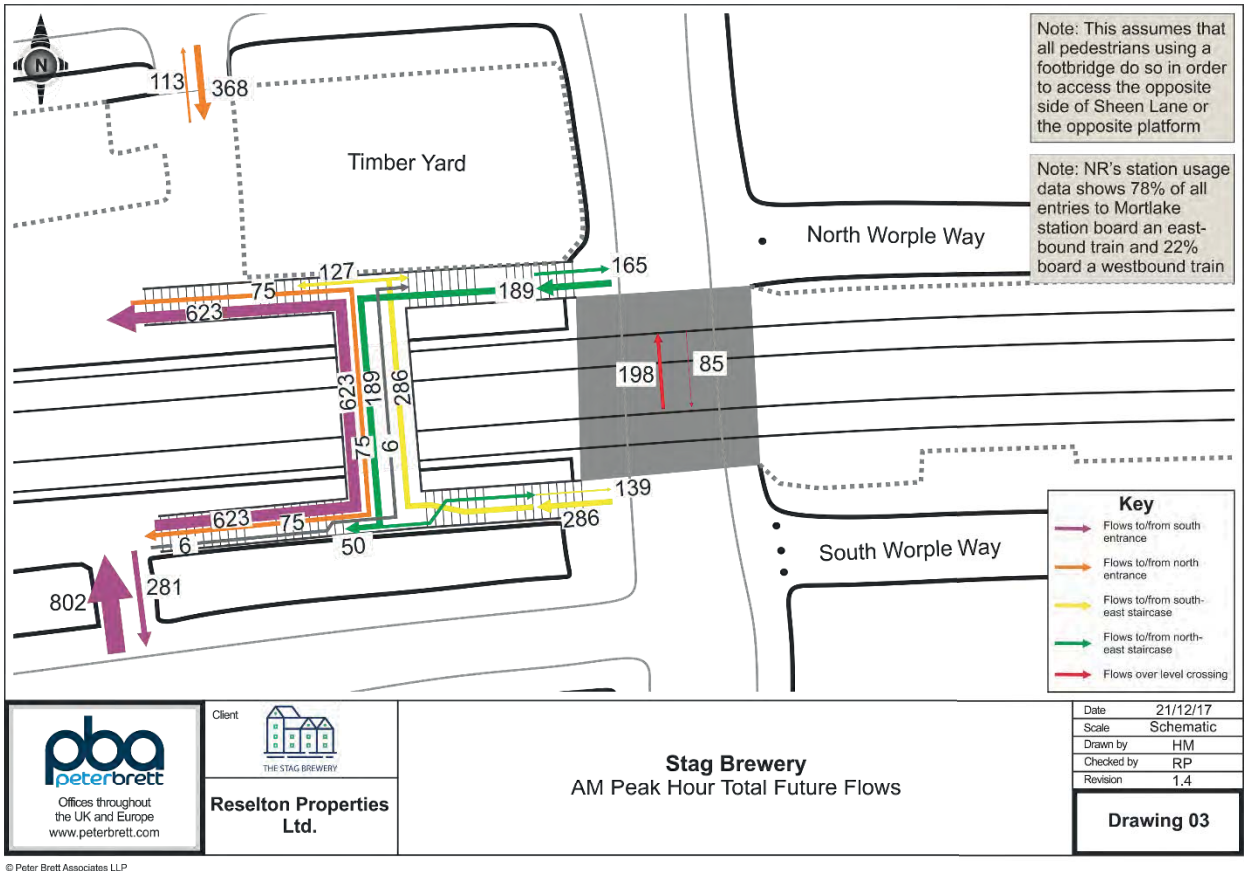

Figure 5.1 Total Future Flows Across Mortlake Crossing with the Stag Brewery

5.3 Review of Bridge and Staircase Capacity

5.3.1 NR's '*Station Capacity Planning Guidance*' (November 2016) has been used to assess conditions at Mortlake FB including the staircases with the proposed development at the Stag Brewery site in place, as the guidance

"*includes all calculations required to assess whether a station meets Network Rail's aspirations regarding passenger comfort and safety in the station environment…"* and

"provides a good practice guide for undertaking capacity assessments".

5.3.2 Section 3.6.1 of NR's Guidance provides the following equation to calculate the notional minimum width of a two-way passageway based on NR's requirement for a Fruin LoS C. The average peak minute flow is increased by 25% in order to take account of possible service delays that may lead to fluctuations in passenger flow through the station.

$$Notional\ Two-way\ width\ (m) = \frac{Average\ Peak\ Minute\ Flow}{40} + (2\ x\ 0.3)$$

5.3.3 The notational width for the baseline and future baseline with proposed development scenarios is shown in Table 5.1. The guidance recommends a minimum passageway width of 1.9m on either side of a central division (1.6m passageway plus 0.3m edge effect) plus the width of the central divider (0.05m), given a minimum required width of 3.85m unless the notational width is greater than this. Note that in the calculations in this section the number of cyclists using the footbridge and staircase are included in the average peak minute flows.

Table 5.1: Notional and Required Width of Mortlake FB

Scenario	Average Peak Minute Flow	Notional Two-Way Width	Required Width
Baseline	18.08	1.165	3.85m
Baseline with Proposed Development	20.11	1.228	3.85m

5.3.4 As can be seen, the notional two-way width increases by 0.063m in the baseline plus proposed development scenario compared to the baseline scenario. Comparing the notional width and required width for both assessed scenarios, it can be seen that in both scenarios sufficient spare capacity is available to accommodate the notional demands.

5.3.5 As shown in Chapter 2, the existing FB width is 4.0m wide. As such, sufficient width is provided to accommodate the baseline and the proposed development's demand in the future.

5.4 Mortlake Staircase

5.4.1 Section 3.6.3 of NR's Guidance provides the following equation to calculate the notional minimum width of a two-way staircase for the Footbridge based on NR's requirement for a Fruin LoS C.

$$Two - way \text{ staircase } width\ (m) = \frac{Average\ Peak\ Minute\ Flow}{28}$$

5.4.2 The notational width for the baseline and future baseline with proposed development scenarios is shown in Table 5.2. The guidance recommends a minimum staircase width of 1.6m between handrails, unless the notational width is greater than this.

Table 5.2: Notional and Required Width of Mortlake External Staircase

Scenario	Average Peak Minute Flow	Notional Two-Way Width	Required Width
Baseline	12.67	1.165	1.6m
Baseline with Proposed Development	13.38	1.197	1.6m

5.4.3 As can be seen, the notional two-way width increases by 0.032m in the baseline plus proposed development scenario compared to the baseline scenario. Comparing the notional width and required width for both assessed scenarios, it can be seen that in both scenarios sufficient spare capacity is available to accommodate the notional demands.

5.4.4 As shown in Chapter 2, the existing staircase width is 2.0m wide. As such, sufficient width is provided to accommodate the baseline and the proposed development's demand in the future.

5.5 Review of Mortlake Level Crossing

5.5.1 As NR's 'Station Capacity Planning Guidance' does not include guidance for flows across level crossings, the Office of Rail Regulation's (ORRs) '*Level Crossings: A guide for managers, designers and operators*' (December 2011) has been used instead as it provides a section on pedestrian using level crossings. This categorises level crossings depending on their usage into one of three class: A, B or C. The class of level crossing dictates the minimum width of the footway required.

5.5.2 To calculate the class, Section 2.185 requires the Train Pedestrian Value (TPV) to be calculated as the product of the maximum number of pedestrians crossing the level crossing in a 15-minute period and 25% of the number of trains passing over the crossing in the same hour.

5.5.3 The guidance stipulates that the maximum number of pedestrians using the crossing in a 15-minute period should be 75% of the maximum hourly figure if the number of pedestrians is estimated rather than surveyed.

5.5.4 The following equation has been used to calculate the TPV value for the baseline and baseline plus proposed development scenarios:

$$Train\ Pedestrian\ Value = \ 75\%\ of\ hourly\ Pedestrian\ Flow\ \ x\ \ 25\%\ of\ hourly\ Trains$$

5.5.5 As outlined in Chapter 2, currently 12 trains per hour pass through Mortlake level crossing. The following table shows TPVs for the baseline and baseline with development scenarios based on 12 trains per hour.

Table 5.3: Train Pedestrian Values during the AM Peak Hour

Scenario	75% of Hourly Flow	Trains in 15-Minute Period (based on 12 trains per hour)	TPV
Baseline	152	3	457
Baseline with Proposed Development	218	3	655

5.5.6 Based on the above TPVs, the level crossing can be categorised into class A, B or C, which are defined as follows:

Table 5.4: ORR's Pedestrian Categories for level crossing

Pedestrian Category	TPV
A	More than 450
B	151 – 450
C	150 or less

5.5.7 The following table shows the category based on the calculated TPVs.

Table 5.5: Mortlake level crossing TPVs and associated Categories

Scenario	TPV	Category	Required Minimum Width
Baseline	457	A	2.0m
Baseline with Proposed Development	655	A	2.0m

5.5.8 As outlined in Chapter 2, the footways across Mortlake level crossing measure approximately 1.6m in width on each side of the carriageway.

5.5.9 Although not mentioned in the ORR guidance, it is considered that as the TPVs are based on two-directional flows, both footway widths would need to be added together to realistically assess the footway width required for the baseline plus proposed development scenario. Based on this consideration, the existing footway width across Mortlake level crossing is approximately 3.2m.

5.5.10 Table 5.5 shows that in the baseline scenario, a minimum footway width of 1.8m is required, while in the baseline plus development scenario a minimum footway width of 2.0m is required. As 3.2m footway width is currently provided, it is considered that the existing footways across Mortlake level crossing have sufficient spare capacity to accommodate the additional demand generated by the proposed development at the Stag Brewery development.

5.6 Summary

5.6.1 The assessment of future pedestrian demand for both the footbridge and the level crossing suggests that the current infrastructure meets required standards both now and in the future.

6 Options for Improving Safety

6.1 Introduction

6.1.1 This chapter sets out the existing safety measures that are in place at the level crossing and then lists the various options that have been identified as a possible means for further improving safety at the crossing. NR's views on these various options is highlighted.

6.1.2 A potential strategy for improving safety is set down.

6.2 Existing Safety Conditions

6.2.1 The Level Crossing benefits from the following safety equipment:

- CCTV monitoring by signaller;
- Full barrier equipment;
- Road traffic light signals;
- Audible alarm;
- Signage (including instructions for pedestrians to use the FB); and,
- Train signalling protection.

6.2.2 In addition, the crossing benefits from an existing footbridge, deemed acceptable by NR, which provides an alternative through route for pedestrians removing the need to wait at the barriers when they are down.

6.2.3 As such, NR considers that the Level crossing currently has the highest level of safety protection. Based on this it has also stated that, in its view, safety risks at this location primarily relate to potential vehicle/pedestrian conflicts since risks to trains and therefore passengers are effectively managed by the current safety equipment and remote manual control of the crossing. On that basis it has therefore stated that it is therefore unable to justify any further spending on improving the level crossing or its associated infrastructure.

6.2.4 In their Risk Assessment, NR review a number of potential options for improving the safety of the crossing as follows:

I. **Complete closure of the level crossing with potential replacement by a footbridge and/or for road bridge/tunnel.** This is in line with their policy to reduce the number of level crossings and so is their preferred option. However, it concluded that closure of the crossing to vehicular traffic was unlikely to be feasible and could not in any case be justified in cost benefit terms;

II. **Provision of red light enforcement cameras with automatic number plate recognition** as recently installed at the nearby White Hart Crossing. The report concluded that such a system would not address the main safety issues here ie pedestrian/vehicle conflict, and deliberate pedestrian/vehicle misuse and was again ruled out on cost benefit grounds;

III. **Renewal of the Crossing**, or increasing the width to allow provision of wider marker pedestrian areas across. This was also ruled out on the basis that there would be no quantifiable reduction in risk benefit.

6.2.5 The assessment also briefly considers the potential benefits of providing a new/improved footbridge and concludes "The concern (pedestrian/vehicle conflict) arises despite the presence of a suitable bridge at Mortlake something which is not available at its neighbouring crossing White Hart Lane and, which experiences similar issues. ***It is unlikely that another bridge structure at the site would solve this problem ".***

6.2.6 At the meeting with Mr Goldsmith, MP a number of options were identified as worthy of proper consideration as follows:

IV. Improved signing of the footbridge;

V. Signage to urge drivers to turn off engines when waiting for the barriers;

VI. Provision of a count-down clock so that pedestrians were better informed about likely wait times

VII. Further improvements to the pedestrian bridge; and

VIII. Comprehensive traffic management measures aimed at slowing traffic and providing greater priority for pedestrians and cycles.

6.2.7 The meeting also agreed that further investigation should be undertaken regarding the possibilities for renewing the crossing, to provide wider marked footways and to look at provision of camera enforcement.

6.2.8 The above strategy was endorsed by the LBRuT.

6.2.9 The meeting also concluded that the closure of the level crossing was not feasible for a number of reasons, including impact on other crossings, feasibility for providing either an alternative bridge / tunnel on cost/environmental grounds. This was also agreed by LBRuT

6.2.10 The recent letter from NR has discounted the use of countdown times as being impractical and whilst it states that improved signing and road and footway markings will be considered further it surprisingly (in view of the stance taken in the Risk Assessment) suggests that there is a need to provide a new ramped footbridge at the site. No justification is provided for this nor does the feasibility for providing such a structure appear to have bene considered.

6.3 Discussion

6.3.1 Whilst NR appears to have concern regarding the level of miss use at the crossing ie attempting to cross by both traffic and pedestrians after the red lights start flashing, which appears to be the main contributory factor to the high safety risk score for the site this appears to be at odds with NR's apparent conclusion that the current safety measures at the site provide adequate protection of trains and passengers and that the main risks relating in part to in proper use.

6.3.2 There is no clear picture regarding the real safety risks at this location from the analysis that has so far been provided by NR. The main risk that they have identified relate to pedestrian / vehicle conflicts.

6.3.3 The 5-year accident data does not show any pattern of injury accidents relating to the level crossing.

6.3.4 In relation to the potential impacts of the proposed Stag development on safety factors at this site then:

- The traffic analysis undertaken as part of the wider TA suggests that with the proposed Chalkers Corner improvements which form a key element of the proposals there will be no material impact on traffic flows or delays for traffic travelling across the crossing;

- There will be some increase in existing pedestrian demand at the site both form pedestrians travelling along Sheen Lane, mainly associated with accessing years 4 to 7 at Thomson House School and for passengers accessing and egressing the westbound platform at the station.

- The assessment of pedestrian flows suggest that the current footbridge and stairways provide sufficient capacity to meet both current and future demand with the Stag.

- The assessment of pedestrian flows also suggests that the width of the marked footway areas on the level crossing also meet required standards both now and in the future with the Stag.

6.3.5 Based on the above, it is considered that the proposed development would not have a severe impact upon the level crossing and associated infrastructure.

6.4 Potential Strategy

6.4.1 Notwithstanding the above conclusion, it is considered that the will be merit in improving conditions, in particular for pedestrians and cycles in and around the station and the crossing. It is considered that the following measures should be considered further:

- Potential for improving the pedestrian access to the station from the north over the builder's merchants yard – it is not clear whether NR has any control over this land;

- Whilst the width of the marked footways over the crossing appear to meet the required standards it is considered that there would be merit in widening these areas. It is not clear what this would entail in design terms and cost and so it is considered that NR should take the lead in providing detailed study.

- Associated with the above, the feasibility for improving road markings, including the possible use of surfaced treatment at the crossing should be investigated;

- There appears to be limited scope to provide a new footbridge or to enhance the current one (potentially with the additional of lifts to cater better for buggies and the disabled). Detailed land ownership information would be required from NR to allow this to be considered further.

- Provision of red light enforcement cameras would appear to address one of the main concerns identified by the NR Risk Assessment.

- Whilst there is no record of injury accidents along Sheen Lane, the developer has proposed a 20 mph zone along the site frontage and extending down Sheen Lane towards the crossing as part of its proposals. This is in line with the Stag Planning Brief and would appear to be in line with current Mayer's policy to promote "Healthy Streets". It is considered that this would further enhance safety around the level crossing.

- It is understood that Thomson House School, as part of its travel planning has included initiatives to promote the proper use of the crossing. These initiatives could be extended to the proposed new secondary school and to the rest of the development. Ultimately, the secondary school could seek to enforce a ban on

children using the level crossing instead requiring the use of the footbridge or other bridges in the area.

Summary and Conclusion

6.5 Summary

6.5.1 Peter Brett Associates LLP (PBA) has been commissioned to provide transport planning advice to support the planning application of the Stag Brewery site, situated in Mortlake, LBRuT. This Note has been prepared to address safety concerns raised by Network Rail (NR) relating to increased usage of the Mortlake Level Crossing as a result of the proposed Stag Brewery development.

6.5.2 This Note responds to the concerns raised in NR's 'Mortlake Level Crossing Risk Assessment' (July 2017) and NR's letter to Zac Goldsmith MP (26 October 2017), which are included in Appendix A, by discussing the likely impact of the increased demand to be generated by the Stag Brewery development on Mortlake level crossing.

6.5.3 The crossing is located on Sheen Lane, a busy high street with numerous shops and local amenities including a library, primary school and health care centre. Immediately to the west of the crossing is Mortlake station which lies on the Windsor Lines (via Richmond). 8 trains per hour call and an additional 4 trains per hour pass through the LC during a typical daytime hour. Mortlake station includes a footbridge which provides an alternate route for pedestrians to cross the railway line when the barriers at the crossing are down as well as access to the platforms.

6.5.4 The existing crossing has marked out footways on both sides, which are approximately 1.6m wide each. The FB, which has a width of 4.0m, is accessed via two sets of staircases, which are each 2.0m width.

6.5.5 NR has requested that PBA, on behalf of the Stag Developer, assess the likely impact of the proposed development on the level crossing and associated footway. The assessment, which has been summarised in this report, has focussed on the AM peak, since this is considered to provide a worst case since at that time there are heavy pedestrian demand associated with both commuters and trips to school. Surveys were undertaken in June 2016 and again in June 2017, to establish both vehicular and pedestrian use of the infrastructure. respectively.

6.5.6 NR's risk assessment of the crossing suggests that the trains and passengers are adequately protected by the existing safety features at the crossing. It intimates that the main risk relates to potential vehicle/pedestrian conflict at the crossing. This in turn appears to be related to the long wait time due to the barriers being down between 40 and 45 minutes in any hour.

6.5.7 The Risk Assessment provides no clear analysis of risk nor does it recommend any specific improvements, other than a preference for complete closure of the level crossing, but which it acknowledges is unlikely to be feasible. it states that, since there is an existing bridge, a new or improved footbridge is unlikely to resolve their safety concerns.

