A1/A2/A3/A4/B1/D1/Boathouse) in order to provide the necessary flexibility to respond to market demand. These are shown by the orange colour on the figure.

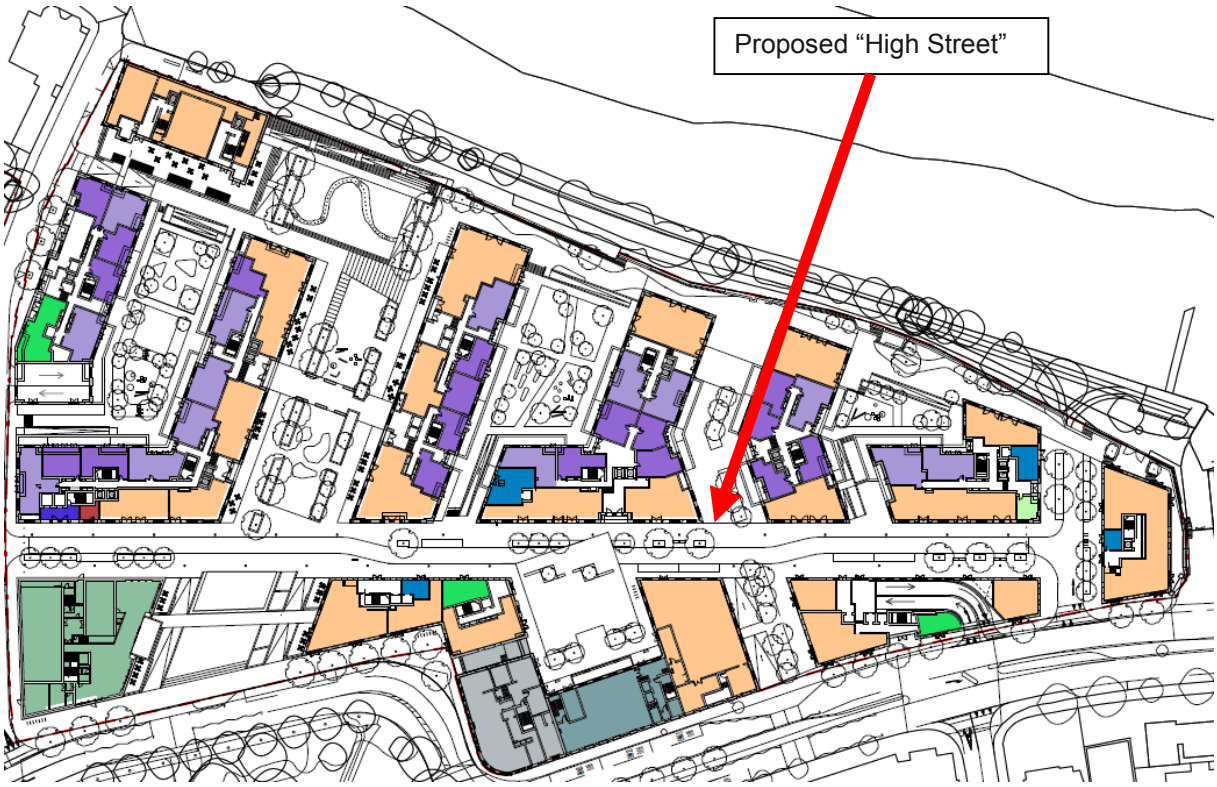


Figure 5.1 Eastern section of the site

5.3.6 For the purposes of this assessment we have assumed the following mix of flexible uses as set out in Table 5.2 below and which are slightly different from the final application floor areas set out in Chapter 4.

Table 5.2 Flexible Use assumptions

Use	Floor Area m^2 (GIA)	Comment
Retail – Local Shops	691	The combined retail area (1,259) is the minimum retail required as part of mix. The area for local shops has been minimised as this use will mainly generate local/linked trips. The food store is the floor area for the unit fronting Mortlake High Street (Block 5).
Retail – Food Store	568	
Office and Financial / Professional Services	1,353	Highest AM peak vehicle generator plus significant PM peak generator
Community	854	Combined ground floor of Maltings and Boathouse buildings which are both identified for this use

Café's, Restaurants and Bars	1,353	Highest vehicle generator during PM peak
Total	4,819	

5.3.7 It is considered that this mix of flexible uses will provide a likely worst case assessment of highway impacts since it is highly unlikely that the Boathouse or the area identified within the Maltings (Blocks 4 and 9) will be used for anything other than community and we have assumed higher levels of office and cafes/bars and restaurants, which have a higher vehicular trip rate than local retail. Table 5.3 then provides the final floor areas for the detailed application that were assumed for assessment purposes, which are again slightly different from the final application arteas set out in Chapter 4.

Table 5.3 Application A (Development Area 1) Non-Residential Units used within Trip Generation Assessment

Land Use	Architects Schedule m^2 (GIA)	Floor Area (GIA)		Units used for Trip Generation
Unspecified Flexible Floor Area inc. Retail/Restaurant/Office/Community	4,819 m^2	Food Store	568 m^2	568 m^2 **
		Local Retail	691 m^2	Included in food store assessment
		Restaurant	1,353 m^2	1,353 m^2
		Office	1,353 m^2	
		Community	854 m^2	854 m^2
Hotel	1,668 m^2	1,266 m^2		16 Rooms
Office	2,424 m^2	2,424 m^2		3,777 m^2 ***
Cinema	2,120 m^2	1,899 m^2		370 Seats
Gym	757 m^2	757 m^2		757 m^2
Total	11,165 m^2	11,265 m^2		

*** 568m^2 represents the size of the convenience store (Building 5) which the retail trip generation is based on.*
**** Including Flexible Use Office*

Application A – Development Area 2 (Outline)

5.3.8 For the Development Area 2, the area shown in Figure 5.2, there are no flexible uses and only three different land uses within the application. The following land uses have been applied for the trip generation assessment.

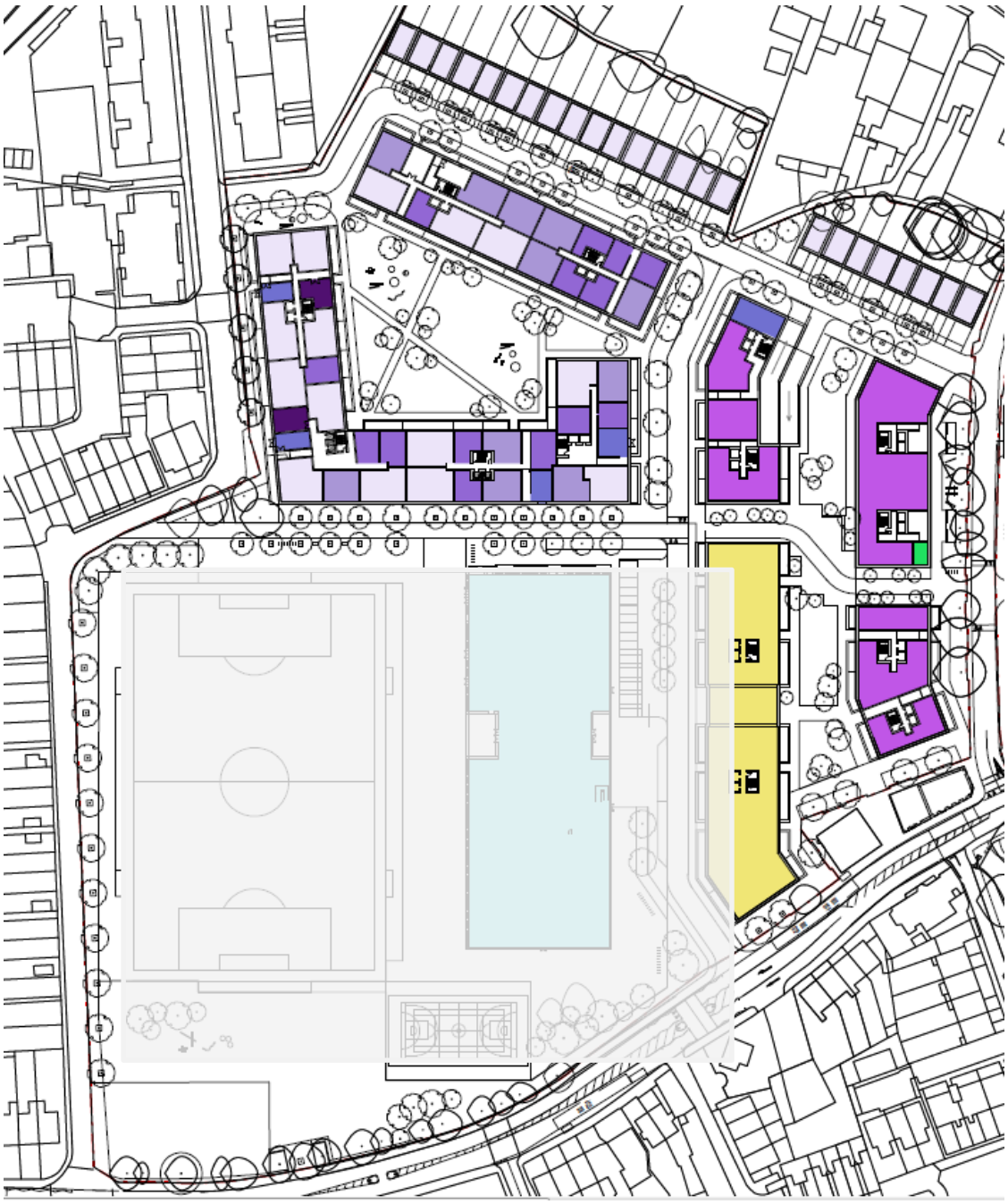


Figure 5.2 Application A (Development Area 2)

Table 5.4 Application A (Development Area 2) trip generation units

Land Use	Floor Area (GIA)	Units used for trip generation

Residential	26,547m^2	Up to 232 Units
Flexible Assisted Living / Residential [1]	12,324 m^2	Up to 150 Assisted Living Units
Care Home	8,450 m^2	Up to 70 Care Home beds

Note 1: It has been previously noted that the outline application (Application A – Development Area 2) seeks flexible permission for up to 150 assisted living units (within blocks 13, 16, 17) to be used as either assisted living units or residential with no age restriction

Application B – Secondary School

5.3.9 The trip generation for the secondary school has been based on the Education and Skills Funding Agency Brief requirements to cater for 1,260 pupils and 60 staff.

5.4 Mode Share

5.4.1 The methodology for calculating mode share has varied depending upon the land use. This is detailed below.

Residential

5.4.2 Vehicular trip rates were based upon an agreed selection of sites. These were:

- Kew Riverside (PBA commissioned survey);
- Kew Riverside Park (PBA commissioned survey);
- Kew Bridge Road (PBA commissioned survey); and
- Wadham Mews (survey undertaken by Aecom as part of their review of parking behaviour within the Borough – Research to Support the London Borough of Richmond-upon-Thames' Review of their Local Parking Standards, 2016)

5.4.3 In order to obtain an estimate of trips by other modes, vehicular trips were subtracted from total person trips. The remaining trips were then divided between the remaining modes based upon the 2011 Census Journey to Work data for the Richmond upon Thames 003 area.

5.4.4 Further details on the mode splits for residential is found within the technical notes in Appendix M.

Hotel, Office, Cinema, and Gym land uses

5.4.5 For the Hotel, Office, Cinema, and Gym land uses the 2011 Census Journey to work data was also used but with Richmond upon Thames 003 selected as the place of work and all other areas the usual place or residence to reflect the proposed development as a place of work rather than residence.

5.4.6 The non-residential mode shares have been adjusted in order to allow for the restrictions and adaptations made to the car driver mode share. In order to increase the bus and rail mode shares proportionately, the car driver mode share used in the vehicle assessment has been subtracted from the census car driver mode share and the difference subtracted from 100%. The census bus and rail mode share has then been divided by this number in order to provide an increased mode share for these modes.

Community Use

5.4.7 It has been assumed that trips associated with the community space would be local and undertaken on foot or by cycle.

Secondary School

5.4.8 The Education mode share has been taken as an average of three travel plan targets for local schools provided by LBRuT. These schools, Richmond Park Academy, Christ's Secondary School and Grey Court Secondary, all have an existing PTAL (2) similar to that of the proposed development site at the moment. Further detail of the justification of using these mode shares is included in Technical Note 8b.

Local Retail, Restaurants and Bars

5.4.9 It is anticipated that the retail and restaurant uses within the development will primarily be used by the local population i.e. new residents / employees within the Stag site and the existing local Mortlake community. Therefore, most trips would be made by foot or by cycle with limited use made of motorised modes of transport including rail and bus. As such TRICS data has been used to provide separate mode shares for the retail and restaurant land uses. As only the convenience store component of the retail contributes to the trip generation the mode share is specific to the convenience store.

Delivery and Servicing

5.4.10 The TRICS based vehicular trip rates relating to the various land uses will generally include service vehicle trips. In developing the delivery and servicing strategy for the site, a separate assessment has been undertaken to estimate such trips and this is detailed within the FDSMP, attached at Appendix J. In order to be robust we have added the estimate of HGV service trips from this assessment to the above trip generation trips as well as the LGV trips from non-residential land uses. These are as follows:

- AM Peak Hour - 28 trips (56 movements)
- PM Peak Hour - 8 trips (16 movements)

5.5 Final Trip Generation Numbers

5.5.1 Based on the above assumptions, total development trip numbers by principal mode of travel for the AM (08:00 to 09:00) and PM peak (17:00 to 18:00) hours are set in the tables below as follows:

Table 5.5 Final Person Trip Generation Numbers

Land Use	08:00 – 09:00			17:00 – 18:00		
	Arrival	Departure	Two Way	Arrival	Departure	Two Way
Detailed Application (Application A – Development Area 1)						
Residential	43	190	233	126	71	197
Retail	238	235	473	324	320	644
Restaurant	0	0	0	125	109	234

Land Use	08:00 – 09:00			17:00 – 18:00		
	Arrival	Departure	Two Way	Arrival	Departure	Two Way
Hotel	3	7	10	5	4	9
Office	79	7	86	12	97	109
Cinema	0	0	0	76	102	178
Gym	12	16	28	30	14	44
Community Space	7	1	8	7	6	13
Detailed Total	382	456	838	705	723	1428
Outline Application (Application A – Development Area 2)						
Residential	44	201	245	124	66	190
Extra Care	22	21	43	17	20	37
Health Care	9	2	11	5	10	15
Outline Total	75	224	299	146	96	242
Detailed School Application (Application B)						
Education	1162	95	1257	50	149	199
Total	**1619**	**775**	**2394**	**901**	**968**	**1869**

Table 5.6 Final Vehicle Trip Generation (HGV Trips in Brackets)

Land Use	08:00 – 09:00			17:00 – 18:00		
	Arrival	Departure	Two Way	Arrival	Departure	Two Way
Detailed Application (Application A – Development Area 1)						
Residential	33	54	88	45	29	74
Retail	7	6	13	8	10	18
Restaurant	0	0	0	6	4	10
Hotel	0	1	1	1	0	1
Office	14	3	17	5	15	20
Cinema	0	0	0	8	11	20
Gym	2	4	5	2	1	2

Land Use	08:00 – 09:00			17:00 – 18:00		
	Arrival	Departure	Two Way	Arrival	Departure	Two Way
Community Space	0	0	0	0	0	0
Detailed Total	56 (26)	67 (26)	123 (52)	75 (6)	70 (6)	145 (12)
Detailed Total including HGVs	82	93	175	81	76	157
Outline Application (Application A – Development Area 2)						
Residential	17	28	46	23	15	38
Extra Care	5	4	9	4	4	8
Health Care	2	1	3	2	2	4
Outline Total	25 (2)	33 (2)	58 (4)	29 (2)	21 (2)	50 (4)
Outline Total including HGVs	27	35	62	31	23	54
Detailed School Application (Application B)						
Education*	105	85	191	12	27	39
Total	**186 (28)**	**185 (28)**	**371 (56)**	**116 (8)**	**118 (8)**	**234 (16)**
Total including HGVs	**214**	**213**	**427**	**124**	**126**	**250**

**No school HGV trips to occur during the peak hours*

Table 5.7 Pedestrian Trips

Land Use	08:00 – 09:00			17:00 – 18:00		
	Arrival	Departure	Two Way	Arrival	Departure	Two Way
Residential	17	83	100	52	28	80
Education	372	30	402	16	48	64
Retail	185	183	368	252	248	500
Restaurant	0	0	0	38	14	52

Land Use	08:00 – 09:00			17:00 – 18:00		
	Arrival	Departure	Two Way	Arrival	Departure	Two Way
Hotel	0	1	1	0	0	1
Office	11	1	12	1	11	13
Cinema	0	0	0	46	40	86
Gym	4	5	8	9	4	13
Community Space	7	4	11	9	4	13
Extra Care	5	5	11	4	5	9
Healthcare	6	1	7	3	7	10
Total	**607**	**313**	**921**	**432**	**410**	**843**

Table 5.8 Cycle Trips

Land Use	08:00 – 09:00			17:00 – 18:00		
	Arrival	Departure	Two Way	Arrival	Departure	Two Way
Residential	2	12	14	7	4	11
Education	23	2	25	1	3	4
Retail	3	3	7	5	4	9
Restaurant	0	0	0	1	1	2
Hotel	0	0	0	0	0	0
Office	6	0	6	1	6	6
Cinema	0	0	0	5	4	9
Gym	2	2	4	5	2	7
Community Space	0	0	0	0	0	0
Extra Care	0	0	1	0	0	1
Healthcare	0	0	0	0	0	0
Total	**37**	**21**	**58**	**25**	**25**	**50**

Table 5.9 Bus Trips

Land Use	08:00 – 09:00			17:00 – 18:00		
	Arrival	Departure	Two Way	Arrival	Departure	Two Way
Residential	9	42	51	27	15	42
Education	523	43	566	22	67	90
Retail	23	23	45	31	31	62
Restaurant	0	0	0	6	5	12
Hotel	0	1	1	1	1	1
Office	12	1	13	2	14	16
Cinema	0	0	0	11	14	25
Gym	2	2	4	5	2	7
Community Space	0	0	0	0	0	0
Extra Care	2	1	3	1	1	3
Healthcare	1	0	1	1	1	1
Total	**571**	**113**	**685**	**106**	**152**	**258**

Table 5.10 Rail Trips (combination of rail and underground trips)

Land Use	08:00 – 09:00			17:00 – 18:00		
	Arrival	Departure	Two Way	Arrival	Departure	Two Way
Residential	17	69	86	56	31	88
Education	8	1	8	5	13	17
Retail	15	14	30	24	24	47
Restaurant	0	0	0	7	7	13
Hotel	1	1	2	2	1	3
Office	8	1	10	9	18	27
Cinema	0	0	0	0	18	18

Land Use	08:00 – 09:00			17:00 – 18:00		
	Arrival	Departure	Two Way	Arrival	Departure	Two Way
Gym	5	3	8	6	6	11
Community Space	0	0	0	0	0	0
Extra Care	0	0	0	0	0	0
Total	**54**	**90**	**144**	**108**	**117**	**225**

5.5.2 As can be seen from the above tables, the school is one of the biggest trip generators during the AM peak hour, accounting for 52.5% of all trips, 44.7% of vehicular trips and 69.2% of public transport trips.

5.5.3 Overall trip generation numbers are substantially lower during the PM peak than in the AM peak due to the reduced impact of the school during the PM peak. Total person trips are 2,394 in the AM peak compared with 1,889 in the PM peak (the PM peak is therefore 78% of the AM peak). In terms of vehicle trips the respective numbers are 427 AM peak and 250 PM peak (PM peak 58% of AM peak) and public transport 829 AM peak and 483 PM peak (PM peak 58% of AM peak).

5.5.4 This trip generation has been agreed with both TfL and LBRuT.

5.6 Distributions

Vehicle Distribution

5.6.1 TfL's South London Saturn model (SoLHAM) has been used to assess the likely impacts of the proposed development on the strategic highway network. It was therefore agreed with TfL that the distribution of trips to/from the development should be estimated using the SoLHAM 2031 forecast traffic distribution to/from three 'donor' zones in the SoLHAM model. The development trips have then been distributed accordingly based on these three zones. A more detailed description of the distribution is included in a Technical Note produced by PBA and attached at Appendix N.

Public Transport Distribution

5.6.2 The distribution of public transport trips, namely bus and rail trips, have been distributed using the census data for journeys to work. These trips were then distributed across the relevant services dependent upon the destination. For example, if someone was recorded as taking the bus to Richmond they would be allocated onto the 419 as this is the most appropriate current service for them to use. The same principle was then applied for Rail, if someone was working in Central London they would be assigned to the eastbound route but if they worked in Richmond, the westbound route.

5.6.3 The following tables show the distribution of Public Transport Users and the expected service they would use.

Table 5.11 Residential Bus distribution

Bus Route	Proportion by Route	Proportion by Direction	
		End destination	Proportion
419	58%	Hammersmith	41%
		Richmond	17%
190	36%	West Brompton Station	36%
209	3%	Hammersmith	3%
R68	3%	Kew	2%

Table 5.12 Non-Residential Bus distribution

Bus Route	Proportion by Route	Proportion by Direction	
		End destination	Proportion
419	76%	Hammersmith	55%
		Richmond	21%
190	18%	West Brompton Station	18%
209	4%	Hammersmith	4%
R68	3%	Kew	3%

Table 5.13 Rail distribution

Direction of Travel	Proportion by Direction
Westbound	28%
Eastbound	72%

5.7 Review of final design changes on Trip Generation

5.7.1 As noted above, there has been some further design development following the issue of the land use schedule in September 2017. The effects of these design changes on trip generation have been set out in detail within Technical Note 22, attached at Appendix O.

5.7.2 This note therefore provides a summary of the trip generation for the AM and PM peak hour for three scenarios as follows:

- Scenario 1 – sets out the vehicular trip numbers used for the highway modelling, which were based upon the September 2017 floor areas, which included the health centre;
- Scenario 2 – provides the updated trip numbers based on the revised scheme but still assuming an age restriction on the 150 assisted living units; and
- Scenario 3 - shows the revised numbers if all 150 units were occupied as residential with no age restriction.

5.7.3 Table 5.14 below provides a summary of these three scenarios. As can be seen, the overall impact is small. Chapter 6 sets out how these changes have been taken into account within the detailed operational highway assessment.

5.7.4 The technical note also confirms that there are no material changes to daily traffic generation as a result of the above changes. Indeed, daily vehicular trip numbers are overall slightly reduced.

Table 5.14 Changes in Peak Hour Vehicular Trip Generation due to Design Changes

Scenario	AM Peak			PM Peak		
	Arrival	Departure	Two Way	Arrival	Departure	Two Way
Scenario 1 – TA Trip Generation	214	213	427	124	126	250
Scenario 2 - January Update	211	211	422	120	122	244
Scenario 3 - No Extra Care	221	228	449	132	130	262
% increase between scenario 1 and 3	+3.3%	+7.0%	+5.2%	+6.5%	+3.2%	+4.8%

5.8 Summary

5.8.1 The Site was previously occupied by the Stag Brewery which was operational from a brewery perspective until December 2015. The buildings have not yet been demolished and so could be reoccupied as a brewery or for another use within the same use class order without the need for planning permission. Data provided by the developer suggest that on a typical working day, when it was fully operational, the brewery generated about 500 vehicle movements daily including a large number of HGV movements. No account has been taken of these historic traffic movements in the assessment i.e. a baseline of zero vehicles, even though the buildings are still in use and could be used as a brewery or for an alternative use covered by the historic planning permissions. Therefore, the assessment of net transport impacts can be considered to be extremely robust.

5.8.2 For the operational development a detailed spreadsheet model has been developed which provides trip estimates for each of the separate land-uses by mode of travel and for each hour

of the day. In order to identify appropriate trip rates for the proposed development data has been drawn from a number of sources. These include the TRICS database, bespoke residential trip generation surveys commissioned by PBA at similar riverside locations and journey to work data from the 2011 Census. In addition, for the cinema use, a first principles model was developed and agreed with LBRuT and TfL which reflected the number of seats and likely arrival and departures profile of visitors based on typical screen times. The various trip rates used in the spreadsheet have been agreed with both TfL and LBRuT through a series of technical notes.

5.8.3 The trip generation estimates have been based upon the anticipated floor areas set out in the land use schedule issued by Squires Architects on 28th September 2017, Since then there has been further design development which has led to small changes to floor areas and to the potential use of apartments originally only identified for elderly, assisted living units, now coming forward as flexible assisted living units / residential units. The effects of these changes has been assessed and shown to be very small.

5.8.4 Based on the agreed trip rates, it is anticipated that the proposed development could generate around 427 2 way vehicular trips during the AM weekday peak (08:00 to 09:00) and 250 2 way trips during the evening weekday network peak (17:00 to 18:00), inclusive of servicing vehicles. The higher AM peak trip generation reflects the combined impact of the school and the other development with the school generating around 45% of all vehicular trips during the AM peak.

5.8.5 Overall, the trip rates can be considered to be robust since they make no explicit allowance for the internalisation of trips within a mixed used development which, since it provides a wide range of facilities and opportunities will reduce the need for travel outside of the area, not only by members of the new community but also by existing residents of Mortlake. In addition, no discount has been applied to take account of the trips that were generated by the previous brewery use.

5.8.6 The trip generation assessment provides the basis for the detailed assessment of development impacts; for the highway network these are considered within Chapter 6 and for the public transport and walking and cycling networks within Chapter 7.

5.8.7 The trip generation takes into account the flexible uses within the development and details the number of person, vehicle, pedestrian, cycle, bus and rail trips. The vehicle trips have been distributed using the distribution taken from the 2031 year of the SoLHAM Saturn Model whilst public transport trips have been distributed using the 2011 Census travel to work distribution.

6 Highway Network Assessment

6.1 Introduction

6.1.1 This chapter provides a review of the operation of the local and strategic highway network surrounding the Site during both the AM (08:00 to 09:00) and PM (17:00 to 18:00) peak hours, with and without the proposed development. This has been observed to already be heavily congested at several times of the day. The methodology for undertaking this work has been discussed at length and agreed with both TfL and LBRuT and has involved both strategic modelling, to allow potential area wide impacts of the development and proposed changes to the highway network to be better understood, as well as detailed modelling of local junctions.

6.1.2 The assessment work is based on the traffic surveys undertaken in 2017 and described in section 2.7.

6.1.3 The uplift in traffic between the base (existing situation) and future base is as predicted by the use of TfL's strategic SATURN model, described later. The effects of the additional development traffic on traffic flows through the network are then based on inputting the predicted development trip generations, set out in Chapter 5, into the strategic model. The model has then been run to identify the likely effects of the development traffic on overall traffic flows through the area and to provide inputs into local junction models, which provide a more detailed and therefore realistic prediction of the operation of an individual junction within the network.

6.1.4 It was noted in the previous chapter that since the main modelling work was undertaken there have been small adjustments made to the development proposals, including a potential change in the use of the units within the assisted living units to allow the potential for their occupation as residential units without age restriction. As a very worst case this could result in an additional 22 trips during the AM peak and 12 trips during the PM peak. These increases would not be enough to materially affect the outcome of the strategic modelling but, in order to ensure a robust assessment, we have undertaken sensitivity tests for the local junction models to assess the additional impact arising from this potential change. The details of this work are set out in a separate technical note (Appendix P) with the results summarised within this chapter.

6.2 Overview of Modelling Work Undertaken

6.2.1 To assess the likely highway impacts of the proposed development, the following transport modelling tools have been used:

- TfL's South London Highway Assignment Model (SoLHAM) has been utilised to assess the effects arising from the proposed development over a wide area, including all arms of Chalkers Corner and the South Circular Road up to its junction with White Hart Lane to the south east of the development site.

- SoLHAM is TfL's strategic Saturn highway model covering south London, which provides a means for assessing the impacts arising from a development on traffic flows and journey times across the wider network covered by the model. It is therefore able to assess the likely changes in vehicle routing that may occur as a result of infrastructure improvements as well as the effects of new development traffic. Whilst the model has been used at the request of TfL, a number of potential shortcomings are noted:

    i. Typically, a strategic model, such as SoLHAM, is better suited to assessing larger scale infrastructure improvements or very large developments, which are likely to have significant impacts on traffic routing and on the wider strategic network;

ii. The 2031 forecast model, which has been used for the future year assessments shown substantial growth in traffic demand as compared with the existing situation (+9% overall in the matrix for both the AM and PM peak). This appears at odds with emerging policy of the Mayor to limit traffic growth with a target to increase the proportion of trips made by non-car modes from 64% to 80% by 2041;

iii. The application of a matrix with potentially unrealistic future demand to a network that is already congested will result in potentially unrealistic increses in reported delays and journey times and route choice due solely to background traffic growth;

iv. A strategic model, such as this, cannot provide realistic representation of the operation of complex junctions such as Chalkers Corner. The local LinSig model will provide a much better representation of such a junction.

- Detailed local junction capacity modelling, using LinSig junction models (A Design and Assessment Tool for Traffic Signal Junctions and Urban Networks) for traffic signals and ARCADY (Assessment of Roundabout Capacity and Delay) and PICADY (Priority Intersection Capacity and Delay) (Junctions 8) models for uncontrolled junctions (roundabouts and priority junctions, respectively), has been undertaken to assess the proposed development impacts on junctions of the local highway network. The coverage of these local assessments has been agreed with both LBRuT and TfL, and comprises the following:
    - LinSig
        - Chalkers Corner signalised junction;
        - Upper Richmond Road / Sheen Lane signalised junction;
    - ARCADY
        - Sheen Lane / Mortlake High Street / Lower Richmond Road roundabout;
    - PICADY
        - Lower Richmond Road / Site internal school access road junction;
        - Lower Richmond Road / Ship Lane junction; and
        - Mortlake High Street / Vineyard Path / Site internal car park access junction.