6.5.8 There appears to be no clear evidence that the conflict between pedestrians and traffic referred to in the Risk Assessment occurs in practice. A review of the 5 year accident data suggests that Sheen Lane has a good safety record with no pattern of accidents associated with the crossing.

6.5.9 In relation to the potential impacts of the proposed Stag development on safety factors at this site then:

- The traffic analysis undertaken as part of the wider TA suggests that with the proposed Chalkers Corner improvements which form a key element of the proposals there will be only a small impact on traffic flows or delays for traffic travelling across the crossing;

- There will be some increase in existing pedestrian demand at the site both form pedestrians travelling along Sheen Lane, mainly associated with accessing years 4 to 7 at Thomson House School and for passengers accessing and egressing the westbound platform at the station.

- The assessment of pedestrian flows suggest that the current footbridge and stairways provide sufficient capacity to meet both current and future demand with the Stag.

- The assessment of pedestrian flows also suggests that the width of the marked footway areas on the level crossing also meet required standards both now and in the future with the Stag.

6.5.10 Based on the above, it is considered that the proposed development would not have a severe impact upon the level crossing and associated infrastructure.

6.5.11 Notwithstanding the above conclusion, it is considered that the will be merit in improving conditions, in particular for pedestrians and cycles in and around the station and the crossing. It is considered that the following measures should be considered further:

- Potential for improving the pedestrian access to the station from the north over the builder's merchants yard – it is understood that NR own the freehold to this land but the terms of the lease are unknown;

- Whilst the width of the marked footways over the crossing appear to meet the required standards it is considered that there would be merit in widening these areas. It is not clear what this would entail in design terms and cost and so it is considered that NR should take the lead in providing detailed study.

- Associated with the above, the feasibility for improving road markings, including the possible use of surfaced treatment at the crossing should be investigated;

- There appears to be limited scope to provide a new footbridge or to enhance the current one (potentially with the additional of lifts to cater better for buggies and the disabled). Detailed land ownership information would be required from NR to allow this to be considered further;

- Provision of red light enforcement cameras would appear to address one of the main concerns identified by the NR Risk Assessment;

- Whilst there is no record of injury accidents along Sheen Lane, the developer has proposed a 20 mph zone along the site frontage and extending down Sheen Lane towards the crossing as part of its proposals. This is in line with the Stag Planning Brief and would appear to be in line with current Mayer's policy to promote "Healthy Streets". It is considered that this would further enhance safety around the level crossing; and

- It is understood that Thomson House School, as part of its travel planning has included initiatives to promote the proper use of the crossing. These initiatives could be extended to the proposed new secondary school and to the rest of the development. Ultimately, the secondary school could seek to enforce a ban on children using the level crossing instead requiring the use of the footbridge or other bridges in the area.

Appendix A Network Rail's 'Mortlake Level Crossing Risk Assessment' (July 2017) and Letter to Mr Goldsmith MP (26 October 2017)

Mortlake Level Crossing Risk Assessment

Date assessment compiled 26th July 2017

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1. INTRODUCTION

This document provides the necessary supporting safety information to a decision making process for Mortlake Level Crossing, leading to recommendations as to the most suitable level crossing option that reduces the risk to as low as is reasonably practicable.

1.1 Background

Mortlake level crossing is located on the Reading to London Waterloo line. It is an urban Manually Controlled Barrier CCTV crossing with a 4 barrier layout situated near a major arterial road connecting Barnes to Upper/Lower Richmond and has multiple approach roads. The line speed is 60mph in directions, slowing and accelerating for Mortlake Station which is immediately adjacent to the crossing.

Road space is restricted on the main approach road Sheen Lane which has a speed limit of 30 mph. There are footpaths on each side of the road, each of them being narrower over the crossing than on the pedestrian approaches. There is a footbridge at the station which allows for pedestrian access and standard signage is provided on each approach.

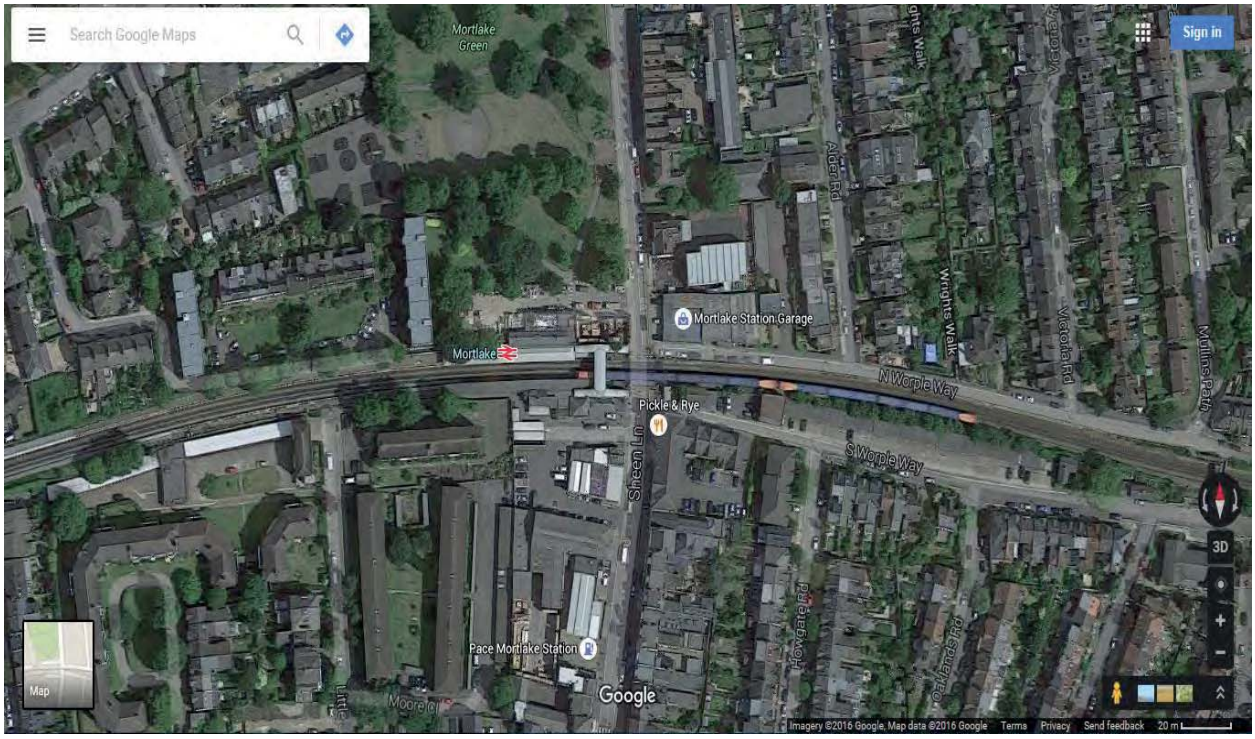
2. DESCRIPTION OF THE SITE

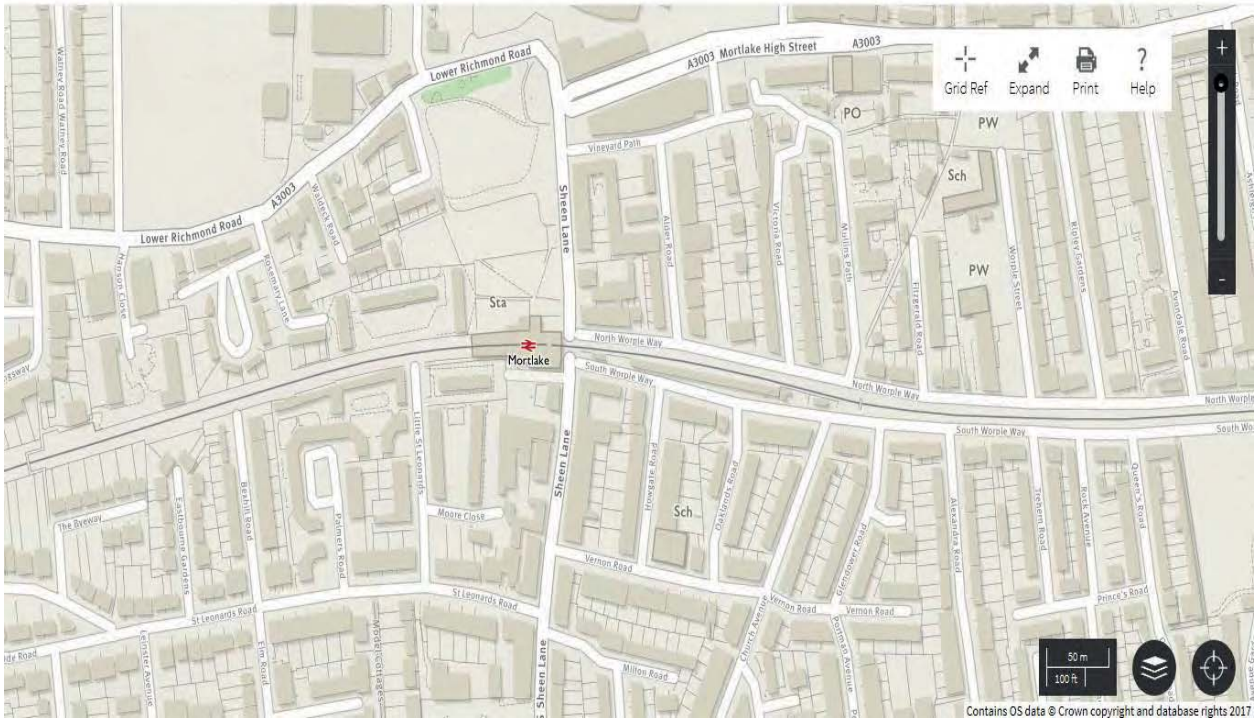
2.1 Current Level Crossing Details

Level Crossing Name	**Mortlake**
Level Crossing Type	CCTV-MCB
Engineers Line Reference (ELR)	RDG1
Mileage	8 miles 21 chains
OS Grid Reference	TQ205758
Local Authority	Richmond Borough Council
Supervising Signalbox	Wimbledon
Number of running lines	2
Maximum Permissible Line Speed	60mph

2.2 Environment

Aerial map and Ordnance survey of the location

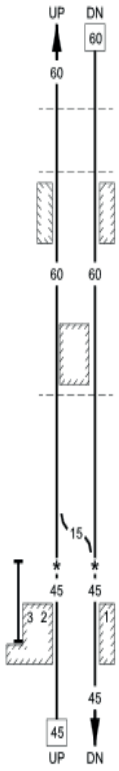




Version 1

Sectional appendix extract of the crossing

LOR	Seq.	Line of Route Description	ELR	Route	Last Updated
SW210	003	Clapham Junction to Reading	RDG1	Wessex	30/11/2015

Location	Mileage M Ch	Running lines & speed restrictions	Signalling & Remarks
			GSM-R TCB Wimbledon SB (W) RA8 DC: Raynes Park
White Hart LC (CCTV)	7 52		
Mortlake LC (CCTV)	8 21		
MORTLAKE	8 21		
NORTH SHEEN	9 03		
North Sheen LC (CCTV)	9 12		
	9 50 *		Feltham SB (F)
RICHMOND	9 57		

Down line approach to the crossing

2.3 Crossing Usage

A quick census was conducted on 5th October 2016 by the Level Crossing Manager at 10:40hrs for a period of 30 minutes. The census applies to 100% of the year. The findings were as follows:

Cars	122
Vans / small lorries	16
Buses	0
HGVs	6
Pedal / motor cyclists	28
Pedestrians	60
Tractors / farm vehicles	0
Horses / riders	0
Animals on the hoof	0

Available information indicates that the crossing does have a high proportion of vulnerable users for a crossing of its type and location. When the census data is aggregated within the ALCRM (All Level Crossing Risk Model) algorithms, it realises a daily usage of 3,888 vehicles users and 2,376 pedestrian and cycle users per day.

2.4 Rail Usage

Rail traffic is heavy at the location with a combination of both passenger and freight services. Most services use Class 458 and class 450 rolling stocks with occasional use of EMU (Electric Multiple Unit). There are 349 trains per day that run over this crossing.

There are currently no known plans to increase train services in the area, although franchise commitments will mean some potential increase in the next few years.

2.5 Future developments

The Stag brewery site near the neighbouring Mortlake level crossing is currently due for development and an application is likely to be submitted in September/October 2017. Similarly there were also historical proposals for the Barnes Hospital / adjoining site for the facilitation of a school or, a residential mixed-use development.

Network Rail is a statutory consultee for all of the main crossings in Richmond and is continually in contact with Richmond Borough Council and associated stakeholders. This would include the potential for the introduction of risk to all of these level crossings by virtue of these developments and on each merits is required to consider possible contributions either under Section 106 or Community Infrastructure Levy intentions to mitigate such risk.

This holistic approach to all the crossings in the Richmond area is imperative and requires the conjoined review by the Wessex Level Crossing Team, the Wessex Capacity/Performance team and Richmond Borough Council/Richmond Highways. At the time of writing, indications are that the Stag Brewery site appears to be a substantive proposal although the impact of that remains notional at this stage. It is probable that this has the potential to increase the risk and usage at Mortlake crossing (further explained

below in section 2.6) and resulting mitigations proposed to negate this could, effectively dissipate the risk to the other crossings in the area therefore, a meeting is being scheduled for a high level review in August 2017.

2.6 Incident history (Source SMIS)

Date	Short Description
18 Feb 17	Lorry struck and ripped off the down side facing barrier at Mortlake LX
27 Jan 17	A flatbed lorry had struck the up facing boom at Mortlake LX
20 Oct 16	Pedestrian ran across LX after the barriers had been lowered
23 Sep 16	A lorry had struck the down side facing barrier at Mortlake LX knocking off the barrier
22 Aug 16	MOP crossed as the barriers were lowering at Mortlake LX
16 Jul 16	Male and female crossed Mortlake LX after leading booms had lowered
16 Jul 16	Cyclist crossed with road lights flashing at Mortlake LX

Mortlake Level Crossing scores high on both individual and collective risk with it being the 4th riskiest CCTV crossing on the Wessex Route. This means that the risks to pedestrians or, road users are high and also that the risks to passengers on trains are high. However, the majority of the risk is controlled by the full barriers separating road users from the trains and the signaller protecting the crossing ensuring that a train cannot approach unless the crossing is clear.

Above is a snap-shot extract of deliberate misuse at the crossing within the past year. Deliberate misuse is prolific and almost occurs on a daily basis which is similar to other crossings in the area or, comparable CCTV crossings situated in congested urban environments. Historic data shows not only that the deliberate misuse is sustained over a number of years, but that this has resulted in other incidents such as regular near-miss events (1-2 per year for the last ten years although less in the last few years) and barriers strikes where vehicles have managed to knock barriers off completely (2-3 per year for the last ten years)

The barrier downtime at the crossing (see section 3) is lengthy and thus is likely to be a contributory factor in deliberate misuse terms. For motorists this includes the potential for blocking back associated with the nearby junctions and cars pulling out straight onto the crossing and on occasion causing damage to the barriers.

In terms of make-up, the road surface and gradient is unlikely to impact on the ability of a vehicle to stop behind either stop line. At the estimated road speed, the visibility of level crossing signage and equipment is considered compliant and provides road users with surplus time to react if the crossing is activated.

For pedestrians, despite the presence of a pedestrian bridge adjoining Mortlake station, this has not deterred deliberate pedestrian misuse i.e. something which was identified on the date of the last assessment as well as during cyclical asset inspections. Pedestrian movements are likely to have increased during the peak period in recent years with children both accompanied and unaccompanied being the predominate users.

In 2015 the associated level crossing manager lodged objections against a development of a Free School development in close proximity to the crossing. This development later went ahead but subject to assurances from the School and further to a proposed safety analysis, revised travel plans necessitating school coordination with Network Rail, and regular education with the parental attendees which has since been continually progressed.

Present at these meeting were developers, BTP (British Transport Police), Metropolitan Police and the school governors. Network Rail has also liaised with the schools in the area providing safety seminars and parental 'Q and A' sessions and has provided internal funding for the provision of additional signs to aid users to encourage use of the station bridge.

With the Stag Brewery development there is a probability (yet to be established) that the primary risk at the crossing will emerge as a 'pedestrian-vehicle' related risk with rail risk being secondary. With associated congestion and by virtue of the developments proximity to the crossing, pedestrians are likely to be forced into the path of vehicles on either side of the crossing when the barriers are lifted. This conflict will also arise from the congestion caused by the extensive barrier downtime at this site and the inability to provide more waiting space and pavement width. This concern arises despite the presence of a suitable bridge at Mortlake, something which is not available at its neighbouring crossing White Hart Lane and, which experiences similar issues. It is unlikely that another bridge structure at the site would solve this problem.

There has also been tasking of the British Transport Police enforcement vehicle throughout the years at Mortlake which has been productive but does not allow or account for enforcement for deliberate pedestrian misuse and is restricted to enforcing vehicle contraventions. The table below show the results from various 'tasking dates' at the crossing.

Crossing name	Date	Total Time (hh:mm)	No. of drivers captured	No. of pedestrians observed offending	Total no. of vehicles
Mortlake	06/12/2011	05:00	19	4	1,760
Mortlake	22/12/2011	06:45	13	0	2,310
Mortlake	16/01/2012	03:15	0	2	1,369
Mortlake	02/02/2012	03:30	7	5	1,396
Mortlake	07/02/2012	03:00	6	8	1,100
Mortlake	29/02/2012	03:00	6	3	1,142
Mortlake	21/03/2012	03:00	3	0	921
Mortlake	28/03/2012	03:45	2	5	924
Mortlake	30/05/2012	03:30	14	9	1,501
Mortlake	02/07/2012	03:30	3	7	1,675
Mortlake	27/09/2012	04:15	9	8	1,720
Mortlake	02/10/2012	02:30	5	0	1,020
Mortlake	09/10/2012	03:00	0	0	1,009
Mortlake	24/10/2012	03:30	8	0	1,593
Mortlake	08/11/2012	03:00	3	0	1,844
Mortlake	15/11/2012	03:00	8	0	1,337
Mortlake	29/11/2012	02:15	2	0	1,259
Mortlake	03/12/2012	03:00	4	0	1,863

Mortlake	12/12/2012	03:00	4	0	1,776
Mortlake	18/12/2012	03:00	2	6	1,682
Mortlake	29/01/2013	03:00	3	9	1,553
Mortlake	05/02/2013	03:00	4	7	1,887
Mortlake	25/02/2013	03:00	7	9	1,426
Mortlake	28/03/2013	01:00	0	0	402
Mortlake	16/05/2013	03:00	3	15	1,205
Mortlake	12/06/2013	03:15	5	6	1,477
Mortlake	25/06/2013	02:15	2	9	473
Mortlake	03/07/2013	03:00	8	5	2,026
Mortlake	24/07/2013	03:30	7	4	1,078
Mortlake	12/09/2013	03:10	5	7	4,055
Mortlake	13/01/2014	03:15	4	6	902
Mortlake	09/12/2014	03:30	8	16	2,549
Mortlake	11/12/2014	03:30	2	13	2,756
Mortlake	18/12/2014	03:30	7	15	2,341
Mortlake	15/01/2015	03:45	3	18	3,233
Mortlake	03/02/2015	04:00	7	17	2,682
Mortlake	26/06/2015	07:45	13	40	7,504
Mortlake	12/10/2016	03:20	0	4	2,187
Mortlake	24/10/2016	03:20	1	4	1,960
Mortlake	13/01/2017	03:20	2	2	1,207
Mortlake	07/02/2017	03:15	0	0	1,928
Mortlake	13/02/2017	03:20	0	6	2,145
Mortlake	01/06/2017	03:30	0	5	1,765
Mortlake	08/06/2017	03:05	3	4	1,307
Mortlake	12/06/2017	03:30	0	1	998

2.6 Vegetation Risk

Vegetation management is occasionally an issue on the upside of the crossing, which arises during cyclical inspections but is generally rectified as and when required. There are no other known issues and at the last inspection all vegetation was complaint.