6.2.2 In addition to the above, a local VISSIM micro-simulation model has been developed for the morning and evening peak hours to better understand the effects of the proposed development on the local network along Lower Richmond Road, Sheen Lane and Mortlake High Street, including interactions with the nearby railway level crossing on Sheen Lane and proposed new pedestrian crossings. This has been used as a design tool only and not as a detailed assessment model.

6.2.3 Assessments have been undertaken for the AM (08:00 to 09:00) and PM (17:00 to 18:00) peak hours, as agreed with TfL and LBRuT, for the following scenarios:

- 2017 Base (Where appropriate)

- 2031 Future Base (FB);
- 2031 Future Base plus Development (FB + Dev).

6.2.4 The impacts arising from proposed changes to the highway network are then reported within the next chapter.

6.2.5 Where appropriate, base models have also been built for the base year 2017, to ensure that they provide an acceptable representation of existing conditions on the date of the traffic surveys. In the case of the Chalkers Corner LinSig model, this has been validated to a high specification in accordance with TfL's Model Auditing Process (MAP) requirements.

6.2.6 TfL's SoLHAM base model was fully validated for the overall modelled area following an extensive review undertaken in conjunction with TfL. This process is described in detail within the PBA technical note "SoLHAM Baseline Review (PBA, October 2017" attached at Appendix N). This process and the technical note were agreed with TfL. The changes made to the base model were then incorporated into the future base forecasting model, again with the agreement of TfL.

6.2.7 The proposed development is anticipated to be fully operational by 2027. However, the assessment year considered is 2031, since this is the forecast year for which TfL's SoLHAM has been set up. The modelling work therefore presents a worst case in terms of representing opening year highway conditions since it includes an additional four years' background growth.

6.2.8 It should be noted that the proposed development at the Stag includes the proposed Chalkers Corner Highway Improvements, since these are deemed to be an essential element of the overall scheme. However, it is considered to be important that the TA demonstrates clearly the impacts of the improvement scheme together with other local mitigation and so an assessment has been included to show how the highway network will operate with the remainder of the development implemented but with no junction improvement at Chalkers Corner.

6.2.9 The strategic modelling has therefore been undertaken for the following scenarios:

- Existing Base;
- 2031 Future Base (FB);
- 2031 Future Base plus Development (FB + Dev) but no highway improvements); and
- 2031 Future Base plus Development plus Chalkers Corner Improvements (FB + CC);
- 2031 Future Base plus Development plus local Improvements on Lower Richmond Road – Mortlake High Street (FB + Dev + LHI) but no Chalkers Corner improvements; and
- 2031 Future Base plus Development plus local Improvements on Lower Richmond Road – Mortlake High Street plus Chalkers Corner (FB + Dev + LHI + CC)

6.2.10 The first three scenarios are dealt with within this chapter, whilst the final three are addressed within Chapter 7.

6.2.11 Two detailed technical notes have been submitted to TfL relating to the strategic modelling undertaken using SoLHAM. These are as follows:

- Technical Note: Stag Brewery Development - SoLHAM Baseline Review (PBA, October 2017); and

- Information Note: Stag Brewery Development - SoLHAM Forecast Assessment (PBA, February 2018).

6.2.12 These provide a detailed review of the strategic modelling work undertaken and have been attached at Appendix N. Both technical notes have been formally approved by TfL. Therefore, this chapter provides only a summary of the key points set out in these notes.

6.3 Traffic Distribution

6.3.1 As agreed with TfL, the distribution of trips to/from the development was estimated using the PBA Stag Brewery Development SoLHAM 2031 forecast traffic distribution to/from three 'donor' zones, included in the SoLHAM model. Full details are provided within SoLHAM Forecast Assessment technical note, included within Appendix N. This also provides details of how the access to the proposed development is represented within that model.

6.4 SoLHAM Modelling Results

6.4.1 As discussed above, the main reason for using SoLHAM is as a means of deriving traffic flows for different scenarios to input into the local junction models, which both take account of forecast future background traffic growth and the likely reassignment of trips due to new infrastructure or development. The local traffic models will, however, provide a much better representation of the operation of an individual junction than can a strategic model such as this.

6.4.2 It is noted that the SoLHAM 2031 model shows quite high levels of overall trip growth as compared with the Base Model of about 9% in both the AM and PM peaks in the overall model, primarily due to an increase of trips with an external origin or destination. This is reflected in some substantial increases in traffic flows on links close to the Stag. In particular, there is an increase in traffic on the A316 at Chiswick Bridge in both directions of between 70 and 200 PCU's per hour in both peaks. Given that the network is already congested the reality of this level of increase, which is reflected in high levels of congestion at key junctions, such as Chalkers Corner, is questioned, particularly given the changing patterns of travel that are now emerging within London.

6.4.3 The increase in development traffic is small in the context of the forecast background traffic growth and is also relatively localised near the proposed site. Tables 6.1 and 6.2 below show traffic flows for the different scenarios modelled in relation to the highway network around the Site as shown in Figure 6.1 below.

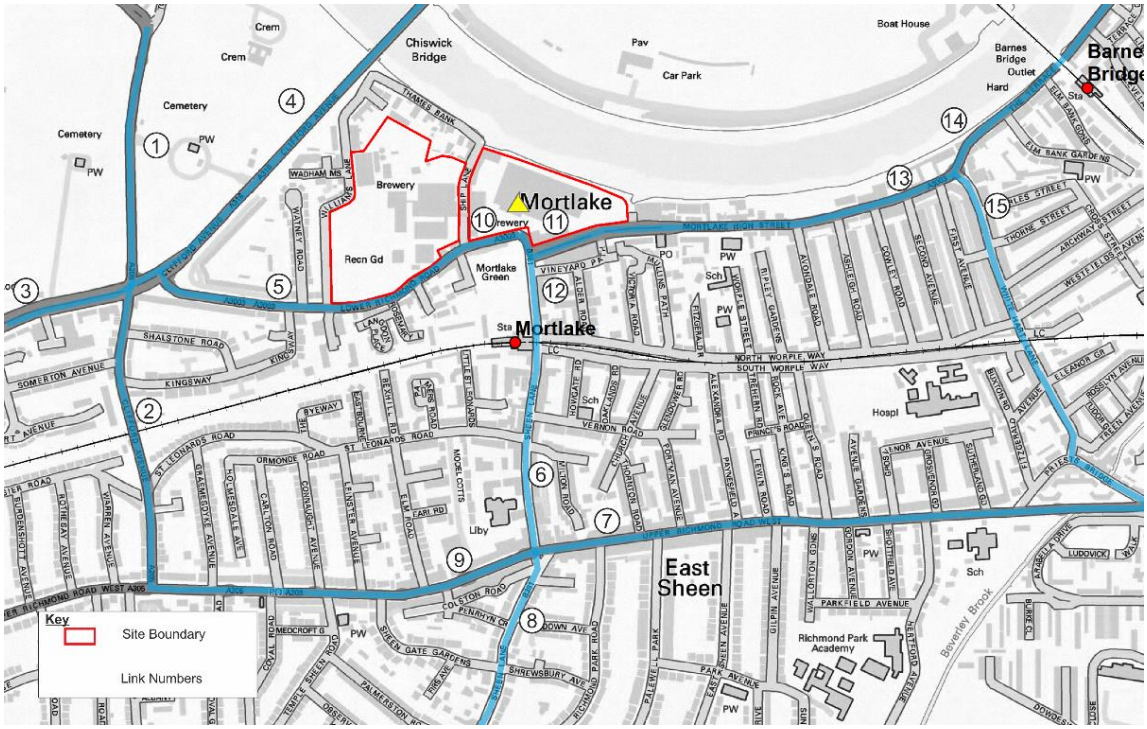


Figure 6.1 Diagram showing links referenced in Tables 6.1 and 6.2

Table 6.1 AM Peak Link Flows for Different Modelled Scenarios showing percentage increase from Future Base to Future Base + Development

node			2031 FB	2031 FB + DEV	2031 FB + DEV + MIT	% Increase/Decrease
1	South Circular (North)	Approach	676	752	785	4.4%
2	South Circular (South)	Approach	673	564	526	-6.7%
3	Lower Richmond Rd (West)	Approach	1598	1635	1654	1.2%
1	South Circular (North)	Exit	631	546	523	-4.2%
2	South Circular (South)	Exit	728	675	677	0.3%
3	Lower Richmond Rd (West)	Exit	1193	1332	1333	0.1%
4	Clifford Rd (East)	Approach	1005	1205	1222	1.4%
5	Lower Richmond Rd (South)	Approach	667	717	721	0.6%
4	Clifford Rd (East)	Exit	1313	1496	1502	0.4%
5	Lower Richmond Rd (South)	Exit	720	638	686	7.5%
6	Sheen Lane (North)	Approach	169	225	237	5.3%
7	South Circular (East)	Approach	711	747	734	-1.7%
8	Sheen Lane (South)	Approach	188	279	306	9.7%
9	South Circular (West)	Approach	541	519	562	8.3%
6	Sheen Lane (North)	Exit	279	349	418	19.8%
7	South Circular (East)	Exit	675	653	682	4.4%
8	Sheen Lane (South)	Exit	215	264	280	6.1%
9	South Circular (West)	Exit	439	503	458	-8.9%
10	Lower Richmond Rd (North)	Approach	778	778	737	-5.3%
11	Mortlake High St (West)	Approach	690	771	725	-6.0%
12	Sheen Lane (South)	Approach	224	272	244	-10.3%
10	Lower Richmond Rd (North)	Exit	694	764	721	-5.6%
11	Mortlake High St (West)	Exit	863	834	738	-11.5%
12	Sheen Lane (South)	Exit	135	223	249	11.7%

node			2031 FB	2031 FB + DEV	2031 FB + DEV + MIT	% Increase/Decrease
13	Mortlake High Street (East)	Approach	814	803	837	4.3%
14	The Terrace (West)	Approach	625	701	691	-1.4%
15	White Hart Lane (South)	Approach	354	411	414	0.8%
13	Mortlake High Street (East)	Exit	641	704	720	2.2%
14	The Terrace (West)	Exit	911	962	978	1.6%
15	White Hart Lane (South)	Exit	240	249	246	-1.2%

Table 6.2 PM Peak Link Flows for Different Modelled Scenarios showing percentage increase from Future Base to Future Base + Development

node			2031 FB	2031 FB + DEV	2031 FB + DEV + MIT	% Increase/Decrease
1	South Circular (North)	Approach	660	595	668	12.3%
2	South Circular (South)	Approach	563	773	586	-24.2%
3	Lower Richmond Rd (West)	Approach	1418	1419	1411	-0.6%
1	South Circular (North)	Exit	477	564	419	-25.7%
2	South Circular (South)	Exit	779	668	745	11.5%
3	Lower Richmond Rd (West)	Exit	1038	1126	1134	0.7%
4	Clifford Rd (East)	Approach	1119	1315	1309	-0.5%
5	Lower Richmond Rd (South)	Approach	642	650	670	3.1%
4	Clifford Rd (East)	Exit	1258	1425	1395	-2.1%
5	Lower Richmond Rd (South)	Exit	760	821	795	-3.2%
6	Sheen Lane (North)	Approach	236	246	253	2.8%
7	South Circular (East)	Approach	633	656	651	-0.8%
8	Sheen Lane (South)	Approach	202	183	199	8.7%
9	South Circular (West)	Approach	514	517	545	5.4%
6	Sheen Lane (North)	Exit	169	174	211	21.3%

node			2031 FB	2031 FB + DEV	2031 FB + DEV + MIT	% Increase/Decrease
7	South Circular (East)	Exit	689	685	683	-0.3%
8	Sheen Lane (South)	Exit	264	246	267	8.5%
9	South Circular (West)	Exit	463	497	487	-2.0%
10	Lower Richmond Rd (North)	Approach	757	831	780	-6.1%
11	Mortlake High St (West)	Approach	773	780	686	-12.1%
12	Sheen Lane (South)	Approach	188	172	206	19.8%
10	Lower Richmond Rd (North)	Exit	656	679	628	-7.5%
11	Mortlake High St (West)	Exit	781	786	755	-3.9%
12	Sheen Lane (South)	Exit	281	317	288	-9.1%
13	Mortlake High Street (East)	Approach	765	778	777	-0.2%
14	The Terrace (West)	Approach	553	609	576	-5.4%
15	White Hart Lane (South)	Approach	423	378	399	5.7%
13	Mortlake High Street (East)	Exit	651	668	642	-4.0%
14	The Terrace (West)	Exit	815	779	810	3.9%
15	White Hart Lane (South)	Exit	277	318	301	-5.2%

6.4.4 A review of the predicted traffic flows reveals the following with respect to the AM peak hour:

- With the exception of the South Circular (south) all approaches to the Chalkers Corner junction show a substantial increase in predicted traffic flows between the existing and future base scenarios. This is particularly marked on the Clifford Avenue approach from the north which shows an increase of 200 pcu's (19.9%). It was noted within the technical note that the reduced traffic on the South Circular appeared to relate to an issue of model convergence and so should be treated with caution;

- Generally, there is observed to be an increase in traffic flows between the existing and future base on the local network identified (average + 6%), on what is already a congested network;

- With the addition of the Stag development there are only small changes observed in the predicted flows across this network. This indicates that the network is predicted to be congested as a result of the forecast increase in background traffic and that through flows have either been held back at other junctions or diverted away from some of these local routes.

6.4.5 A review of the predicted traffic flows for the PM peak reveals a similar pattern to the AM peak:

- Flows on the local network increase on average by about 5% between the existing and future base scenarios but generally there are less pronounced changes on individual links as compared with the AM peak. The exception is the Clifford Road approach from the bridge which has increased by 196 pcu's (17.5%).

Journey Times

6.4.6 Journey times have also been taken from the Strategic model to give an indication of the potential impact that the predicted flow increases between the existing and future base may how on local journey times through Mortlake.

6.4.7 Table 6.3 below shows predicted journey times on the local roads through Mortlake for the different scenarios. This shows large increases in the predicted journey times for the routes towards Chalkers Corner especially in the AM peak between the Base and the future Base, reflecting the increase in background traffic. The additional impact arising from the Stag development proposals is much more modest.

Table 6.3 Journey Times in Seconds

Route	Journey Times (Seconds)								
	Direction	AM Peak Hour				PM Peak Hour			
		2017 Base	2031 FB	2031 FB + Dev	% Increase	2017 Base	2031 FB	2031 FB + Dev	% Increase/ Decrease
Chalkers Corner to Sheen Lane	EB	439	484	561	15.9%	589	812	809	-0.3%
Sheen Lane to Chalkers Corner	WB	688	1417	1538	8.5%	838	924	1064	15.2%
Chalkers Corner to White Hart Lane	EB	258	253	263	3.9%	260	261	264	1.1%
White Hart Lane to Chalkers Corner	WB	482	1017	1088	6.9%	683	774	901	16.4%

Network Analysis and Junction Performance

6.4.8 PBAs Note - SoLHAM Forecast Assessment, Appendix N, present the predicted change in peak hour queue flows and the ratio of volume to capacity for each time period and each modelled scenario. As expected, changes in road network performance are linked to the addition of background traffic growth, leading to predicted increases in congestion in the forecast year relative to the base year. Comparing the future base forecast year with the 2015 base year reveals the following:

- Generally, the morning peak hour is more congested than the evening peak hour with greater levels of queuing and congestion on the PBASBD SOLHAM network in the wider study area;

- There is a notable predicted increase in queued traffic on the A316 at Manor Road and Chalkers Corner in both directions in both time periods with an increase in queued flows of between 100 and 360 PCUs per hour respectively;

- More modest increases in queued traffic occur on the local highway network in the vicinity of the development with up to 120 additional queued PCU's westbound on Lower Richmond Road, westbound, in the morning peak; and

- Network hotspots on the local network in the 2031 forecast year include the A316 at Manor Road, A305 at Manor Road, Chalkers Corner junction, South Circular Road between Upper Richmond Road West and Sheen Lane, and South Circular Road at Priests Bridge.

6.4.9 The additional development traffic is predicted to result in some further increased congestion at the above locations, however, this is relatively slight in the context of the forecast change in network performance over time due to background traffic growth, with an increase of up to 20 queued PCU's.

6.5 Local Modelling

6.5.1 As part of the assessment the following junctions have been assessed using the relevant junction testing software.

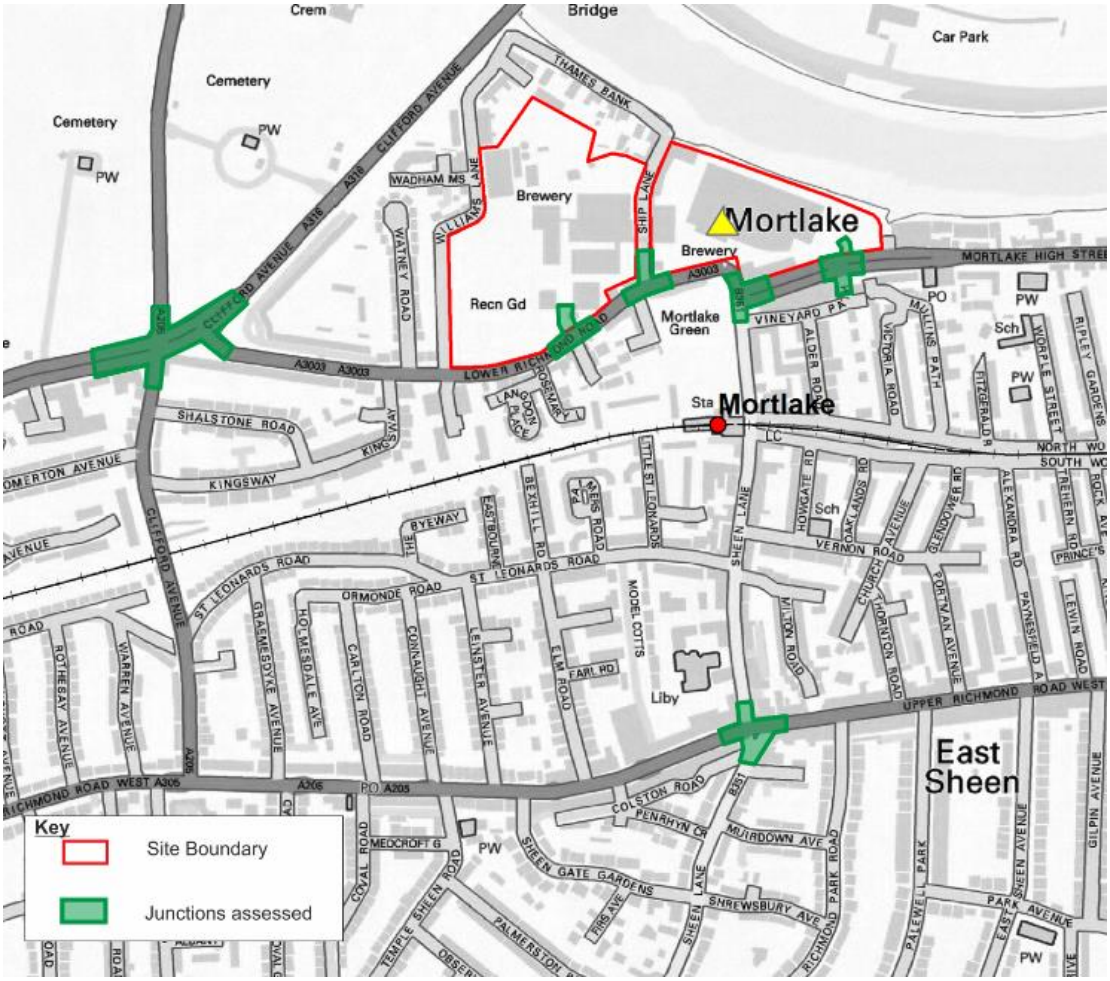


Figure 6.2 Location of Local Junction Models

Local Modelling Results - LinSig

6.5.2 Signal controlled junctions have been modelled by using the industry standard LinSig software. LinSig assesses the capacity of a junction against the against the Degree of Saturation (DoS) and the Practical Reserve Capacity (PRC). The model has been used to assess two junctions, Chalkers Corner and the A205 Upper Richmond Road / Sheen Lane junction.

6.5.3 The DoS is the ratio of demand flow to maximum flow (capacity). Values greater than 100% on a lane indicate that the lane is over saturated and, thus, queues are likely to occur as traffic on that lane tends to no longer be able to fully discharge through the junction during every signal cycle. Best practice considers a lane being at its theoretical/practical capacity when it reaches a DoS of 90% or greater; this is to allow for certain level of flexibility when working with a traffic model.

6.5.4 The PRC is calculated from the maximum DoS on a lane in the junction and indicates the amount by which traffic demand can grow before practical capacity is reached. The PRC thus provides an overview of the operation of the junction, where a positive value represents a junction operating within practical capacity. A negative PRC value thus shows the percentage reduction in traffic which would be required for the junction to operate at a 90% DoS.

6.5.5 The LinSig Modelling Technical Note, included in Appendix Q, outlines the methodology used to produce calibrated/validated base models for the Chalkers Corner junction and Upper

Richmond Road / Sheen Lane junction and subsequently future base scenarios to assess the impact of Stag Brewery development.

6.5.6 On-site measured saturation flow values and Degree of Saturation (DoS %) calculations were undertaken for all the major links at both junctions, where applicable for both AM and PM peak periods. These observed DoS values were then compared against the modelled DoS for the purpose of validation and the difference observed is within 5% for both modelled junctions in line with TfL validation requirements.

6.5.7 The Note, furthermore, presents the results of the model runs, which are summarised below.

Chalkers Corner Junction

6.5.8 The layout of the modelled network for the Chalkers Corner assessment is shown in Figure 6.3.

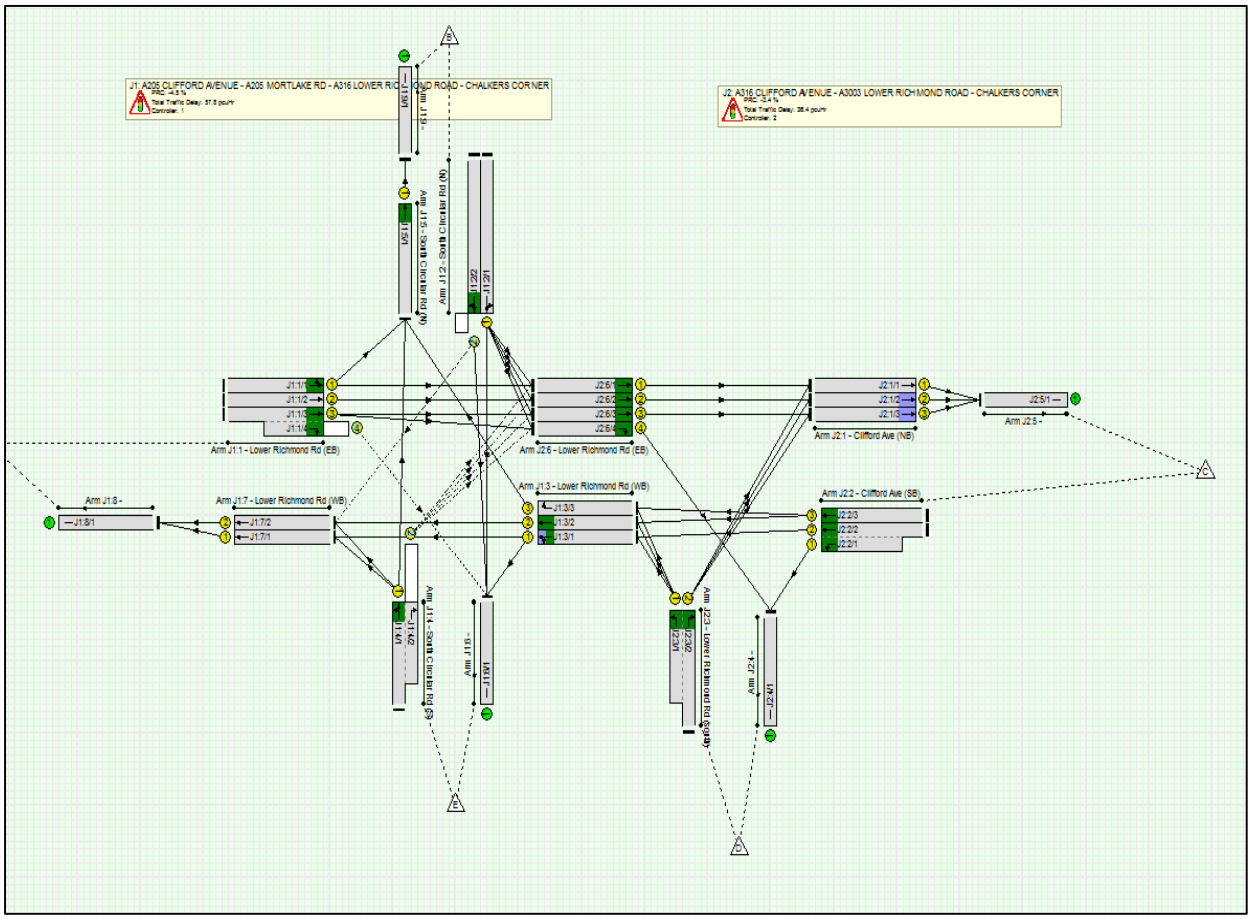


Figure 6.3 Chalkers Corner – LinSig Network Layout

6.5.9 Table 6.1 shows the DoS for each arm and lane of the Chalkers Corner junction and for each tested scenario for the morning and evening peak hours. It shows that for the existing situation (2017 Base), that in the morning peak hour the DoS on most lanes is below 90% indicating that most lanes operate within capacity. These results are based on traffic surveys collected on particular days, however it is acknowledged that the junction frequently appears to operate over capacity. In the evening peak hour, however, the majority of lanes operate over capacity with DoS above 90%.

6.5.10 In the Future Base scenarios, the majority of lanes in the morning peak and all lanes in the evening peak hour would operate over capacity with DoSs predominantly above 90% in the

morning and above 100% in the evening peak hour. This reflects the substantive forecast growth within the TfL traffic model between now and 2031.

6.5.11 With the additional traffic generated by the proposed development in the FB + Dev scenarios, the DoSs would increase only slightly on the majority of lanes in the morning peak hour, but would predominantly decrease in the evening peak hour compared to the FB scenarios. The reason for the slight worsening in the morning peak hour is likely due to traffic of the proposed development taking up spare capacity shown in the FB scenario. Given that in the evening peak hour, the FB is already over capacity, the additional traffic generated by the proposed development is likely to force existing traffic that would travel through the Chalkers Corner junction to re-route, hence the slight improvement.

6.5.12 The local model therefore clearly shows that by 2031, even with no development at the Stag, the Chalkers Corner junction would operate well beyond its desirable capacity during the AM peak and beyond its theoretical maximum capacity during the PM peak. This suggests the need for junction capacity enhancements irrespective of the potential additional impacts of the proposed Stag development.

Table 6.1: Chalkers Corner Junction – Degree of Saturation

	Degree of Saturation (%)					
	AM Peak Hour			PM Peak Hour		
	2017 Base	2031 FB	2031 FB + Dev	2017 Base	2031 FB	2031 FB + Dev
J2:2/2 Clifford Ave SB Lane 2	88.6	98.3	99.3	99.7	122.2	125.2
J2:2/3 Clifford Ave SB Lane 3	88.0	95.8	96.9	102.0	127.6	124.8
J2:3/2 Lower Richmond Road	93.1	98.2	98.4	87.6	128.0	114.8
J1:4/1 S Circular Road NB	86.5	96.2	97.4	83.8	123.8	97.3
J1:1/1 Clifford Ave NB Lane 1	85.4	92.9	91.9	94.6	113.2	94.2
J1:1/2 Clifford Ave NB Lane 2	78.8	93.5	92.5	94.7	114.2	92.7
J1:1/3 Clifford Ave NB Lane 3	94.0	93.5	90.9	87.7	113.6	96.8
J1:2/1 Mortlake Road SB Lane 1	78.3	89.4	96.1	92.2	116.9	105.7
J1:2/2 Mortlake Road SB Lane 2	86.8	88.7	95.9	97.0	91.8	105.8
Whole Junction PRC	**-4.5**	**-10.2**	**-10.4**	**-13.3**	**-42.3**	**-39.1**

6.5.13 As can be seen from the table above the development is shown to have quite a modest impact on the operation of the junction itself since congestion on the network appears to have constrained the level of traffic able to access the junction during the modelled period.