2.7 ALCRM (All Level Crossing Risk Model) Scores

The current risk assessment score on ALCRM is E2* with a FWI scoring of 3.47E-02. As mentioned previously, this score makes it the 4th riskiest CCTV crossing on the Wessex Route, and places it in the high risk category. The following key risk drivers were identified by the ALCRM toolset and contributed to the risk score as follows:

- Frequent trains
- Crossing near station
- Large number of users

* The ALCRM (All Level Crossing Risk Model) provides a prediction of risk which it classifies in the following ways:

- Individual risk of fatality (identified by a letter A (high) to M (low)), which relates to the risk of death for an individual using the crossing on a frequent basis (500 times per year); and
- collective risk (identified by a number 1(high) to 13 (low)), which relates to the total risk generated by the crossing. This takes into account the overall risk of death and injury for crossing users, train crew and passengers.

Note: The ALCRM tool can give a rather limited output about hazards around residual risk or misuse. It is not possible to use ALCRM to properly assess the risk from a wide range of hazards.

3.1 BARRIER DOWN-TIME ANALYSIS

Barrier down-time at Mortlake has been a contentious issue which has had escalation to the ORR, the Wessex Executive and Wessex Operations throughout the years. The high frequency of trains at the crossing, and other contributing factors, means that information from barrier downtimes displayed below gave values where the average barrier down time for non-rail users at Mortlake is 03:59 minutes outside peak hours which averages 40:39 minutes down-time per hour, and 04:40 minutes during peak hours with 46:32 down time minutes per hour.

	Time of day	North Sheen	Mortlake	White Hart Lane	Barnes (Richmond)
Average barrier down time (mm:ss)	Full day	03:41	03:59	03:50	03:52
Average barrier downtime per hour (mm:ss)		39:13	40:39	40:21	40:12
Average barrier down time (mm:ss)	Peak	04:26	04:40	05:15	05:33
Average barrier downtime per hour (mm:ss)		46:32	46:45	47:13	52:43

This snapshot of data is from a report published in the latter part of 2016 and there is likely to be a slight variation in barrier down times from day to day and may alter subject to unforeseen events as well as operational delays.

There has been no change in the services within the area since which would warrant further review of those timings however, as the scale shows, it is imperative that this crossing is not reviewed in isolation and must incorporate the other crossings within the Richmond area. If a closure option was later considered for Mortlake Level Crossing, then it may be feasible that the surrounding traffic could seek alternative routes which perhaps may increase vehicle and pedestrian usage at the other crossings as well as introducing additional risk.

This in turn requisites the necessity for cross collaboration with stakeholders and in particular for collaboration and the insistence for substantive pedestrian and traffic/census modelling relative to the Stag Brewery site. An increase in Rail Traffic at this site would also increase barrier downtime adversely at the site to unacceptable levels.

3.1 OPTION ASSESSMENT

This section reviews the various options available to mitigate risk and reduce it to acceptable levels. These options are then reviewed with a cost benefit analysis to see if they satisfy the spend in return for a proportionate reduction in risk.

In line with ORR guidance, closure is always the first option that has to be investigated.

4.1 Closure via diversion / road Rail Bridge

In November 2013 Network Rail were questioned in Parliament by the Transport Select Committee over the safety of level crossings and were challenged to close crossings wherever feasible. This crossing is situated in an urban area with multiple roads leading to it. There are alternative ways of traversing the railway further away from the crossing however, it is the understanding of this assessment that closure via diversion is currently not possible due to the high usage and lack of suitable diversionary routes within the immediate vicinity of the crossing. This position may change subject to future feasibility studies arising from upcoming meetings with various stakeholders.

Extinguishment and diversion was partially mooted circa 2014/2015 by the Wessex Level Crossing team but later discounted as unfeasible save for a large-scale redevelopment programme, e.g. a Crossrail type project. It was also envisaged locally that a tunnel option may allow for closure to be realised but could cost in excess of £10m although this figure remains notional. A road rail bridge was also considered not to be feasible due to location, absent a similar type of project and well as its proximity to the station with the possibility of land purchase options (again a notional figure of £6m was optioned). This may alter further to the Stag Brewery development and thus these have been optioned as part of this assessment. Together with the notional figures provided both options failed a cost benefit analysis review (CBA).

4.2. Red Light Enforcement Cameras (RLSE)

A bespoke enforcement camera is an option that has been applied to reduce vehicle misuse at another London Crossing in Richmond (White Hart Lane) and has recently passed Home Office approval and could similarly be applied to Mortlake. The camera has automatic number-plate recognition software and would be able to penalise/prosecute vehicles that ran the red-light at the crossing. This would not have an impact on pedestrian misuse which is a significant concern nor would it prevent pedestrian/motorist interaction. Furthermore, it may not have a preventative impact to tackle deliberate vehicle misuse which is a predominate concern there. In risk terms the attributable reduction to the overall risk scorings would be minimal (around 2%) and installation would be cost prohibitive (potentially £200k+).

This option has failed a Cost Benefit Analysis (see below) however may be suitable if external funding with the local authority/Highways/developer was an option but this would not be recommended as a risk reduction option here. This provision would also necessitate additional maintenance costs and ongoing process costs with Staffordshire Police, the current custodian of RLSE contraventions. This option has merely been progressed for documentary purposes.

4.3 Renewal of the crossing

Expanding the width of the crossing and/or the footpath approach access may be an interim option to allow for additional pedestrian room. Notwithstanding that such an upgrade does not stack up under a cost benefit analysis (as per similar studies for other crossings) this would again require external contributions as there is no quantifiable risk reduction benefit for Network Rail and therefore no equivalent balance of finance.

Initial assessments suggest that this is not possible unless there is a full/partial renewal of the crossing and as such justification for such an alteration is unlikely to be passed. In fact for Mortlake it is likely that more land would be required for us to be able to expand the crossing and would impede on existing structures and rights of way. Failing that altering the current 'crossing footpath' may create pinch points thus potentially trapping users within the barriers. Therefore in order for these to have some impact it would necessitate significant works. This would include barrier lengthening, pedestal removal, surface renewal, re-signaling alignment /interfacing, the shortening of adjacent conductor rail as well as ancillary works.

Working in accordance with national standards and combined with feasibility studies and possession requirements, this option is expected to realise at least £400k for a partial renewal or a full renewal of £2.7 besides the other aforementioned factors. It is unlikely that this can be achieved within the current or subsequent control periods (CP5/CP6).

5.1 COST BENEFIT ANALYSIS

Option	Term[1]	ALCRM risk score	ALCRM FWI	Safety Benefit	Cost	Benefit Cost Ratio	Status	Comments
Renewal of crossing partial	Long Term	E2	3.34E-02	0	£400k	0.04	**REJECTED**	Safety and business option case fails CBA.
Renewal of crossing Full	Long Term	E2	3.34E-02	0	£2.7 m	0.01	**REJECTED**	Safety and business option case fails CBA.
Tunnel Structure with Closure	Long Term	M13	3.34E-02	3.34E-2	£10m	0.15	**REJECTED**	Safety and business option case fails CBA.
Road Rail Bridge with Closure	Long Term	M13	3.34E-02	3.02E-04	£6m	0.25	**REJECTED**	Safety and business case fails CBA.
Red Light enforcement	Long Term	E2	2.13E-02	1.02E-04	£200k	0.02	**REJECTED**	Safety and business option case fails CBA.

6 CONCLUSION AND RECOMMENDATION

Rail risk is not a significant concern at Mortlake Level Crossing by virtue of the fact that it is a CCTV controlled crossing. This means that the majority of the risk is controlled by the full barriers separating road users from the trains and the signaller protecting the crossing

ensuring that a train cannot approach unless the crossing is clear. This then leaves the potential risk arising from pedestrians who are struck as a result of a contravention or, error on their part i.e. as opposed to railway failures or errors.

The main risk is a vehicular risk to pedestrians from general road users and more so road users who deliberately misuse the crossing. This is not helped by the current width of the footpaths on both approaches and specifically user congestion during peak hours. This does not mean that the footpaths on the actual crossing are deficient as they are compliant but, with the possibility of increased usage /congestion this may present an issue in the future.

Resolving the wider issue of congestion (both road and pavement) does not rest solely with Network Rail but is also the responsibility of the local council and Highway teams. It is imperative that a Borough-wide strategy of traffic management, enforcement, collaboration on building developments as well as possible regeneration plans are considered by these parties. Network Rail has already taken steps to assist in reducing deliberate misuse by progressing engagement with external parties. The presence of an existing station footbridge, something of which is unavailable at Mortlake's neighbouring crossing White Hart Lane, should alleviate the deliberate misuse at Mortlake although this is still prevalent. This has been countered by education and enforcement, Many of the schools in the vicinity have received guidance to parents and children. Also, the British Transport Police are regularly tasked to the crossing in order to avert misuse.

It is important to emphasise that whilst a footbridge is being considered for White Hart Lane as a partial solution, Mortlake has almost similar usage at the crossing and is likely to see increased usage should the Stag Brewery development proceed in the years to come and thus has the potential to adversely congest the area around the crossing during barrier down-times. A brief census analysis was also conducted to review the current bridge usage at Mortlake station in 2016 and initial findings suggest that the bridge may not be used as much and therefore this would question justifying further spend or, may warrant other logical solutions for consideration.

This in turn prompted the provision of additional signage at the site to encourage usage of the bridge but the problem remains; particularly during the peak hours and has the potential to get worse. It is also a type of risk which not it is easily quantifiable, would require in-depth pedestrian movement analysis as well as high level evaluations with the local authority equally incorporating their considerations as well as establishing available risk prioritisation funding amongst other things.

Expansion of the crossing and approaching pavements is undoubtedly cost prohibitive and may also necessitate land grab as well as station redevelopment as outlined within the options sections above. Whilst the option has a notional costing, the true cost of land grab cannot be determined at this stage and this may not reduce congestion. Moreover expanding the crossing would not provide a risk reduction for Network Rail as the crossing type would remain identical. In fact, it may increase the risk should more users traverse. Alternatively the other RLSE camera option is also only likely to reduce risk minimally and also does not pass a CBA for funding.

On that basis it is the recommendation of this assessment, with an impending development looming that closure with diversion or, via a road Rail Bridge remains the best option. However, whether this is achievable remains to be seen and will requisite complex modelling, feasibility studies, in depth census analysis as well as collaboration with Richmond authorities and possible developers. As the crossing currently has the highest form of signaller protection and a footbridge, funding from Network Rail is unlikely so a solution is likely to be wholly dependent on S106 or CIL contributions arising from developments in the area.

Therefore, even though Network Rail is currently managing the risk as far as is reasonably practical at Mortlake it is the recommendation of this risk assessment for Network Rail to engage with the local council/developers to not only establish possible user impact but to broach mitigation options. At the time of writing a meeting with representatives of the developer is planned for August 2017.

6 APPROVALS

Prepared By: Mark O'Flynn	Signature: Held on file
	Job Title: Level Crossing Manager
Date:26th July 2017	
Approved By: [redacted] (RLCM)	Signature: Held On File
	Job Title:

Appendix B Stag Trip Generation Summary

Proportion	%
Residential Trips to Primary School	26.8%
Residential Trips to Secondary School	31.2%
Restaurant, Cinema and Gym Trips from Residential	30%

PAGE 1 - Development Pedestrian Trip Generation and Trip Distribution Amongst Level Crossings

All Pedestrian Movements from Development (taken from J:\38262 Stag Brewery, Mortlake\4. Working\Calculations\Trip Gen and Parking Spreadsheets for Members Presentation\TRIP GEN SPREADSHEET\Design Freeze\170911 trip generation spreadsheet v11.4 - Design Freeze)

Time	Total Pedestrian Trips			Residential			Residential Trips to Education (Primary)			Education (Secondary)			Retail		
	Arrival	Departure	Two Way	Arrival	Departure	Two Way	Arrival	Departure	Two Way	Arrival	Departure	Two Way	Arrival	Departure	Two Way
07:00-08:00	352	353	736	11	46	57	0	27	27	26	4	62	285	264	549
08:00-09:00	911	639	1644	17	83	100	0	81	81	429	43	566	381	377	758
09:00-10:00	615	542	1156	21	31	52	0	0	0	78	10	88	401	412	813
10:00-11:00	491	465	956	17	26	43	0	0	0	21	13	34	365	355	720
11:00-12:00	501	480	981	23	24	47	0	0	0	30	22	52	366	352	718
12:00-13:00	916	903	1819	24	24	48	0	0	0	28	39	67	760	743	1503
13:00-14:00	1129	1117	2245	24	24	48	0	0	0	51	37	89	904	928	1832
14:00-15:00	738	717	1455	22	25	47	0	0	0	26	23	49	549	545	1094
15:00-16:00	818	1032	1944	49	29	78	81	0	81	31	392	518	480	482	962
16:00-17:00	726	676	1433	52	30	82	27	0	27	35	64	130	434	433	867
17:00-18:00	793	800	1593	52	28	80	0	0	0	22	67	90	519	512	1031
18:00-19:00	1073	990	2063	44	23	67	0	0	0	21	41	62	607	617	1224
19:00-20:00	722	644	1366	30	16	46	0	0	0	0	0	0	489	473	963
20:00-21:00	695	771	1466	21	13	34	0	0	0	0	0	0	381	404	785
Daily Totals	10479	10128	20859	408	421	829	108	108	216	798	756	1806	6922	6897	13819

Time	Restaurant			Hotel			Office			Cinema			Gym			Community			Extra Care			Healthcare			Ped Trips to Take a Westbound Train (from all land uses)			Non-Residential Total			
	Arrival	Departure	Two Way	Arrival	Departure	Two Way	Arrival	Departure	Two Way	Arrival	Departure	Two Way	Arrival	Departure	Two Way	Arrival	Departure	Two Way	Arrival	Departure	Two Way	Arrival	Departure	Two Way	Arrival	Departure	Two Way	Arrival	Departure	Two Way	% of Total Trips
07:00-08:00	0	0	0	0	1	2	10	1	11	0	0	0	6	4	10	6	1	6	4	2	7	2	1	2	1	1	2	340	307	679	92%
08:00-09:00	0	0	0	1	3	3	34	2	36	0	0	0	5	8	13	7	4	11	5	4	9	6	1	7	26	34	60	894	556	1544	94%
09:00-10:00	0	0	0	1	2	3	28	4	33	0	0	0	7	5	12	9	10	20	5	5	10	7	4	11	57	58	115	594	511	1105	96%
10:00-11:00	2	1	3	1	1	2	11	8	19	0	0	0	8	7	15	8	5	13	6	7	13	7	3	10	46	38	84	473	440	913	95%
11:00-12:00	2	2	4	1	1	2	8	12	20	0	0	0	7	6	14	10	13	23	6	5	11	4	6	10	44	36	80	478	456	934	95%
12:00-13:00	12	4	16	1	1	2	19	27	46	0	0	0	9	8	17	7	10	18	5	5	10	5	6	11	45	35	80	892	879	1771	97%
13:00-14:00	14	4	18	1	1	2	24	22	46	24	12	36	7	9	16	5	9	14	6	6	11	7	6	13	61	59	121	1105	1093	2198	98%
14:00-15:00	23	7	30	1	1	2	18	11	29	5	5	10	5	8	14	5	4	9	6	4	10	5	6	11	73	77	150	716	692	1408	97%
15:00-16:00	24	16	40	1	1	3	11	12	23	61	24	85	6	5	11	8	7	14	5	5	10	5	5	10	57	53	110	769	1003	1866	96%
16:00-17:00	14	17	31	2	1	2	7	16	22	73	27	99	7	7	14	5	5	10	4	5	9	7	10	17	59	62	121	674	646	1351	94%
17:00-18:00	33	12	45	1	1	3	4	35	39	80	70	150	14	6	21	9	4	13	4	4	8	3	7	10	51	53	104	741	772	1513	95%
18:00-19:00	45	37	83	2	2	4	2	17	19	259	167	427	22	13	35	0	0	0	3	3	7	2	2	4	66	67	133	1030	967	1997	97%
19:00-20:00	51	45	96	3	2	4	0	0	0	68	32	99	13	18	31	0	0	0	1	2	3	0	0	0	67	56	124	692	628	1320	97%
20:00-21:00	26	36	62	2	1	4	0	0	0	191	264	456	8	16	23	0	0	0	1	1	2	0	0	0	65	36	100	674	758	1432	98%
Daily Totals	247	181	428	18	20	38	176	167	344	761	601	1362	126	120	246	78	73	151	59	61	120	60	57	117	717	666	1383	10071	9707	20030	96%

	Residential	Residential Trips to Education (Primary)	Education (Secondary)	Retail	Restaurant	Hotel	Office	Cinema	Gym	Community	Extra Care	Healthcare
Pedestrian Modeshare	21%		45%	78%	35%	39%	37%	65%	63%	78%	25%	78%

Pedestrian Trip Distribution Amongst Railway Crossings AM (0800-0900)