Upper Richmond Road / Sheen Lane Junction

6.5.14 The layout of the modelled network for the Upper Richmond Road / Sheen Lane Junction assessment is shown in Figure 6.4

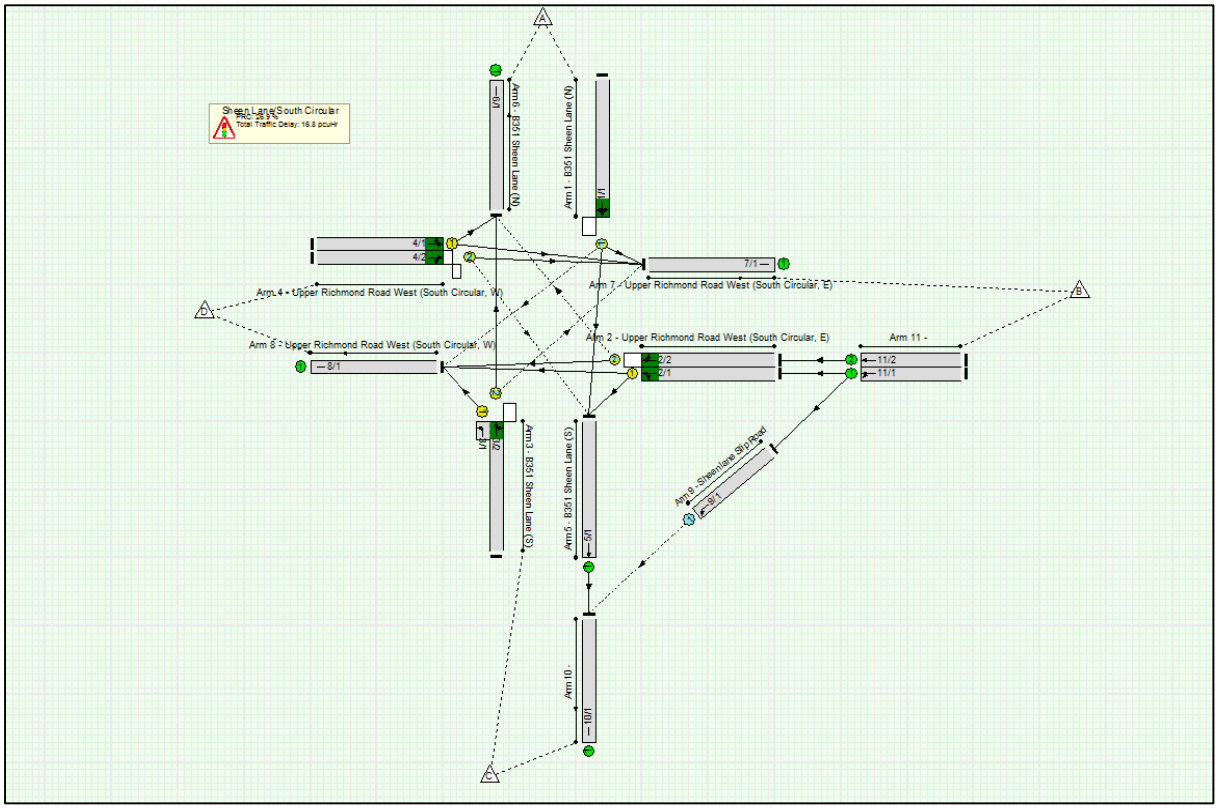


Figure 6.4 Upper Richmond Road / Sheen Lane Junction – LinSig Network Layout

6.5.15 Table 6.2 shows the DoS for each lane of the junction and for each tested scenario for the morning and evening peak hours.

Table 6.2: Upper Richmond Road / Sheen Lane Junction – Degree of Saturation

	Degree of Saturation (%)					
	AM Peak Hour			PM Peak Hour		
	2017 Base	2031 FB	2031 FB + Dev	2017 Base	2031 FB	2031 FB + Dev
Upper Richmond Road West (E) Lane 1	85.5	87.4	96.2	59.3	69.8	72.3
Upper Richmond Road West (E) Lane 2	30.4	29.3	35.6	40.0	49.3	58.3

Sheen Lane NB	62.8	90.8	97.4	57.2	48.5	48.1
Upper Richmond Road West (W) Lane 1	38.3	36.9	41.5	46.7	48.8	52.3
Upper Richmond Road West (W) Lane 2	42.9	41.4	46.2	43.6	46.8	47.8
Sheen Lane SB	59.8	87.5	84.2	81.5	71.2	69.3
Whole Junction PRC (%)	5.2	-0.9	-8.2	10.4	26.3	24.4

6.5.16 The local model shows that the junction currently operates within capacity during both the AM and PM peaks with a PRC of 5.2% in the AM peak and 10.4% during the PM peak.

6.5.17 In the future base model, the operation of the junction is shown to deteriorate somewhat in the AM peak morning peak hour with a slight negative overall PRC of -0.9 indicating that the junction is operating just beyond its desirable capacity. This reflects the predicted increase in traffic through the junction from the SoLHAM model. In the PM peak the future base model is actually shown to operate with an improved level of spare capacity compared to the existing base, although there are slight increases in the DoS values for both south Circular approaches.

6.5.18 With the addition of the Stag development there is a further deterioration in the operation of the junction during the AM peak with the overall PRC increasing to -8.2%, although the majority of links are operating well within capacity. This mainly reflects increased DoS values for the Upper Richmond Road (E) Lane 1 and the local Sheen lane (south) arm

6.5.19 Whilst the model indicates that the junction may operate over capacity with the introduction of the Stag, as previously mentioned these flows are dependent on the strategic model. This has been shown to cause much more significant increases in traffic than the development. It is felt that whilst the development causes the DOS to increase, a large proportion of this increase can be put to the increases between base and future base scenarios from the model.

6.5.20 The modelling suggests that in the evening peak the junction will operate well within capacity with the proposed development. Local Modelling Results – ARCADY and PICADY

6.5.21 One roundabout has been modelled using the ARCADY software and three priority junctions have been modelled using the PICADY software, both of which are contained in the Junctions 8 software, which is the industry standard software used for priority roundabout and junction assessments. the software assesses the capacity of a roundabout or junction against its Ratio of Flow to Capacity (RFC).

6.5.22 The RFC is the ratio of demand flow to capacity at a junction. The RFC provides the basis for the assessment of the performance of a junction. Best practice suggests that an RFC of less than 0.85 is considered to indicate that a junction operates within capacity, where an RFC of 0.85 would represent a junction nearing practical/theoretical capacity.

Sheen Lane / Mortlake High Street / Lower Richmond Road Roundabout (Sheen Lane Mini Roundabout)

6.5.23 Table 6.3 shows the RFC for each arm of the Sheen Lane / Mortlake High Street / Lower Richmond Road roundabout and for each tested scenario for the morning and evening peak hours.

6.5.24 The base, FB and FB + Dev scenarios have been modelled based on the existing roundabout layout, while FB + Dev + Highway Works scenarios have been modelled based on the proposed layout of the roundabout with the additional 60 metre second entry lane on the western approach.

6.5.25 The detailed ARCADY outputs are included in Appendix R.

Table 6.3: Sheen Lane / Mortlake High Street / Lower Richmond Road Roundabout – Ratio of Flow to Capacity

Arm	Ratio of Flow to Capacity					
	AM Peak Hour			PM Peak Hour		
	2017 Base	2031 FB	2031 FB + Dev	2017 Base	2031 FB	2031 FB + Dev
Lower Richmond Road	1.08	1.10	1.07	1.04	1.11	1.05
Mortlake High Street	0.57	0.65	0.63	0.57	0.58	0.51
Sheen Lane	0.34	0.42	0.37	0.35	0.32	0.37

6.5.26 The results show that the Lower Richmond Road arm of the roundabout is forecast to be over capacity in both peak hours and across all scenarios modelled. However, as shown in Table 6.3, in the base, future base and future base plus development scenarios (without highway works) the RFC on the Lower Richmond Road would be over 1.0 in both peak hours, while the RFCs in the FB with Development and Highway Works scenarios would be over 0.9 but under 1.0 in both peak hours.

6.5.27 The two remaining arms of the roundabout would operate with spare capacity across all scenarios during both peak hours.

6.5.28 It should be noted that ARCADY is not able to take account of the effect of the Sheen Lane level crossing, which frequently results in vehicles queuing back into the roundabout when the barriers are down for prolonged periods of time. Furthermore, ARCADY assumes that all queuing would occur along the roundabout arm rather than within the roundabout itself. Therefore, the modelling results need to be viewed with caution.

Lower Richmond Road / Site Internal School Access Road Priority Junction

6.5.29 Table 6.4 shows the RFC for each arm of the Lower Richmond Road / Site Internal School Access Road junction and for each tested scenario for the morning and evening peak hours.

6.5.30 It should be noted that base and FB scenarios have not been tested as there is and would be no priority junction at this location without the proposed development in place.

6.5.31 The detailed PICADY outputs are included in Appendix R.

Table 6.4: Lower Richmond Road / Site Internal School Access Road Priority Junction – Ratio of Flow to Capacity

Movement	Ratio of Flow to Capacity			
	AM Peak Hour		PM Peak Hour	
	2031 FB + Dev	2031 FB + Dev + Highway Works	2031 FB + Dev	2031 FB + Dev + Highway Works
School Access to LRR* (E and W)	0.37	0.41	0.18	0.22
LRR (E) to School Access and LRR (W)	0.12	0.12	0.04	0.04

**Lower Richmond Road*

6.5.32 As can be seen, the Lower Richmond Road / Site Internal School Access Road junction would in the future operate with within capacity, with the maximum RFC of 0.41 forecast in the FB plus Development and Highway Works scenario in the morning peak hour.

Lower Richmond Road / Ship Lane Priority Junction

6.5.33 Table 6.5 shows the RFC for each arm of the Lower Richmond Road / Ship Lane junction and for each tested scenario for the morning and evening peak hours.

6.5.34 It should be noted that the base and FB scenarios have been modelled based on the existing junction configuration, while scenarios with the proposed development have been modelled based on the proposed junction layout.

6.5.35 The detailed PICADY outputs are included in Appendix R.

Table 6.5: Lower Richmond Road / Ship Lane Priority Junction – Ratio of Flow to Capacity

Movement	Ratio of Flow to Capacity							
	AM Peak Hour				PM Peak Hour			
	2017 Base	2031 FB	2031 FB + Dev	2031 FB + Dev + Highway Works	2017 Base	2031 FB	2031 FB + Dev	2031 FB + Dev + Highway Works
Ship Lane to LRR (E and W)	0.03	0.03	0.20	0.22	0.05	0.05	0.19	0.24
LRR (E) to Ship Lane and LRR (W)	0.03	0.03	0.03	0.03	0.02	0.02	0.03	0.03

6.5.36 As can be seen, the Lower Richmond Road / Ship Lane junction is and would in the future operate with within capacity across all scenarios tested, with the maximum RFC of 0.24 forecast in the FB plus Development and Highway Works scenario in the evening peak hour.

Mortlake High Street / Vineyard Path / Site Internal Car Park Access Junction

6.5.37 Table 6.6 shows the RFC for each arm of the Mortlake High Street / Vineyard Path / Site Internal Car Park Access junction and for each tested scenario for the morning and evening peak hours.

6.5.38 The detailed PICADY outputs are included in Appendix R.

Table 6.6: Mortlake High Street / Vineyard Path / Site Internal Car Park Access Priority Junction – Ratio of Flow to Capacity

	Ratio of Flow to Capacity							
	AM Peak Hour				PM Peak Hour			
	2017 Base	2031 FB	2031 FB + Dev	2031 FB + Dev + Highway Works	2017 Base	2031 FB	2031 FB + Dev	2031 FB + Dev + Highway Works
Car Park Access to MHS* (E)	-	-	0.06	0.06	-	-	0.05	0.05
MHS (W) to Vineyard Path	0.06	0.06	0.06	0.06	0.03	0.04	0.04	0.04
Vineyard Path to Car Park Access and MHS (E and W)	0.10	0.11	0.11	0.11	0.10	0.10	0.10	0.10
MHS (E) to Car Park Access	-	-	0.04	0.04	-	-	0.04	0.04

**Mortlake High Street*

6.5.39 As can be seen, the junction is and will be operating with spare capacity across all tested scenarios and in both peak hours.

6.5.40 It can also be seen that the highway works (Chalkers Corner and local highway improvements) would have no impact on the operation of the junction compared to the FB + Development scenario.

6.6 VISSIM Modelling

6.6.1 Two local VISSIM models have been created throughout the application process. The first to be shown at public consultation to indicate the potential improvements based on the Chalkers Corner scheme, which indicated a reduction in queueing from Chalkers Corner along Lower Richmond Road, and the second has been created in order to better understand the interaction between traffic travelling along the Lower Richmond Road-Mortlake High Street corridor. This included the location of pedestrian crossing facilities and the effects of the Sheen lane level crossing barriers. The model was used as a design tool only and was therefore not MAP compliant. The work focussed on the AM peak hour and the model incorporated surveyed barrier down times for that hour.

6.6.2 Details of this modelling work are presented within Appendix S and demonstrate the effect on traffic flow and queuing of different locations for the new pedestrian crossing on Lower Richmond Road to link the two parts of the Green Link. It also helped to better understand the benefits that might occur from providing an extended second approach lane to the Sheen Lane

mini roundabout from the west when the level crossing barrier was down for an extended time. The flows used within these assessments were existing survey data plus trips generated from the development as opposed to flows from the strategic model. As a result, it was felt this was a more robust way of testing the local impacts of the development within the context of the mayor's Transport Strategy.

6.6.3 A number of different layout scenarios were tested as follows:

- Scenario 1 – existing situation
- Scenario 2 – the addition of an approximately 60m flared approach on Lower Richmond Road to Mortlake roundabout
- Scenario 3 - an approximately 60m flared approach on Lower Richmond Road to Mortlake roundabout and a new pedestrian crossing between Ship Lane and Mortlake roundabout
- Scenario 4 - an approximately 60m flared approach on Lower Richmond Road to Mortlake roundabout and a new pedestrian crossing on the Lower Richmond Road bend near Mortlake roundabout, but removal of the existing pedestrian crossing on Lower Richmond Road near Mortlake Roundabout
- Scenario 5 - an approximately 60m flared approach on Lower Richmond Road to Mortlake roundabout and the existing signalised pedestrian crossing plus a new signalised pedestrian crossing on the Lower Richmond Road bend near Mortlake roundabout
- Scenario 6 - an approximately 60m flared approach on Lower Richmond Road to Mortlake roundabout, the existing signalised pedestrian crossing plus a new signalised pedestrian crossing on the Lower Richmond Road bend near Mortlake roundabout and an 8min level crossing delay

6.6.4 The main conclusions arising from the VISSIM modelling were as follows:

- The provision of a new pedestrian crossing on or close to the bend on Lower Richmond Road (approximately 30 metres from the mini roundabout) led to frequent queuing of westbound traffic back into the mini roundabout. Whilst this queuing soon cleared it did have a noticeable effect on average peak hour journey times and increased the length of time for the network took to recover after an extended level crossing barrier down time;
- If the existing Ship Lane crossing was moved to a midpoint between the bend and the existing location, then this did not lead to any blocking back to the mini roundabout and had no material impact on delays or journey times through the network.
- The provision of the additional flare on the approach to the Sheen Lane crossing had a beneficial effect on the eastbound flow of traffic from Lower Richmond Road to Mortlake High Street for level crossing down times of up to around 8 minutes.

6.6.5 As a result of the VISSIM work it was agreed to retain the extended flare as part of the proposed package of local highway works. The VISSIM work also contributed to the decision to abandon the initial proposal to locate the new crossing on the bend of Mortlake Green and instead to relocate the existing crossing, located just to the east of Ship Lane, to the midpoint between the existing location and the bend.

6.7 Summary of Findings

6.7.1 The strategic SoLHAM modelling has shown that the overall impact of the addition of Stag Brewery development traffic is relatively slight in the context of overall (committed) forecast background traffic growth. Quantifiable impacts are localised near and around the proposed Stag Brewery site and most pronounced on Lower Richmond Road and Mortlake High Street.

6.7.2 Changes in road network performance are in line with background traffic growth leading to predicted increases in congestion in the forecast year relative to the base year. Additional development traffic is predicted to result in some increased congestion mostly near the proposed site. The forecast change in network performance further away from the development is not significant in the context of the forecast change over time and the application of SoLHAM.

6.7.3 The SoLHAM model has been used to assess the potential wider impacts of the proposed development and to provide flows to input into the local models for the forecast year assessments with and without the development. However, it has been noted that the 2031 models include a high level of increased background growth, approximately a 9% increase over existing levels, for both the AM and PM peaks. This appears to be at odds with the Mayors Transport strategy and, given the static nature of background growth recorded in the area over recent years, may not be realistic. The use of a forecast model with a high level of background growth on a network that is already operating close to capacity, inevitably leads to predicted increased delay and congestion.

6.7.4 The operation of local junction models has been undertaken using LinSig for Chalkers Corner and for the Upper Richmond Road / Sheen Lane junctions. ARCADY (for roundabouts) and PICADY (for priority junctions) software have been used to model individual local junctions. These local models are considered to provide a much better representation of how individual junctions will operate than will the strategic model since they are represented in much greater detail.

Chalkers Corner

6.7.5 The local junction modelling of the Chalkers Corner junction has shown that the junction operates within capacity in the morning peak hour but at capacity in the evening peak hour in the base year scenario.

6.7.6 With the introduction of substantial background traffic, the junction would operate predominantly over capacity in both peak hours with the PM peak model being substantially over capacity.

6.7.7 The additional traffic generated by the proposed development would result in a slight worsening in the morning peak hour. In the evening peak the junction appears to operate slightly better with development than without development. However, this reflects the congested nature of the strategic model resulting in a reduction in traffic accessing the junction on certain arms.

Other local junctions

6.7.8 The modelling suggests that the junction operates well within capacity during the PM peak, with or without the development. In the AM peak the junction operates close to capacity in all scenarios and there is a slight deterioration in performance with the proposed development. However, the main impacts relate to the high levels of background traffic rather than development traffic.

6.7.9 The Mortlake High Street / Sheen Lane / Lower Richmond Road roundabout has been modelled using ARCADY. The modelling results show that the Lower Richmond Road arm of the roundabout is forecast to operate over capacity in all scenarios modelled. However, delays are slightly less in the with development scenario reflecting the change in the balance of flows through the junction.

6.7.10 Three priority junctions that will provide access to / from the development site, Lower Richmond Road / Site Internal School Access Road, Lower Richmond Road / Ship Lane and Mortlake High Street / Vineyard Path / Site Internal Car Park Access Junction, have been modelled using PICADY. The modelling results show that all three junctions would operate with considerable spare capacity in all scenarios tested and in both peak hours.

7 Operational Review of Proposed Highway Improvements

7.1 Introduction

7.1.1 This Chapter sets out the proposed changes to the highway network that have been identified in the preceding Chapter, and the effects that these have on the operation of that network, based on both the use of the strategic SoLHAM model and local models, described in Chapter 6.

7.2 Proposed Improvements

7.2.1 The proposed changes to the highway infrastructure and set out below and involve proposed improvements to the Chalkers Corner junctions and also enhancements to the layout of Lower Richmond Road, Mortlake High Street and the section of Sheen Lane to the north of the level crossing. These proposals have been discussed at length with both LBRuT and TfL.

Chalkers Corner Proposals

7.2.2 The proposed improvements to Chalkers Corner are shown in Figure 7.1 below and in more detail within PBA Drawing Number 38262/5501/51E attached at Appendix H.

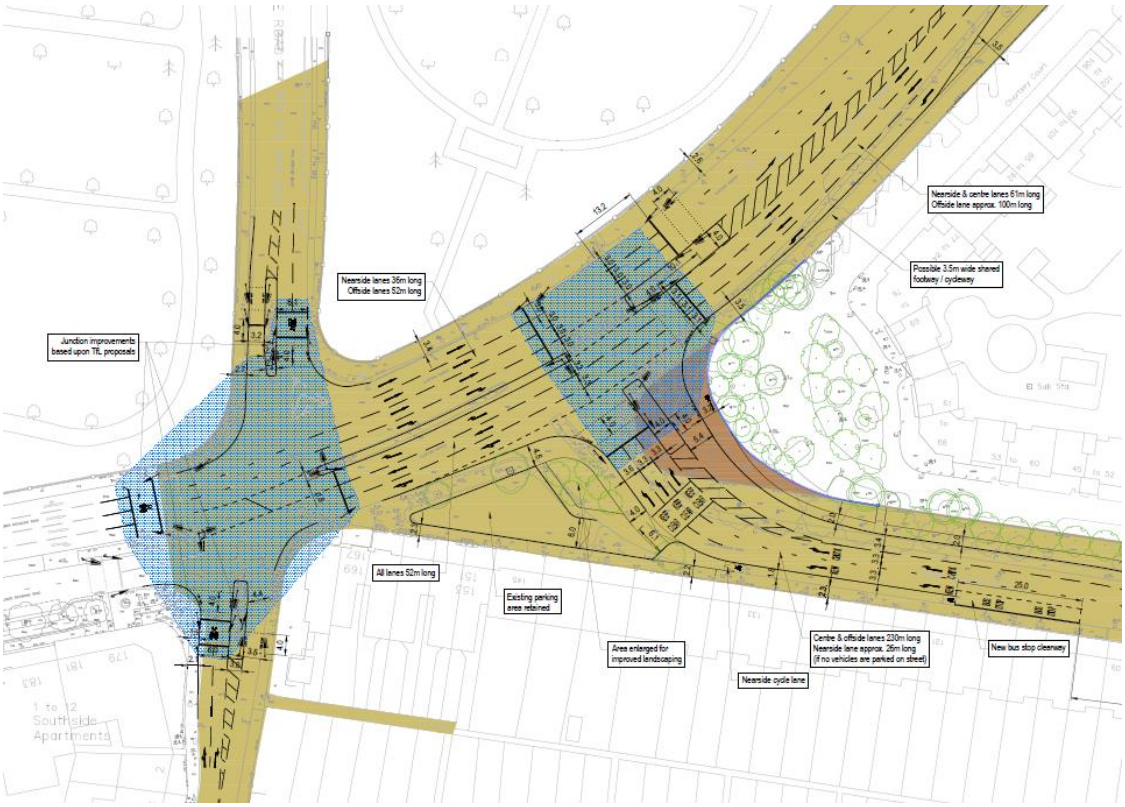


Figure 7.1 Proposed Chalkers Corner Layout

7.2.3 The operational assessment of the existing junction has confirmed on-site observations that a key problem with the existing layout is the very close spacing between the main cross roads junction and the additional, Lower Richmond Road arm. This effectively limits the amount of traffic that can egress Lower Richmond Road on each cycle of the signals. The right turn out

from Lower Richmond Road, whilst served by a separate lane, has been observed to frequently become blocked by traffic wishing to turn left from the incorrect lane.

7.2.4 As such improvements have been proposed that aim to address key issues such as:

- Improved Safety Issues;
- Pedestrian and Cycling Improvements;
- Capacity enhancements and additional resilience of the junction operation;
- Public Real Improvements;
- Protection and enhancement of bus journey times through the network;

7.2.5 Therefore, the proposed works involve:

- Realigning the Lower Richmond Road arm by moving it slightly closer to Chertsey Court. This is the most important feature from a traffic capacity perspective as it increases the storage area between Lower Richmond Road and the main cross roads allowing more vehicles to exit Lower Richmond Road each cycle of the signals. The increased reservoir length will also help to reduce the risk of traffic turning right into Lower Richmond road queuing back into the main junction and blocking traffic movements at that junction;
- Localised widening of Lower Richmond Road to provide an additional left turn flare on the entry to the junction. This will allow the middle lane to feed the subsequent right turn into the South Circular (northbound) with the left lane feeding the subsequent straight ahead movement towards Richmond and the lightly used left turn to South Circular (southbound). This should also reduce the current miss use of the right turn lane;
- Improved pedestrian refuges and facilities for cyclists, including new “toucan” crossing facilities and provision of a feeder lane on the Lower Richmond Road approach arm to link with TfL’s proposed Quiet Way cycle scheme along the A316 corridor.

7.2.6 The scheme also incorporates a new wall and planting to address environmental impacts on Chertsey Court as well as the provision of a new “pocket park” on the south west corner of the secondary junction.

7.2.7 The proposed improvements seek to achieve a balance between enhancing the operational efficiency of the junction, in order to mitigate the traffic impacts of the proposed development, improving safety and enhancing cycle linkages both along the A316. A key objective has been to try and ensure that the improvements are not so great as to encourage substantial additional through traffic to use Lower Richmond Road as opposed to other more suitable though routes. It is also considered that the proposed improvements will substantially improve the resilience of the junction by making it less likely that increased congestion will arise through traffic blocking back.

Lower Richmond Road and Mortlake High Street Improvements

7.2.8 The proposed improvements to this corridor are shown in PBA Drawing 38262/5501/58E which is included in Appendix T. These proposals allow for access to the new development but also aim to provide a much more appropriate layout for the highway, recognising the need to prioritise pedestrian and cycle access and to facilitate the safe movement of people between the new development, including the school, and the wider facilities within the area, including bus stops and the station. The proposals are in line with the Mayor’s emerging Transport Strategy to promote the provision of healthy streets.

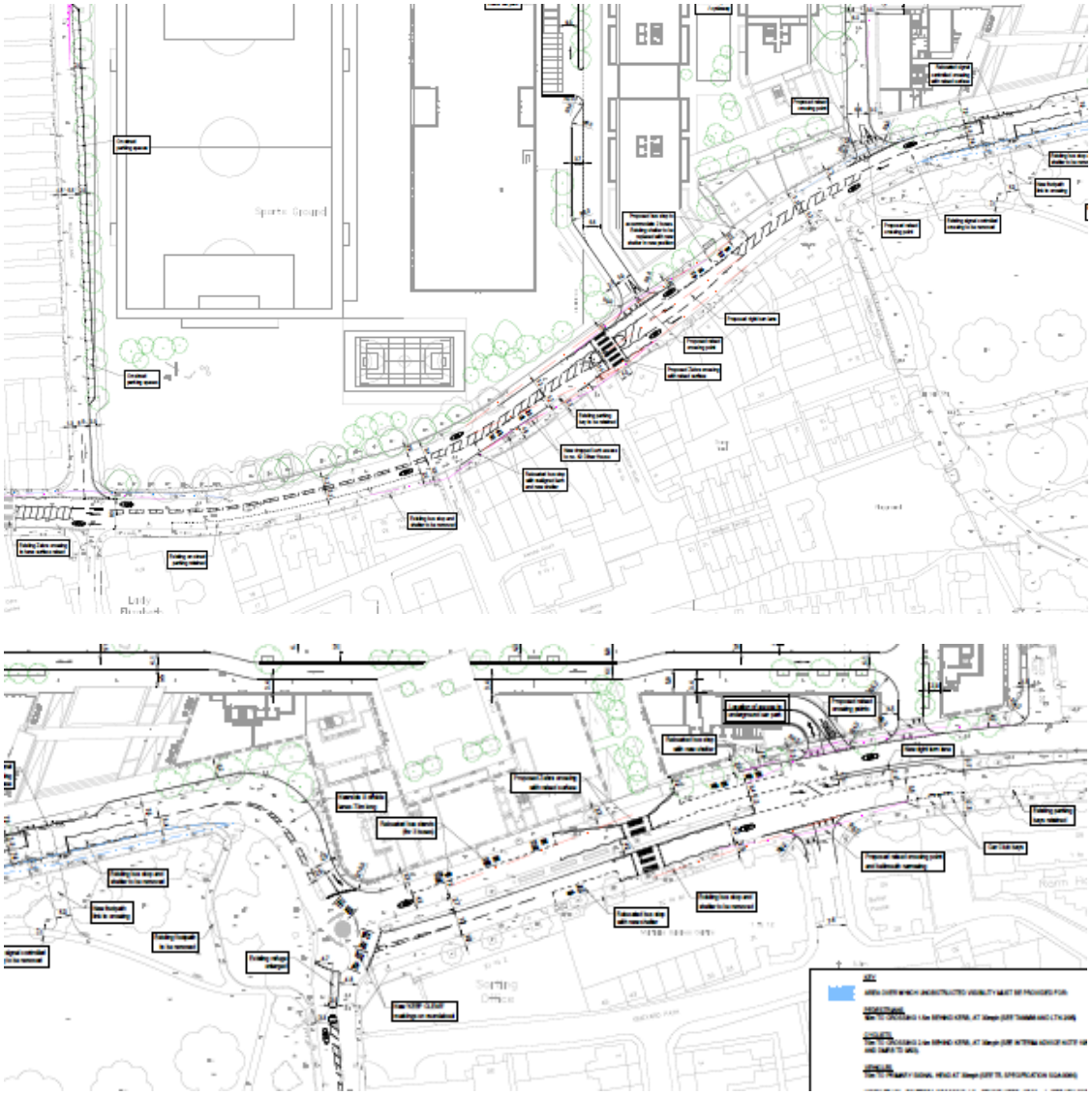


Figure 7.2 Lower Richmond Road/Mortlake High Street Improvements

7.2.9 The proposed improvement works are described in further detail in Chapter 8 but comprise of the following main elements:

- A new 20mph speed limit enforced between Williams Lane and Bulls Alley including Sheen Lane, between the Mortlake High Street / Lower Richmond Road junction and the Sheen Lane level crossing;
- Provision of two new pedestrian crossings, one just to the west of the new access road to the school to improve access for pupils needing to cross Lower Richmond Road and a second on Mortlake High street to provide access to the western section of the site.
- Relocation of the exiting pelican crossing currently located just to the east of Ship Lane further east to better align with the new “green link” proposed between the riverside and Mortlake Station; and
- Localised widening of the Lower Richmond Road approach to the Sheen lane mini roundabout to improve eastbound flow through the junction when the level crossing is down for an extended time.

7.3 Effects of Proposed Improvements on Strategic Model outputs

7.3.1 As set out in the previous chapter, TfL's strategic SoLHAM model has been used to provide predicted traffic flows for input into more local traffic models. Additional model runs have been undertaken to incorporate both the local highway improvements and the proposed enhancement of the Chalkers Corner junction. This modelling has again been agreed with TfL.

7.3.2 Tables 7.1 and 7.2 show the impact of these changes on local traffic flows (refer to Figure 6.1 within Chapter 6 for the relevant link nodes).