	Crossing	Residential[1]			Residential Trips to Education (Primary)[2a]			Education (Secondary)[2b]			Retail[3]			Restaurant[4]		
		Arrival (Northbound trips)	Departure (Southbound trips)	Two Way	Arrival (Northbound trips)	Departure (Southbound trips)	Two Way	Arrival (Northbound trips)	Departure (Southbound trips)	Two Way	Arrival (Northbound trips)	Departure (Southbound trips)	Two Way	Arrival (Northbound trips)	Departure (Southbound trips)	Two Way
	North of Railway Line	90%	90%	90%	81%	81%	81%	41%	41%	41%	93%	93%	93%	50%	50%	50%
South of Railway Line	North Sheen Level Crossing / North Sheen Footbridge	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Clifford Avenue Road Bridge	2%	2%	2%	0%	0%	0%	1%	1%	1%	3%	3%	3%	8%	8%	8%
	Kingsway Footbridge	2%	2%	2%	0%	0%	0%	21%	21%	21%	3%	3%	3%	8%	8%	8%
	Mortlake Level Crossing*	0%	1%	1%	0%	4%	4%	0%	3%	0%	0%	0%	0%	0%	2%	0%
	Mortlake Footbridge*	5%	4%	4%	15%	11%	11%	13%	9%	10%	1%	0%	0%	8%	6%	0%
	Mullins Path Footbridge	1%	1%	1%	4%	4%	4%	7%	7%	7%	0%	0%	0%	8%	8%	8%
	Queen's Road Footbridge	1%	1%	1%	0%	0%	0%	8%	8%	8%	2%	2%	2%	8%	8%	8%
	White Hart Lane Level Crossing	0%	0%	0%	0%	0%	0%	10%	10%	10%	0%	0%	0%	8%	8%	8%
		100%	100%	100%	100%	100%	100%	100%	100%	98%	100%	100%	100%	100%	100%	92%

Crossing	Hotel[5]			Office[6]			Cinema[7]			Gym[8]			Community[9]			Extra Care[10]			Healthcare[11]			Ped trips to westbound trains		
	Arrival (Northbound trips)	Departure (Southbound trips)	Two Way	Arrival (Northbound trips)	Departure (Southbound trips)	Two Way	Arrival (Northbound trips)	Departure (Southbound trips)	Two Way	Arrival (Northbound trips)	Departure (Southbound trips)	Two Way	Arrival (Northbound trips)	Departure (Southbound trips)	Two Way	Arrival (Northbound trips)	Departure (Southbound trips)	Two Way	Arrival (Northbound trips)	Departure (Southbound trips)	Two Way	Arrival (Northbound trips)	Departure (Southbound trips)	Two Way
North of Railway Line	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	100%	100%	100%	50%	50%	50%	50%	50%	50%	0%	0%	0%
North Sheen Level Crossing / North Sheen Footbridge	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Clifford Avenue Road Bridge	0%	0%	0%	8%	8%	8%	8%	8%	8%	8%	8%	8%	0%	0%	0%	8%	8%	8%	8%	8%	8%	0%	0%	0%
Kingsway Footbridge	5%	5%	5%	8%	8%	8%	8%	8%	8%	8%	8%	8%	0%	0%	0%	8%	8%	8%	8%	8%	8%	0%	0%	0%
Mortlake Level Crossing*	0%	10%	8%	0%	2%	0%	0%	2%	1%	0%	2%	1%	0%	0%	0%	0%	2%	1%	0%	2%	0%	0%	26%	13%
Mortlake Footbridge*	40%	30%	32%	8%	6%	8%	8%	6%	7%	8%	6%	7%	0%	0%	0%	8%	6%	7%	8%	6%	8%	100%	74%	87%
Mullins Path Footbridge	5%	5%	5%	8%	8%	8%	8%	8%	8%	8%	8%	8%	0%	0%	0%	8%	8%	8%	8%	8%	8%	0%	0%	0%
Queen's Road Footbridge	0%	0%	0%	8%	8%	8%	8%	8%	8%	8%	8%	8%	0%	0%	0%	8%	8%	8%	8%	8%	8%	0%	0%	0%
White Hart Lane Level Crossing	0%	0%	0%	8%	8%	8%	8%	8%	8%	8%	8%	8%	0%	0%	0%	8%	8%	8%	8%	8%	8%	0%	0%	0%
	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Education Trips if Site Not Built

Richmond Park Academy Education[2]	Arrival (Southbound trips)	Departure (Northbound trips)	Two Way
AM (0800-0900) Mortlake Level Crossing*	3%	0%	2%
AM (0800-0900) Mortlake Footbridge*	9%	11%	7%
Mid-Peak (1500-1600) Mortlake Level Crossing*	5%	0%	4%
Mid-Peak (1500-1600) Mortlake Footbridge*	6%	11%	6%
PM Peak (1700-1800) Mortlake Level Crossing*	3%	0%	2%
PM Peak (1700-1800) Mortlake Footbridge*	9%	11%	8%

Pedestrian Trip Distribution Amongst Railway Crossings Mid-Peak (1500-1600)

Crossing	Residential A	Residential D	Residential TW	Res. to Educ. (Primary) A	D	TW	Educ. (Secondary) A	D	TW	Retail A	D	TW	Restaurant A	D	TW	Hotel A	D	TW	Office A	D	TW	Cinema A	D	TW	Gym A	D	TW	Community A	D	TW	Extra Care A	D	TW	Healthcare A	D	TW	Westbound trains A	D	TW
Mortlake Level Crossing*	0%	11%	4%	0%	9%	9%	0%	6%	4%	0%	0%	0%	0%	4%	2%	0%	18%	8%	0%	4%	2%	0%	4%	1%	0%	4%	2%	0%	0%	0%	0%	4%	2%	0%	4%	2%	0%	45%	26%
Mortlake Footbridge*	25%	14%	21%	19%	11%	11%	13%	7%	6%	1%	1%	1%	8%	5%	7%	40%	22%	32%	8%	5%	6%	8%	5%	7%	8%	5%	7%	0%	0%	0%	8%	5%	6%	8%	5%	6%	100%	55%	74%

Pedestrian Trip Distribution Amongst Railway Crossings PM Peak (1700-1800)

Crossing	Residential A	Residential D	Residential TW	Res. to Educ. (Primary) A	D	TW	Educ. (Secondary) A	D	TW	Retail A	D	TW	Restaurant A	D	TW	Hotel A	D	TW	Office A	D	TW	Cinema A	D	TW	Gym A	D	TW	Community A	D	TW	Extra Care A	D	TW	Healthcare A	D	TW	Westbound trains A	D	TW
Mortlake Level Crossing*	0%	6%	2%	0%	4%	4%	0%	3%	2%	0%	0%	0%	0%	2%	1%	0%	9%	4%	0%	2%	2%	0%	2%	1%	0%	2%	1%	0%	0%	0%	0%	2%	1%	0%	2%	1%	0%	23%	13%
Mortlake Footbridge*	25%	19%	23%	19%	15%	15%	13%	10%	11%	1%	1%	1%	8%	6%	8%	40%	31%	36%	8%	6%	7%	8%	6%	7%	8%	6%	8%	0%	0%	0%	8%	6%	7%	8%	6%	7%	100%	77%	87%

Note: Arrivals to the Site are northbound trips over the various level crossings, departures from the Site are southbound trips over the various level crossings.
* The proportion of pedestrians using the level crossing and footbridge changes at different times of day (as shown in the 'LC Video Counts' tab), the appropriate proportion is the average for the AM and PM peak, except for Education where it is the average of the AM and Mid-Peak Hour.
[1] It is assumed that most residential trips on foot are to "the shops" and/or local pubs and amenities - most of which (say 60%) are situated on the South Circular Road and Sheen Lane south of the railway line
[2] The education proportions are dervied in the "Education - Future" tab
[3] The retail trips at the Site are heavily localized around the immediate surrounding area. The are many retail units on Sheen Lane just north of Mortlake LC
[4] The restaurant trips on foot are localized - it is assumed within a 1000m radius and so is split evenly between the LCs and north/south of the railway line
[5] The hotel trips on foot are heavily localized - but as tourists/visitors would not know the area well they would be expected to walk towards the shops on Sheen Lane accessed via Mortlake LC
[6] The office trips on foot would be similar to the hotel trips as they would be heavily localised and mainly made by office employees (who mainly don't live in the area) on breaks.
[7] The cinema trips follow the same trip distribution of the restaurant.
[8] The gym trips follow the same trip distribution of the restaurant.
[9] The use of the community area is entirely internalized within the Site.
[10,11] The extra care and healthcare trips on foot are expected to be generated mainly from local friends and family who are visiting elderly relatives on foot and so are geographically distributed evenly around the Site.

PAGE 3 - Development Trips Across Crossings at Peak Hours

AM Peak Hour (**0800-0900**) Trips Across Railway Crossings

Crossing	Residential A	D	TW	Res. to Educ. (Primary) A	D	TW	Educ. (Secondary) A	D	TW	Retail A	D	TW	Restaurant A	D	TW	Hotel A	D	TW	Office A	D	TW	Cinema A	D	TW	Gym A	D	TW	Community A	D	TW	Extra Care A	D	TW	Healthcare A	D	TW	Ped Trips to Take a Westbound Train A	D	TW
North of Railway Line	15	75	90	0	65	65	174	17	192	353	348	701	0	0	0	0.4	1.3	2	17	1	18	0	0	0	3	4	7	7	4	11	2.3	2.2	5	2.9	0.7	4	0	0	0
North Sheen Level Crossing / North Sheen Footbridge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0	0	0	0	0	0	0
Clifford Avenue Roadbridge	0	1	2	0	0	0	2	0	3	10	9	19	0	0	0	0	0	0	3	0	3	0	0	0	0	1	1	0	0	0	0.4	0.4	1	0	0	1	0	0	0
Kingsway Footbridge	0	1	2	0	0	0	90	9	99	10	9	19	0	0	0	0	0	0	3	0	3	0	0	0	0	1	1	0	0	0	0.4	0.4	1	0	0	1	0	0	0
Mortlake Level Crossing	0	1	1	0	3	3	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.1	0	0	0	0	0	9	9
Mortlake Footbridge	1	3	4	0	9	9	55	4	59	2	1	3	0	0	0	0	1	1	3	0	3	0	0	0	0	0	1	0	0	0	0.4	0.3	1	0	0	1	26	25	51
Mullins Path Footbridge	0	1	1	0	3	3	30	3	33	0	0	0	0	0	0	0	0	0	3	0	3	0	0	0	0	0	1	0	0	0	0.0	0.1	0	0	0	0	0	0	0
Queen's Road Footbridge	0	1	1	0	0	0	33	3	36	6	6	11	0	0	0	0	0	0	3	0	3	0	0	0	0	1	1	0	0	0	0.4	0.4	1	0	0	1	0	0	0
White Hart Lane Level Crossing	0	0	0	0	0	0	44	4	48	0	0	0	0	0	0	0	0	0	3	0	3	0	0	0	0	1	1	0	0	0	0.4	0.4	1	0	0	1	0	0	0
	17	83	100	0	81	81	429	43	471	380	375	754	0	0	0	1	3	3	34	2	36	0	0	0	5	7	13	7	4	11	4	4	8	5	1	7	26	34	60

AM Peak Hour (**0800-0900**) Summary of Trips Across Railway Crossings

Crossing	Total Trips Arrival (Northbound trips)	Departure (Southbound trips)	Two Way	Education Arrival (Northbound trips)	Departure (Southbound trips)	Two Way	% of Total Trips	Non-Education Arrival (Northbound trips)	Departure (Southbound trips)	Two Way	% of Total Trips
North of Railway Line	575	519	1094	174	83	257	23%	401	436	837	77%
North Sheen Level Crossing / North Sheen Footbridge	0	0	0	0	0	0	0%	0	0	0	0%
Clifford Avenue Roadbridge	16	12	28	2	0	3	9%	14	12	26	91%
Kingsway Footbridge	104	21	125	90	9	99	79%	14	12	26	21%
Mortlake Level Crossing	0	16	16	0	5	5	30%	0	11	11	70%

PAGE 2 - Map of Site and Surrounding Crossing Points

PAGE 4

Existing Trips
These trips have been calculated from anaylsis of video footage of the crossing

New Trips if Site is not built
This section assumes that if the proposed secondary school at the Site is not built then the education trips that were generated to the proposed secondary school will simply go to the existing Richmdon Park Academy instead. The proportions of pupils living in the catchment area for Richmond Park Academy using each crossing is calculated on the Education-Crossings Proportions tab

The "arrival" numbers from the pedestrian trip generation will now correspond to southbound trips (as school children and their escorts walk south to Richmond Park Academy). The "departure" numbers will now correspond to northbound trips (as school children and their escorts leave Richmond Park Academy and return home)

Total Future Trips if Development Not Built

AM Peak Hour (**0800-0900**) Summary Trips Across Railway Crossings

Crossing	Existing Total Trips Northbound	Southbound	Two Way	+ Education Northbound	Southbound	Two Way	= Total Trips Northbound	Southbound	Two Way
Mortlake Level Crossing	0	29	29	1	0	1	1	29	30
Mortlake Footbridge	150	83	233	4	49	53	154	132	286
	150	112	262	5	49	54	155	161	316

Mid Peak Hour (**1500-1600**) Summary Trips Across Railway Crossings

Crossing	Existing Total Trips Northbound	Southbound	Two Way	+ Education Northbound	Southbound	Two Way	= Total Trips Northbound	Southbound	Two Way
Mortlake Level Crossing	0	68	68	20	0	20	20	68	88
Mortlake Footbridge	27	82	109	25	4	28	52	86	137
	27	150	177	45	4	49	72	154	226

PM Peak Hour (**1700-1800**) Summary Trips Across Railway Crossings

Crossing	Existing Total Trips Northbound	Southbound	Two Way	+ Education Northbound	Southbound	Two Way	= Total Trips Northbound	Southbound	Two Way
Mortlake Level Crossing	0	22	22	2	0	2	2	22	24
Mortlake Footbridge	41	74	115	6	3	9	47	77	124
	41	96	137	8	3	10	49	99	147

PAGE 5 - Future Trips With Development

Existing Trips
These trips have been calculated from anaylsis of video footage of the Mortlake level crossing and footbridge.

New Trips if Site is built

Total Future Trips if Development Built

AM Peak Hour (**0800-0900**) Summary Trips Across Railway Crossings

Crossing	Total Existing Trips Northbound	Southbound	Two Way	+ Total Development Trips Northbound	Southbound	Two Way	= Total Trips Northbound	Southbound	Two Way	Education Trips %
Mortlake Level Crossing	0	29	29	0	16	16	0	45	45	10.4%
Mortlake Footbridge	150	83	233	88	45	133	238	128	366	18.7%
	150	112	262	88	60	148	238	172	410	

Mid Peak Hour (**1500-1600**) Summary Trips Across Railway Crossings

Crossing	Total Existing Trips Northbound	Southbound	Two Way	+ Total Development Trips Northbound	Southbound	Two Way	= Total Trips Northbound	Southbound	Two Way	Education Trips %
Mortlake Level Crossing	0	68	68	0	55	55	0	123	123	19%
Mortlake Footbridge	27	82	109	104	67	170	131	149	279	11%
	27	150	177	104	122	226	131	272	403	

PM Peak Hour (**1700-1800**) Summary Trips Across Railway Crossings

Crossing	Total Existing Trips Northbound	Southbound	Two Way	+ Total Development Trips Northbound	Southbound	Two Way	= Total Trips Northbound	Southbound	Two Way	Education Trips
Mortlake Level Crossing	0	22	22	0	20	20	0	42	42	5%
Mortlake Footbridge	41	74	115	84	66	150	125	140	265	4%
	41	96	137	84	86	170	125	182	307	

PAGE 6 - Net Impact of Development

Net Impact of Development
This section calculates the net additional movements across the crossings if the development is built.
Positive numbers are increases in usage, negative numbers are decreases in usage

AM Peak Hour (**0800-0900**) Summary Trips Across Railway Crossings

Crossing	Total Trips Northbound	Southbound	Two Way
Mortlake Level Crossing	-1	16	14
Mortlake Footbridge	84	-5	80
	83	11	94

Mid Peak Hour (**1500-1600**) Summary Trips Across Railway Crossings

Crossing	Total Trips Northbound	Southbound	Two Way
Mortlake Level Crossing	-20	55	35
Mortlake Footbridge	79	63	142
	58	119	177

PM Peak Hour (**1700-1800**) Summary Trips Across Railway Crossings

Crossing	Total Trips Northbound	Southbound	Two Way
Mortlake Level Crossing	-2	20	18
Mortlake Footbridge	78	63	142
	77	83	160

PAGE 1 - Development Cyclist Trip Generation and Trip Distribution Amongst Level Crossings

Proportion	%
Residential Trips to Primary School	26.8%
Residential Trips to Secondary School	31.2%
Restaurant, Cinema and Gym Trips from Residential	30%

All Cyclist Movements from Development (taken from J:\38262 Stag Brewery, Mortlake\4. Working\Calculations\Trip Gen and Parking Spreadsheets for Members Presentation\TRIP GEN SPREADSHEET\Design Freeze\170911 trip generation spreadsheet v11.4 - Design Freeze)

Time	Total Trips Arrival	Total Trips Departure	Total Trips Two Way	Residential Arrival	Residential Departure	Residential Two Way	Residential Trips to Education (Primary) Arrival	Departure	Two Way	Education (Secondary) Arrival	Departure	Two Way	Retail Arrival	Departure	Two Way	Restaurant Arrival	Departure	Two Way
07:00-08:00	9	18	34	2	6	8	0	6	6	1	1	8	5	5	10	0	0	0
08:00-09:00	61	43	125	2	12	14	0	18	18	49	6	75	7	7	14	0	0	0
09:00-10:00	23	14	38	3	4	7	0	0	0	10	1	12	7	7	15	0	0	0
10:00-11:00	14	13	27	2	4	6	0	0	0	3	2	4	7	6	13	0	0	0
11:00-12:00	15	14	30	3	3	7	0	0	0	4	3	7	7	6	13	0	0	0
12:00-13:00	23	25	48	3	3	7	0	0	0	4	5	9	14	13	27	0	0	0
13:00-14:00	31	29	60	3	3	7	0	0	0	7	5	12	16	17	33	0	0	0
14:00-15:00	19	19	38	3	3	7	0	0	0	4	3	7	10	10	20	0	0	0
15:00-16:00	45	61	127	7	4	11	18	0	18	4	44	69	9	9	17	0	0	0
16:00-17:00	34	22	64	7	4	11	6	0	6	5	6	17	8	8	16	0	0	0
17:00-18:00	29	32	61	7	4	11	0	0	0	3	9	12	9	9	19	0	0	0
18:00-19:00	47	38	85	6	3	9	0	0	0	3	5	8	11	11	22	0	0	0
19:00-20:00	21	15	36	4	2	6	0	0	0	0	0	0	9	9	17	0	0	0
20:00-21:00	29	36	65	3	2	5	0	0	0	0	0	0	7	7	14	0	0	0
Daily Totals	**401**	**380**	**837**	**57**	**59**	**116**	**24**	**24**	**48**	**95**	**90**	**241**	**125**	**124**	**249**	**1**	**0**	**1**

Time	Hotel Arrival	Departure	Two Way	Office Arrival	Departure	Two Way	Cinema Arrival	Departure	Two Way	Gym Arrival	Departure	Two Way	Community Arrival	Departure	Two Way	Extra Care Arrival	Departure	Two Way	Healthcare Arrival	Departure	Two Way	Non-Residential Total Arrival	Departure	Two Way	% of Total Trips
07:00-08:00	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	7	12	26	76%
08:00-09:00	0	0	0	2	0	2	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	58	32	111	89%
09:00-10:00	0	0	0	1	0	2	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	20	10	30	81%
10:00-11:00	0	0	0	1	0	1	0	0	0	0	0	1	0	0	0	0	1	1	0	0	0	11	10	21	78%
11:00-12:00	0	0	0	0	1	1	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	12	11	23	78%
12:00-13:00	0	0	0	1	1	2	0	0	0	1	0	1	0	0	0	0	0	1	0	0	0	20	21	41	86%
13:00-14:00	0	0	0	1	1	2	2	1	4	0	1	1	0	0	0	0	0	1	0	0	1	28	25	53	89%
14:00-15:00	0	0	0	1	1	1	0	0	1	0	0	1	0	0	0	0	0	1	0	0	0	16	15	31	82%
15:00-16:00	0	0	0	1	1	1	6	2	8	0	0	1	0	0	0	0	0	1	0	0	0	38	57	116	91%
16:00-17:00	0	0	0	0	1	1	7	3	10	0	0	1	0	0	0	0	0	1	0	0	1	27	18	52	82%
17:00-18:00	0	0	0	0	2	2	8	7	15	1	0	1	0	0	0	0	0	1	0	0	0	22	28	50	82%
18:00-19:00	0	0	0	0	1	1	25	16	42	1	1	2	0	0	0	0	0	1	0	0	0	41	35	76	89%
19:00-20:00	0	0	0	0	0	0	7	3	10	1	1	2	0	0	0	0	0	0	0	0	0	16	13	29	82%
20:00-21:00	0	0	0	0	0	0	19	26	45	0	1	1	0	0	0	0	0	0	0	0	0	26	34	60	93%
Daily Totals	**0**	**0**	**0**	**9**	**8**	**17**	**75**	**59**	**133**	**7**	**7**	**14**	**1**	**1**	**3**	**5**	**5**	**10**	**3**	**2**	**5**	**222**	**191**	**413**	**49%**

	Residential	Residential Trips to Education (Primary)	Education (Secondary)	Retail	Restaurant	Hotel	Office	Cinema	Gym	Community	Extra Care	Healthcare
Cyclist Modeshare	3%		6%	1%	1%	1%	2%	6%	4%	1%	2%	1%

Cyclist Trip Distribution Amongst Railway Crossings AM Peak (0800-0900)

Arrival = Northbound trips; Departure = Southbound trips.