Table 7.1 AM Peak Link Flows showing percentage increase from Future Base to Future Base + Development + Mitigation

node			2031 FB	2031 FB + DEV	2031 FB + DEV + MIT	% Increase/Decrease
1	South Circular (North)	Approach	752	785	789	4.9%
2	South Circular (South)	Approach	564	526	518	-8.2%
3	Lower Richmond Rd (West)	Approach	1635	1654	1658	1.4%
1	South Circular (North)	Exit	546	523	529	-3.1%
2	South Circular (South)	Exit	675	677	673	-0.3%
3	Lower Richmond Rd (West)	Exit	1332	1333	1325	-0.5%
4	Clifford Rd (East)	Approach	1205	1222	1186	-1.6%
5	Lower Richmond Rd (South)	Approach	717	721	828	15.5%
4	Clifford Rd (East)	Exit	1496	1502	1506	0.7%
5	Lower Richmond Rd (South)	Exit	638	686	707	10.8%
6	Sheen Lane (North)	Approach	225	237	237	5.3%
7	South Circular (East)	Approach	747	734	711	-4.8%
8	Sheen Lane (South)	Approach	279	306	297	6.5%
9	South Circular (West)	Approach	519	562	554	6.7%
6	Sheen Lane (North)	Exit	349	418	429	22.9%
7	South Circular (East)	Exit	653	682	682	4.4%
8	Sheen Lane (South)	Exit	264	280	273	3.4%
9	South Circular (West)	Exit	503	458	415	-17.5%
10	Lower Richmond Rd (North)	Approach	778	737	754	-3.1%

node			2031 FB	2031 FB + DEV	2031 FB + DEV + MIT	% Increase/Decrease
11	Mortlake High St (West)	Approach	771	725	778	0.9%
12	Sheen Lane (South)	Approach	272	244	246	-9.6%
10	Lower Richmond Rd (North)	Exit	764	721	790	3.4%
11	Mortlake High St (West)	Exit	834	738	743	-10.9%
12	Sheen Lane (South)	Exit	223	249	245	9.9%
13	Mortlake High Street (East)	Approach	803	837	840	4.6%
14	The Terrace (West)	Approach	701	691	734	4.7%
15	White Hart Lane (South)	Approach	411	414	418	1.8%
13	Mortlake High Street (East)	Exit	704	720	770	9.4%
14	The Terrace (West)	Exit	962	978	976	1.4%
15	White Hart Lane (South)	Exit	249	246	246	-1.0%

Table 7.2 PM Peak Link Flows showing percentage increase from Future Base to Future Base + Development + Mitigation

node			2031 FB	2031 FB + DEV	2031 FB + DEV + MIT	% Increase/Decrease
1	South Circular (North)	Approach	595	668	649	9.1%
2	South Circular (South)	Approach	773	586	620	-19.8%
3	Lower Richmond Rd (West)	Approach	1419	1411	1415	-0.3%
1	South Circular (North)	Exit	564	419	456	-19.1%
2	South Circular (South)	Exit	668	745	735	10.0%
3	Lower Richmond Rd (West)	Exit	1126	1134	1136	0.9%
4	Clifford Rd (East)	Approach	1315	1309	1306	-0.7%
5	Lower Richmond Rd (South)	Approach	650	670	760	16.9%
4	Clifford Rd (East)	Exit	1425	1395	1413	-0.8%
5	Lower Richmond Rd (South)	Exit	821	795	833	1.5%

node			2031 FB	2031 FB + DEV	2031 FB + DEV + MIT	% Increase/Decrease
6	Sheen Lane (North)	Approach	246	253	250	1.6%
7	South Circular (East)	Approach	656	651	648	-1.2%
8	Sheen Lane (South)	Approach	183	199	197	7.7%
9	South Circular (West)	Approach	517	545	545	5.4%
6	Sheen Lane (North)	Exit	174	211	208	19.5%
7	South Circular (East)	Exit	685	683	679	-0.9%
8	Sheen Lane (South)	Exit	246	267	276	12.2%
9	South Circular (West)	Exit	497	487	476	-4.2%
10	Lower Richmond Rd (North)	Approach	831	780	801	-3.6%
11	Mortlake High St (West)	Approach	780	686	767	-1.7%
12	Sheen Lane (South)	Approach	172	206	208	20.9%
10	Lower Richmond Rd (North)	Exit	679	628	722	6.3%
11	Mortlake High St (West)	Exit	786	755	768	-2.3%
12	Sheen Lane (South)	Exit	317	288	287	-9.5%
13	Mortlake High Street (East)	Approach	778	777	788	1.3%
14	The Terrace (West)	Approach	609	576	634	4.1%
15	White Hart Lane (South)	Approach	378	399	408	8.1%
13	Mortlake High Street (East)	Exit	668	642	719	7.7%
14	The Terrace (West)	Exit	779	810	808	3.7%
15	White Hart Lane (South)	Exit	318	301	304	-4.4%

7.3.3 As can be seen, the highway improvements have very little effect on predicted traffic flows through the area. There is a small increase in the westbound flow along The Terrace, Mortlake High Street and Lower Richmond Road in both peaks; this increases by up to 80 pcu's in the AM peak and by up to 100 70 pcu's in the PM peak (the highest increases being at the western end of the corridor on the approach to Chalkers Corner). In the AM peak only, there is a corresponding reduction in the predicted flow on the Clifford Avenue approach to Chalkers Corner from the north.

7.3.4 The highway improvements have been developed in order to address the issues discussed in this section as well as to reduce speeds on Lower Richmond Road and Mortlake High Street in order to benefit pedestrians and cyclists. As such the flows do not change considerably but the

whole environment is better suited for more vulnerable users and those travelling both healthily and more sustainably.

7.3.5 Table 7.3 below provides a summary of predicted journey times through the Mortlake area. As previously discussed these journey times need to be treated with a certain amount of caution since they reflect the congested nature of the future highway network due to high background traffic growth. It should also be noted that the journey times for the "with highway works" also reflect the impact of the proposed 20mph zone along these corridors which are specifically designed to slow traffic in order to improve safety and will therefore contribute towards longer journey times.

7.3.6 As can be seen, in the AM peak the highway works lead to an overall improvement in the journey time from White Hart Lane to Chalkers Corner of almost 2 minutes, as compared with the future Base position. The journey time between Sheen Lane and Chalkers Corner reduces by more than 1.5 minutes as compared with the situation with no highway improvement, but is still marginally longer than the future base position. Journey times from Chalkers Corner are largely unaffected by the highway works.

7.3.7 There is a similar pattern in the PM peak with predicted journey times with the proposed highway works generally improving as compared with the no works situation. Journey times are very similar to the future Base situation.

Table 7.3 Journey Times in Seconds

Route	Direction	Journey Times (Seconds)					
		AM Peak Hour			PM Peak Hour		
		2031 FB	2031 FB + Dev	2031 FB + Dev + Highway Works	2031 FB	2031 FB + Dev	2031 FB + Dev + Highway Works
Chalkers Corner to Sheen Lane	EB	484	561	551	812	809	813
Sheen Lane to Chalkers Corner	WB	1417	1538	1428	924	1064	964
Chalkers Corner to White Hart Lane	EB	253	263	267	261	264	268
White Hart Lane to Chalkers Corner	WB	1017	1088	910	774	901	800

7.3.8 The strategic model also provides an indication of likely levels of road congestion and junction performance, but as previously noted it is less accurate in this respect than the more detailed local models. The Chalkers Corner scheme, as would be expected, is shown to reduce queues and delays on the Lower Richmond Road approach to that junction but has only modest impacts elsewhere.

7.3.9 The detailed results for these scenarios are provided within the technical notes contained within Appendix N, but in summary the small impacts of the development are mitigated based on the results of the strategic model.

7.4 LinSig Models

7.4.1 The LinSig models for both Chalkers Corner and for the Sheen Lane South Circular junctions have been rerun with the updated flows from the strategic model with the results summarised within Table 7.4 for Chalkers Corner and Table 7.5 for the Sheen Lane junction. As discussed in the previous chapter, it is considered that the LinSig models provide a much better basis for assessing the likely future operation of the junction than does the strategic model since it represents its operation in much greater detail.

Table 7.4 Chalkers Corner LinSig results

	Degree of Saturation (%)							
	AM Peak Hour				PM Peak Hour			
	2017 Base	2031 FB	2031 FB + Dev	2031 FB + Dev + Highway Works	2017 Base	2031 FB	2031 FB + Dev	2031 FB + Dev + Highway Works
J2:2/2 Clifford Ave SB Lane 2	88.6	98.3	99.3	90.0	99.7	122.2	125.2	97.8
J2:2/3 Clifford Ave SB Lane 3	88.0	95.8	96.9	82.6	102.0	127.6	124.8	93.6
J2:3/2 Lower Richmond Road	93.1	98.2	98.4	55.8	87.6	128.0	114.8	62.5
J1:4/1 S Circular Road NB	86.5	96.2	97.4	88.5	83.8	123.8	97.3	90.2
J1:1/1 Clifford Ave NB Lane 1	85.4	92.9	91.9	90.5	94.6	113.2	94.2	83.3
J1:1/2 Clifford Ave NB Lane 2	78.8	93.5	92.5	91.3	94.7	114.2	92.7	81.1
J1:1/3 Clifford Ave NB Lane 3	94.0	93.5	90.9	91.6	87.7	113.6	96.8	84.7
J1:2/1 Mortlake Road SB Lane 1	78.3	89.4	96.1	91.0	92.2	116.9	105.7	81.4
J1:2/2 Mortlake Road SB Lane 2	86.8	88.7	95.9	90.6	97.0	91.8	105.8	82.7
Whole Junction PRC	**-4.5**	**-10.2**	**-10.4**	**-1.8**	**-13.3**	**-42.3**	**-39.1**	**-8.7**

7.4.2 The DoS for the FB + Dev + Highway Works scenarios show that the improvements proposed at Chalkers Corner and along Lower Richmond Road would create sufficient capacity to accommodate forecast future traffic growth as well as the traffic generated by the proposed

development, producing a considerable improvement as compared with the Future Base scenarios in both peak hours.

Table 7.5 Upper Richmond Road/Sheen Lane LinSig results

	Degree of Saturation (%)							
	AM Peak Hour				PM Peak Hour			
	2017 Base	2031 FB	2031 FB + Dev	2031 FB + Dev + Highway Works	2017 Base	2031 FB	2031 FB + Dev	2031 FB + Dev + Highway Works
Upper Richmond Road West (E) Lane 1	85.5	87.4	96.2	92.8	59.3	69.8	72.3	70.9
Upper Richmond Road West (E) Lane 2	30.4	29.3	35.6	38.7	40.0	49.3	58.3	47.4
Sheen Lane NB	62.8	90.8	97.4	90.4	57.2	48.5	48.1	49.1
Upper Richmond Road West (W) Lane 1	38.3	36.9	41.5	42.4	46.7	48.8	52.3	54.9
Upper Richmond Road West (W) Lane 2	42.9	41.4	46.2	45.5	43.6	46.8	47.8	49.4
Sheen Lane SB	59.8	87.5	84.2	84.6	81.5	71.2	69.3	68.3
Whole Junction PRC	5.2	-0.9	-8.2	-3.1	10.4	26.3	24.4	26.9

7.4.3 The modelling work confirms that the junction will operate well within its capacity in all scenarios during the PM peak. During the AM peak the junction is operating above its desirable capacity in all forecast scenarios but within its maximum capacity. With the proposed Chalkers Corner scheme, the proposed development leads to a very small reduction in the Degrees of Saturation.

7.4.4 As previously noted this most likely reflects changes in predicted flows along the south Circular reflecting some instability in the model due to its highly congested nature. Even based on the strategic model flow estimates the net impacts of the proposed development on this junction are extremely small and would not be regarded as severe.

Sheen Lane Mini Roundabout

7.4.5 Table 7.6 below shows the RFC for each arm of the Lower Richmond Road / Site Internal School Access Road junction and for each tested scenario for the morning and evening peak hours. It should be noted that the Future Base and Future Base with Development scenarios have been modelled based on the existing roundabout layout, while the Future Base with Development

and Highway Works scenarios have been modelled based on the proposed layout of the roundabout with the additional 60 metre second entry lane on the western approach.

7.4.6 The detailed ARCADY outputs are included in Appendix R.

Table 7.6 Sheen Lane / Mortlake High Street / Lower Richmond Road Roundabout – Ratio of Flow to Capacity

Arm	Ratio of Flow to Capacity					
	AM Peak Hour			PM Peak Hour		
	2031 FB	2031 FB + Dev	2031 FB + Dev + Highway Works	2031 FB	2031 FB + Dev	2031 FB + Dev + Highway Works
Lower Richmond Road	1.10	1.07	0.94	1.11	1.05	0.96
Mortlake High Street	0.65	0.63	0.67	0.58	0.51	0.60
Sheen Lane	0.42	0.37	0.46	0.32	0.37	0.48

7.4.7 The modelling shows that the extended flare would provide a substantial improvement in the capacity of the eastbound flow through the junction with the predicted RFC reducing from 1.07 to 0.94 in the AM peak and from 1.05 to 0.96 in the PM peak. The junction is shown to operate better than in the Future Base scenario in both the AM and PM peaks.

Site Access Junctions

7.4.8 The below tables demonstrate the assessments carried out at all the site access junctions.

7.4.9 It should be noted that the base and FB scenarios have been modelled based on the existing junction configuration, while scenarios with the proposed development have been modelled based on the proposed junction layout.

Table 7.7 Lower Richmond Road / Site Internal School Access Road Priority Junction – Ratio of Flow to Capacity

Movement	Ratio of Flow to Capacity			
	AM Peak Hour		PM Peak Hour	
	2031 FB + Dev	2031 FB + Dev + Highway Works	2031 FB + Dev	2031 FB + Dev + Highway Works
School Access to LRR* (E and W)	0.37	0.41	0.18	0.22
LRR (E) to School Access and LRR (W)	0.12	0.12	0.04	0.04

**Lower Richmond Road*

Table 7.8 Lower Richmond Road / Ship Lane Priority Junction – Ratio of Flow to Capacity

Movement	Ratio of Flow to Capacity							
	AM Peak Hour				PM Peak Hour			
	2017 Base	2031 FB	2031 FB + Dev	2031 FB + Dev + Highway Works	2017 Base	2031 FB	2031 FB + Dev	2031 FB + Dev + Highway Works
Ship Lane to LRR (E and W)	0.03	0.03	0.20	0.22	0.05	0.05	0.19	0.24
LRR (E) to Ship Lane and LRR (W)	0.03	0.03	0.03	0.03	0.02	0.02	0.03	0.03

Table 7.9 Mortlake High Street / Vineyard Path / Site Internal Car Park Access Priority Junction – Ratio of Flow to Capacity

	Ratio of Flow to Capacity							
	AM Peak Hour				PM Peak Hour			
	2017 Base	2031 FB	2031 FB + Dev	2031 FB + Dev + Highway Works	2017 Base	2031 FB	2031 FB + Dev	2031 FB + Dev + Highway Works
Car Park Access to MHS* (E)	-	-	0.06	0.06	-	-	0.05	0.05
MHS (W) to Vineyard Path	0.06	0.06	0.06	0.06	0.03	0.04	0.04	0.04
Vineyard Path to Car Park Access and MHS (E and W)	0.10	0.11	0.11	0.11	0.10	0.10	0.10	0.10
MHS (E) to Car Park Access	-	-	0.04	0.04	-	-	0.04	0.04

**Mortlake High Street*

7.4.10 As can be seen from the above tables, all three junctions are not indicated to operate over practical capacity in any scenario.

7.4.11 Full ARCADY and PICADY outputs can be found in Appendix R.

Summary of Effects of Proposed Changes to Highway Network

7.4.12 In summary the proposed changes to the highway network have a positive impact on DOS and RFC where the arms/lanes are indicated to operate over practical capacity. Where this was the case all arms are indicated to reduce in DOS/RFC between Future Base + Development and Future Base + Development with Highways Improvements.

7.4.13 Where the arms are not shown to operate over practical capacity, at the majority of the site access junctions, they remain this way once the highway improvements are implemented.

7.5 Sensitivity Test for Potential Change in use of Assisted Living apartments from C2 (Care) to C3 (Residential)

7.5.1 As discussed in paragraph 6.1.4 above, sensitivity tests have been undertaken to identify the net effects of the combined impacts arising from the small changes to floor areas and the change in the designation of the up to 150 units within the assisted living from a C2 care use to a C3 residential use. As agreed with LBRuT and TfL the impacts arising have been tested using the local models only since the net change to trip generation would have minimal impact on the overall strategic network.

7.5.2 Full details of the methodology adopted and the outcome of the tests is provided within Technical Note 23 within Appendix P. As expected the impacts of these changes on the operation of local junctions is very small and summarised below:

- Chalkers Corner Junction – An additional 9 development trips use the junction in the AM peak hour and 7 during the PM peak hour. This has no greater impact than 1.9% in terms of DOS in the FB + Development scenario in either peak and no greater than 0.5% in the FB + Development + Highway improvement scenario. on any arm in either peak or development scenario.

- Sheen Lane / South Circular Junction – An additional 5 two way trips in the AM peak and 3 in the PM Peak are modelled at this junction. This results in no greater increase in DOS than 0.4% across any scenario in any peak.

- Sheen Lane mini roundabout – An additional 9 flows in the AM peak and 4 in the PM peak are distributed through the roundabout. This results in a maximum increase in RFC of 0.02 in the AM Peak and 0.01 in the PM Peak.

- Site access junctions – Of the three site access junctions only two are subject to increased flows, the Ship Lane Access and the Car Park Access of Mortlake High Street. 12 and 4 two way trips respectively are added to each access in the AM Peak and 9 and 3 in the PM peak. This led to minor increases in RFC on the Ship Lane exit, with the turn into Ship Lane remaining almost identical (a change of 0.01 in the AM peak). Although the RFC increases it is still well below practical capacity.

7.5.3 It has therefore been concluded that whilst there are some minor increases in both RFC or DOS across the junctions as a result in the increasing trips. The junctions show that these are only very marginal increases and they do not reflect either the conclusions of the junction modelling or the wider transport strategy for the site.

7.6 Summary of Findings

7.6.1 The strategic SoLHAM modelling has shown that the overall impact of the addition of Stag Brewery development traffic is relatively slight in the context of overall (committed) forecast background traffic growth. Quantifiable impacts are localised near and around the proposed Stag Brewery site and most pronounced on Lower Richmond Road and Mortlake High Street.

7.6.2 The local modelling work suggests that the proposed enhancements to the Chalkers Corner junction will provide a substantial improvement to the operation of that junction during both the AM and PM peaks more than mitigating the impacts of the proposed development at that location.

7.6.3 The main improvement, as would be expected, is to the Lower Richmond Road approach from Mortlake, but through adjustments to the signal timings these benefits can be shared between

this approach and the Clifford Avenue approach, providing wider benefits to the operation of the junction. This will also provide a mechanism for ensuring that there is no increased use of Mortlake High Street – Lower Richmond Road as a through traffic route. It is also considered that the improvements will greatly improve the resilience of the junction by reducing the risks associated with traffic blocking

7.6.4 The Chalkers Corner scheme also provides important wider benefits, in particular providing enhanced cycle access through the junction in line with TfL's aspirations to create a A316 corridor cycle Quietway. The scheme also incorporates high quality landscaping proposals and substantive improvements to the boundary wall to Chertsey Court, which will help mitigate impacts on that property. This is dealt with in more detail within the separate air quality assessment work.

8 Operation of the Public Transport, Walking and Cycling Networks

8.1 Introduction

8.1.1 This chapter sets out the likely impacts of the development proposals on the public transport, walking and cycling networks, and includes an assessment of the Sheen Lane level crossing in order to address the concerns that have been expressed by both NR and local residents regarding the operation of that crossing from a capacity and safety perspective.

8.1.2 The assessment is based upon the modal trip generation estimates for the proposed development which were set out within Chapter 5. The key issues that are examined include:

- The likely increase in demand to board trains at Mortlake Station during the critical AM peak hour;
- The capacity of the existing station infrastructure, including platforms, station entrances and the footbridge, to accommodate the additional demand;
- The capacity of the rail services through Mortlake to accommodate the additional demand;
- The additional demand that the development will generate on local bus services. In accordance with TfL requirements this focusses on likely increased demand on the relevant bus corridors rather than providing a detailed assessment of the capacities of individual services;
- The key impacts of the proposed development on the pedestrian and cycle networks and the ability of those networks to accommodate the flows.

8.1.3 Chapter 8 then sets out the overall Transport strategy which aims to encourage residents and visitors to the new development to adopt sustainable patterns of travel. This includes proposals to enhance access by non-car modes as well as measures to mitigate the impacts of the development on the transport infrastructure.

8.2 Assessment of Rail Impacts

8.2.1 As part of PBA's rail impact assessment a separate Technical Note, Technical Note 19 – Mortlake Station Capacity Assessment (TN19), has been produced providing full details of the assessment. This is included in Appendix U.

8.2.2 The assessment includes the following elements:

- A review of baseline conditions. This has been based upon site visits to the station at both peak and off peak times, desktop study of available data, discussions with NR and review of data provided by NR plus surveys of pedestrian flows at station entrances commissioned by PBA.
- The predicted increased demand based upon the trip generation assessment set out in Chapter 5.
- A review of station capacity with the proposed development.
- A review of the likely train capacity with the proposed development.

8.2.3 The technical note calculates the current and future station capacity at Mortlake Station, including an analysis of the footbridge, staircases and platforms. In addition, it discusses the different entrances to the station and the issues associated with the entrance most likely to be used by those living within the Stag Brewery site.

8.2.4 At peak times the station is served by 4 trains per hour that travel directly to London Waterloo via the eastbound platform and a further 4 trains per hour travelling from Waterloo towards Richmond via the westbound platform. Although these services towards Richmond subsequently travel along either the Hounslow Loop or the Kingston Loop and return to Waterloo, 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.

8.2.5 At present, South Western Railway is in the process of completing a programme of upgrading from 8 to 10-car trains on all services calling at Mortlake station. This programme will be complete by the end of 2019 and will provide a significant increase in the overall peak hour capacity of trains serving Mortlake.

Review of Station Capacity

8.2.6 A plan of the station is shown in Figure 8.1 below.

Figure 8.1: Mortlake Station layout and Station Entrances

8.2.7 The station has a total of four entrances. The main entrance and ticket office is on the south side of the railway but there is also an access on the north side accessed from Mortlake Green through the builder's yard. The two platforms are also connected via a footbridge which has two sets of stairs, west facing stairs that act to connect the two platforms and east facing stairs from Sheen Lane that provide a secondary means of access into the station but also provide an external route along Sheen Lane avoiding the level crossing.

8.2.8 Passenger flows within the station itself are bi-directional with only minor conflict between passengers boarding and alighting. As there is only one entrance/exit point at the eastern end

of each platform this reduces the number of passenger movements possible and therefore reduces conflict within the station.

8.2.9 The movement of pedestrians is also not impeded by gate lines. This means that the movement of pedestrians within Mortlake station should be significantly more free-flowing than for a typical station that NR's guidance is based on. The assessment has taken account of the detailed characteristics of the station, including the tendency to board the front carriages of any train.

8.2.10 The assessment of station capacity has been undertaken for the AM peak hour (08:00 to 09:00) since this is the critical hour due to the peaked nature of commuter trips during the morning. The technical work contained within TN19 did also review the evening peak but concluded that the AM peak would remain the critical peak taking into account the future demand generated by the Stag proposals.

8.2.11 NR has provided data on passenger numbers in order to inform station requirement calculations (Table 7.1). 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.

8.2.12 PBA commissioned surveys of the numbers of pedestrians entering and leaving Mortlake station. These were carried out on Wednesday, 15th June, 2016 and since these surveys indicated higher numbers of passengers at the station, than the estimates provided by NR for Putney, these have been used as the basis for estimating existing demand.

8.2.13 PBA's estimates of boarding and alighting are also provided within Table 7.1 and full details of the surveys together with the detailed assumptions used to derive these estimates set out in full within TN19 together with the detailed assumptions regarding the numbers of passengers using the footbridge to access the further platform.

Table 7.1: Number of passengers boarding and alighting per hour – AM peak (Existing)

Source	Platform 1 - Eastbound		Platform 2 Westbound	
	Boarding	Alighting	Boarding	Alighting
Network Rail Estimates	482	67	133	227
PBA Estimates	979	75	291	281

8.2.14 With the development trips then added, this results in the following number of passengers boarding and alighting by hour across the AM peak period based on the PBA figures.

Table 7.2: Number of passengers boarding and alighting per hour – AM peak (Existing + Development)

Time	Platform 1 - Eastbound		Platform 2 Westbound	
	Boarding	Alighting	Boarding	Alighting
PBA Existing	979	75	291	281
Development Trips	64	38	26	15
Total Future	1043	113	5317	296

8.2.15 Assumptions were then made, based on site visit observations, as to the proportion of passengers boarding in each carriage. These are shown in Table 3.2 of TN19. The pedestrian

entry surveys suggest that the peak loading occurs between 08:00 and 08:15 with approximately 33% of the hourly (08:00 to 09:00) demand. Based on this, boardings and alightings at the "critical" carriage have been calculated for the base and future situations. The latter are reproduced within Table 7.3 below.

Table 7.3: Total Future Loading into the Critical Carriage onto busiest train during the AM Peak Hour

Time	Platform 1 - Eastbound			Platform 2 - Westbound		
	Boarding	Alighting	Total	Boarding	Alighting	Total
08:00 - 08:15	52	6	58	26	15	41
08:15 - 08:30	52	6	58	26	15	41
08:30 - 08:45	52	6	58	26	15	41
08:45 - 09:00	52	6	58	26	15	41
08:00 09:00	**209**	**23**	**231**	**103**	**59**	**162**

8.2.16 In accordance with the NR's Station Capacity Assessment Guidance, TN19 then assesses the ability of the platforms to accommodate both the existing and future demand taking account of the different zones (Zone A - Yellow Line (safety) Zone, Zone B - Boarding/Alighting Zone, Zone C - Circulation Zone and Zone D - the Activity Zone) taking account of the uneven platform loading.

8.2.17 The outcome of this analysis is summarised within Table 7.4 below. This gives a minimum requirement for the overall platform width of 4.14m.

Table 7.4: Existing and Future Platform Width Requirement

Requirement	Existing Requirement (m)	Future Requirement (m)
Zone A	1	1
Zone B	2.45	2.69
Zone C	0.00	0.00
Zone D	0.45	0.45
Total	**3.90**	**4.14**

8.2.18 The change in requirements for Zone B is as a result of increased patronage on trains as a result of the proposed development.

8.2.19 The station meets both the existing and future requirements as it has a critical platform width of 4.67m which is 0.53m or 13% wider than the minimum requirement.

Footbridge, Stairways and Entrances

8.2.20 The suitability of the capacities of these elements has been assessed based upon Fruin's Level of Service (LoS) which 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. NR guidance suggests that a Fruin LoS of C should normally be achieved. This is because it is deemed to provide a certain level of comfort within the confines of the station.

8.2.21 The detailed calculations are again set out within Technical Note 19. Figure 8.2 and Figure 8.3 show the existing and future pedestrian flows for the AM peak hour using these key elements. The flows using the footbridge take account of existing and predicted future through flows along Sheen Lane.

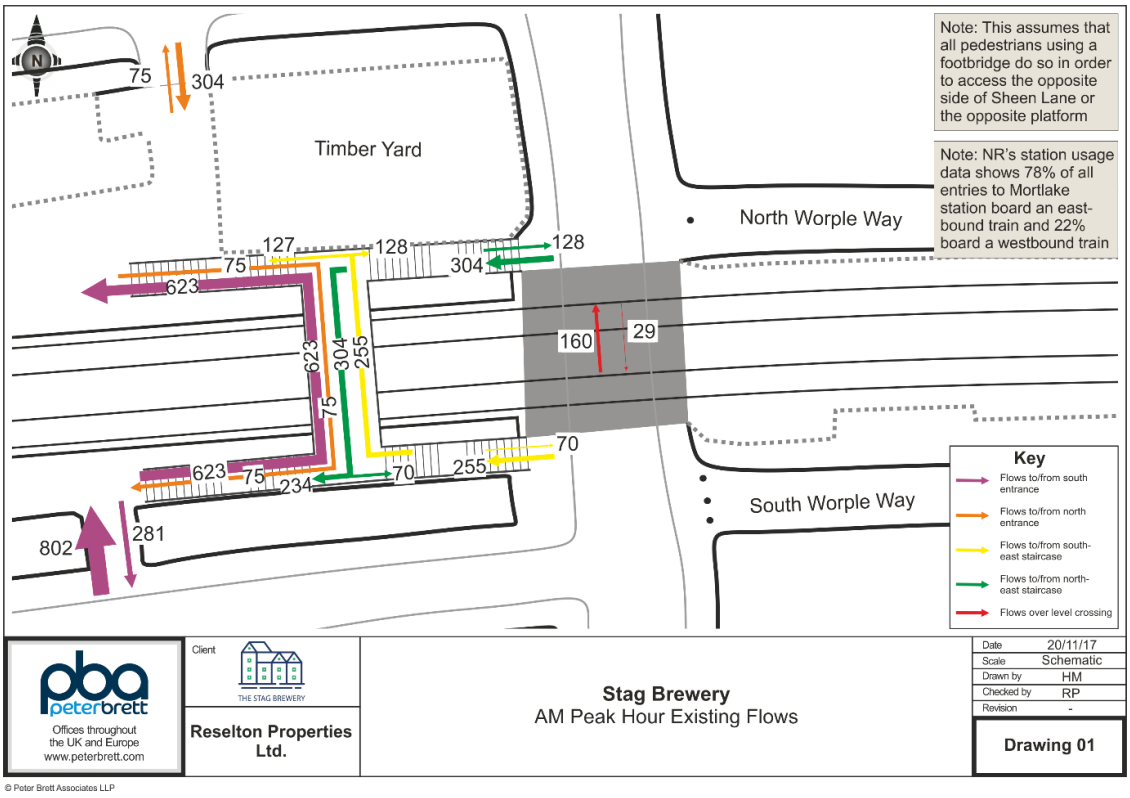


Figure 8.2: Existing AM Peak Hour Flows

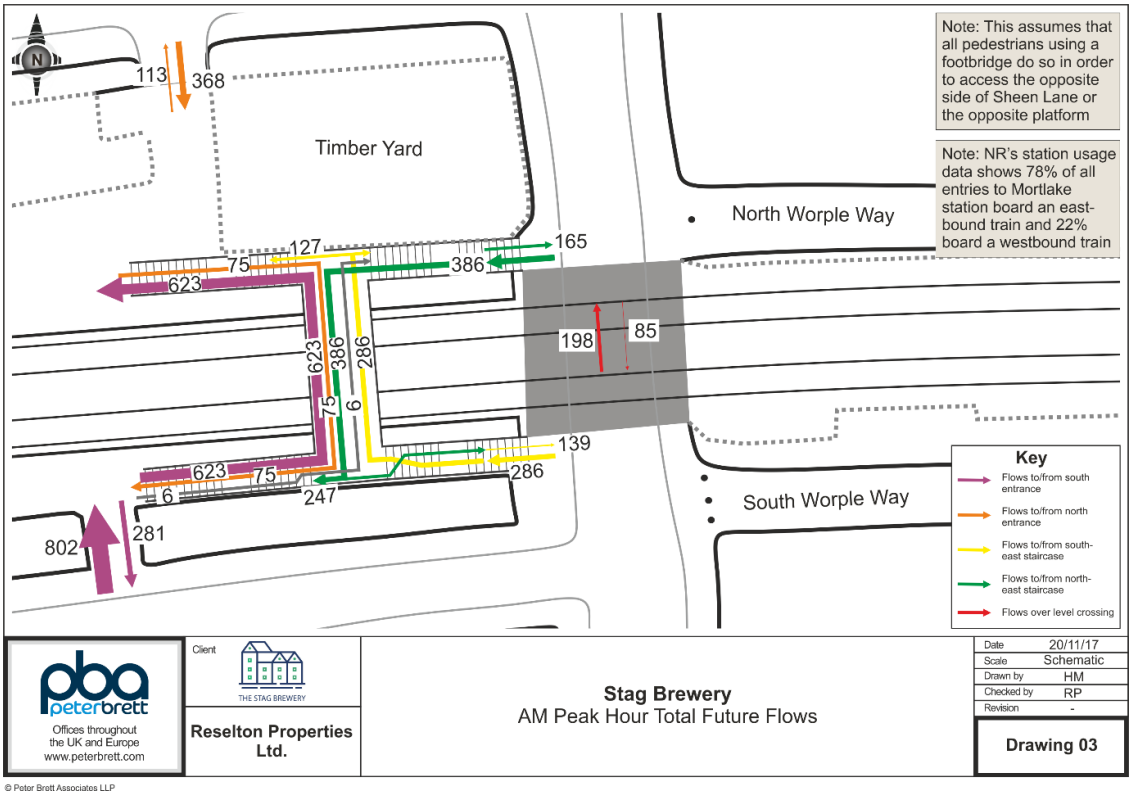


Figure 8.3: Future AM Peak Hour Flows

8.2.22 Based on these flows and the Fruin analysis the following is concluded:

- The internal stairways, which have a width of 2.0m are more than sufficient in width to meet the future demand based on the required Fruin Level of Service C. Based on this the minimum future width should be 1.6m;
- The bridge itself, which comprises of a total width of 4.0 m requires a minimum width of 3.85m to meet future requirements and is therefore satisfactory;
- The northern station entrance, which will be the main focus for the additional demand generated by the Stag development proposals, has sufficient width to accommodate the increased demand.

The detailed methodology and calculations are set out within TN19.

Future Line Capacity

8.2.23 Mortlake station lies on the Windsor Lines and in particular the section of track via Richmond which runs 12 trains per hour in the morning peak. Of these, 8 trains per hour which call at Mortlake station and 4 of these trains are direct services to London Waterloo.

8.2.24 NR does not plan to increase this level of service in the future as the number of train services using the Windsor Lines via Richmond cannot be increased due to capacity constraints caused by the level crossings on the line. However, as mentioned earlier, a programme of upgrading from 8 to 10-car trains is currently in progress and will be completed by 2019. The former 8-car Class 455 train provided capacity for 9,856 passengers (3,776 seated) whereas the new 10-car train sets are expected to provide capacity for circa 11,800 passengers (4,547 seated) in the morning peak hour. This represents an increase in capacity of approximately 1,944, almost a 20% increase, on trains calling at Mortlake station in the morning peak hour.

8.2.25 The analysis presented in TN19 shows this is more than sufficient to accommodate the extra patronage caused by the additional 90 passengers in the AM peak hour from the development.

Summary

8.2.26 The rail assessments carried out indicate that there is sufficient capacity for both the existing and forecasted future passenger numbers in terms of station infrastructure and train capacity.

8.2.27 The trip generation was used to calculate the number of new trips anticipated to be made by train and using these numbers combined with existing flows, platform widths, staircase capacity, footbridge capacity and station entrances were all assessed and indicated they were sufficient for future needs.

8.3 Assessment of Bus Impacts

8.3.1 The bus network around the Site is extensive with a wide variety of services available along a number of corridors providing access to a range of key destinations, including Hammersmith, Richmond and Wimbledon. Whilst the 419 Hammersmith to Richmond bus service, which operates along Mortlake High Street and Lower Richmond Road, past the Site frontage is the closest service other services can be accessed through a relatively short walk depending upon the specific location within the Site. These include the 209 (Richmond to Hammersmith) service, which currently terminates at the Avondale Road bus turn facility, but which can be accessed from stops by the junction of Mortlake High Street/Avondale Road, the 190 (West Brompton to Richmond) bus service that operates along the A316 corridor, the R68 that provides access to Kew Gardens. In addition, there are a number of services that operate along the South Circular to the south of the Site.

8.3.2 A more detailed summary of the routes available around the site is provided in Chapter 2, as well as Technical Note 18 – Bus enhancement options (TN18) which is included in Appendix V.

8.3.3 The impact of the development proposals on the bus network has been assessed based on the trip generation estimates set out in Chapter 5. Figure 8.4 shows the estimate of new bus trips, arrivals and departures, on an hourly basis between 07:00 and 19:00 hrs, with school related and other trips shown separately.

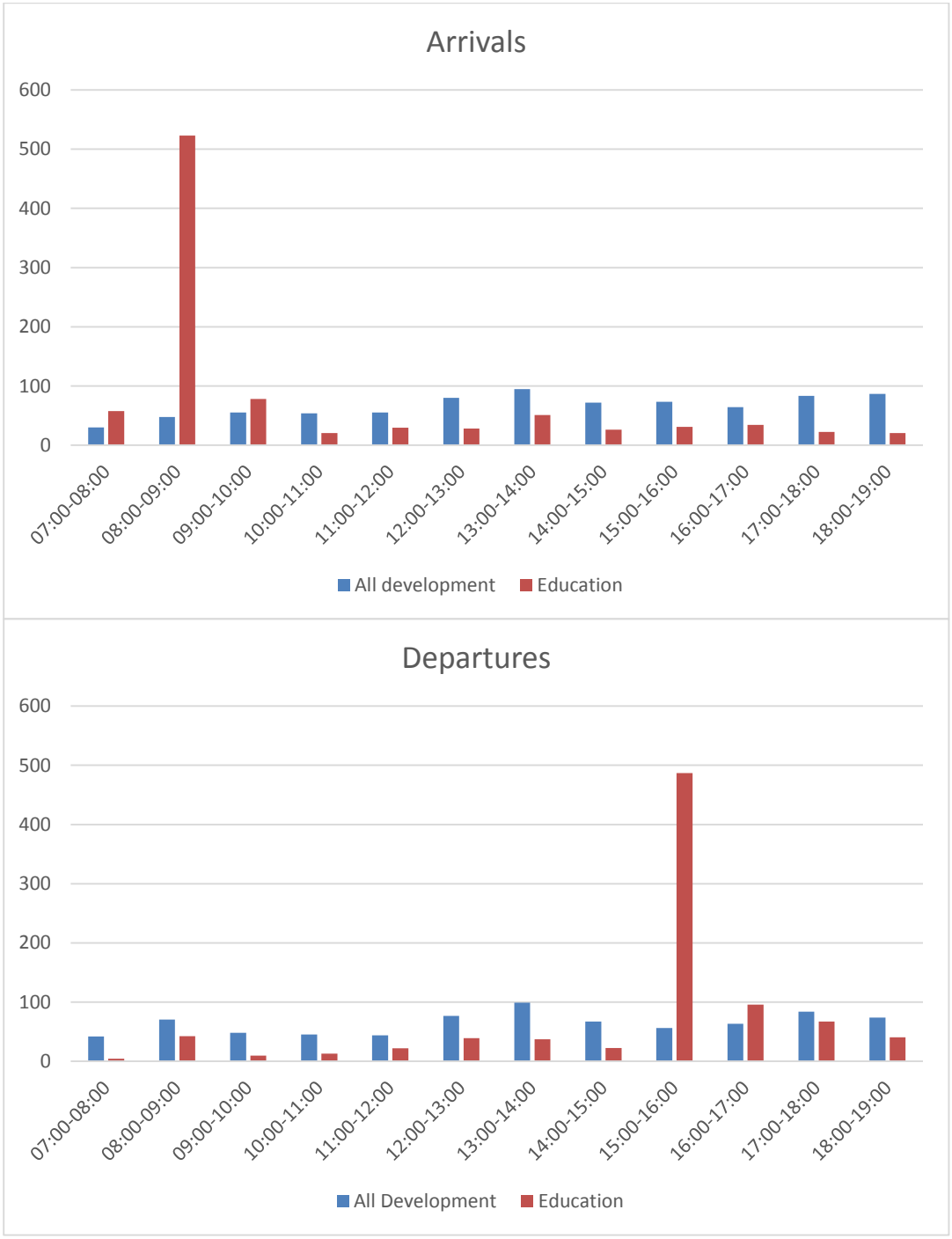


Figure 8.4 Graphs showing anticipated development and education arrivals and departures by bus across the day

8.3.4 Figure 8.4 shows that the secondary school (Application B) generates high numbers of bus trips during the AM peak (523 arrivals) and at the end of the school day (487 departures) with relatively few trips at other times of the day. In contrast, the demand profile for the remainder of the development (Application A) is quite flat over the full day reflecting the mixed nature of the development.

8.3.5 Table 7.5 provides a more detailed analysis of expected arrivals and departures by bus of non-school trips during the AM and PM peak hours. The breakdown of trips by direction is based upon the estimated trip distribution of bus trips which reflects Census journey to work data.

Based on the current service pattern, trips shown as being to/from the west are likely to utilise the 419 service whilst "other" trips would be spread between the other services, in particular the R68 to Kew Gardens and Riverside and the 190 service towards West Brompton.

8.3.6 In terms of the 419 service this currently provides 4 buses in each direction in each of the two peak hours, each bus providing 28 seats i.e. a total of 112 seats in either direction past the development Site. The additional demand generated by the proposed non education development (Application A) is therefore equivalent to just more than one additional bus in either peak (not allowing for standing room).

Table 7.5 Boarding and Alighting bus numbers excluding School trips

Peak		To/From East	To/From West	Other	Total
AM Peak	Arrivals	27	11	10	48
	Departures	35	15	20	71
PM Peak	Arrivals	40	17	18	75
	Departures	42	17	16	75

8.3.7 Current loadings on the 419 bus service are not known, although based on observation and discussions with TfL, are thought to be quite low on this part of the route. At most, a modest increase in the frequency of this service would provide the required capacity to meet the future requirements of the proposed development i.e. two additional peak hour buses increasing the service frequency from every 15 minutes to every 10 minutes.

Discussions with TfL and LBRuT

8.3.8 Having considered the impacts of the trip generation on the bus network, meetings and discussions have been held with officers at TfL in order to ascertain their preferred option for improving services to and around the site.

8.3.9 Discussions have focussed on three issues:

- How best to meet the anticipated additional demand generated by the school, which is potentially of a high level but is highly concentrated at the start and end of the school day;
- Options for improving the bus service to meet the future needs of residents and visitors to the other uses proposed. This is as much concerned with improving the quality of the service offer as providing sufficient capacity; and
- The potential need to provide a bus turning facility within the development site.

8.3.10 At this stage the catchment area of the school and therefore the likely additional demand that would be generated on buses is not known. LBRuT has indicated that the school is likely to have quite a local catchment and has provided details of the main primary schools that are likely to feed this secondary school and in turn the catchment areas of those primary schools. These

details are provided within Appendix W and do indeed suggest a local catchment that could predominantly walk or cycle to school.

8.3.11 As a robust, worst case, the mode share for buses which is reflected in the demand figures shown in Figure 8.4 above, has been based upon travel plan data for other local secondary schools provided by LBRuT. Based on this data, TfL has suggested that there could be a need for up to 8 special double deck bus services to meet the demand of the school during the AM and afternoon school peaks. This has therefore been taken as a robust worst case for assessment purposes.

8.3.12 There are a number of alternative options for meeting the future requirements of the non-education development at the Stag (Application A). These would include a simple upgrade to the frequency of the 419 service which would appear to meet most requirements since it provides a connection to the west towards Richmond as well as to the north east towards Hammersmith and in doing so provides a connection with town centre facilities at these two locations.

8.3.13 LBRuT had initially suggested that the option for diverting the 209 service, that currently terminates to the south east of the site at Avondale Road, should be considered. Whilst this would provide improved access from the Site to a service that is currently more frequent than the 419, the 209 only provides access eastwards towards Hammersmith and does not provide the connection to Richmond.

8.3.14 TfL has indicated that the diversion of the 209 service would not be their preferred option since it would be costlier than other options and remove access to the service from a substantial number of people that board/alight at the stops on Avondale Road, including people that cross the rail line to use the service. Other options would be to extend one of a number of services that currently terminate in the Richmond area or which pass close to the western edge of the Site, such as the R68 from Kew Gardens to Richmond or the 190 service from West Brompton to Richmond. TfL has also indicated that it plans to undertake a comprehensive review of bus services in the wider Richmond and Hammersmith area with a view to implementing changes following the completion of repair works to the Hammersmith Bridge, which are now due to start late in 2018. Until this review is carried out, TfL considers that it is unable to provide a firm proposal to upgrade buses in relation to the Stag proposals and so has provided a costing based on the diversion of the 209 as a worst case.

8.3.15 The need for a bus turn and associated driver facilities within the Stag site is dependent upon the actual service enhancements that are made. The diversion of the 209 facility would require the current facility at Avondale Road to be replaced. The diversion/extension of other bus services would also most likely require such a facility. The upgrading of the 419 bus service would not. TfL has requested that land be provided that could accommodate a bus turn facility for up to three buses.

8.3.16 Any special bus services for the school would also require somewhere to set down and pick up children at the end of the day. TfL has suggested that this could be undertaken from the bus turn facility if that were to be provided. If not, two bus standing areas are provided to the west of the school and a further space is available to the north of the school.

8.3.17 It is therefore concluded that the upgrading of the 419 service would likely best meet the needs of the non-school development for an improved local bus service. This would not require a bus turn area to be provided. There may be wider operational advantages to TfL from providing a new bus turn facility within the Site, but this may not be essential for the development and any future application for a bus turnaround would be subject to a separate planning application and further discussions between TfL and LBRuT.

8.3.18 The future pattern of bus services in the area, together with the potential need to safeguard an area for a bus turnaround facility with driver facilities, is discussed in more detail within the Transport Strategy in Chapter 9.

Summary

8.3.19 It is considered that, at most, a modest upgrade to the frequency of the 419 bus service may be required to accommodate the additional trips generated by the non-education element of the development.

8.3.20 The future bus requirements of the school will not be known until the catchment area is clarified once the provider has been chosen. As a very worst case it has been agreed with TfL that up to eight special buses might be required.

8.3.21 An upgrade to the 419 service would not require the provision of a dedicated bus turn facility on the Site. There may be wider operational benefits to TfL from such a provision, although this is not essential for the development.

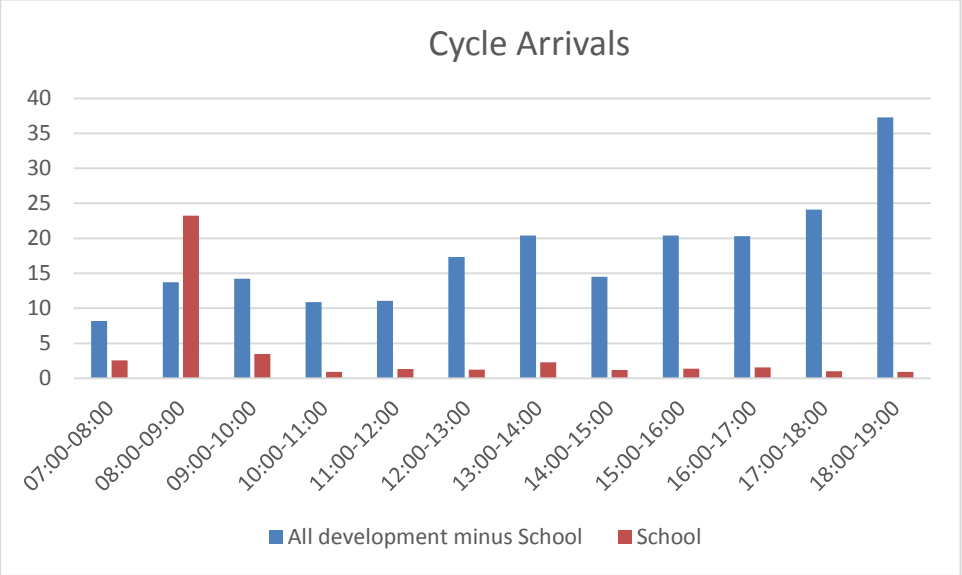
8.3.22 The preference is for the extension of the 419 but TfL are not able to commit to this due to the uncertainty for buses in the area caused by Hammersmith Bridge. Should the need for a bus turnaround come forward, it will be subject to a separate application and consultation process.

8.3.23 Further detail on the bus strategy is provided in Chapter 9.

8.4 Cycle Network

8.4.1 Chapter 2 described the existing cycle network serving the area, which includes the main strategic route which runs along the A316 linking Chiswick in the North west with Richmond in the south east. It concludes that the Site is already well connected into the existing network via the existing route that runs along Ship Lane and which therefore bisects the Site. This in turn connects to the strategic route via Thamesbank and to the local routes that run east towards the City along South and North Worpole Way via an existing shared use path through Mortlake Green.

8.4.2 Figure 8.5 shows the anticipated cycle trips that will be generated by the development during a typical weekday. There is a significant peak in demand during the morning peak and in the late afternoon associated with the proposed secondary school.



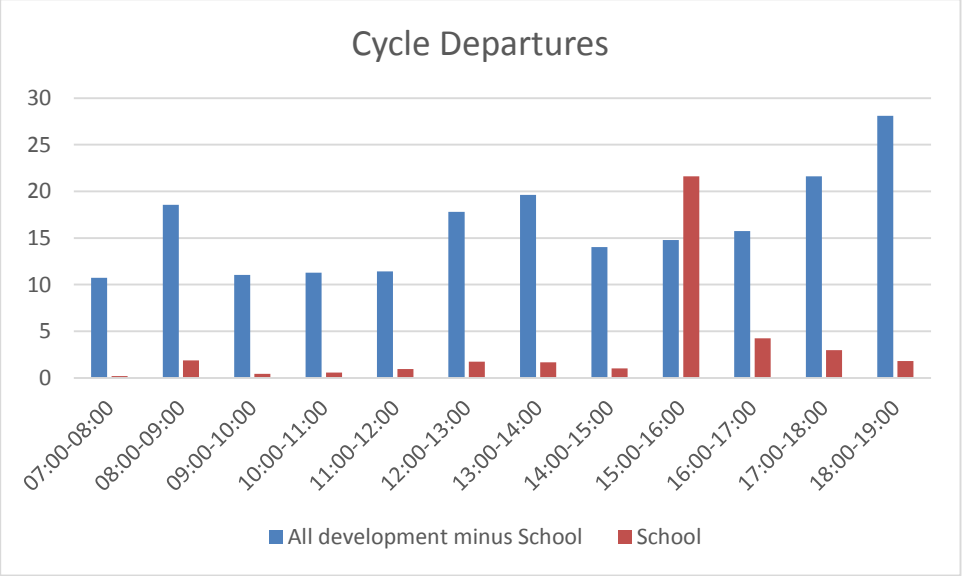


Figure 8.5 Cycle arrivals and departures by hour

8.4.3 Whilst higher levels of cycling will be encouraged through the various travel plans it is considered that the level of additional flow should be easily accommodated by the existing off site infrastructure. The development proposals outlined within Chapter 4 provide a high emphasis on the provision of a cycle friendly infrastructure within the Site and includes details of how the on-site cycle network will link into the wider network including through the provision of new pedestrian crossings over Mortlake High Street and Lower Richmond Road and enhanced provision at the Chalkers Corner junction to access the TfL Quiet Way scheme.

8.4.4 The importance of linking the school into the network has been recognised with the creation of a new east – west cycle route immediately north of the school providing a link with Williams Lane and Ship Lane and thence onward to Mortlake High Street at the eastern end.

8.4.5 The Transport Strategy, Chapter 9, sets out in further details the proposals to improve the connectivity of the Site by cycle.

8.5 Pedestrian Network

8.5.1 As with the cycle network the on-site infrastructure and public realm will be designed to a very high quality with very generous dimensions that will facilitate pedestrian movement through the Site. The key pedestrian connections from the Site are through Mortlake Green towards the station and along the river towards Barnes.

8.5.2 It is considered that, in general, the existing off-site infrastructure has more than sufficient capacity to accommodate the additional flows associated with the proposed development.

8.5.3 One issue that has emerged during the design process has been the capacity of the level crossing at Mortlake station, together with the associated infrastructure, to accommodate the additional demand associated with the proposed development. A NR risk assessment (July 2017) has highlighted a number of concerns. The report highlights that the main risk relates to conflicts between traffic and pedestrians and cycles at the crossing mainly as a result of driver frustration due to the long and variable barrier down times at this location. These concerns have been discussed with NR and at their request, a detailed technical assessment has been undertaken to provide a better understanding of the likely impacts of the development proposals on this infrastructure. This note is attached at Appendix X.

8.5.4 The assessment has concluded that the proposed development will have only a modest impact upon the level crossing. In particular, the footbridge appears to have sufficient capacity to accommodate both station demand and through movements along Sheen Lane, whilst the width of the marked pedestrian areas on the crossing appears sufficient to meet NR guidelines both now and in the future with the proposed development. In addition, there is no evidence that the delays experienced by drivers and pedestrians and cyclists has affected road safety along Sheen Lane.

8.5.5 Notwithstanding the above conclusions it is considered that there would be benefits in considering improvements to the infrastructure to make access to the station and across the railway line a better experience. However, any study would need to be led by NR since any substantive improvements are likely to require their land and/or expertise. The following are suggestions put forward for either Network Rail or other land owners to take forward with no relation to the Stag Brewery. The development itself does not generate a need to carry out these works at the level crossing but the following suggestions have been put forward for other stakeholders to take forward separately:

- Potential for improving the pedestrian access to the station from the north over the builder's merchant yard – although 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 NR should take the lead in providing a detailed assessment;
- Associated with the above, the feasibility for improving road markings, including the possible use of surfaced treatment at the crossing could be investigated;
- Potential improvements to the existing footbridge – suggestions have ranged from provision for better signage including potentially information regarding barrier down time, to encourage increased use to physical improvements and potentially provision of a new footbridge. 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, the high incidence of drivers ignoring the red lights.
- 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 under the S278 works. 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. Extensive talks with NR have been held on this matter.

8.6 Summary

8.6.1 In summary, assessments have been carried out on the bus, rail, walking and cycling networks/infrastructure.

8.6.2 The main impacts of the development on the rail network relate to Mortlake Station. As a worst case, it has been assumed that all rail demand from the proposed development will all be focussed on that station. We have also based our assessment upon the higher existing demand flows based on surveys commissioned by PBA, as compared with existing boarding and alighting figures provided by NR. The assessment has shown that on that basis the infrastructure, including the station entrances, platforms and footbridge have sufficient capacity to accommodate the additional demand generated by the proposed development.

8.6.3 In terms of line capacity, it is considered that the upgrade from 8 to 10 car trains that is currently underway and which will be complete by the end of 2019 will provide more than sufficient additional capacity to accommodate the proposed development. In addition, new higher capacity rolling stock is also to be introduced to the line and will further increase the capacity of the peak hour services at Mortlake.

8.6.4 With the exception of the proposed secondary school, the proposed development will generate only a modest increase in demand on the bus network. It is considered that, as a worst case, this could be accommodated by a modest increase in the frequency of the 419 bus service which provides a link to both Richmond and Hammersmith.

8.6.5 As a very worst case, TfL has indicated that the additional demand generated by the proposed school might require up to 8 special buses (double decker) to operate in the AM and afternoon peaks only. These would require up to three bus stops, either within a dedicated bus turn facility or on street within the Site.

8.6.6 From a walking and cycling perspective, our assessment demonstrates that there is enough capacity at the level crossing and on the surrounding footways and bridges in order to accommodate the additional walking and cycling traffic. The development proposals provide a very high quality public realm to encourage walking and cycling and the on-site networks are well connected into the off-site networks with new crossing facilities proposed on Lower Richmond Road and Mortlake High Street.

8.6.7 This includes the Level Crossing where a further assessment demonstrates there is enough capacity for pedestrians and there is only a modest impact and that the footbridge appears to have sufficient capacity to accommodate both station demand and through movements along Sheen Lane. Additionally, the width of the marked pedestrian areas on the crossing appears sufficient to meet NR guidelines both now and in the future. Nor is there any evidence that driver frustration has led to a poor accident record in the area based on a review of injury accident records. Therefore, no improvements are required at the level crossing as a result of the development.

8.6.8 Notwithstanding the above, it is considered that there would be benefits in considering improvements to the infrastructure to make access to the station and across the railway line a better experience. However, any study would need to be led by NR, unconnected to the Stag Brewery Development, since any substantive improvements are likely to require their land and/or expertise.

8.6.9 The overall Sustainable Transport Strategy for the development is set out in Chapter 9 of this TA. This identifies the specific measures that are proposed to mitigate the identified impacts for the proposed development as well as identify a wider range of measures aimed at enhancing access by non-car modes and at encouraging the take up of more sustainable patterns of travel.

9 Transport Strategy

9.1 Introduction

9.1.1 This chapter sets out the proposed transport strategy for the development which aims to promote the use of more sustainable modes of travel. The strategy also seeks to address the various impacts of the development identified within Chapters 6 and 7.

9.1.2 The Strategy has been shaped by the detailed discussions that have taken place with officers of LBRuT and TfL, with members of the public through CLG meetings and through the two extensive formal public consultation events and with third party stakeholders, including NR.

9.1.3 The overall strategy for the Site is in line with the Planning Brief, the emerging Site Allocation and with the Mayor's Transport Strategy and the recently issued updated draft Strategy which places considerable emphasis on the creation of "Healthy Streets" and as such has given a high priority to the provision of a high quality public realm which will help to promote walking and cycling.

9.1.4 The Planning Brief for the Site and the emerging Site Allocation also places a high priority on the need to create a high quality public realm as part of a permeable development and in particular highlights the need to provide a high quality pedestrian link through the Site to connect Mortlake Green and the station with the riverside. It also recognised that there were a number of difficult transport issues that needed to be addressed within the TA including existing congestion and the need to consider improvements to public transport, including the possible provision of a bus turning facility to replace the excising one at Avondale Road.

9.1.5 The quantum and design of parking is also a key element of the Transport Strategy. Not only will excessive parking encourage car use and potentially increase existing levels of congestion in the area but it will also challenge the provision of a high quality public realm. Too little parking may cause overspill onto surrounding residential roads.

9.1.6 The remaining part of this chapter sets out the various elements of the Transport Strategy that seek to ensure good access by all modes but with priority to walking and cycling and to minimise adverse impacts on the existing community.

9.1.7 The Transport Strategy comprises the following elements:

- Overall design principles;
- Walking and cycling strategy;
- Public transport strategy;
- Parking strategy and delivery and servicing strategy;
- Highway access strategy; and
- Travel planning/demand management strategy.

9.1.8 Each of these is set out below. In addition, impacts during construction will be dealt with through a Framework Construction Management Statement. This is a separate document that has been prepared by AECOM.

9.1.9 As part of the overall strategy, the proposed parking for the development is below LBRuT's maximum standards for the location, but in accordance with GLA standards. It has been pitched

at a level that is considered to achieve an appropriate balance between facilitating and encouraging the use of more sustainable modes of transport and ensuring that there is adequate parking to meet the needs of the various land uses proposed.

9.2 Development Layout Principles

9.2.1 The scheme has two distinct elements:

- To the east of Ship Lane (Application A – Development Area 1), and in accordance with the Planning Brief and the emerging Site Allocation, the scheme seeks to create a vibrant new centre for Mortlake with new restaurants and bars, cafes, local retail and employment opportunities and community uses. This is reflected in the creation of a new "high street" running east to west parallel to Mortlake High Street as well as a series of new links to the riverside with a number of new public squares being created. The area will essentially be traffic free since all parking is underground with access points on the periphery. Whilst servicing will occur on street level, access to the area will be controlled physically and by time restriction to minimise conflicts with pedestrians and cycles;

- To the west of Ship Lane (Application A – Development Area 2), the development is more residential in nature, comprising further residential units, flexible assisted living/residential units and the care home. The school (Application B) is also coming forward to the west of Ship Lane. With the exception of pedestrian and cycle flows related to the school at the start and end of the school day this part of the site will be subject to much less intense movement. In addition, it has no direct access to the river. Therefore, the design involves a more traditional streetscape with footways. The key challenge for this part of the Site is to manage the flow of people, cycles and traffic associated with the school.

9.2.2 Full details of the proposed public realm are provided within Gillespies' submitted Landscape Design and Access Statement. This gives high priority to establishing a network of pedestrian and cycle routes which will be largely traffic free providing very high quality access through the site, including excellent access routes to the river and towards Mortlake Green.