	Crossing	Residential[1] Arrival	Departure	Two Way	Residential Trips to Education (Primary)[2a] Arrival	Departure	Two Way	Education (Secondary)[2b] Arrival	Departure	Two Way	Retail[3] Arrival	Departure	Two Way	Restaurant[4] Arrival	Departure	Two Way	Hotel[5] Arrival	Departure	Two Way
	North of Railway Line	85%	85%	85%	81%	81%	81%	41%	41%	41%	90%	90%	90%	50%	50%	50%	50%	50%	50%
South of Railway Line	North Sheen Level Crossing / North Sheen Footbridge	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Clifford Avenue Roadbridge	2%	2%	2%	0%	0%	0%	1%	1%	1%	4%	4%	4%	18%	18%	18%	4%	4%	4%
	Kingsway Footbridge	2%	2%	2%	0%	0%	0%	21%	21%	21%	1%	1%	1%	3%	3%	3%	2%	2%	2%
	Mortlake Level Crossing	0%	5%	0%	0%	16%	0.161401	0%	12%	0%	0%	0%	0%	2%	2%	2%	10%	10%	10%
	Mortlake Footbridge	5%	0%	5%	17%	1%	1%	13%	1%	13%	1%	1%	1%	6%	6%	6%	30%	30%	30%
	Mullins Path Footbridge	1%	1%	1%	2%	2%	2%	7%	7%	7%	1%	1%	1%	4%	4%	4%	4%	4%	4%
	Queen's Road Footbridge	1%	1%	1%	0%	0%	0%	8%	8%	8%	2%	2%	2%	4%	4%	4%	0%	0%	0%
	White Hart Lane Level Crossing	5%	5%	5%	0%	0%	0%	10%	10%	10%	1%	1%	1%	15%	15%	15%	0%	0%	0%
		100%	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Crossing	Office[6] Arrival	Departure	Two Way	Cinema[7] Arrival	Departure	Two Way	Gym[8] Arrival	Departure	Two Way	Community[9] Arrival	Departure	Two Way	Extra Care[10] Arrival	Departure	Two Way	Healthcare[11] Arrival	Departure	Two Way
North of Railway Line	50%	50%	50%	50%	50%	50%	50%	50%	50%	100%	100%	100%	50%	50%	50%	50%	50%	50%
North Sheen Level Crossing / North Sheen Footbridge	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Clifford Avenue Roadbridge	8%	8%	8%	18%	18%	18%	18%	18%	18%	0%	0%	0%	13%	13%	13%	13%	13%	13%
Kingsway Footbridge	8%	8%	8%	3%	3%	3%	3%	3%	3%	0%	0%	0%	5%	5%	5%	5%	5%	5%
Mortlake Level Crossing	2%	2%	2%	2%	2%	2%	2%	2%	2%	0%	0%	0%	2%	2%	2%	2%	2%	2%
Mortlake Footbridge	6%	6%	6%	6%	6%	6%	6%	6%	6%	0%	0%	0%	6%	6%	6%	6%	6%	6%
Mullins Path Footbridge	8%	8%	8%	4%	4%	4%	4%	4%	4%	0%	0%	0%	5%	5%	5%	5%	5%	5%
Queen's Road Footbridge	8%	8%	8%	4%	4%	4%	4%	4%	4%	0%	0%	0%	4%	4%	4%	4%	4%	4%
White Hart Lane Level Crossing	8%	8%	8%	15%	15%	15%	15%	15%	15%	0%	0%	0%	15%	15%	15%	15%	15%	15%
	100%	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Education Trips if Site Not Built

Crossing	Richmond Park Academy Education[2] Arrival (now becomes Southbound trips)	Departure (now becomes Northbound trips)	Two Way
Mortlake Level Crossing	11%	0%	7%
Mortlake Footbridge	1%	11%	1%

Cycling Trip Distribution Amongst Railway Crossings Mid-Peak (1500-1600)

Crossing	Res. A	Res. D	Res. TW	Prim. A	Prim. D	Prim. TW	Sec. A	Sec. D	Sec. TW	Retail A	Retail D	Retail TW	Rest. A	Rest. D	Rest. TW	Hotel A	Hotel D	Hotel TW	Office A	Office D	Office TW	Cinema A	Cinema D	Cinema TW	Gym A	Gym D	Gym TW	Comm. A	Comm. D	Comm. TW	Extra Care A	Extra Care D	Extra Care TW	Health. A	Health. D	Health. TW	RPA A	RPA D	RPA TW
Mortlake Level Crossing*	0%	16%	6%	0%	19%	19%	0%	13%	8%	0%	0%	0%	0%	4%	2%	0%	19%	9%	0%	4%	2%	0%	4%	1%	0%	4%	2%	0%	0%	0%	0%	4%	2%	0%	4%	2%	11%	0%	7%
Mortlake Footbridge*	35%	19%	29%	19%	0%	0%	13%	0%	1%	1%	1%	1%	8%	4%	7%	40%	21%	31%	8%	4%	6%	8%	4%	7%	8%	4%	7%	0%	0%	0%	8%	4%	6%	8%	4%	6%	0%	11%	1%

Cycling Trip Distribution Amongst Railway Crossings PM Peak (1700-1800)

Crossing	Res. A	Res. D	Res. TW	Prim. A	Prim. D	Prim. TW	Sec. A	Sec. D	Sec. TW	Retail A	Retail D	Retail TW	Rest. A	Rest. D	Rest. TW	Hotel A	Hotel D	Hotel TW	Office A	Office D	Office TW	Cinema A	Cinema D	Cinema TW	Gym A	Gym D	Gym TW	Comm. A	Comm. D	Comm. TW	Extra Care A	Extra Care D	Extra Care TW	Health. A	Health. D	Health. TW	RPA A	RPA D	RPA TW
Mortlake Level Crossing*	0%	0%	0%	0%	12%	12%	0%	8%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	7%	0%	4%
Mortlake Footbridge*	35%	35%	35%	19%	8%	8%	13%	5%	7%	1%	1%	1%	8%	8%	8%	40%	40%	40%	8%	8%	8%	8%	8%	8%	8%	8%	8%	0%	0%	0%	8%	8%	8%	8%	8%	8%	5%	11%	4%

Note: Arrivals to the Site are northbound trips over the various level crossings, departures from the Site are southbound trips over the various level crossings.

[1] *It is assumed that most residential trips on foot are to "the shops" and/or local pubs and amenities - most of which (say 60%) are situated on the South Circular Road and Sheen Lane south of the railway line*

[2] *The education proportions are dervied in the "Education - Future" tab*

[3] *The retail trips at the Site are heavily localized around the immediate surrounding area. The are many retail units on Sheen Lane just north of Mortlake LC.*

[4] *The restaurant trips on foot are localized - it is assumed within a 1000m radius and so is split evenly between the LCs and north/south of the railway line*

[5] *The hotel trips on foot are heavily localized - but as tourists/visitors would not know the area well they would be expected to walk towards the shops on Sheen Lane accessed via Mortlake LC.*

[6] *The office trips on foot would be similar to the hotel trips as they would be heavily localised and mainly made by office employees (who mainly don't live in the area) on breaks.*

[7] *The cinema trips follow the same trip distribution of the restaurant.*

[8] *The gym trips follow the same trip distribution of the restaurant.*

[9] *The use of the community area is entirely internalized within the Site.*

[10,11] *The extra care and healthcare trips on foot are expected to be generated mainly from local friends and family who are visiting elderly relatives on foot and so are geographically distributed evenly around the Site.*

PAGE 2 - Map of Site and Surrounding Crossing Points

PAGE 3 - Development Trips Across Crossings at Peak Hours

AM Peak Hour (0800-0900) Trips Across Railway Crossings

Arrival = Northbound trips; Departure = Southbound trips.

Crossing	Res. A	Res. D	Res. TW	Prim. A	Prim. D	Prim. TW	Sec. A	Sec. D	Sec. TW	Retail A	Retail D	Retail TW	Rest. A	Rest. D	Rest. TW	Hotel A	Hotel D	Hotel TW	Office A	Office D	Office TW	Cinema A	Cinema D	Cinema TW	Gym A	Gym D	Gym TW	Comm. A	Comm. D	Comm. TW	Extra Care A	Extra Care D	Extra Care TW	Health. A	Health. D	Health. TW
North of Railway Line	2	10	12	0	15	15	20	2	22	6	6	12	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
North Sheen Level Crossing / North Sheen Footbridge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Clifford Avenue Roadbridge	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Kingsway Footbridge	0	0	0	0	0	0	10	1	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mortlake Level Crossing	0	1	1	0	3	3	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mortlake Footbridge	0	0	0	0	0	0	6	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mullins Path Footbridge	0	0	0	0	0	0	3	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Queen's Road Footbridge	0	0	0	0	0	0	4	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
White Hart Lane Level Crossing	0	1	1	0	0	0	5	1	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	2	**12**	**14**	**0**	**18**	**18**	**49**	**6**	**54**	**7**	**7**	**14**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**

AM Peak Hour (0800-0900) Summary of Trips Across Railway Crossings

Crossing	Total Trips Arrival (Northbound trips)	Departure (Southbound trips)	Two Way	Education Arrival	Departure	Two Way	% of Total Trips	Non-Education Arrival	Departure	Two Way	% of Total Trips
North of Railway Line	29	33	63	20	17	37	58%	10	17	26	42%
North Sheen Level Crossing / North Sheen Footbridge	0	0	0	0	0	0	0%	0	0	0	0%
Clifford Avenue Roadbridge	1	1	1	0	0	0	20%	1	1	1	80%
Kingsway Footbridge	11	1	12	10	1	11	95%	0	0	1	5%
Mortlake Level Crossing	0	4	4	0	4	4	85%	0	1	1	15%
Mortlake Footbridge	7	0	7	6	0	7	93%	0	0	0	7%
Mullins Path Footbridge	4	1	5	3	1	4	89%	0	0	1	11%
Queen's Road Footbridge	4	1	5	4	0	4	87%	0	0	1	13%
White Hart Lane Level Crossing	5	1	7	5	1	6	82%	0	1	1	18%
	61	**43**	**104**	**49**	**24**	**72**	**70%**	**12**	**19**	**31**	**30%**

Mid Peak Hour (1500-1600) Trips Across Railway Crossings

Crossing	Res. A	Res. D	Res. TW	Prim. A	Prim. D	Prim. TW	Sec. A	Sec. D	Sec. TW	Retail A	Retail D	Retail TW	Rest. A	Rest. D	Rest. TW	Hotel A	Hotel D	Hotel TW	Office A	Office D	Office TW	Cinema A	Cinema D	Cinema TW	Gym A	Gym D	Gym TW	Comm. A	Comm. D	Comm. TW	Extra Care A	Extra Care D	Extra Care TW	Health. A	Health. D	Health. TW
North of Railway Line	6	3	9	15	0	15	2	18	20	8	8	16	0	0	0	0	0	0	0	0.3	1	3	1	4	0	0	0	0	0	0	0	0	0	0	0	0
North Sheen Level Crossing / North Sheen Footbridge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Clifford Avenue Roadbridge	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0.0	0.0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Kingsway Footbridge	0	0	0	0	0	0	1	9	10	0	0	0	0	0	0	0	0	0	0.0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mortlake Level Crossing	0	0	0	0	0	0	0	5	5	0	0	0	0	0	0	0	0	0	0.0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mortlake Footbridge	0	0	0	3	0	3	1	0	1	0	0	0	0	0	0	0	0	0	0.0	0.0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Mullins Path Footbridge	0	0	0	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0.0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Queen's Road Footbridge	0	0	0	0	0	0	0	3	4	0	0	0	0	0	0	0	0	0	0.0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
White Hart Lane Level Crossing	0	0	1	0	0	0	0	5	5	0	0	0	0	0	0	0	0	0	0.0	0.0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	7	**4**	**11**	**18**	**0**	**18**	**4**	**44**	**48**	**9**	**9**	**17**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**	**1**	**6**	**2**	**8**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**

Mid Peak Hour (1500-1600) Summary of Trips Across Railway Crossings

Crossing	Total Trips Arrival (Northbound trips)	Departure (Southbound trips)	Two Way	Education Arrival	Departure	Two Way	% of Total Trips	Non-Education Arrival	Departure	Two Way	% of Total Trips
North of Railway Line	34	31	65	16	18	34	52%	17	13	31	48%
North Sheen Level Crossing / North Sheen Footbridge	0	0	0	0	0	0	0%	0	0	0	0%
Clifford Avenue Roadbridge	2	1	3	0	0	0	9%	2	1	3	91%
Kingsway Footbridge	1	10	11	1	9	10	93%	0	0	1	7%
Mortlake Level Crossing	0	6	6	0	5	5	92%	0	0	0	8%
Mortlake Footbridge	5	1	5	4	0	4	77%	1	0	1	23%
Mullins Path Footbridge	1	3	4	1	3	4	83%	0	0	1	17%
Queen's Road Footbridge	1	4	5	0	3	4	80%	1	0	1	20%
White Hart Lane Level Crossing	2	5	7	0	5	5	68%	2	1	2	32%
	45	**61**	**106**	**22**	**44**	**66**	**62%**	**23**	**17**	**40**	**38%**

PM Peak Hour (1700-1800) Trips Across Railway Crossings

Crossing	Res. A	Res. D	Res. TW	Prim. A	Prim. D	Prim. TW	Sec. A	Sec. D	Sec. TW	Retail A	Retail D	Retail TW	Rest. A	Rest. D	Rest. TW	Hotel A	Hotel D	Hotel TW	Office A	Office D	Office TW	Cinema A	Cinema D	Cinema TW	Gym A	Gym D	Gym TW	Comm. A	Comm. D	Comm. TW	Extra Care A	Extra Care D	Extra Care TW	Health. A	Health. D	Health. TW
North of Railway Line	6	3	10	0	0	0	1	4	5	8	8	17	0	0	0	0	0	0	0	0.8	1	4	3	7	0	0	1	0	0	0	0	0	0	0	0	0
North Sheen Level Crossing / North Sheen Footbridge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Clifford Avenue Roadbridge	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0.0	0.1	0	1	1	3	0	0	0	0	0	0	0	0	0	0	0	0
Kingsway Footbridge	0	0	0	0	0	0	1	2	3	0	0	0	0	0	0	0	0	0	0.0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mortlake Level Crossing	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0.0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mortlake Footbridge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Mullins Path Footbridge	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0.0	0.1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Queen's Road Footbridge	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0.0	0.1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
White Hart Lane Level Crossing	0	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0.0	0.1	0	1	1	2	0	0	0	0	0	0	0	0	0	0	0	0
	7	**4**	**11**	**0**	**0**	**0**	**3**	**9**	**12**	**9**	**9**	**19**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**2**	**8**	**7**	**15**	**1**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**

PM Peak Hour (1700-1800) Summary of Trips Across Railway Crossings

Crossing	Total Trips Arrival (Northbound trips)	Departure (Southbound trips)	Two Way	Education Arrival	Departure	Two Way	% of Total Trips	Non-Education Arrival	Departure	Two Way	% of Total Trips
North of Railway Line	21	20	41	1	4	5	12%	19	17	36	88%
North Sheen Level Crossing / North Sheen Footbridge	0	0	0	0	0	0	0%	0	0	0	0%
Clifford Avenue Roadbridge	2	2	4	0	0	0	2%	2	2	4	98%
Kingsway Footbridge	1	2	3	1	2	3	72%	0	1	1	28%
Mortlake Level Crossing	0	1	2	0	1	1	62%	0	0	1	38%
Mortlake Footbridge	1	1	2	0	0	0	22%	1	1	2	78%
Mullins Path Footbridge	1	1	2	0	1	1	44%	1	1	1	56%
Queen's Road Footbridge	1	1	2	0	1	1	43%	1	1	1	57%
White Hart Lane Level Crossing	2	3	5	0	1	1	26%	2	2	3	74%
	29	**32**	**61**	**3**	**9**	**12**	**20%**	**26**	**23**	**49**	**80%**

PAGE 4 - Future Trips Without Development

Existing Trips

These trips have been calculated from analysis of video footage of the Mortlake crossing and footbridge.