9.3 Walking and Cycling Strategy

9.3.1 The walking and cycling strategy for the site is encompassed within the wider design and landscape of the site. It is envisaged that the site will have a high level of on street activity with walking and cycling providing the best way to travel through, to and from the development.

9.3.2 Street design is crucial in providing an appropriate environment for walking and cycling through the development and therefore streets have been designed to slow vehicle speeds, where they are permitted and to provide areas where vehicles are either not allowed or the access is controlled, such as along the riverfront, with no vehicle access with the exception of delivery and servicing vehicles whose access will be strictly controlled both through design and management arrangements.

9.3.3 Figures 9.1 and 9.2 show the proposed network of pedestrian and cycle routes through the Site and how these link into the wider networks.

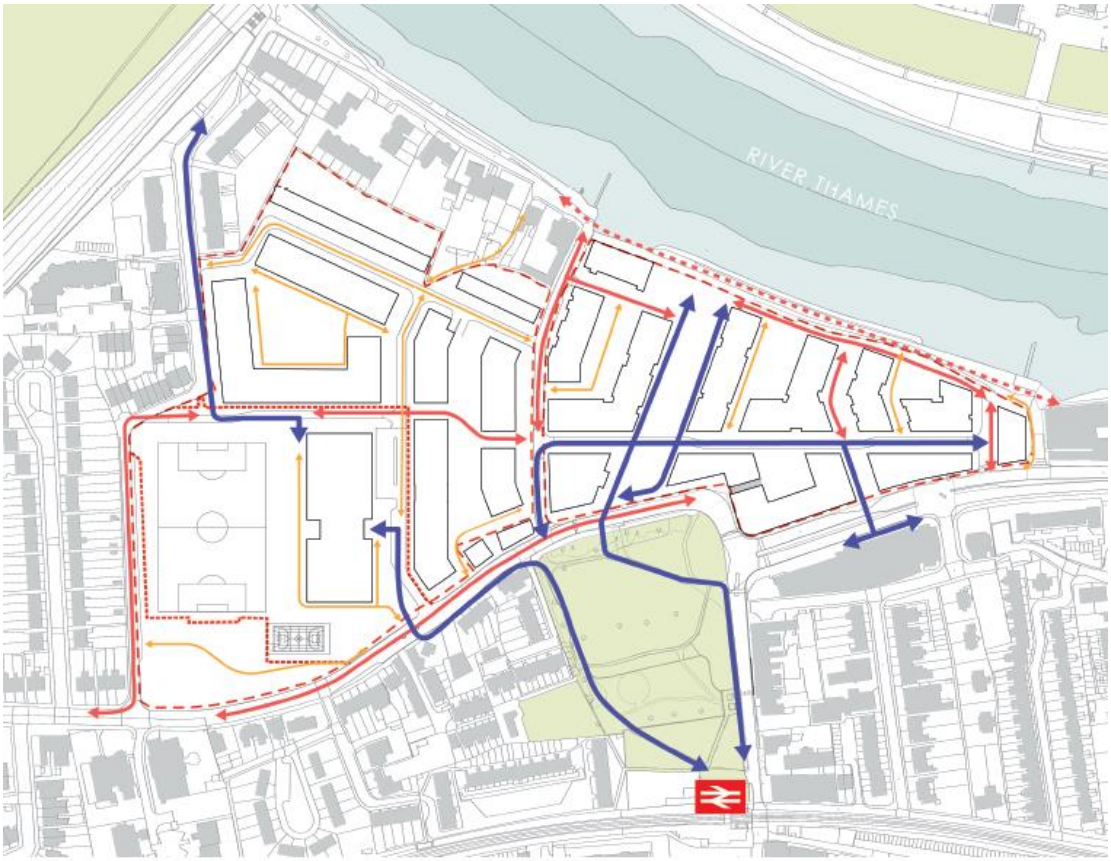


Figure 9.1 proposed pedestrian network

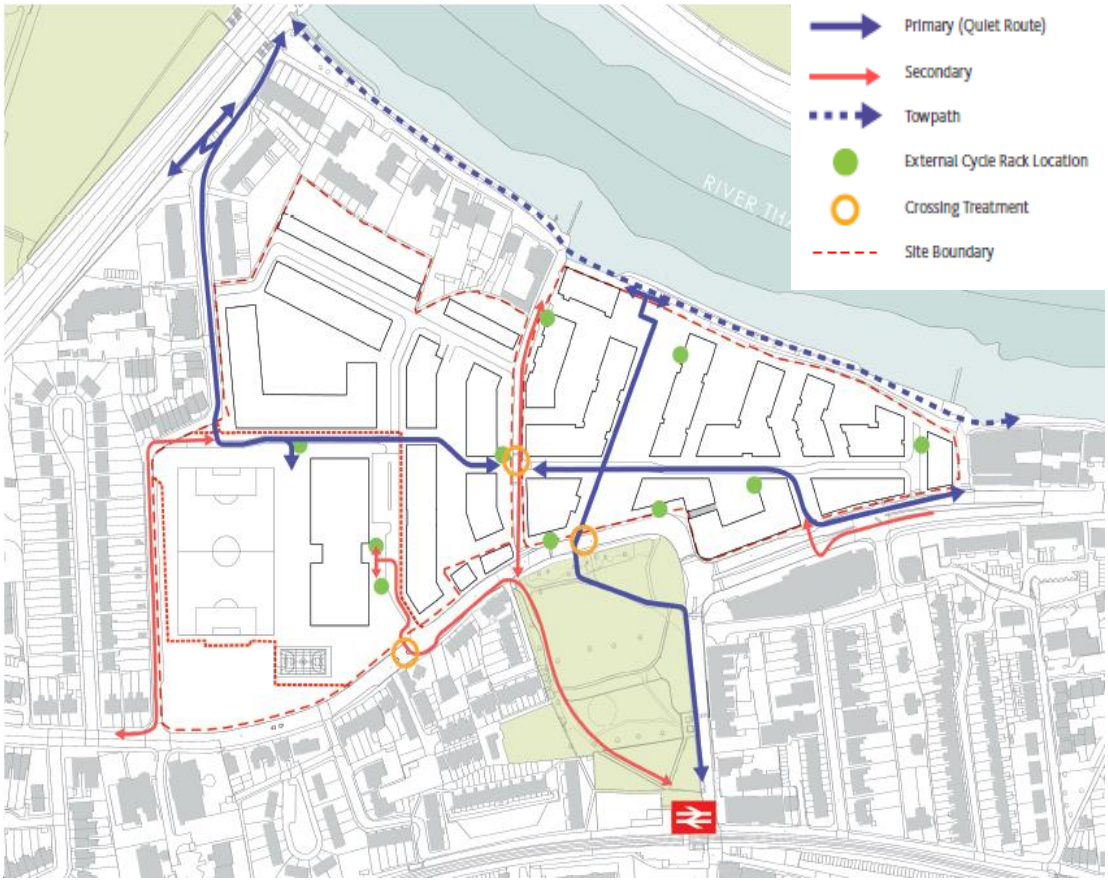


Figure 9.2 proposed cycle network

9.3.4 Key features of the pedestrian network are as follows:

- Provision of the new "Green Link which will run north-south through the Site providing a link between Mortlake Green and the River. This will have an overall width of between 30 and 38 metres and provide an important route for cycles as well as pedestrians;

- New "high street" running east- west parallel to Mortlake High Street and linking Ship Lane in the west with Mortlake High Street at the eastern end of the Site. This will again be a wide street (14 metres between buildings). It will have a defined vehicular path of 4.1 metres together with a number of defined loading bays. Actual traffic flows will be low and limited to servicing vehicles. Traffic access will be from the eastern end only and will be controlled though barriers which will allow time limited access to be effectively managed. The design will allow cycles to use this as a through route in either direction;

- The existing towpath east of Ship lane will be largely unaffected by the proposals. However, a new pedestrian promenade, (with a width of between 4 and 4.6 metres) will be provided parallel to the towpath but at a higher level above the flood level. This will be primarily a pedestrian route but will provide an informal route for cycles. Limited servicing activity will also take place along this route since there will be a series of bars, restaurants and other 'flexible uses' along the river frontage.

- Ship Lane, which bisects the Site, will continue as a public highway but will be considerably enhanced as a pedestrian route through the provision of a wider footway on the west side and a generous (3 metre) new footway on the east side. Subject to agreement with the Council, on street parking will be limited mainly to car club spaces;

- To the west of Ship Lane, a new east-west pedestrian cycle route will be constructed across the Site immediately to the north of the school. This will be essentially traffic free but there may be limited access for school service vehicles and buses. This will link with Williams Lane to the west and Ship Lane to the east and then in turn with the new east-west "high street" creating a new east-west route across the full site. A crossing treatment is proposed where this route crosses Ship Lane.

9.3.5 Figure 9.3 then shows how the proposed local pedestrian and cycle network will interface with the wider networks.

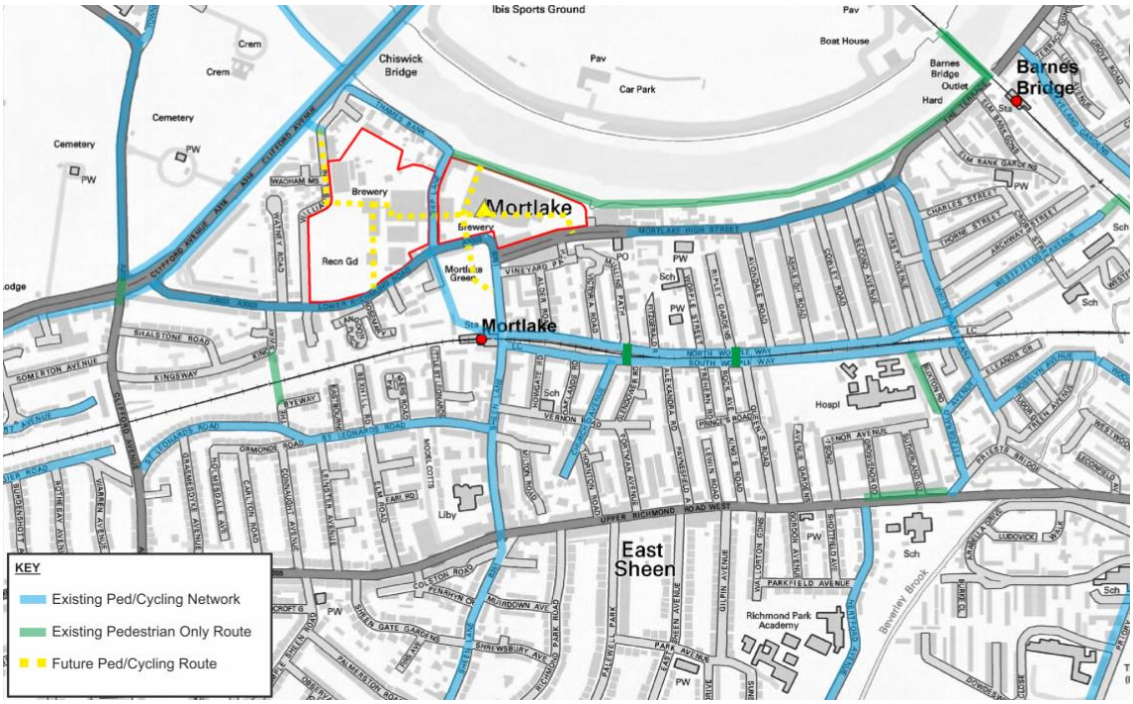


Figure 9.3 Wider pedestrian and cycle links

9.3.6 For pedestrians the main desire lines are considered as follows:

- To the station and south along Sheen Lane – this will be facilitated by providing a new toucan crossing at the southern end of the Green Link.

- To various bus stops located along Mortlake High Street and Lower Richmond Road – two new pedestrian crossings are proposed: one on Mortlake High Street which will connect to the new "high street" and one on Lower Richmond Road to the west of the new access road to the school. This will provide the main pedestrian access to the school and link in turn to Kingsway footbridge for pupils living to the south of the railway;

- To the river towpath, including Thames Path. There are various connections to this route, including via Williams Lane, Ship Lane and the "Green Link". The towpath in turn provides a route to Barnes Bridge Station to the east and to Kew Riverside to the west as well as access onto Chiswick Bridge.

9.3.7 In terms of cycle access, the proposed east-west route connects with both the riverside route towards Kew and the TfL Quiet Way along the A316. This in turn provides access to Chiswick to the north across Chiswick Bridge and to Richmond to the South west. For north-south movement the new "Green Link" would provide the main signposted route linking the riverside route with Mortlake Green and onward to the station and the signposted routes along South and North Worpole Way which run either side of the railway line.

9.3.8 Further detail on the highway changes such as the realigned crossings and modifications to the highway layout to benefit pedestrians and cyclists is included within the Highway Strategy section later in this chapter.

Off-site Cycle Design

9.3.9 As part of the transport strategy, further improvements to the cycle network have been considered but ruled out due to feedback from local residents, LBRuT and TfL. Other options included replacing parking on the southern side of Lower Richmond Road with a two way segregated cycle track, cycle lanes in both directions on Lower Richmond Road and several iterations of the Chalkers Corner Junction Design. These designs were not carried further into the strategy due to issues relating to parking and the balance between cycling and motor vehicles. Whilst some local residents expressed a desire for greater cycle facilities in the area, there was also a high value placed on existing parking and accessibility to the highway network. Therefore, it is felt that the cycling strategy put forward enables the best balance between these two modes.

9.4 Public Transport Strategy

9.4.1 As discussed in Chapter 2 the Site has an existing PTAL score of 2 indicating a poor level of accessibility by public transport. However, this is considered to underplay the accessibility of the location by public transport since the nearby Mortlake Station provides good access to central London and to the wider strategic network via interchange at Clapham Common, Vauxhall, Waterloo or Richmond.

9.4.2 The key issues identified in discussions with the transport authorities and the public have been:

- The poor quality of the pedestrian access to the Station;
- Crowding of existing peak services from Mortlake towards London in the AM peak. This was raised by the public rather than the authorities;
- The relatively poor bus service that is accessible from the Site;
- The potential need for a bus turnaround facility with driver facilities within the Site with TfL considering their potential options.

Rail

9.4.3 As concluded in chapter 8 there are no anticipated capacity issues in relation to either the peak hour trains or station infrastructure at Mortlake as a result of the development.

9.4.4 The access route between the Site and the station will be improved through the provision of a more direct route achieved by relocating the existing pedestrian crossing close to Ship Lane further west to align with the “Green Link”.

9.4.5 The possibility for improving the quality of the environ around the northern access to the station has also been investigated with NR. It has been shown from land ownership plans that NR are the owners of the land surrounding the north of the station but that the Timber Yard company have a leasehold on the land here. Whilst the current arrangements are considered to be unattractive there is no evidence that the Stag Brewery development has a significant impact on the area in terms of pedestrian capacity. In any case, potential improvement options have been put forward as suggestions for other stakeholders to take forward.

Buses

9.4.6 From discussions with both TfL and LBRuT, and with the exception of the school requirements, the main issue regarding buses for this Site is not one of capacity but of the relatively unattractive nature of the 419 service due to its relatively low frequency, up to 4 buses an hour. The service does however provide an important link to both Hammersmith (in the east) and to Richmond (in the west) which are considered to be the most important local destinations. In addition, there are a variety of other bus services that can be accessed from the different parts of the Site, as described in chapters 2 and 7, albeit requiring a walk in excess of the preferred walking distance to a stop. Taken together these bus services provide direct access to a wide range of destinations.

9.4.7 We have looked at a range of options for improving the local bus offer and this work is summarised within Technical Note 18 attached at Appendix V. These options can be summarised as follows:

- Diversion of the 209 bus service which provides a frequent service to Hammersmith but which currently terminates at the bus turn facility at Avondale Road to the south west of the Site. This was originally the Council's preferred option and would require the provision of a replacement bus turn facility within the Site;

- Upgrading the frequency of the 419 bus service. This would be the most straightforward option;

- Diverting or extending one of a number of other services to the Site that currently terminate in the Richmond area. Again, these options are likely to require the provision of a bus turnaround facility on the Site but would be provided to benefit the wider area and not directly as a result of the development, hence why the turnaround facility is not included within this application.

9.4.8 TfL's current position is that, given the uncertainties relating to the repair works at Hammersmith Bridge which are due to start during 2018, they are not yet in a position to advise on their preferred strategy to meet the future requirements of the masterplan. They anticipate that, prior to the reopening of Hammersmith Bridge to double deck buses, they will undertake an extensive review of bus services throughout the Hammersmith and Richmond area.

9.4.9 As things stand, the diversion of the 209 bus service is unlikely to be TfL's preferred option since this would be costly and would remove the service from residents living in the Avondale Road area, including to the south of the rail line.

9.4.10 TfL agree that increasing the frequency of the 419 bus service, together with the provision of special school bus services as required once the school's catchment has been determined, would meet the needs of the Stag development proposals. This would not require the provision of the bus turn facility, although in the absence of this, provision would need to be made to accommodate buses. This can be done in the coach/bus parking provided to the west of the school and along the access road to the north of the school.

9.4.11 Therefore, at this stage, and for the purposes of this assessment it is assumed that the 419 bus service will be enhanced to provide a 10-minute peak frequency service with additional buses provided to meet the needs of the school, but the level of provision will be agreed once the catchment area for the school has been established.

9.4.12 Whilst the need for a bus turn facility has not been established and will not be a direct requirement for this development and therefore part of a separate application, land has been reserved at the south west corner of the site at the junction of Williams Lane with Lower Richmond Road. Here a bus turn facility to accommodate up to 4 bus spaces together with driver facilities, could be provided. This is TfL's preferred location for such a facility since it

provides them with the greatest flexibility in terms of the management of bus services in the area and would involve least redundant bus mileage. These proposals however, are not supported by LBRuT and GLA. Figure 9.4 shows the location of the safeguarded land and Drawing 38262/5501/70A, attached at Appendix L, shows a possible layout for a four bay facility on this land.

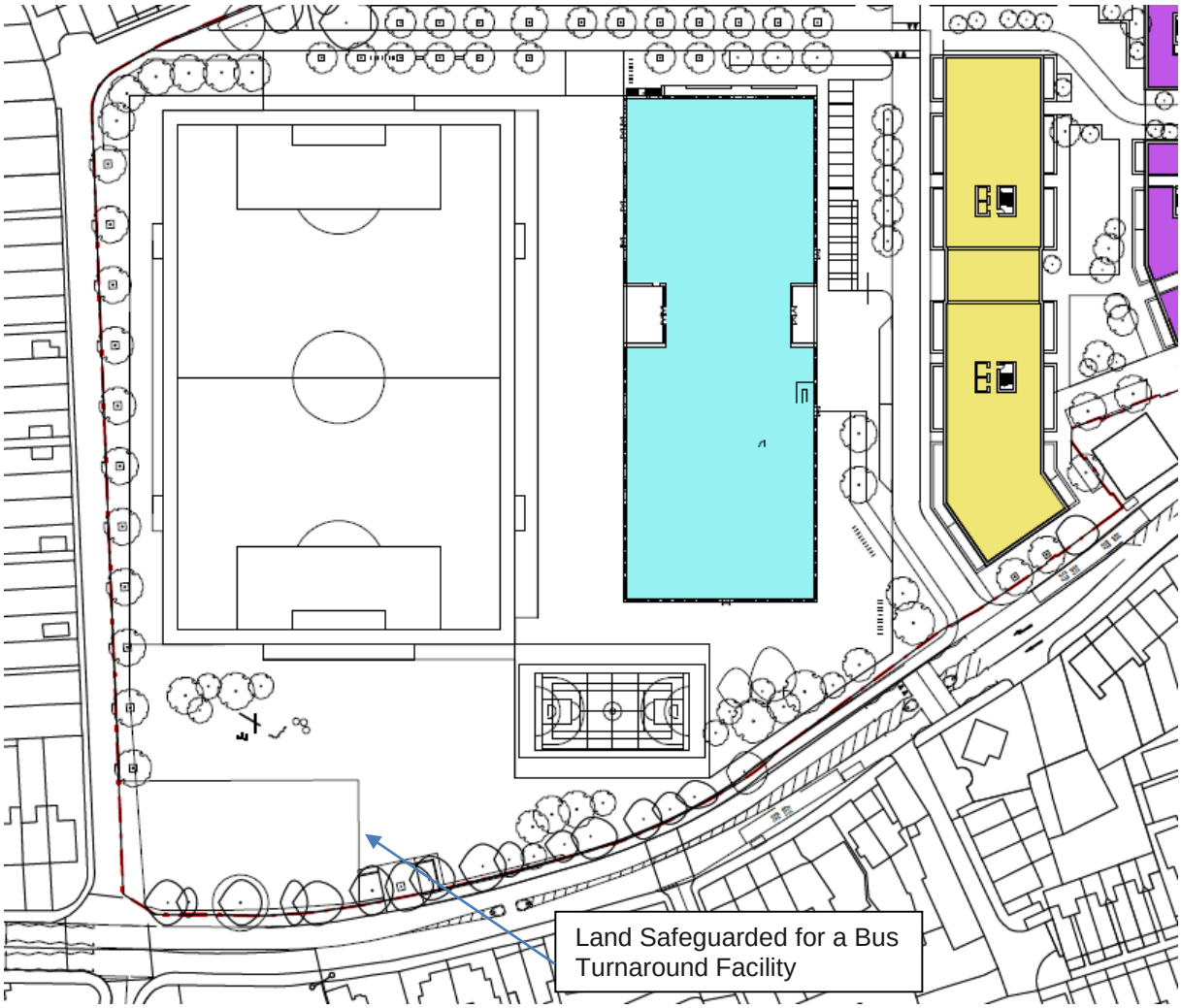


Figure 9.4 Location of Bus Turnaround Safeguarded Land

9.5 River Use

9.5.1 Notwithstanding the constraints regarding the commercial use of this part of the river, that were noted in paragraph 2.12.4, the potential for the possible extension of river boat services from Putney to the stag was discussed with officers of TfL and the Chief Operating Officer of Thames Clipper (TC). These discussions confirmed that the provision of a service from the Stag was unlikely to be viable. A number of factors were highlighted:

- Bridge height is a key issue. TC vessels (approx. 150 capacity) currently have some difficulty clearing both Wandsworth and Putney bridges at certain times of day due to a combination of low bridge height and high tide. Heading further west with existing TC vessels is not considered feasible as the channel depth worsens and navigating bridges at high tide is difficult and subsequently restricts the service timings. Hammersmith (south) bridge has a main navigational arch clearance of 3.6m, which is not sufficient for existing TC vessels. The use of smaller vessels was not considered to be viable;

- Unattractive Journey time due to the combination of the speed restriction and the river alignment. These would combine to give an unattractive journey time of circa 30 minutes between the Stag and Putney; and

- Difficulty of providing access to the Site from the navigable channel.

9.5.2 For these reasons the potential use of the river to provide a commercial river bus service was discounted.

9.6 Parking Strategy

9.6.1 As set out above, the parking strategy for the Site seeks to provide an appropriate balance between provision of too much parking that would encourage residents and visitors to use a car as a 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 for both the residential and non-residential elements of the development is below the maximum LBRuT standards for the location, although it is in accordance with GLA standards.

9.6.2 Overall, a total of 664 parking spaces is proposed for the development providing parking for residents at a ratio of approximately 0.74 spaces per dwelling with the assisted living element and 0.70 with the additional residential units. 77 spaces are provided within the eastern car park (Development Area 1) to meet the needs of the non-residential development. The care home has 31 spaces located within the western basement (Development Area 2) and the school has 15 spaces provided at surface level.

9.6.3 The provision of an average of 0.74 spaces per unit is considered appropriate for this type of residential development as evidenced by the take up of spaces within other similar developments such as those surveyed by PBA at Kew Riverside, Kew Riverside Park and Kew Bridge. It is also similar to the existing level of car ownership within the area from residents of apartments. 2011 Census data shows that for Car ownership levels in the zone Richmond upon Thames 003D (the zone containing Mortlake) just 55.6% residents of flats own at least one car.

9.6.4 For the non-residential development a parking accumulation assessment has been undertaken based upon the agreed trip generation rates and this suggests that the quantum of non-residential parking should be sufficient to meet the needs of the proposed commercial and leisure uses.

9.6.5 The importance of ensuring that parking from the proposed development does not overspill onto the surrounding road network has been recognised. Baseline parking surveys have established that, whilst there are spaces available at all times of day on the surrounding road network relatively high stress levels do exist. The outcome of these surveys was reported in detail within Chapter 2.

9.6.6 An Outline Parking Management Plan (PMP) has been prepared and is attached at Appendix Y. The overriding objective of the plan is to minimise any detrimental impacts associated with potential overspill parking, on residential roads surrounding the Site. Sub objectives of this Plan are as follows:

- To provide clear and effective management of all residential and non-residential parking across the development (but excluding the school which will be responsible for managing its own parking);

- To actively discourage residents and visitors from parking on residential streets on the periphery of the Site;

- To monitor the utilisation of both on and off site parking in conjunction with the Framework Travel Plan and provide an annual report to the Local Planning Authority.

This will provide a basis for determining if changes should be made to the management regime or potentially whether it might be appropriate to consider off street parking controls.

9.6.7 It is envisaged that the full PMP will need to be agreed with the Planning Authority prior to first occupation of the development. It is recognised that the demand for non-residential parking spaces could exceed demand at busy times and therefore it is envisaged that the Management Plan will inquorate some form of pre booking facility and measures to discourage visitors to turn up on a speculative basis to use the parking. Notwithstanding this, we expect the commercial and community uses to be quite local in nature so expect that a number of visitors will walk/cycle rather than drive to the Site.

9.6.8 It is anticipated that this will include the following detailed measures.:

- Residential parking spaces will be allocated to specific users;
- Detailed arrangements for the management of non-residential spaces within the main car park. This will include proposed charges and the method of charging;
- Information regarding the availability of non-residential parking and any pre booking arrangements;
- An agreed monitoring and reporting regime relating to both on-site and off-site parking.

9.6.9 It is also anticipated that the school, as part of its Travel Plan, will need to agree its own management arrangements for its parking and to discourage indiscriminate short term parking by parents seeking to drop off / pick up children at the start and end of the school day. This is reflected within the Draft School Travel Plan attached to this TA.

9.6.10 It is also recognised that, should overspill parking occur and cannot be effectively managed then there may be a need to implement a controlled parking zone (CPZ) in the streets around the Site, which are currently uncontrolled and potentially modify the hours of existing CPZ's in the area. It is therefore anticipated that the potential costs associated with such measures would be addressed through the Section 106 agreement. This will also need to cover potential on-street parking related to the school. Whilst this CPZ is desirable for the area, it is not essential to the development.

9.7 Highway Strategy

9.7.1 The highway access strategy has focussed on the following aspects:

- Strategic access to the area, recognising the need to ensure that the Stag development does not significantly add further to existing levels of congestion. This reflects the concerns expressed by the Council, including within the Planning Brief and emerging Site Allocation, and members of public through the various consultation exercises;
- The operation of the local network, in particular, the site frontage of Lower Richmond Road and Mortlake High Street to ensure that it does not act as a barrier to pedestrian / cycle access to the Site and aligns with the Mayor's Policy for Health Streets; and
- Ensuring safe and efficient access to the Site including to the two underground car parks and for servicing vehicles that does not prejudice through traffic movement or the movement of pedestrians and cycles through the Site.

9.7.2 For any offsite works that fall outside of the application red line boundary, they will be secured through a S278 agreement in the usual way.

Strategic Access

9.7.3 Whilst the Transport Strategy gives priority to non-car modes it is recognised that the area is subject to existing high levels of congestion at busy times. This relates to the limited points of access to Mortlake due to the combined barriers created by the River Thames and the railway lines and the congested nature of the main access to the area via Chalkers Corner. Also, two of the main access points are across level crossings which are characterised by extended and unpredictable barrier down times (which average at around 45 minutes per hour).

9.7.4 The Planning Brief recognised the importance of addressing congestion as part of the TA. Whilst options for improving vehicular access over the level crossings has been examined, it is clear that improvements are not practical, certainly in the context of the proposed development. NR has confirmed that it has no plans to alter the level crossings or introduce any measures that would reduce or better regulate barrier down time. It has also been confirmed with LBRuT that there are no realistic options for replacing either of the crossings with an underpass or road bridge due to constraints of land availability, cost and environmental issues.

9.7.5 Therefore, the highway assessment has focussed on the option of improving the design of the Chalkers Corner junction as the main and most suitable way of ensuring that the proposed development does not further increase congestion levels in the area. As set out in the development proposals within Chapter 4, these improvement works are considered to form an essential element of the development and form a separate detailed application (Application C).

9.7.6 The proposed works will provide additional capacity, in particular on the exit arm from Mortlake (Lower Richmond Road) but also some additional entry capacity into Mortlake. In addition, by lengthening the queuing space between the main cross roads and the Lower Richmond Road arm the works will reduce the risks of traffic queuing back and blocking the main cross roads. It is considered therefore that the works will improve the overall resilience of the junction as well as improving capacity.

9.7.7 The current proposals are shown in Drawing 38262/5501/51E and are included in Appendix H and were described in detail within Chapter 4. Figure 9.5 illustrates the proposals.

Figure 9.5 Chalkers Corner Proposals (Application C)

9.7.8 As noted previously, whilst the main objective of the Chalkers Corner scheme is to provide additional highway capacity to mitigate the impacts of the proposed development, the scheme does also provide a number of features to enhance pedestrian and cycle access providing a better linkage for cycles between Lower Richmond Road and the TfL A316 Quite Way,

enhanced pedestrian islands and improved cycle features at the main Chalkers Corner junction, in line with TfL requirements.

9.7.9 Whilst the scheme will necessarily require the removal of a number of mature trees along Lower Richmond Road and one in Clifford Avenue, as well as a number within the Chertsey Gardens site, it is proposed to add new planting to compensate for this loss. The landscape scheme proposes to replace the existing wall and fence on the revised alignment with a 2m high brick wall to help mitigate any noise impacts arising from moving the road slightly closer to Chertsey Court. In addition, a number of semi-mature trees are proposed within the Chertsey Court site to augment existing trees and visually screen the building with greenery. These proposed trees will include a mix of deciduous and evergreen species which assist in pollution absorption. The trees will be supplied at 6m height (4+ years old) to maximise immediate impact of the proposed landscape. A small pocket park with additional trees is also proposed on the opposite side of Lower Richmond Road intersection. In total, 22 trees will be removed but 33 new trees will be planted, a net increase of 11 trees.

9.7.10 Chertsey Court will be set back a minimum of 14.0 metres from the carriageway of Lower Richmond Road (compared with 16.2 metres now). The nearest property to Clifford Avenue carriageway will be 16.2 metres (compared to 18.3 currently).

9.7.11 The scheme will have very little impact on parking. The existing informal car park on the corner of Lower Richmond Road will be retained and no spaces are lost within Chertsey Court. As part of the proposals TfL has asked that the scheme includes a protected bus clearway for the westbound service on the approach to the junction. Currently buses cannot access the kerb due to parking and this is particularly unsatisfactory for less mobile passengers boarding and alighting at this location. If this element of the proposals is included in the scheme it will result in the loss of three currently uncontrolled on-street spaces plus one overnight parking space

Lower Richmond Road/Mortlake High Street

9.7.12 In addition to the works at Chalkers Corner, a package of works is proposed along the Lower Richmond Road corridor including Mortlake High Street and extending down Sheen Lane towards the level crossing. These works focus on enhancing the pedestrian and cycle environment and by slowing speeds and improving pedestrian and cycle crossing facilities, further enhancing the safety and in particular creating a suitable environment for a new secondary school.

9.7.13 The specific proposals are shown in Drawing 38262/5501/58E which is included in Appendix T as follows:

- A New 20mph speed limit enforced between Williams Lane and Bulls Alley including Sheen Lane, between the Mortlake High Street / Lower Richmond Road junction and the Sheen Lane level crossing. A number of physical measures are proposed to help manage speeds including junction entry treatments, carriageway narrowing and provision of a textured tarmac resin to differentiate the area of speed restraint. Potentially, table tops to comply with TfL requirements for buses could be installed at pedestrian crossing points by the school and on the “Green Link”.

- A new crossing provided just to the west of the new access road to the school to improve access for pupils needing to cross Lower Richmond Road. This is currently shown as a zebra crossing but could potentially be upgraded to a pelican crossing;

- Moving of Bus Stop P further to the east to align with the new crossing point and encourage them to cross at the crossing rather than informally;

- The existing signalised crossing point adjacent to Ship Lane is relocated to align better with the Green Link. This also requires the removal of Bus Stop Z;

- Extension of the two lanes on the Lower Richmond Road arm of the Sheen Lane mini-roundabout so as to provide more capacity for those heading from west to east across the roundabout. This will reduce the tendency for the eastbound traffic movement through the junction to become blocked when the level crossing barriers are down;

- Provision of 'KEEP CLEAR' markings on the Sheen Lane mini-roundabout to free up the roundabout when the level crossing is down;

- Provision of an informal crossing point on the east side of the roundabout enabled by providing a kerb buildout on the corner to slow traffic and improve pedestrian/vehicle inter visibility at this location;

- Provision of a new zebra crossing to serve a desire line to the eastern portion of the development and help to reduce speeds on Mortlake High Street

- Possible enlargement of the central reserve and narrowing of traffic lanes, again to improve the pedestrian environment by slowing vehicle speeds.

- Provision of a new right turn lane on Mortlake High Street to provide for right turners into the development car park at the current junction with Vineyard Path.

- Tightening of radii and footway build-out at Vineyard Path Junction

- Relocation of bus stops and bus stands on Mortlake High Street to allow for the new access points and the new crossing.

9.7.14 All these modifications whilst part of the highway strategy also widely benefit the walking and cycling strategy with many of the changes aimed at reducing vehicle speeds and increasing the permeability across Lower Richmond Road.

Site Access

9.7.15 Figure 9.6 shows the proposed Site access strategy.

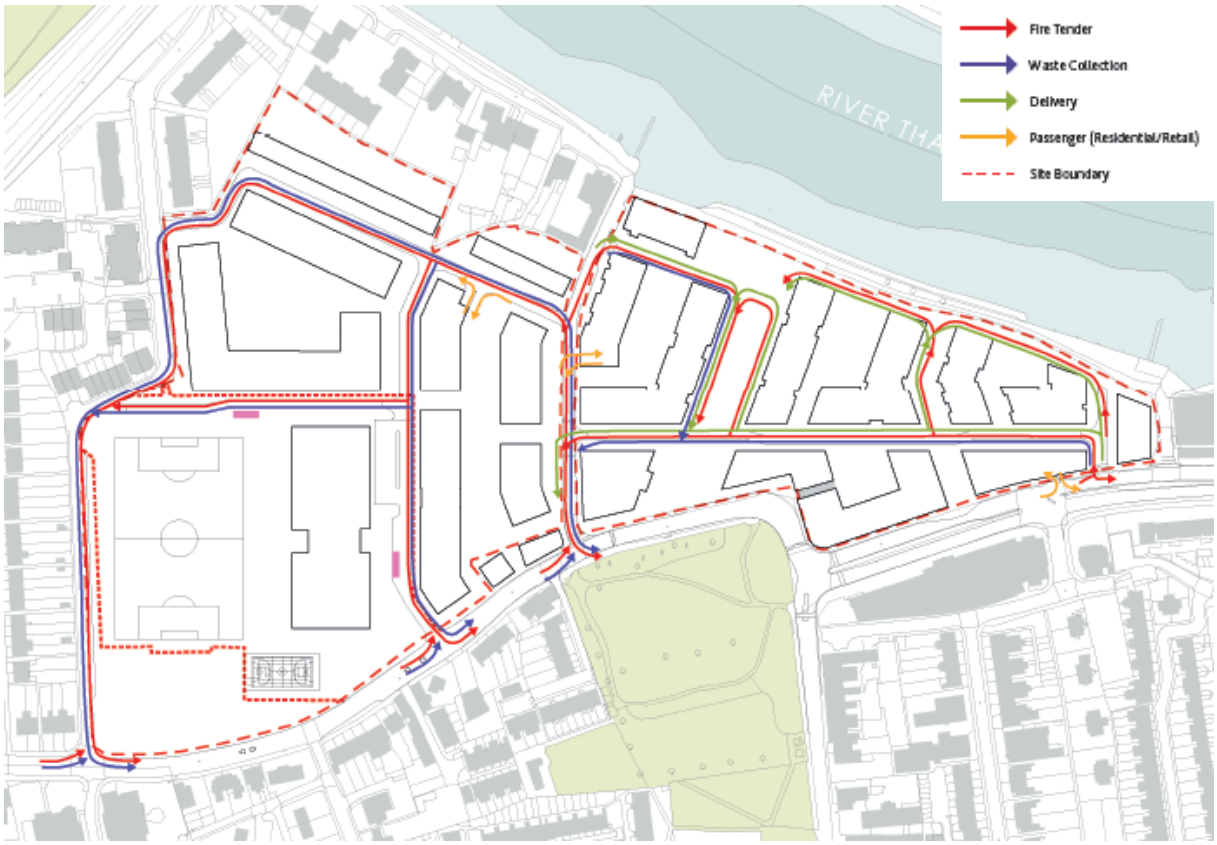


Figure 9.6 Site Access Strategy

9.7.16 As discussed above, the majority of car parking will be provided within two underground car parks. The main car park which will serve the mix of uses to the east of Ship Lane (Development Area 1) can be accessed at two locations, from Ship Lane and from Mortlake High Street. The second access onto Mortlake High Street was added following feedback from public consolation with a view to reducing the impacts of the development upon the Sheen Lane mini roundabout. The addition of this second access will mean that only traffic specifically wishing to use Sheen Lane will need to travel thought the mini roundabout form this part of the development.

9.7.17 Because of the nature of the land uses that it is serving (residential, flexible assisted living / residential and care home) the western underground traffic will generate much less traffic movement than will the eastern car park. Access to the western basement car park (Development Area 2) is to the north of the Site and can be achieved via a number of alternative routes minimising impacts on any one access road.

9.7.18 Access to the School (Application B) is from the new road connected to Lower Richmond Road. Vehicles will be able to use this road and then loop through the site exiting via either Ship Lane or Williams Lane.

9.7.19 Access for servicing vehicles is described within the section on servicing below.

9.7.20 The proposed Site access arrangements together with the proposed enhancements to the Site's highway frontage along Lower Richmond Road and Mortlake High Street, have been subject to an independent Stage One Safety Audit. undertaken by Alpha Consultants in December 2017. The visit to the site of the proposed scheme was made on 15 December

2017. A copy of the Audit, together with the Brief and Designer Response are attached at Appendix T.

9.7.21 Whilst the Audit identified a number of issues none of these required consideration of any fundamental changes to the proposals and the Designers Response indicates how these will be dealt with and where appropriate minor changes will be made to the scheme design. Where changes are indicated in the Designers Response, these have already been incorporated into updated design drawings attached as part of this TA.

9.8 Travel Planning

9.8.1 Three travel plans are being submitted as part of the application, with the aim of promoting more sustainable patterns of travel and outlining the different travel options available to residents, employees, pupils etc. who will be using the site.

9.8.2 The three travel plans, which are attached in Appendix Z, are as follows:

- Framework Travel Plan (FTP) setting out the overarching principles for travel planning across the full development with the exception of the school;
- Residential Travel Plan (RTP) similar to the FTP but with a more detailed and focused approach on the residential aspect of the site; and
- School Travel Plan (STP) focusing on the travel patterns of pupils, staff and visitors of the school.

9.8.3 The Travel Plans have been drawn up based upon the best practice guidance set out in the TfL website:

https://tfl.gov.uk/info-for/urban-planning-and-construction/travel-plans

9.8.4 The FTP is a site encompassing travel plan covering the overarching objectives of the development and how sustainable travel will be promoted.

9.8.5 All three travel plans will set out targets and measures of how best to promote sustainable travel and reduce the amount of private vehicle trips made. This is an integral part of the transport strategy for the site as it is the principal way of communicating with residents and users of the site about their method of travel and the best way to promote walking and cycling as principal modes of travel.

9.8.6 The objective of the FTP is:

To encourage the use of sustainable transport and realise the benefits of walking and cycling to and from the proposed development.

9.8.7 To support the realisation of this overarching objective, the following sub-objectives have been set out:

- Increase awareness of the FTP and its constituent measures;
- Encourage greater use of sustainable transport modes, particularly cycling and walking;
- Promote smarter sustainable travel behaviour and reduce the need to travel overall / and / or in peak times;
- Improve the health of residents and minimise the development impacts on the surrounding environment.

- Promote sustainable modes of travel to all visitors of the site

9.8.8 The FTP also sets targets which will seek to achieve a shift in mode away from car, and in particular single occupancy car, towards the more sustainable modes of travel.

9.8.9 The targets will be reviewed once the initial TRICS travel survey of each individual land use is completed. The baseline data from the surveys will provide a better understanding about what is achievable and what measures will best suit each land use and their respective users.

9.9 Delivery and Servicing

9.9.1 A Framework Delivery and Servicing Management Plan (FDSMP) has also been produced as part of the developments Transport Strategy. The FDSMP outlines the management of delivery and servicing trips and how they will operate within the Site. Figure 9.7 shows the access routes for servicing vehicles.

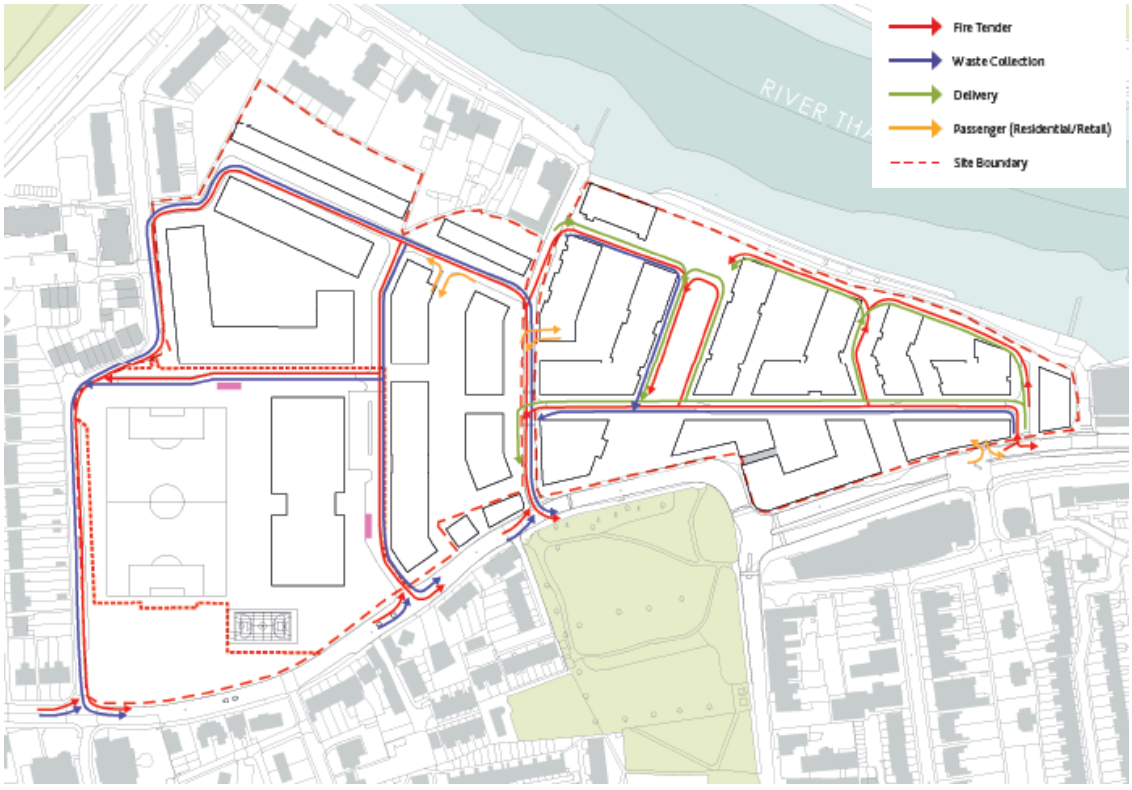


Figure 9.7 Delivery and Servicing Routes

The FDSMP factors in trips made to the residential aspect of the development as well as the school, retail units and all other land uses within the Site. A mix of formal and informal loading bays have been identified within the Site. These will accommodate service vehicles to both the residential and non-residential elements of the Site as well as refuse vehicles. For the detailed application (Application A – Development Area 1) drawing 38262/5501/75A identifies the location of these bays. It also identifies refuse storage areas where residential waste, which will be stored within the basement and will be brought to street level.

9.9.2 The main delivery and servicing area will be the 'new High Street' as this is where the main retail area will be. This will also provide access to the main restaurant/bar area on the river front. As part of the Delivery and Servicing strategy this area will be controlled by the estate management company through the use of rising bollards close to the entrance to the 'new High Street'.

9.9.3 The servicing and waste strategy for the detailed application (Application A – Development Area 1) involves the following elements:

- Entry to the area will be from the eastern end of the 'new High Street' and controlled by bollards close to the entry but allow for "u" turns for which arrive out of hours;
- The management control room is located close to the bollards to improve the effective management of the entrance;
- Loading bays of appropriate size identified throughout the Site. The capacity of these to accommodate the demand has been estimated based on industry data as set out in the FDSMP;
- Bin stores have all been located appropriately within the site so as to make refuse collections more efficient, with all refuse then collected on the 'new High Street' for the eastern part of the site and from appropriate locations within the western side of the development in line with LBRuT's requirements;
- Access for servicing will be time controlled to minimise conflicts with pedestrians and cycles and to ensure servicing does not occur at unsociable hours; and
- All residential buildings will have a concierge service during agreed servicing times. The control room will offer a collection service out of hours.

9.9.4 Vehicle tracking for refuse vehicles and for appropriate service vehicles has been undertaken to ensure the highway layout is navigable by large refuse trucks and delivery vehicles. Drawings for these tracks and the full FDSMP is included in Appendix K.

9.9.5 An Operational Waste Management Strategy has been prepared by PBA. Waste is a key consideration in the creation of sustainable community as it has environmental, social and economic impacts on the development, in terms of physical infrastructure provision and site operation. This Strategy discusses the relevant waste management policies and targets that the development needs to consider, identifies the expected waste arisings and servicing from the operational phase, and describes the on-site requirements for the storage and collection of waste from the development during its operation. The Strategy has been produced through consultation with LBRuT (Wednesday 29th November) and will continue to be development in coordination with LBRuT going forward.

9.10 Construction and Logistics

9.10.1 A Framework Construction Management Statement (FCMS) which will include a draft Construction Logistics Plan (CLP), has been submitted in support of the planning applications. The CLP aims to reduce the impact of construction vehicle trips travelling to and from the Site. It sets out the following measures to reduce adverse effects generated by construction activities:

- Construction vehicle routes to site will be agreed with LBRuT and TfL and will seek to minimise impact on the local road network and community. Wherever possible routes will avoid local schools and where this is not possible time restrictions will be put in place to avoid school start and finish times.
- Commitment to use a Delivery Management System (DMS) to ensure contractors and suppliers forward plan and pre-book deliveries. This will enable site managers to control deliveries and vehicle flow to site including avoiding peak network times where possible.
- Investigate the use of construction consolidation centre to help maximise vehicle load efficiency and reduce vehicle trips.

- Commitment to use contractors and suppliers that are members of best practice schemes such as Considerate Constructors Scheme (CCS), Fleet Operators Recognition Scheme (FORS) and Construction Logistics and Community Safety (CLOCS).

- Ensure a sufficiently robust CLP management, monitoring and compliance regime is in place so that the CLP is implemented correctly and remedial actions are taken when necessary.

9.11 Summary

9.11.1 The Strategy has been shaped by the detailed discussions that have taken place with officers of LBRuT and TfL, with members of the public through CLG meetings and through the two extensive formal public consultation events and with third party stakeholders, including NR.

9.11.2 The walking and cycling strategy for the site is encompassed within the wider design and landscape of the site. It is envisaged that the site will have a high level of on street activity with walking and cycling providing the best way to travel through, to and from the development.

9.11.3 Rail improvements have been explored with the possibility for improving the quality of the environ around the northern access to the station investigated with NR, although this is not part of the application.

9.11.4 We have looked at a range of options for improving the local bus offer including delivering additional bus capacity as required. A number of options have been discussed with TfL and TfL are to confirm their approach in due course. This work is summarised within Technical Note 18 attached at Appendix V.

9.11.5 Overall, a total of 664 parking spaces is proposed for the development providing parking for residents at a ratio of approximately 0.74 spaces per dwelling with the assisted living element and 0.70 with the additional residential units. 77 spaces are provided within the eastern car park (Development Area 1) to meet the needs of the non-residential development. The care home has 31 spaces located within the western basement (Development Area 2) and the school has 15 spaces provided at surface level.

9.11.6 The highway access strategy has focussed on the following aspects:

- Strategic access to the area, recognising the need to ensure that the Stag development does not significantly add further to existing levels of congestion. This reflects the concerns expressed by the Council, including within the Planning Brief, and members of public through the various consultation exercises;

- The operation of the local network, in particular, the site frontage of Lower Richmond Road and Mortlake High Street to ensure that it does not act as a barrier to pedestrian / cycle access to the Site and aligns with the Mayor's Policy for Health Streets; and

- Ensuring safe and efficient access to the Site including to the two underground car parks and for servicing vehicles that does not prejudice through traffic movement or the movement of pedestrians and cycles through the Site.

9.11.7 Three travel plans, which are attached in Appendix Z, have been produced to support the application. They include a Framework Travel Plan, Residential Travel Plan and School Travel Plan.

9.11.8 Both a FDSMP and CLP have also been produced as part of the Transport work and are included as part of the application. The FDSMP is included in Appendix J and the CLP has been produced by AECOM.

10 Summary and Conclusion

10.1 Summary

10.1.1 This Transport Assessment (TA) 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').

10.1.2 This TA has been based upon a very comprehensive assessment, to a scope of work and methodology that has been agreed with both LBRuT and Transport for London (Tfl). In addition to formal pre application meetings a series of technical meetings have been held with officers of both organisations to agree the detailed methodology and key assumptions.

10.1.3 The redevelopment proposals, which have been guided by the Council's Planning Brief for the Site which was adopted as Supplementary Planning Guidance in July 2011, 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.

10.1.4 In accordance with the Brief, the development will provide a new village centre for Mortlake providing a range of local shops, restaurants and bars as well as a local cinema and local jobs. It will also provide much enhanced access to the river, in particular from the station/Mortlake Green, through the creation of a new green link. As such, the proposals will reduce the need for the community to travel further afield to meet many of their day to day needs.

10.1.5 In developing the detailed proposals for the development, including the access strategy, a very comprehensive public consultation exercise has been undertaken. This has included two major exhibitions in March and July 2017 as well as a series of workshops with the local residents group.

10.1.6 The community engagement together with the discussions with officers of LBRuT and TfL have helped to shape the transport and access strategy for the Site which has prioritised the movement of pedestrians, cycles and access by public transport. The streets within the development will operate largely traffic free, since development parking is virtually wholly contained within basements and servicing will be subject to close control. Proposed parking for the development is also below current LBRuT maximum parking standards which will help to reduce vehicular trip generation associated with the development.

10.1.7 These factors, have allowed the creation of a highly attractive network of streets that will allow easy and safe access for pedestrians and cycles. The development proposals therefore accord with the principles of "Healthy Streets" which is a key plank of the mayors emerging London Plan and Transport strategy. The cycle strategy includes new routes through the site connecting to the existing cycle network.

10.1.8 The key components of the multi-modal transport strategy for the site are listed below:

- Development Layout Principles – including public realm/environmental measures to increase the attractiveness of walking and cycling in the site;
- A walking and Cycling Strategy – including new cycle routes and cycle parking facilities as well as new walking routes coupled with new crossing points and access points;
- Public Transport enhancements – such as improvements to the bus network and ease of access to the rail station;

- Parking Strategy – keeping parking space numbers low in order to discourage car ownership;
- Highway Strategy – enhancements to the network including Chalkers Corner and on Lower Richmond Road as well as new site access arrangements; and
- Travel Planning – to encourage more sustainable and healthy modes of transport.

10.2 Public Transport

10.2.1 Options for enhancing the existing access to public transport have been discussed with TfL, LBRuT and Network Rail. With regard to buses, whilst the original development brief has earmarked the 209 bus service for extension, the developers preferred option is to enhance the frequency of the 419 bus service since this provides good access to all parts of the Site and provides a good link to both Hammersmith (to the west) and to Richmond (in the east). Both of these options are important destinations in themselves but also provide connectivity to the wider public transport network. However, at this stage, TfL wish to retain flexibility regarding future bus service upgrades since they are planning a wider review of bus services in the area to take effect once planned works to Hammersmith Bridge have been completed.

10.2.2 In order to maximise TfL's potential future operational flexibility in this location, the Applicant has agreed to TfL's request to safeguard an area of land within the Site at the corner of Lower Richmond Road / Williams Lane, for a possible new bus turn facility. This could accommodate three bus stands as well as driver facilities. Should TfL wish to pursue this option then this would be subject to a further planning application.

10.2.3 In terms of the level crossing, whilst this does not form part of the application and it has been indicated that there is no negative impact on capacity caused by the development, PBA has attended several meetings with regard to this issue. A number of options have been put forward both in these meetings with Network Rail and the local MP, as well as in this TA.

10.3 Highway Enhancements

10.3.1 The on-site development proposals are complimented by proposed enhancement works to the Lower Richmond Road / Mortlake High Street corridor. The aim of these works is to provide a safer environment, in particular for pedestrians and cycles by managing traffic speeds and by providing improved pedestrian crossing facilities. The proposed works include provision of a 20 mph zone along the Site frontage and extending down Sheen Lane. It is also proposed to relocate the existing pelican crossing at Ship lane so that it better aligns with the new Green Link between the station and the river. Two new crossings are proposed, one to provide safe access to the school and the other a convenient crossing over Mortlake High Street.

10.3.2 The development proposals include a scheme to upgrade the Chalkers Corner junction which serves as the main highway access to the Mortlake area. The proposals seek to improve the operational efficiency of the junction, making it easier for traffic to exit Lower Richmond Road and therefore helping to reduce existing queuing and delays on the approach to the junction. The proposals will improve the resilience of the junction making it less prone to becoming blocked by queuing traffic. The scheme also incorporates measures to improve cycle movement through the junction, as agreed with TfL, which will contribute towards the development of their Quietway proposals for the A316 corridor. The scheme also includes a substantial landscaping scheme and other measures aimed at reducing the impacts of the scheme on the local community.

10.3.3 It is considered that the assessment work undertaken has been extremely robust. Trip rates for the proposed development have been agreed with both LBRuT and TfL which reflect current day travel behaviour rather than emerging, more sustainable travel trends. Nor has any account has been taken of the traffic generated by the former Stag Brewery, which was in operation on

the Site until December 2015 and which up to that time was generating significant HGV traffic movements as well as traffic associated with staff and visitors.

10.3.4 In order to assess the likely effects of the proposed development on the operation of the local highway network, including on the strategic network serving the area, it was agreed to use TfL's strategic SATURN model for south London, SoLHAM, in addition to more detailed local models. The strategic model provides a means for taking account of the potential reassignment of traffic due to infrastructure schemes or as a result of large development. It also takes account of anticipated changes in background traffic in London, although the latest Mayor's Transport Strategy is looking to limit traffic growth within London.

10.3.5 As agreed with TfL, their 2031 SoLHAM forecast model has been used as a means of assessing the operation of the highway in the future, with and without the proposed Stag development. In using the model, it has been noted that this suggests a high level of background traffic growth of around 9% compared with the existing situation. This does not necessarily accord with the Mayor's policy, as set out in the draft Transport Strategy, to reduce the proportion of journeys made by car from 36% at present to 20% by 2041 or the emerging observed travel behaviour towards the adoption of more sustainable patterns of travel.

10.3.6 Given that the existing highway network, in common with that serving most of London, is already congested, the SoLHAM model predicts a substantial increase in delay on traffic routes in the area by 2031, due to the high background traffic growth incorporated within the model. The modelling work confirms that the further addition of traffic associated with the Stag development with no improvements to the highway network will have a relatively modest further increase in delay through the network and that the impacts of the proposed development are very localised.

10.3.7 The local modelling also confirms that the proposals for the Chalkers Corner junction will largely mitigate the impacts of the development on the highway network and provide a substantial improvement to the operation of this junction and in some cases mitigates beyond the impacts of the development.

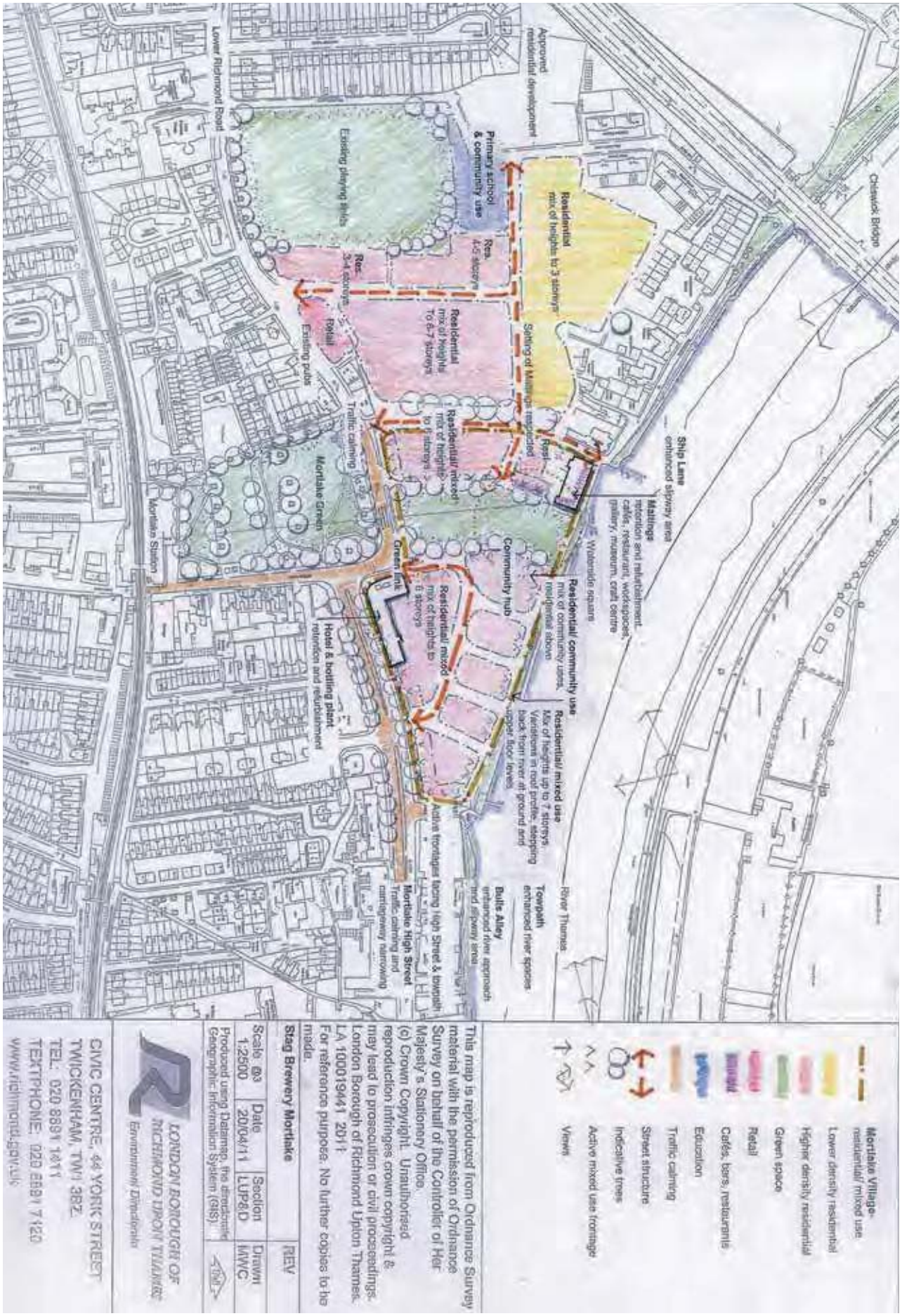
10.3.8 Traffic generation from the development will be subject to demand management through a series of Travel plans that have been drafted in accordance with best practice guidance. These include an overarching Plan for the site as a whole, as well as separate plans for the Residential school. The TA also includes framework plans for the management of the developments car parks, and to manage delivery and serving. It has also been agreed with LBRuT that provision should be made for the development to fund a suitable extension of controlled parking zones in the area should that prove necessary to control parking associated with the development from over spilling onto surrounding residential roads.