New Trips if Site is not built

This section assumes that if the proposed secondary school at the Site is not built then the education trips that were generated to the proposed secondary school will simply go to the existing Richmdon Park Academy instead

The "arrival" numbers from the cyclist trip generation will now correspond to southbound trips (as children and their escorts cycle south to Richmond Park Academy). The "departure" numbers will now correpsond to northbound trips (as children and their escorts leave Richmond Park Academy and return home).

Total Future Trips if Development Not Built

AM Peak Hour (0800-0900) Summary Trips Across Railway Crossings

Crossing	Existing Total Trips Northbound	Southbound	Two Way	+ Education Northbound (what were Departures from Stag school)	Southbound (what were Arrivals to Stag school)	Two Way	= Total Trips Northbound	Southbound	Two Way
Mortlake Level Crossing	0	26	26	0	5	5	0	31	31
Mortlake Footbridge	23	2	25	1	0	1	24	2	26
	23	**28**	**51**	**1**	**6**	**6**	**24**	**34**	**57**

Mid Peak Hour (1500-1600) Summary Trips Across Railway Crossings

Crossing	Existing Total Trips Northbound	Southbound	Two Way	+ Education Northbound (what were Departures from Stag school)	Southbound (what were Arrivals to Stag school)	Two Way	= Total Trips Northbound	Southbound	Two Way
Mortlake Level Crossing	0	23	23	0	0	0	0	23	23
Mortlake Footbridge	1	0	1	5	0	5	6	0	6
	1	**23**	**24**	**5**	**0**	**6**	**6**	**23**	**30**

PM Peak Hour (1700-1800) Summary Trips Across Railway Crossings

Crossing	Existing Total Trips Northbound	Southbound	Two Way	+ Education Northbound (what were Departures from Stag school)	Southbound (what were Arrivals to Stag school)	Two Way	= Total Trips Northbound	Southbound	Two Way
Mortlake Level Crossing	0	18	18	1	0	1	1	18	19
Mortlake Footbridge	5	12	17	0	0	1	5	12	18
	5	**30**	**35**	**1**	**0**	**1**	**6**	**30**	**36**

Page 5 - Future Trips with Development

Existing Trips

These trips have been calculated from analysis of video footage of the crossing

New Trips if Site is built

Total Future Trips if Development Built

AM Peak Hour (0800-0900) Summary Trips Across Railway Crossings

Crossing	Total Existing Trips Northbound	Southbound	Two Way	+ Total Development Trips Northbound	Southbound	Two Way	= Total Trips Northbound	Southbound	Two Way	% Education
Mortlake Level Crossing	0	26	26	0	4	4	0	30	30	12%
Mortlake Footbridge	23	2	25	7	0	7	30	2	32	20%
	23	**28**	**51**	**7**	**5**	**11**	**30**	**33**	**62**	

Mid Peak Hour (1500-1600) Summary Trips Across Railway Crossings

Crossing	Total Existing Trips Northbound	Southbound	Two Way	+ Total Development Trips Northbound	Southbound	Two Way	= Total Trips Northbound	Southbound	Two Way	% Education
Mortlake Level Crossing	0	23	23	0	6	6	0	29	29	18%
Mortlake Footbridge	1	0	1	5	1	5	6	1	6	65%
	1	**23**	**24**	**5**	**6**	**11**	**6**	**29**	**35**	

PM Peak Hour (1700-1800) Summary Trips Across Railway Crossings

Crossing	Total Existing Trips Northbound	Southbound	Two Way	+ Total Development Trips Northbound	Southbound	Two Way	= Total Trips Northbound	Southbound	Two Way	% Education
Mortlake Level Crossing	0	18	18	0	1	2	0	19	20	5%
Mortlake Footbridge	5	12	17	1	1	2	6	13	19	2%
	5	**30**	**35**	**2**	**2**	**4**	**7**	**32**	**39**	

PAGE 6 - Net Impact of Development

Net Impact of Development

This section calculates the net additional movements across the railway crossings if the proposed development is built.

AM Peak Hour (0800-0900) Summary Trips Across Railway Crossings

Crossing	Total Trips Northbound	Southbound	Two Way
Mortlake Level Crossing	0	-1	-1
Mortlake Footbridge	6	0	6
	6	**-1**	**5**

Mid Peak Hour (1500-1600) Summary Trips Across Railway Crossings

Crossing	Total Trips Northbound	Southbound	Two Way
Mortlake Level Crossing	0	5	5
Mortlake Footbridge	-1	1	0
	0	**6**	**5**

PM Peak Hour (1700-1800) Summary Trips Across Railway Crossings

Crossing	Total Trips Northbound	Southbound	Two Way
Mortlake Level Crossing	0	1	1
Mortlake Footbridge	1	0	1
	1	**2**	**2**

Appendix Y Car Park Management Plan

Stag Brewery, Mortlake

Outline Car Park Management Plan

On behalf of Reselton Properti es Ltd

Project Ref: 38262/5501 | Rev: AA | Date: December 2017

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Document Control Sheet

Project Name: Stag Brewery, Mortlake
Project Ref: 38262
Report Title : Outline Car Park Management Plan
Doc Ref: 001
Date: February 2018

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Approved by:	Greg Callaghan	Partner	*G Callaghan*	February 2018
For and on behalf of Peter Brett Associates LLP				

Revision	Date	Description	Prepared	Reviewed	Approved

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1 Introduction

1.1 Background

1.1.1 Peter Brett Associates LLP (PBA) have been appointed by Reselton Properties Limited ('the Applicant') to provide transport planning advice in support of three linked planning applications for the comprehensive redevelopment of the former Stag Brewery Site in Mortlake ('the Site') within the London Borough of Richmond Upon Thames ('LBRuT').

1.1.2 This report provides an outline for a Car Park Management Plan (CPMP) for the proposed development. A detailed CPMP will need to be agreed with the Council prior to first occupation of the development. The overriding objective of the CPMP is to ensure the effective management of all on-site parking in order to minimise risks associated with potential overspill parking from the development onto surrounding residential roads.

1.2 Context

1.2.1 The former Stag Brewery Site is bounded by Lower Richmond Road to the south, the river Thames and the Thames Bank to the north, Williams Lane to the east and Bulls Alley (off Mortlake High Street) to the west. The Site is bisected by Ship Lane. The Site currently comprises a mixture of large scale industrial brewing structures, large areas of hardstanding and playing fields.

1.2.2 The proposed redevelopment will provide homes (including affordable homes), a Care Village for an older population, complementary commercial uses, community facilities, a new secondary school alongside new open and green spaces throughout. Associated highway improvements are also proposed, which include works at Chalkers Corner junction.

1.2.3 The planning application comprises of three linked planning applications, as follows:

- Application A – hybrid planning application for comprehensive mixed use redevelopment of the former Stag Brewery site consisting of:
  - Land to the east of Ship Lane applied for in detail; and
  - Land to the west of Ship Lane (excluding the school) applied for in outline.
- Application B – detailed planning application for the school (on land to the west of Ship Lane).
- Application C – detailed planning application for highways and landscape works at Chalkers Corner.

1.2.4 This Outline Car Park Management Plan (CPMP) sets out the principles that will underpin the management of on-site parking within the Development and will form an appendix to the Transport Assessment (TA) that will support the three linked applications.

1.2.5 The CPMP only relates to Application A since it is considered that the school will be responsible for managing its own on-site parking which in any case is limited to just 15 spaces and so does not merit detailed parking management arrangements.

1.2.6 It is anticipated that a detailed CPMP will need to be agreed prior to the first occupation of the development and that this will be secured by way of a Planning Condition.

1.2.7 The remainder of the document is set out as follows:

- Chapter 2 sets out the detailed car parking proposals, including number of spaces, their allocation between the different uses, their location and general means of access;
- Chapter 3 identifies the main elements of the CPMP and the key principles that will guide the final plan which will need to be approved by the Council.

2 Details of Parking

2.1.1 The TA sets out full details of the proposed parking to support the proposed development and the associated parking strategy that will guide the use of this parking.

2.1.2 The parking strategy for the Site seeks to provide an appropriate balance between ensuring that not too much parking is provided such that parking availability would encourage residents and visitors to use a car as the mode of first choice and providing too little with a potential for parking associated with the development to overspill onto the surrounding residential streets. Accordingly, the proposed parking provision for both the residential and non-residential elements of the development has been set at a level that is less than the maximum LBRuT standards for the location, although it is in accordance with GLA standards.

2.1.3 A parking accumulation exercise was undertaken in respect of the proposed non-residential uses. This was based upon the trip rates agreed with LBRuT and TfL for those individual uses. This is attached at Appendix A and suggests that the proposed parking should be sufficient to cater for normal day to day demand generated by those uses. The maximum demand generated is 68 compared to a proposed provision of 77 spaces for those uses.

2.1.4 The parking for the Site will essentially be provided within two underground car parks, one to the east of Ship lane serving the development within the detailed application, and one to the west serving the proposed residential and Care Village within the Outline application. Parking for the school is provided on plot. Figure 2.1 identifies the location of the two car parks and proposed access routes.

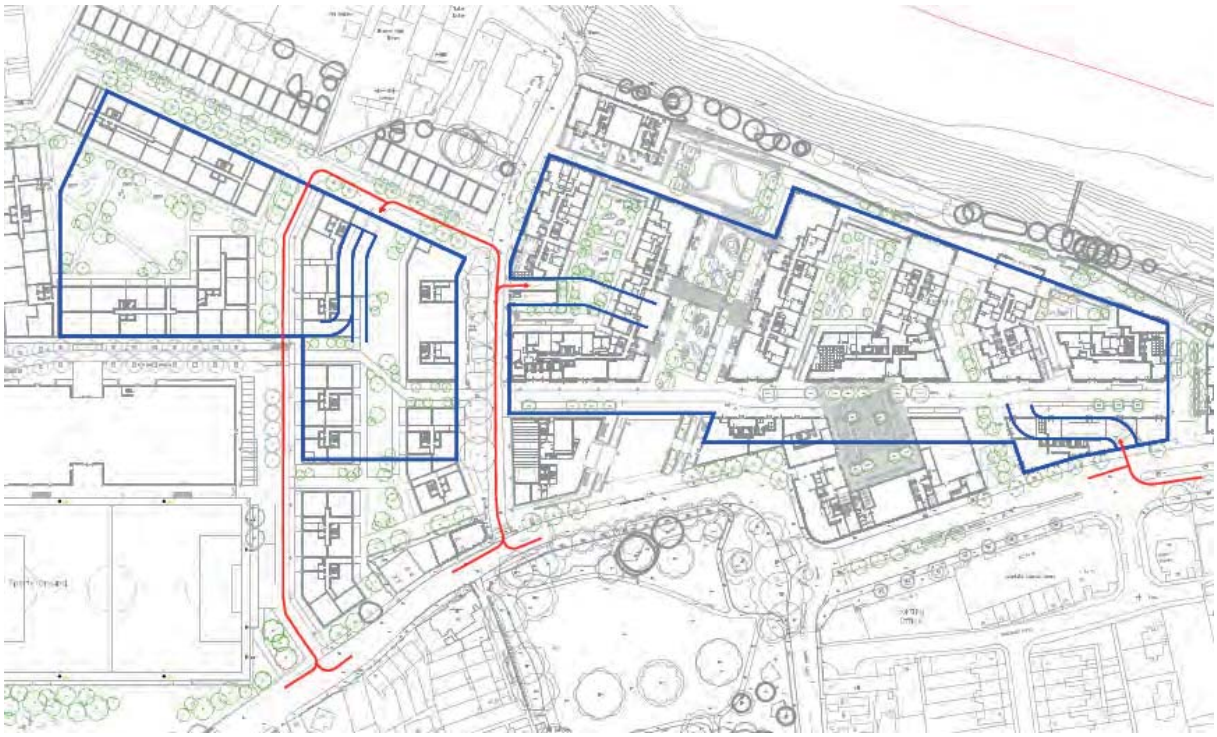

Figure 2.1 Site Access Points and Car Park Entrances

2.1.5 Overall, a total of 408 parking spaces are proposed within the Eastern car park. Figure 2.2 shows the layout proposed for the car park which provides the following:

- Residential Parking Spaces - 331 (38 Disabled spaces)

- Residential Apartments - 443
- Ratio - 0.75 spaces per unit
- Non Residential Spaces - 77 (8 Disabled)

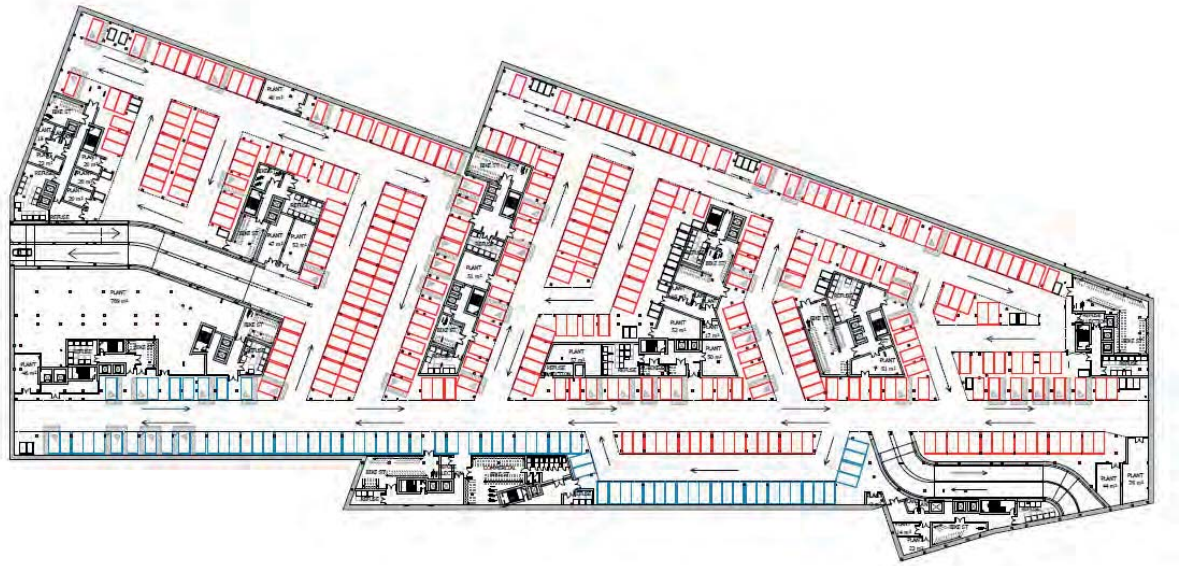

Figure 2.2 Eastern Car Park Layout

2.1.6 The indicative Masterplan illustrates that the western car park could provide 256 spaces. It is anticipated that these would be as follows:

- Residential Parking Spaces - 148 (17 Disabled spaces)
- Residential Apartments - 225
- Ratio - 0.66 spaces per unit
- Care Village - 108 (15 Disabled)

3 Proposed Parking Management Plan

3.1 Objectives

3.1.1 The overriding objective of the CPMP is to ensure the effective management of all on-site parking in order to minimise risks associated with potential overspill parking from the development onto surrounding residential roads. It will also be important to ensure that vehicles accessing the car park do not cause problems on the public highway, for example due to queues forming at the access points. In addition, it will be important to ensure that the car park operates well from the perspective of users, both residents and visitors and that there are mechanisms in place to ensure that any problems that do occur can be detected and rectified.

3.1.2 It is anticipated that the CPMP will be managed by the overall Estate Management Team.

3.1.3 In order to achieve the objectives of the CPMP, it will be important that there is close coordination between the management and operation of the CPMP and of the various Travel Plans that seek to encourage sustainable patterns of traffic. To that end it is anticipated that the Manager of the CPMP would attend the regular Steering Group Meetings of the Stag Framework Travel Plan (FTP).

3.1.4 It is anticipated that the CPMP will cover a number of aspects that will contribute to the overall effectiveness of the management arrangements, including design, charging and enforcement. The following elements will need to be covered by the detailed CPMP:

- Allocation of Residential Parking Permits;
- Charges applied to non-residential parking;
- Methods of payment;
- Means of control to enter and leave the car park;
- Signage, including internal and external signs;
- Enforcement
- Monitoring utilisation of residential and non-residential car parking spaces, including disabled spaces and spaces with electric charging points;
- Preparation of annual monitoring reports to be made available to the Council;
- Communication on parking matters with the Stag Community to include both residents and non-residents;
- Day to day management of the non-residential parking spaces;
- Provision of information to potential visitors to the site regarding the availability of parking and options for pre booking spaces.

3.1.5 The more detailed principles relating to each of the above elements are set out below.

Allocation of Residential Parking Permits

3.1.6 It is anticipated that for the western car park spaces residents will be offered the opportunity to acquire a space on a long lease. Individual spaces will be allocated to individual apartments. The landlord will however, retain the right to temporarily relocate car space demises within the car park through the terms of the lease.

3.1.7 Except for the designated disabled parking spaces these will be sold on a first come basis.

3.1.8 Should demand exceed supply then the Management Company will establish a waiting list and will facilitate transfer of ownership should spaces become available.

3.1.9 Any unsold residential permits can be used to supplement the non-residential parking spaces, subject to the approval of the Council.

3.1.10 Designated disabled spaces will only be allocated to designated wheelchair accessible units.

Charges applied to non-residential parking

3.1.11 It is anticipated that the non-residential parking spaces will not be allocated to a particular end user. If any spaces are to be allocated to specific end users eg the hotel or office, then this would be agreed beforehand with the Council.

3.1.12 Details of penalty charges for over stay or for inappropriate parking will also need to be considered.

3.1.13 The Council will be informed of the proposed charging regime which will generally aim to discourage long stay use (more than four hours).

Methods of payment

3.1.14 Details to be confirmed prior to opening. This will most likely take the form of pay and display although the potential for other technology systems e.g. pay by phone will be considered.

Means of control to enter and leave the car park

3.1.15 To be agreed with the Council prior to opening but will be designed to ensure that any risk of cars queuing back onto the public highway and in particular onto Mortlake High Street, are minimised.

Signage, including internal and external signs

3.1.16 Internal signage will need to ensure that the location of spaces for visitors is clear. Exits from the car parks will also need to be clearly marked. The need for real time signage will need to be considered, including potentially signage to identify empty spaces. The need to sign electric charging points will also need to be considered.

3.1.17 Internal signage will also need to cover pedestrians and cycles. This will need to include locations of any pay and display machines, pedestrian exits and the location of any visitor cycle parking.

3.1.18 External signage strategy will include the potential locations for direction signs and the possible need for variable message signs (VMS).

Enforcement

3.1.19 The enforcement strategy will need to cover both parking incorrectly within the car park eg visitors using residents spaces and inappropriate use of disabled spaces, as well as overstay.

3.1.20 As stated above, consideration will need to be given to penalty charges and the mechanism for enforcing such penalty charges, including the appeals mechanism.

3.1.21 Linked to the above there will be a need to ensure that residents and visitor spaces are clearly marked and to consider possible physical measures to protect residents parking.

Monitoring utilisation of residential and non-residential car parking spaces (including disabled spaces and spaces with electric charging points)

3.1.22 A monitoring regime will be agreed with the Council prior to opening. This will record the number of residential spaces that have been sold/leased, including the number of disabled spaces and will provide an overview of the use of the non-residential spaces.

Preparation of annual monitoring reports to be made available to the Council

3.1.23 Format to be agreed with the Council prior to occupation. The information will also feed into the Travel Plan monitoring reports.

Communication on parking matters with the Stag Community to include both residents and non -residents

3.1.24 Details of how this will be achieved to be set out prior to occupation

Day to day management of the non-residential parking spaces

3.1.25 Identify management measures that will aim to ensure that overspill parking does not occur onto external road network and to minimise risks of queuing on the public highway

Provision of information to potential visitors to the site regarding the availability of parking and options for pre booking spaces

3.1.26 Identify measures that will make it easier for visitors to plan their trip to the Site. This will include information to be provided on the Website regarding access and charging and the general availability of parking.

3.1.27 If available options for pre booking parking should be provided.

3.1.28 The information should seek to discourage people from visiting the Stag by car at busy times without pre booking.

Appendix Z Travel Plans

Stag Brewery, Mortlake

Residential Travel Plan

On behalf of Reselton Properties Ltd

Project Ref: 38262/5501 | Rev: A | Date: February 2018

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Document Control Sheet

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Project Ref: 38262
Report Title: Residential Travel Plan
Doc Ref: 001
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Revision	Date	Description	Prepared	Reviewed	Approved

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Appendix A Development Masterplan

1 Introduction

1.1 Background

1.1.1 This Residential Travel Plan (RTP) has been prepared by Peter Brett Associates LLP (PBA) on behalf of Reselton Properties Limited ('the Applicant') in support of three linked planning applications for the comprehensive redevelopment of the former Stag Brewery Site in Mortlake ('the Site') within the London Borough of Richmond Upon Thames ('LBRuT').

1.1.2 The former Stag Brewery Site is bounded by Lower Richmond Road and Mortlake High Street to the south, the River Thames and existing residential development to the north, Williams Lane to the east and Bulls Alley (off Mortlake High Street) to the west. The Site is bisected by Ship Lane. The Site currently comprises a mixture of large scale industrial brewing structures, large areas of hardstanding and playing fields.

1.1.3 The redevelopment will provide homes (including affordable homes), accommodation for an older population, complementary commercial uses, community facilities, a new secondary school alongside new open and green spaces throughout.

1.1.4 The author of this Travel Plan and relevant contact details are provided in the document control sheet at the front of this report. The company contact details are also noted on the front page.

1.1.5 The Applicant, Reselton Properties Ltd, will manage the RTP for the proposed development and will be responsible for the implementation and further development until a Residential Travel Plan Coordinator (RTPC) is appointed post occupation.

1.2 Site Location

1.2.1 Figure 1.1 below shows the Site location in a local context.

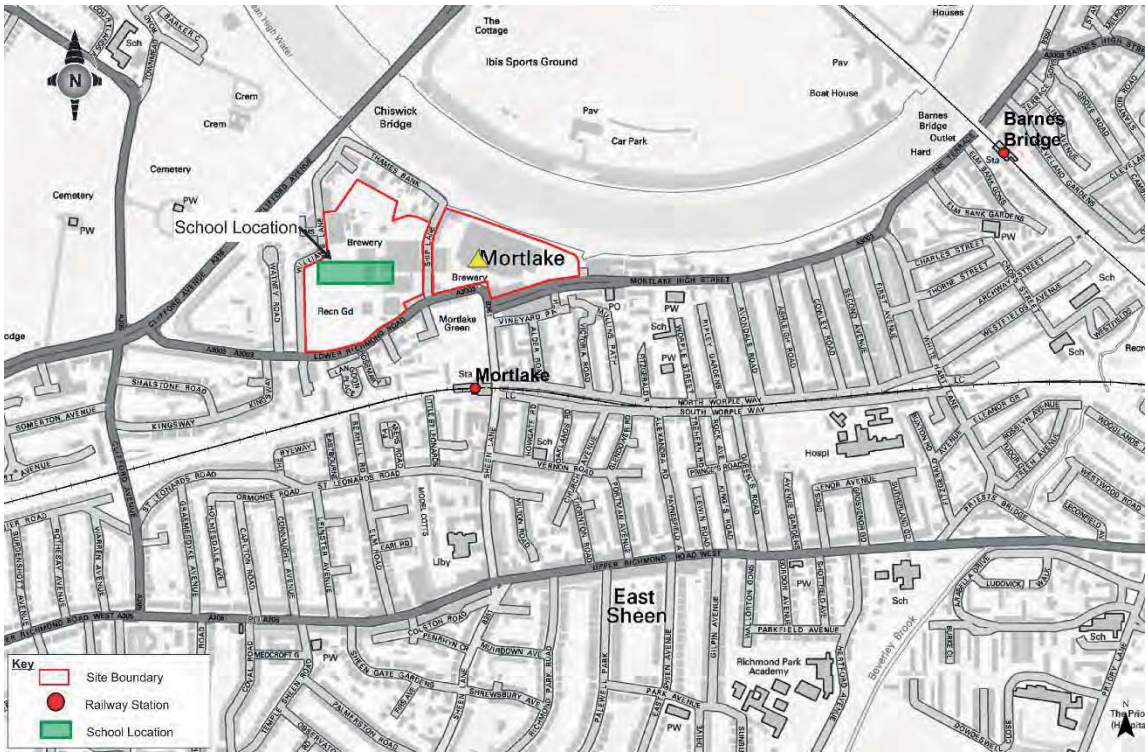


Figure 1.1 Site Location Plan

1.3 Development Proposals

1.3.1 The proposed development seeks to create a new village heart for Mortlake through the provision of a mix of uses, high quality architecture, public realm and landscaping which encourages activity and permeability throughout the site, helping to link Mortlake Green through to the riverside.

1.3.2 The proposed development mix for both the outline and detailed application are set out in Table 1.1. The separate application for the secondary school will be detailed.

Table 1.1 Proposed Detailed Application Development Mix

Land Use	Development Quanta
Detailed Application – Application A (Development Area 1)	
Residential	443 units
Unspecified Flexible Floor Areas inc, Retail/Restaurant/Office/Community/Boathouse	4,664 m^2
Hotel	1,668 m^2 (16 rooms)
Office	2,424 m^2
Cinema	2,120 m^2 (3 screens, 370 seats)
Gym	740 m^2
Management Office	33 m^2
Outline Application	
Residential	Up to 225 units
Residential/Assisted Living	Up to 150 residential or assisted living units
Care Home	70 Units
Detailed School Application	
School	9,319 m^2 (1,200 pupils)

1.3.3 In addition to this RTP there will be a Framework Travel Plan relating to the Site as a whole (i.e. Application A, Development Areas 1 and 2, excluding the School (Development Area 2)). This will set out the overarching principles and objectives for the various travel plans for the Site. There will also be a separate School Travel Plan. This RTP is in accordance with that Framework Plan. There will also be separate travel plans or travel plan statements relating to the individual land uses/units depending on their size or number of employees, in accordance with the Transport for London (TfL) thresholds for the provision of Travel Plans as set out in their Guidance on their Website:

https://tfl.gov.uk/info-for/urban-planning-and-construction/travel-plans#on-this-page-0

1.4 Requirement of a Residential Travel Plan

1.4.1 A full RTP is required for a large residential development such as this.

1.4.2 This RTP is based on the current TfL guidance and has been prepared in accordance with the relevant local best practice travel planning guidance.

1.5 Travel Plan Context

1.5.1 This RTP aims to promote sustainable travel behaviour amongst residents and visitors to the Site. It is considered to be a 'live document'; therefore, not only will it be actively promoted amongst the residents, but reviewed and revised over time and also post occupation of the Site. This will ensure that the RTP is promoting relevant targets that are both suitable and appropriate for the Site, at all stages of the application.

1.6 Travel Plan Structure

1.6.1 This RTP is prepared with the following structure:

- Chapter Two briefly summarises the existing national, regional and local planning policy that informs the writing of this RTP;
- Chapter Three outlines Site accessibility and the existing travel situation;
- Chapter Four presents the development proposals;
- Chapter Five outlines objectives and targets;
- Chapter Six discusses the delivery of the RTP objectives;
- Chapter Seven provides the RTP measures and action plan; and
- Chapter Eight summarises plans and timescales for RTP monitoring and review.

2 Policy Review

2.1 Overview

2.1.1 This section provides a review of the key national, regional and local policy documents relevant to travel planning for the Stag Brewery Site.

2.1.2 The National Planning Policy Framework (NPPF) provides national policy, regional policy is provided by the London Plan (2016), the Mayor's Transport Strategy and TfL's Travel Planning Guidance and finally, the Richmond upon Thames Local Plan, Core Strategy and Development Management Plan provides local guidance.

2.2 National Policy

National Planning Policy Framework, 2012

2.2.1 The NPPF was published in 2012 with subsequent supporting guidance documents prepared in the National Planning Practice Guidance (NPPG), a live document initially published in 2014. The NPPF provides planning policy and the NPPG the guidance to aid its implementation.

2.2.2 The NPPG defines Travel Plans as "long-term management strategies for integrating proposals for sustainable travel into the planning process. They are based on evidence of the anticipated transport impacts of development and set measures to promote and encourage sustainable travel."

2.2.3 Travel Plans, together with Transport Assessments, are used to assess and mitigate the negative transport impacts of the proposed development; and hence, to promote sustainable development. NPPG identifies Travel Plans as a key tool to identify opportunities for the effective promotion and delivery of sustainable transport. All developments which generate significant amounts of movement should be required to provide a Travel Plan.

2.3 Regional Policy

2.3.1 The London Plan, published in July 2011, sets out the overarching policies and principles for developments in London over the next 20-25 years. The London Plan has been further revised in March 2015, Further Alterations to the London Plan (FALP) and March 2016, Minor Alterations to the London Plan (MALP).

2.3.2 A key objective of the Plan states London should be "a city where it is easy, safe and convenient for everyone to access jobs, opportunities and facilities with an efficient and effective transport system which actively encourages more walking and cycling".

2.3.3 The London Plan's objectives pertaining to Travel Plans are as follows:

- To ensure that London is a city where everyone can access jobs, opportunities and facilities with an efficient and effective transport system that actively encourages walking and cycling and makes better use of the Thames;
- To improve the environment locally and globally, so that London becomes a world leader and is at the forefront of policies to tackle climate change, reduce pollution, develop a low carbon economy and consume fewer resources and use them more effectively.

2.3.4 Further policies within the London Plan which encourage the exploration of sustainable travel initiatives are stated below:

2.3.5 Policy 6.11 Smoothing Traffic Flow and Tackling Congestion states that *DPD's (Development Plan Documents) should develop an integrated package of measures.* These measures will aim to reduce the need to travel and consequently traffic flows and congestion. This includes *promoting and encouraging car sharing and car clubs.*

2.3.6 Policy 6.13 Parking posits that *developments in all parts of London must ensure that 1 in 5 car parking spaces (both active and passive) provide an electrical charging point to encourage the uptake of electric vehicles.*

2.3.7 Figure 2.1 below shows the Maximum parking standards for new residential development according to the London Plan.

Suburban	150–200 hr/ha	Parking provision	150–250 hr/ha	Parking provision	200–350 hr/ha	Parking provision
3.8–4.6 hr/unit	35–55 u/ha	Up to 2 spaces per unit	35–65 u/ha	Up to 1.5 spaces per unit	45–90 u/ha	Up to one space per unit
3.1–3.7 hr/unit	40–65 u/ha		40–80 u/ha		55–115 u/ha	
2.7–3.0 hr/unit	50–75 u/ha		50–95 u/ha		70–130 u/ha	
Urban	**150–250 hr/ha**		**200–450 hr/ha**		**200–700 hr/ha**	
3.8 –4.6 hr/unit	35–65 u/ha	Up to 1.5 spaces per unit	45–120 u/ha	Up to 1.5 spaces per unit	45–185 u/ha	Up to one space per unit
3.1–3.7 hr/unit	40–80 u/ha		55–145 u/ha		55–225 u/ha	
2.7–3.0 hr/unit	50–95 u/ha		70–170 u/ha	Up to one space per unit	70–260 u/ha	
Central	**150–300 hr/ha**		**300–650 hr/ha**		**650–1100 hr/ha**	
3.8–4.6 hr/unit	35–80 u/ha	Up to 1.5 spaces per unit	65–170 u/ha	Up to one space per unit	140–290 u/ha	Up to one space per unit
3.1–3.7 hr/unit	40–100 u/ha		80–210 u/ha		175–355 u/ha	
2.7–3.0 hr/unit	50–110 u/hr	Up to one space per unit	100–240 u/ha		215–405 u/ha	

Figure 2.1 London Plan parking standards for residential developments

2.3.8 In addition to the above parking standards and **Error! Reference source not found.**, the London Plan states that,

'*All developments in areas of good public transport accessibility (in all parts of London) should aim for significantly less than 1 space per unit. Adequate parking spaces for disabled people must be provided preferably on-site'*.

2.3.9 Of the parking spaces provided, '*20 per cent of all spaces must be for electric vehicles with an additional 20 per cent passive provision for electric vehicles in the future'* and that '*in outer London areas with low PTAL (generally PTALs 0-1), boroughs should consider higher levels of provision, especially to address 'overspill' parking pressures'*.

2.3.10 Further, major residential developments will be required to contribute towards providing car clubs in the vicinity of the development through CIL and/or Section 106.

2.4 The Mayor's Transport Strategy 2017 consultation

2.4.1 A more recent version of the Mayor's Transport Strategy (MTS) is out to public consultation. This places an even greater emphasis on healthy streets and promoting sustainable travel. The MTS is due to be published in 2018.

2.4.2 The three main themes include

- 'Healthy Streets and Healthy People';
- 'A good public transport experience' and;
- 'New Homes and Jobs'.

2.4.3 'Healthy streets and healthy people' is about creating streets and routes that encourage walking, cycling and public transport. Local streets and neighbourhoods will be designed to

make them pleasant places for people to walk, cycle, and use public transport. Reducing road danger will make people feel safer and more comfortable walking and cycling. A shift away from car use will help London's streets work more efficiently and reduce congestion.

2.4.4 'A good public transport experience' ensures that public transport is the most efficient way for people to travel distances that are too long to walk or cycle, and a shift from private car to public transport could reduce the number of vehicles on the streets. New technologies, such as Wi-Fi to Tube tunnels will make public transport more attractive.

2.4.5 'New homes and jobs' is ensuring that people live and work in well-connected places and transport plays a key role in delivering this. 'Good growth' will provide more opportunities, deliver affordable homes and improve the quality of life. People should be able to live in areas where many of the places they want to go to are within walking and cycling distance, and good public transport connections are available for longer trips.

2.4.6 The new MTS consultation demonstrates a clear focus on providing and promoting sustainable modes of travel.

2.5 Local Policy

Stag Brewery, Mortlake Planning Brief (Supplementary Planning Document, 2011)

2.5.1 The supplementary planning brief for the Stag Brewery Site is set out to provide guidance for the development and what it should contain and represent. The brief also demonstrates the opportunities and constraints surrounding the proposed development.

2.5.2 The brief indicates the desire for a village feel to the Mortlake area to be enhanced by the new development on the Stag Brewery Site focused on a mix of land uses particularly to the east of Ship Lane.

2.5.3 The Brief sets out a requirement to provide a "Green Travel Plan" including a way finding strategy for pedestrians It also stipulates that that the proposals must include car parking (including car club provision) and cycle parking including provision for visitors to the area in line with the Council's standards. It also stresses the importance that the development includes clear proposals to create new pedestrian routes and improve cycle infrastructure in the area.

Local Development Framework Core Strategy, 2009

2.5.4 LBRuT's Core Strategy forms part of a wider Local Development Framework for Richmond Council. The Core Strategy is noted as the most important part of the Local Development Framework and sets out the long-term vision for areas within Richmond and how these areas should be developed by 2024.

2.5.5 CP5 of the Core Strategy outlines the methods Richmond Council have committed to undertaking in order to implement and maintain sustainable travel within the borough.

2.5.6 With regards to transport, the strategy promotes sustainable transport choices with an aim to mitigate the impact of development on the environment, and to reduce the congestion on roads and public transport networks.

Paragraph 8.1.5C in the Core Strategy states that *the council will prioritise the needs of pedestrians and cyclists in the design of new developments including links to existing networks and requiring the provision of adequate cycle parking.*

2.5.7 LBRuT aims to fulfil this by providing and promoting a well-designed bicycle and walking network across the Borough, and improve conditions for cyclists and pedestrians elsewhere.

Development Management Plan, 2011

2.5.8 The LBRuT Development Management Plan (DMP) contain detailed policies which aim to support the achievement of the Core Strategy Objectives. It aims to shape, determine and deliver development with an emphasis on collaboration to promote sustainable developments.

2.5.9 Policy DM TP 3 states that new developments will be expected to create or improve links with the local and wider transport networks, including links to the cycle and pedestrian networks. This supports the Core Strategy in its aim to encourage use of public transport and other sustainable modes of transport. i.e. walking and cycling, whilst reducing reliance on the private car.

2.5.10 Policy DM TP 6 and 7 both express the Council's commitment to maintaining and improving conditions for cyclists and pedestrians by ensuring that new development schemes do not adversely impact on the cycling network or pedestrian environment.

2.5.11 Policy DM TP 8 as it relates to off street parking, states that any new development will need to demonstrate that the new scheme provides an appropriate level of off street parking to avoid an unacceptable impact on on-street parking conditions and local traffic conditions. Where a CPZ is in place new residents may not be eligible for an existing permit, with the exception of blue badge holders.

Draft Local Plan, 2017

In May 2017, the LBRuT submitted the Local Plan (Publication version), to the Secretary of State for Communities and Local Government for independent Examination.

2.5.12 Policy LP 44 - Sustainable Travel Choices of the Local Plan states that the Council will work in partnership to promote safe, sustainable and accessible transport solutions. In terms of walking and Cycling the Council "will *ensure that new development is designed to maximise permeability within and to the immediate vicinity of the development Site through the provision of safe and convenient walking and cycling routes, and to provide opportunities for walking and cycling, including through the provision of links and enhancements to existing networks* "

2.5.13 Furthermore, this policy states that new developments should "*maximise opportunities to provide safe and convenient access to public transport services*".

2.5.14 Paragraph 11.14 states that developments should "*encourage the use of modes other than the car by making it as easy as possible through provision of good pedestrian facilities, clear layout and signage, provision of cycling facilities and improving access to public transport interchanges*".

3 Site Assessment

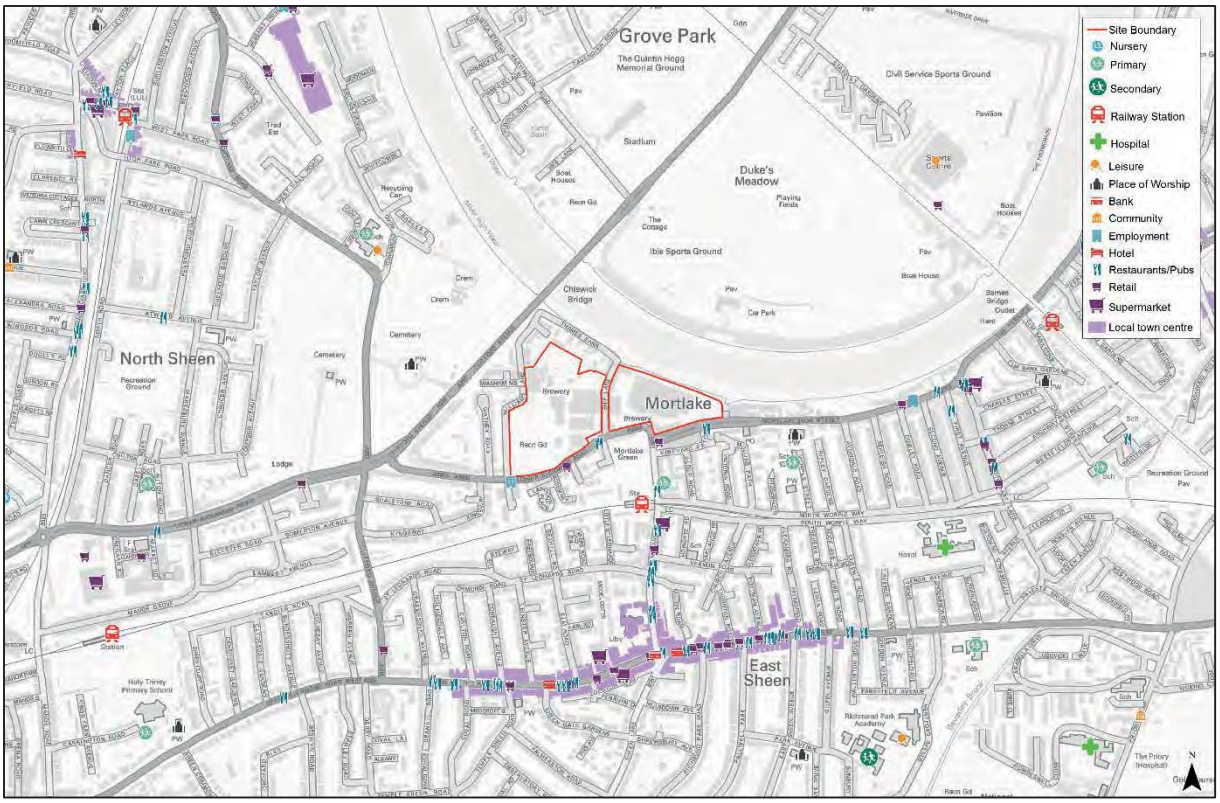
3.1 Introduction

3.1.1 This chapter describes the existing transport conditions on and around the Site. The existing transport context has been examined to ensure that the transport options available to those travelling to and from the Site are identified.

3.2 Local Amenity Provision

3.2.1 Figure 3.1 identifies the wide range of local amenities that are available in the Mortlake area and are easily accessible by foot from the Site. These include public houses, corner shops and employment opportunities along Lower Richmond Road. Sheen Lane provides access to more food/drink establishments as well as both supermarket and non-food retail stores. The nearest local centre, denoted by the purple on the figure, is to the south of the Site centred on the junction of Upper Richmond Road (South Circular) and Sheen Lane.

Figure 3.1 Plan of Local Amenities in Mortlake



3.2.2 In the wider Mortlake area there are several primary schools, and a secondary school. The closest primary school to the Site is Thomson House School located adjacent to the Sheen Lane Level Crossing an approximate 220m walk from the southern end of Ship Lane. The other primary school that's catchment extends to within close proximity of the Site is Kew Riverside Primary school, a one form entry primary school, which may also serve the Site.

3.2.3 Other primary schools in the area but further from the Site include Barnes Primary, Sheen Mount Primary School and East Sheen Primary. Richmond Park academy secondary school, is located to the south of Upper Richmond Road.

3.2.4 Other facilities in the area include Barnes Hospital (approximately 880m walking distance), leisure facilities at Shene Fitness Centre (1.2km) and Chiswick Racquets Club (1.3km) and places of worship (St Mary's Church - 350m, Elim Pentecostal Church, East Sheen). Alternative retail facilities are also available at Kew Bridge Retail Park, including stores such as Next, M&S and Boots among others (2.1km) and along the Lower Richmond Road towards Richmond, including numerous high street shops (580m). The majority of all these facilities are within an appropriate walking or cycling distance from the Site.

3.2.5 Table 3.1 below identifies the existing wide range of local facilities within the area.

Table 3.1 Local Amenities

Amenity		Walking Time from Site
Schools	Kew Riverside Primary	16 minutes
	Sheen Mount Primary	20 minutes
	East Sheen Primary	15 minutes
	Barnes Primary	17 minutes
	Thomson House	3 minutes
Places of Worship	St Mary Magdalen's RC Church	7 minutes
	St Mary's Mortlake	7 minutes
Open Spaces	Mortlake Green	2 minutes
	Vine Road Recreation Ground	22 minutes
Post Offices	Everydays & Mortlake Post Office	5 minutes
	Royal Mail Barnes & Mortlake Delivery Office	2 minutes

3.3 Existing Pedestrian and Cyclists Provision

Pedestrian Network

3.3.1 A Pedestrian Environment Review System (PERS) audit has been carried out in order to assess the existing pedestrian environment in the area and to identify whether any improvements are required in order to provide an acceptable quality of pedestrian access to the Site. The scope of this audit was agreed with TfL prior to the audit taking place and is appended in the Transport Assessment.

3.3.2 The PERS audit confirms that the pedestrian network serving the Site is generally of a good quality providing good connectivity to local facilities, including bus stops and rail stations.

3.3.3 Footways along Lower Richmond Road (A3003), to the south of the Site, are of an adequate width to accommodate all vulnerable road users, although the corner of Lower Richmond Road and Mortlake High Street narrows slightly. Where public transport waiting areas are present on this road they are set back to prevent congested footways. There are very few

crossings along this link which reduces the pedestrian permeability, however the crossings present do give priority to pedestrians.

3.3.4 Williams Lane borders the Site to the west; it is a two lane-single carriageway road. The stretch of road that sits adjacent to the Watney playing fields has pedestrian footways present on the north-bound carriageway side only, measuring approximately 1.5m wide. The remaining stretch of Williams Lane that lies behind the Watney playing fields has pedestrian footways on both sides of the road, which provide an adequate width for pedestrians.

3.3.5 The pedestrian footway on Thames Bank, to the north of the Site, is quite narrow which would pose an access issue for wheelchair users. Despite this, the road is rarely used by vehicle traffic and provides access to the Thames Pathway.

3.3.6 Ship Lane runs through the centre of the proposed Site and only has a pedestrian footway present on the northbound carriageway side. Despite the number of parked cars flanking the footway, permeability is not affected, the parked cars act as a physical barrier to pedestrians from vehicular traffic and cyclists.

3.3.7 Figure 3.2 shows walking isochrones and walk times from the Site The isochrones show distance covered within 5 to 25 minutes walking time in 5 minute increments. Figure 3.2 coupled with Figure 3.1 shows that the Site is within 5 minutes of Mortlake station and within 10 minutes of all of the facilities along Sheen Lane and the South Circular, including the Hospital.

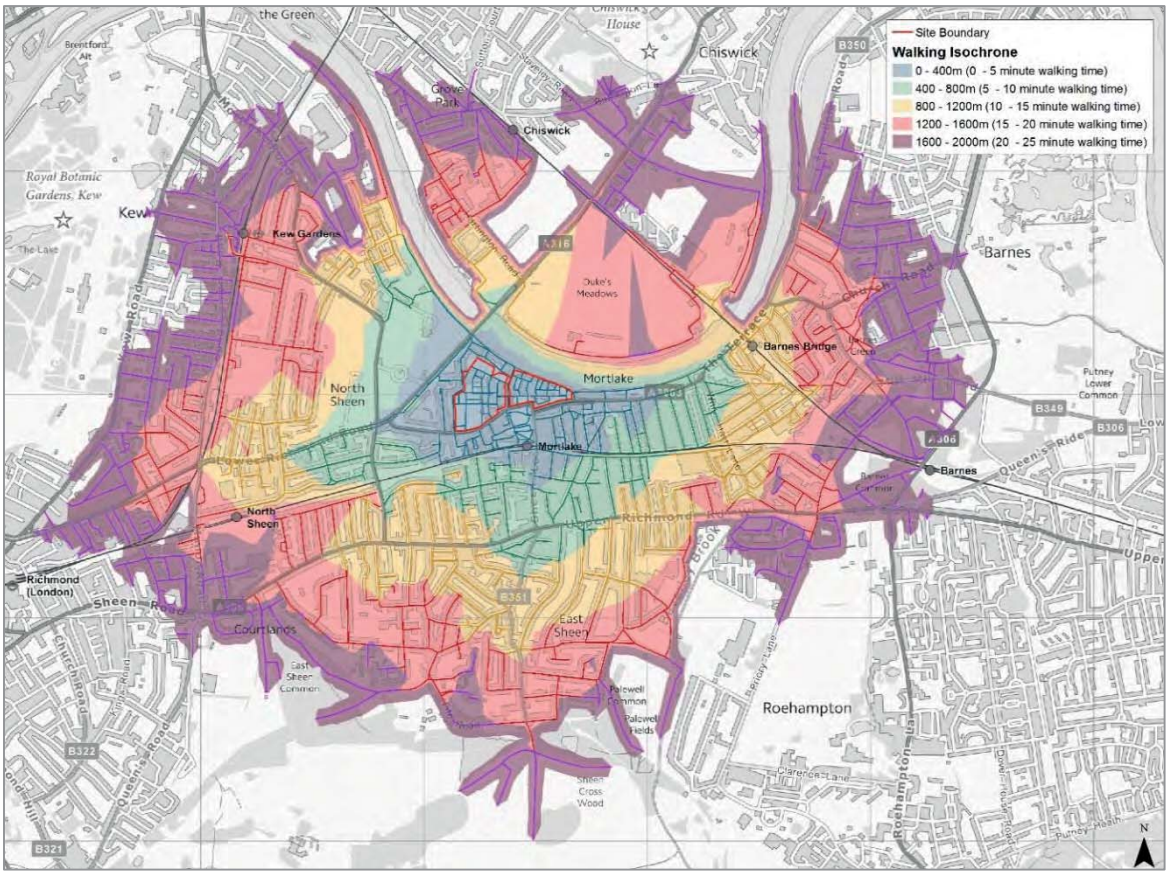


Figure 3.2 Walking Isochrones

Cycle Network

3.3.8 The standard of the Cycle Network in the local vicinity of the Site varies, with some areas being of a good standard and some areas requiring improvements.

3.3.9 Cycle facilities are present on Thames Bank, to the north of the Site, which is a route marked for use by cyclists. Thames Bank forms part of an off-road route along the Thames which effectively connects off-road cycle routes from Clifford Avenue and Williams Lane to The Terrace, to the east of the Site (Development Area 1).

3.3.10 Ship Lane which is also a route marked for use by cyclists and runs through the centre of the Site connecting Thames Bank to Lower Richmond Road (A3003). Both routes are moderately quiet and lit providing a good level of service for cyclists. Cycle infrastructure is also present in Mortlake Green vis signed cycle routes. Cyclists may opt to use Mortlake Green as a through route to access facilities south of the Site towards Mortlake Station.

3.3.11 The current cycle network in the area has a few shortcomings, however, which affect the overall standard. These include the lack of fully connected routes leading to any one destination this is evident in the lack of cycle infrastructure along the Lower Richmond Road and Mortlake High Street corridor. Another of the shortfalls of the Mortlake cycle network is the poor signage indicating that North and South Worpole Way as routes recommended by cyclists.

3.3.12 Figure 3.3 shows the local cycle network in the area according to the TfL Local Cycle Guide 6.

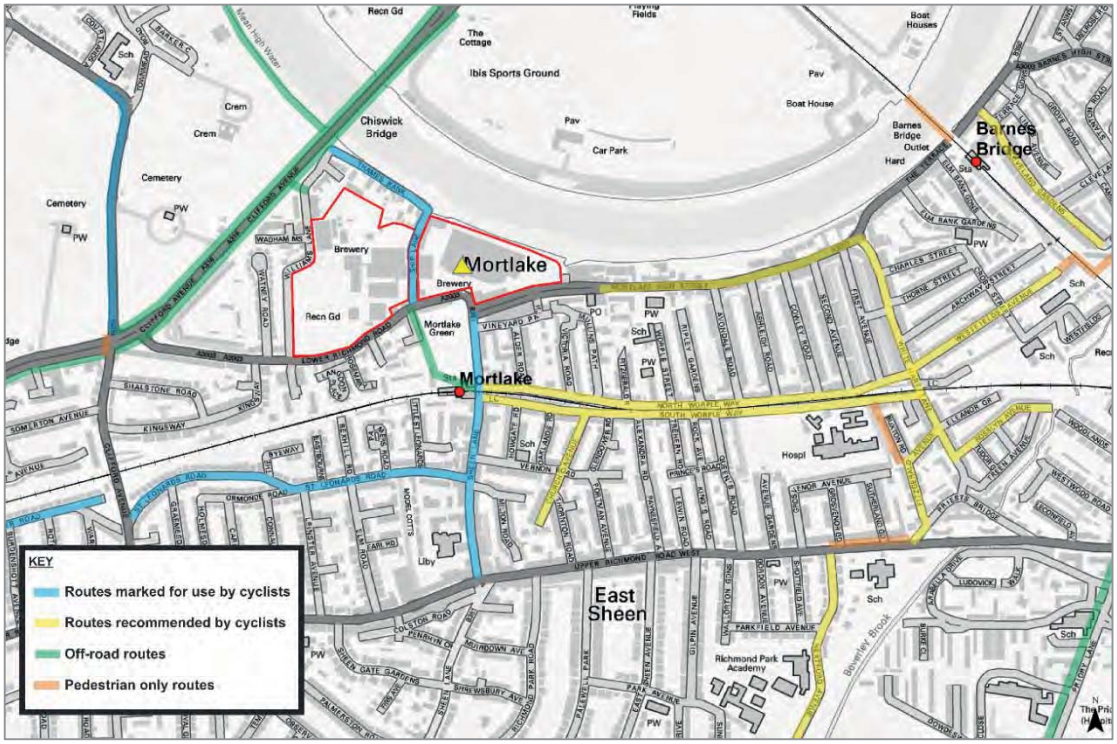


Figure 3.3 Local Cycle Network

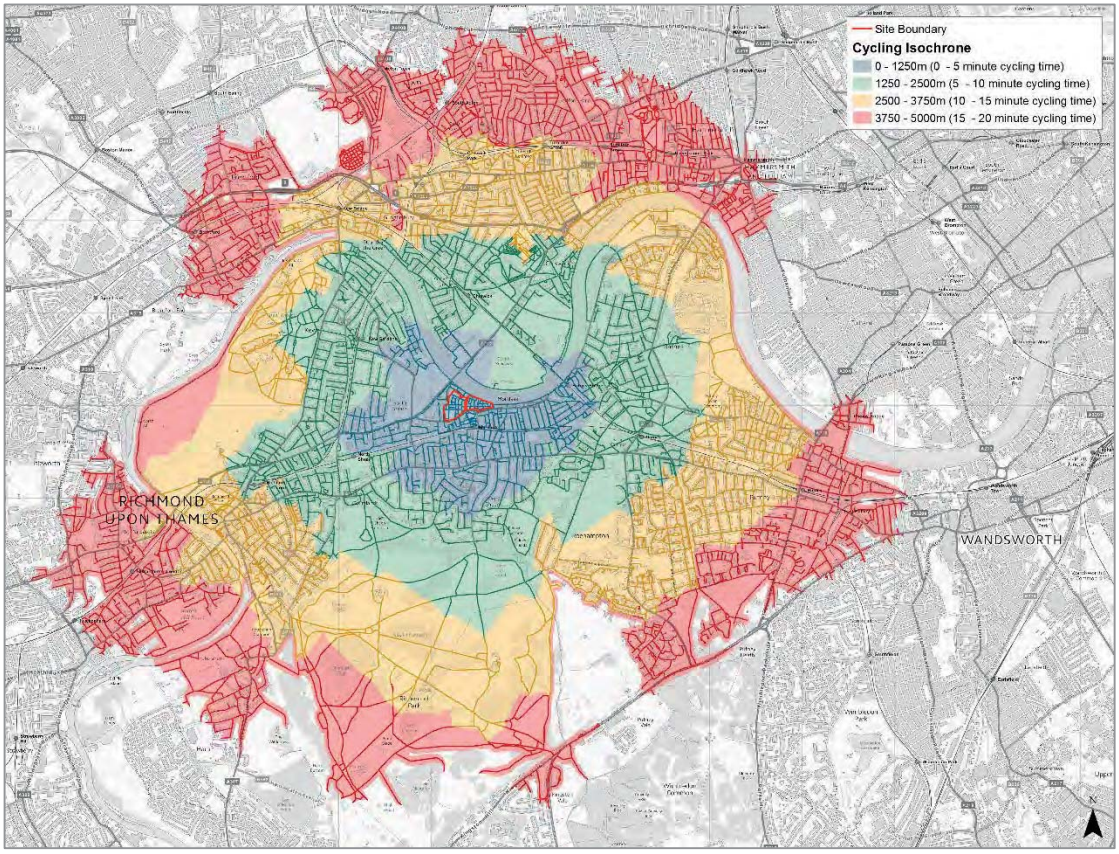


Figure 3.4 Cycle Isochrones

3.3.13 The cycle isochrones presented in 3.4 above shows cycle journey times of up to 20 minutes (in 5 minute increments) from the Site. Also shown in the figure is the extent of facilities easily accessible by cycling to future residents and users of the Stag Mortlake redevelopment Site, these facilities include local schools, places of worship and medical centres.