10.4 Conclusions

10.4.1 The proposed development at the Stag is demonstrated to accord well with both local and national policy and guidance. It is concluded that the proposed development, taking into account the proposed mitigation set out above, will have no severe residual impacts on the operation of the transport networks serving the site abut will provide major benefits in the form of enhanced pedestrian and cycle linkages and much enhanced access for the wider community to the riverside.

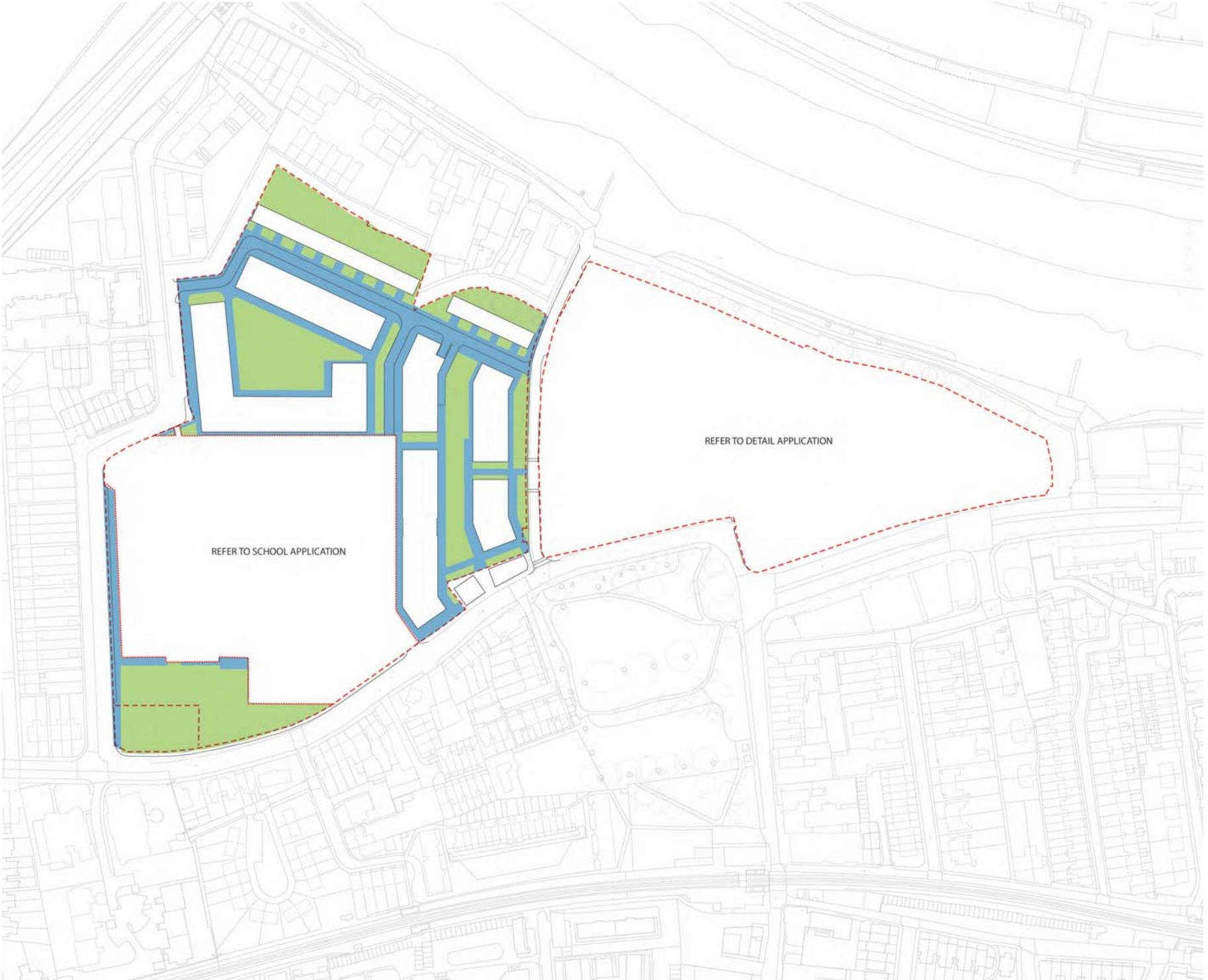
Appendix A Development Planning Brief

Appendix 1



Plan 1: Council's Vision

Appendix B Circulation Parameter Plans and Illustrative Masterplan



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D00	Issue for Information	RJ	29.09.2017
D01	Issue for Information	RJ	04.10.2017
D02	Issue for Information	RJ	24.11.2017
D03	Issue for Planning	RJ	25.01.2018

Notes

1.0 Do not scale from drawing, use figured dimensions only
1.1 All dimensions to be checked on site
1.2 This drawing to be read in conjunction with all other Gillespies drawings and specifications

LEGEND

- Hard Landscape
- Soft Landscape
- Site Boundary

Note:
1. In the event that building positions move, the landscape zones will be adjusted to match any deviation from the current layout.

2. Please refer to Squires and Partners Drawing 16019_C645_Z2_P_PR_001 to 16019_C645_Z2_P_PR_011 for building locations.

N

Project title
STAG BREWERY

Drawing title
Outline Application Hard and Soft Landscape Plan

Drawing status	Scale	Drawn
DESIGN	1:1000 @ A1	RJ
	Date	Checked
	04.10.2017	RC
Drawing number		Revision
P10736-00-001 - 120		D03

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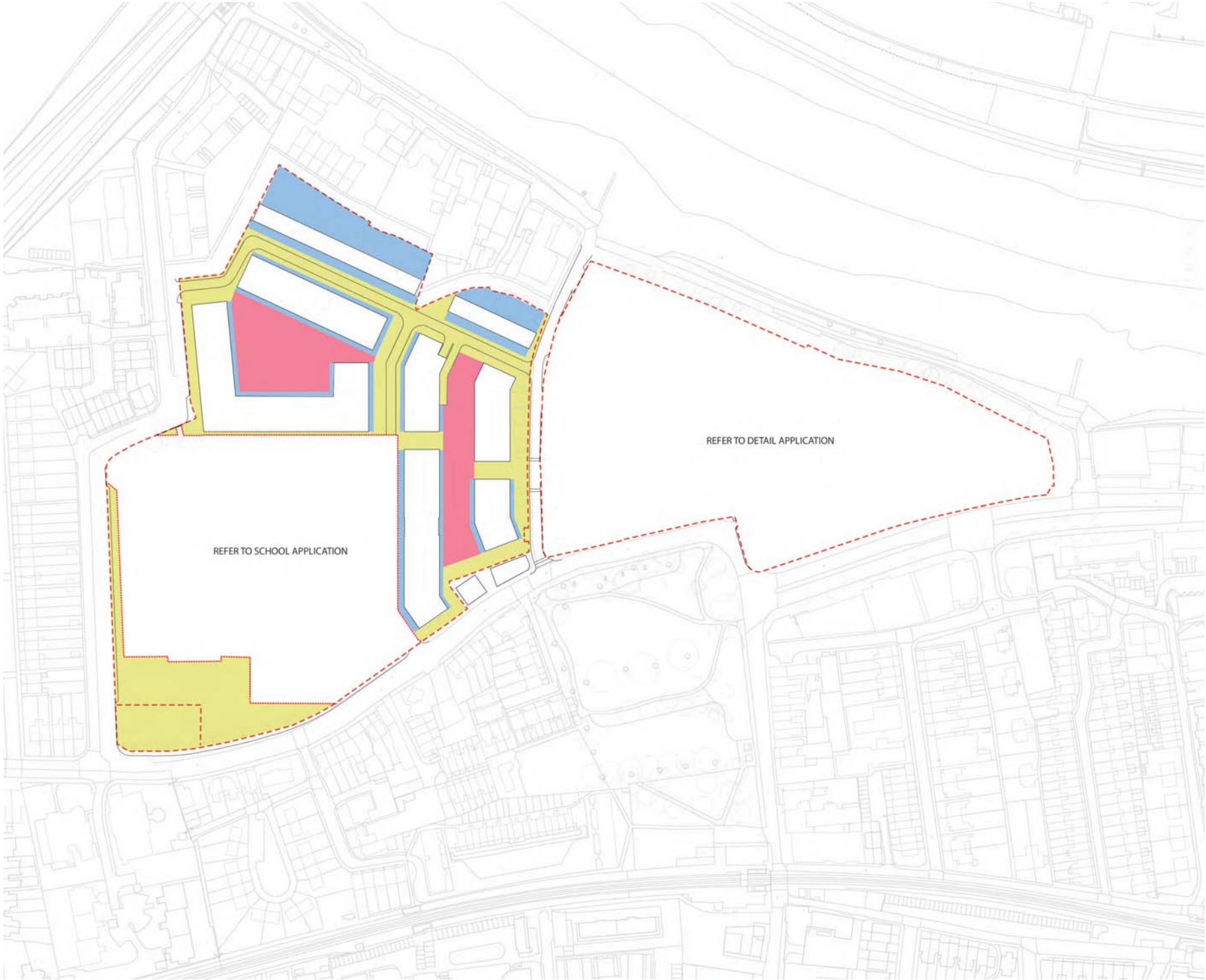

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D00	Issue for Information	RJ	29.09.2017
D01	Issue for Information	RJ	04.10.2017
D02	Issue for Information	RJ	25.11.2017

Notes

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LEGEND

- Public Realm
- Private Realm
- Communal Courtyard
- Site Boundary

Note:
1. In the event that building positions move, the landscape zones will be adjusted to match any deviation from the current layout.

2. Please refer to Squires and Partners Drawing 16019_C645_Z2_P_PR_001 to 16019_C645_Z2_P_PR_011 for building locations.

N

Project title
STAG BREWERY

Drawing title
Outline Application Open Space Plan

Drawing status
DESIGN

Scale
1:1000 @ A1

Drawn
RJ

Date
04.10.2017

Checked
RC

Drawing number
P10736-00-001 - 121

Revision
D02

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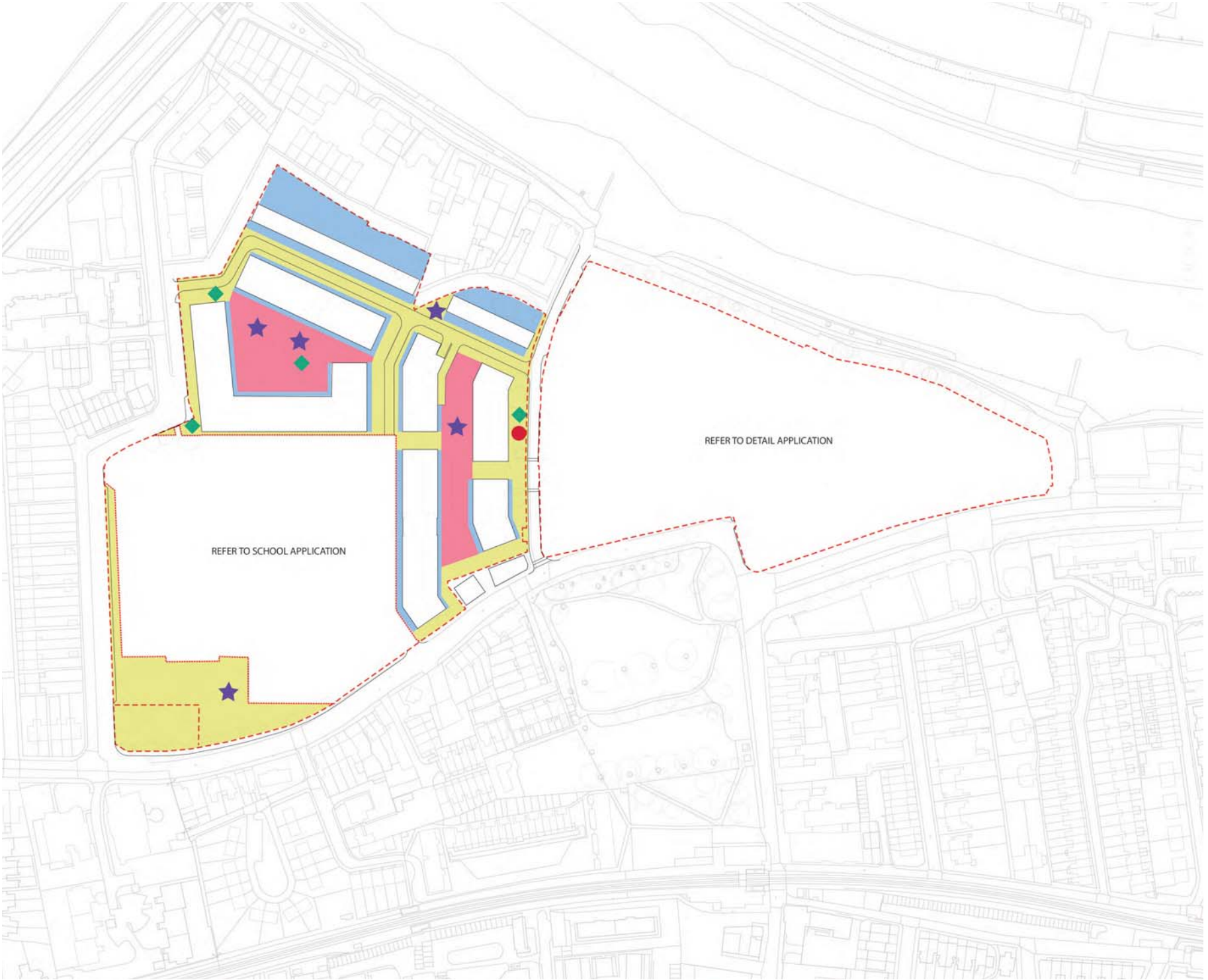

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D00	Issue for Information	RJ	29.09.2017
D01	Issue for Information	RJ	04.10.2017
D02	Issue for Information	RJ	24.11.2017
D03	Issue for Planning	RJ	25.01.2018

Notes

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LEGEND

- Public Realm
- Private Realm
- Communal Courtyard
- Play: Under 5 Years
- 5 - 11 Years
- 12+ Years
- Site Boundary

Note:
1. In the event that building positions move, the landscape zones will be adjusted to match any deviation from the current layout.

2. Please refer to Squires and Partners Drawing 16019_C645_Z2_P_PR_001 to 16019_C645_Z2_P_PR_011 for building locations.

N

Project title
STAG BREWERY

Drawing title
Outline Application Open Space with Play Space Location Plan

Drawing status: DESIGN
Scale: 1:1000 @ A1
Drawn: RJ
Date: 04.10.2017
Checked: RC
Drawing number: P10736-00-001 - 123
Revision: D03

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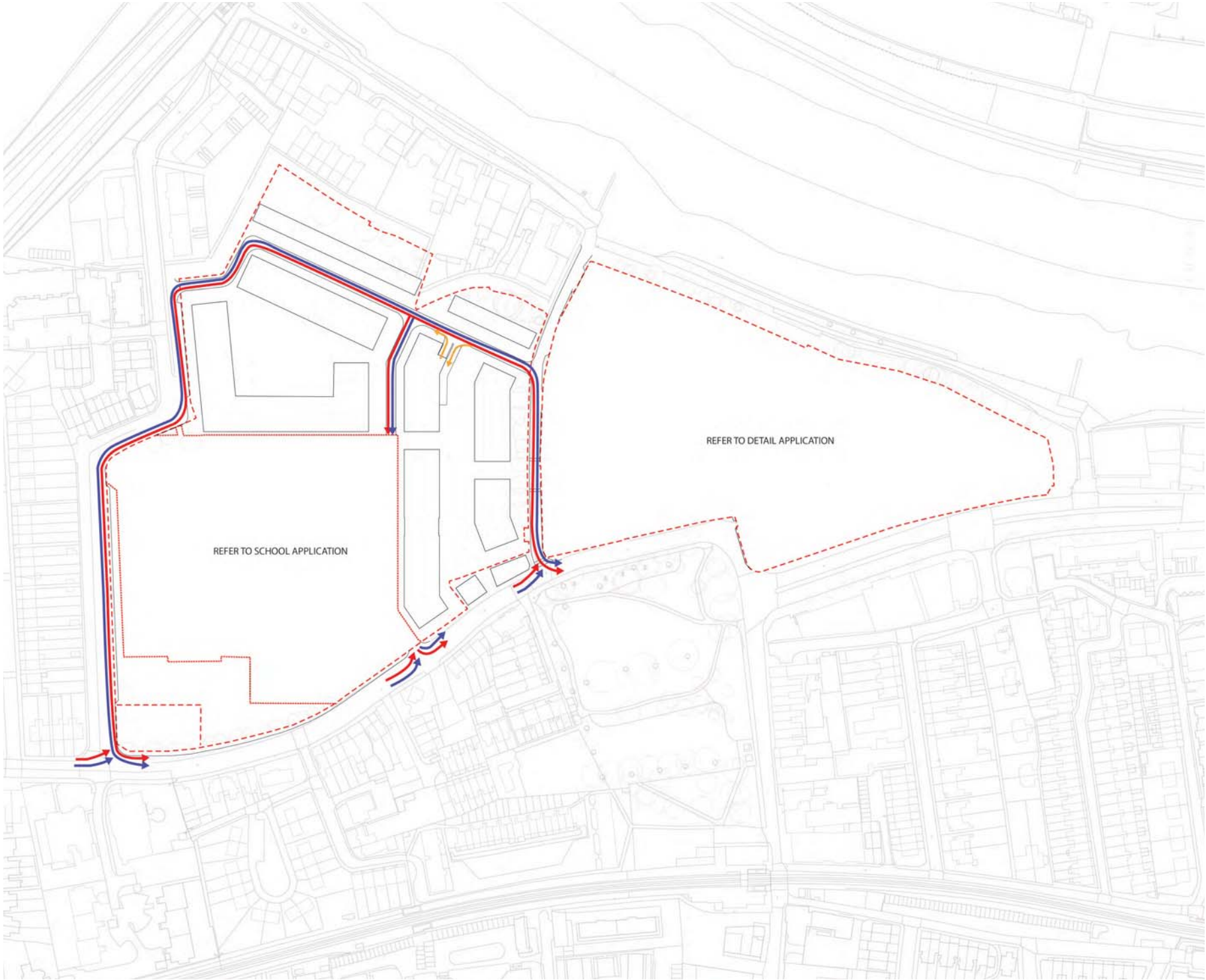

rev	details	by	Idate
D01	Issue for Information	RJ	24.11.2017
D02	Issue for Planning	RJ	25.01.2018

Notes

1.0 Do not scale from drawing, use figured dimensions only
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LEGEND

- Fire Tender
- Waste Collection
- Passenger (Residential/Retail)
- Site Boundary

Note:
1. In the event that building positions move, the landscape zones will be adjusted to match any deviation from the current layout.

2. Please refer to Squires and Partners Drawing 16019_C645_Z2_P_PR_001 to 16019_C645_Z2_P_PR_011 for building locations.

N

Project title
STAG BREWERY

Drawing title
Outline Application Circulation Plan - Vehicular

Drawing status: DESIGN
Scale: 1:1000 @ A1
Drawn: RJ
Date: 24.11.2017
Checked: RC
Drawing number: P10736-00-001 - 124
Revision: D02

Client
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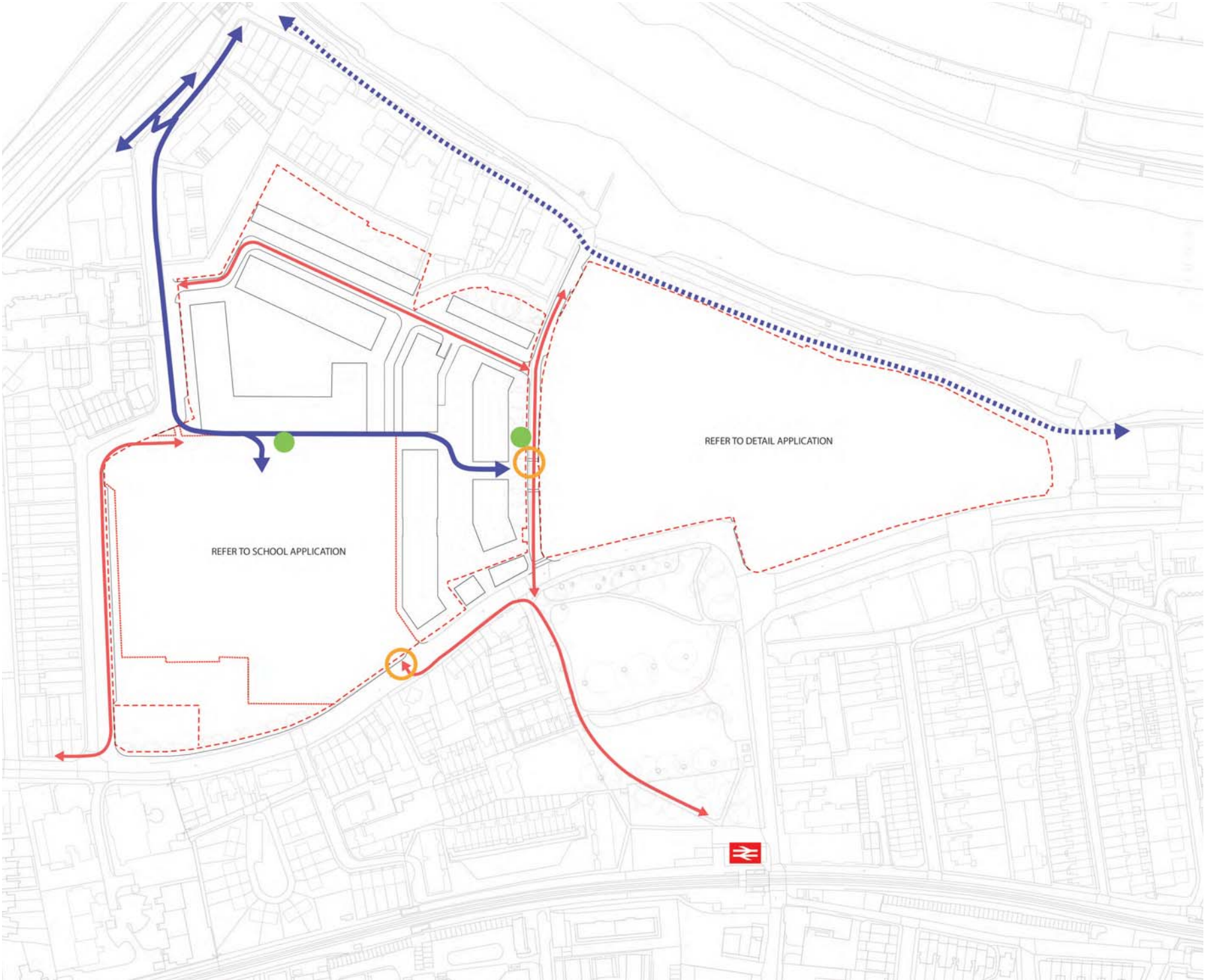

rev	details	by	Idate
D01	Issue for Information	RJ	24.11.2017
D02	Issue for Planning	RJ	25.01.2018

Notes

1.0 Do not scale from drawing, use figured dimensions only
1.1 All dimensions to be checked onsite
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LEGEND

- Primary (Quiet Route)
- Secondary
- Towpath
- External Cycle Rack Location
- Crossing Treatment
- Site Boundary

Note:
1. In the event that building positions move, the landscape zones will be adjusted to match any deviation from the current layout.

2. Please refer to Squires and Partners Drawing 16019_C645_Z2_P_PR_001 to 16019_C645_Z2_P_PR_011 for building locations.

N

Project title
STAG BREWERY

Drawing title
Outline Application Circulation Plan - Cycle

Drawing status	Scale	Drawn
DESIGN	1:1000 @ A1	RJ
	Date: 24.11.2017	Checked: RC
Drawing number: P10736-00-001 - 125		Revision: D02

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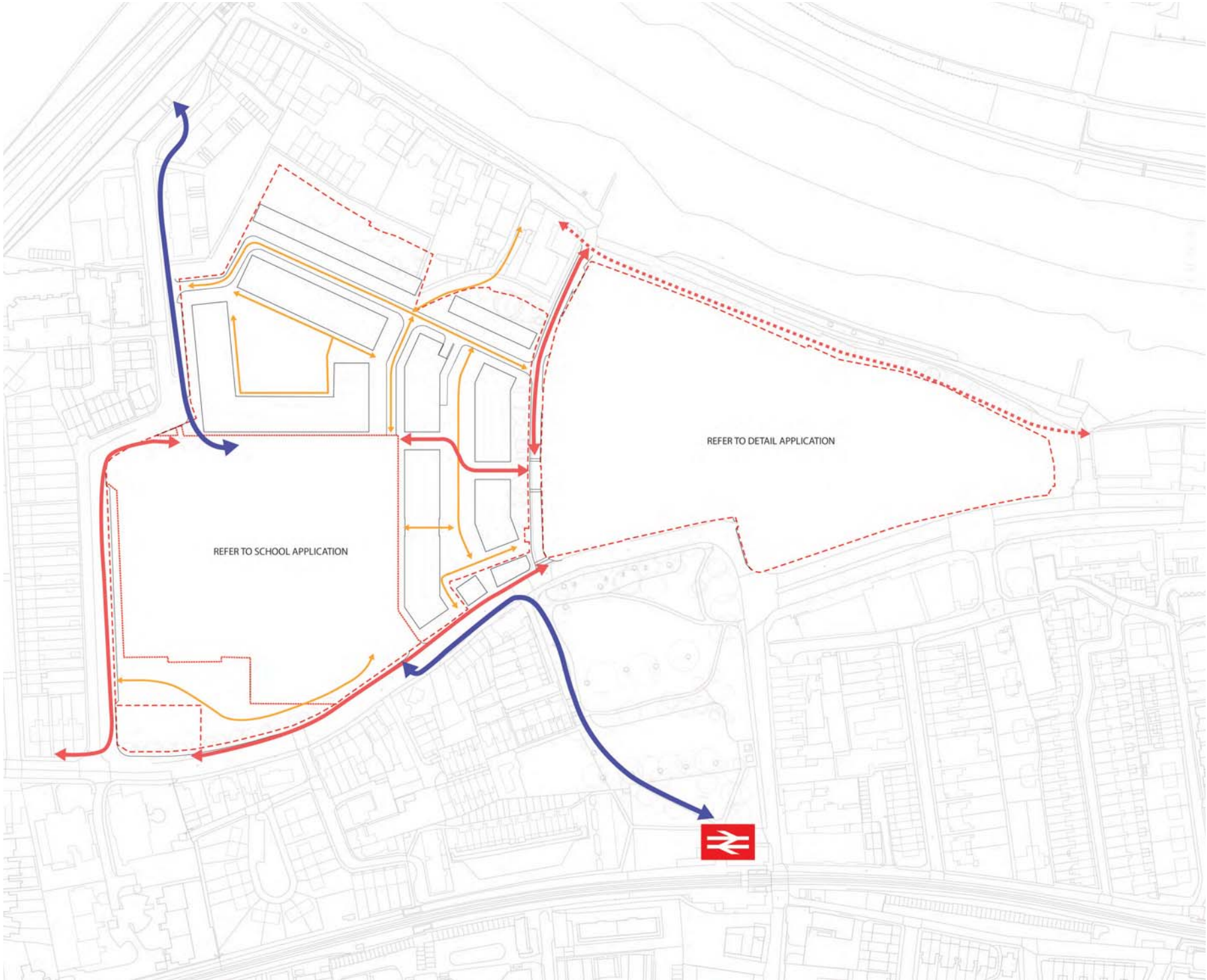

rev	details	by	Idate
D01	Issue for Information	RJ	24.11.2017
D02	Issue for Planning	RJ	25.01.2018

Notes

1.0 Do not scale from drawing, use figured dimensions only
1.1 All dimensions to be checked onsite
1.2 This drawing to be read in conjunction with all other Gillespies drawings and specifications

LEGEND

- Primary (Quiet Route)
- Secondary
- Tertiary
- Towpath
- Site Boundary

Note:
1. In the event that building positions move, the landscape zones will be adjusted to match any deviation from the current layout.

2. Please refer to Squires and Partners Drawing 16019_C645_Z2_P_PR_001 to 16019_C645_Z2_P_PR_011 for building locations.

N

Project title

STAG BREWERY

Drawing title

Outline Application Circulation Plan - Pedestrian

Drawing status	Scale	Drawn
DESIGN	1:1000 @ A1	RJ
	Date: 24.11.2017	Checked: RC
Drawing number		Revision
P10736-00-001 - 126		D02

Client

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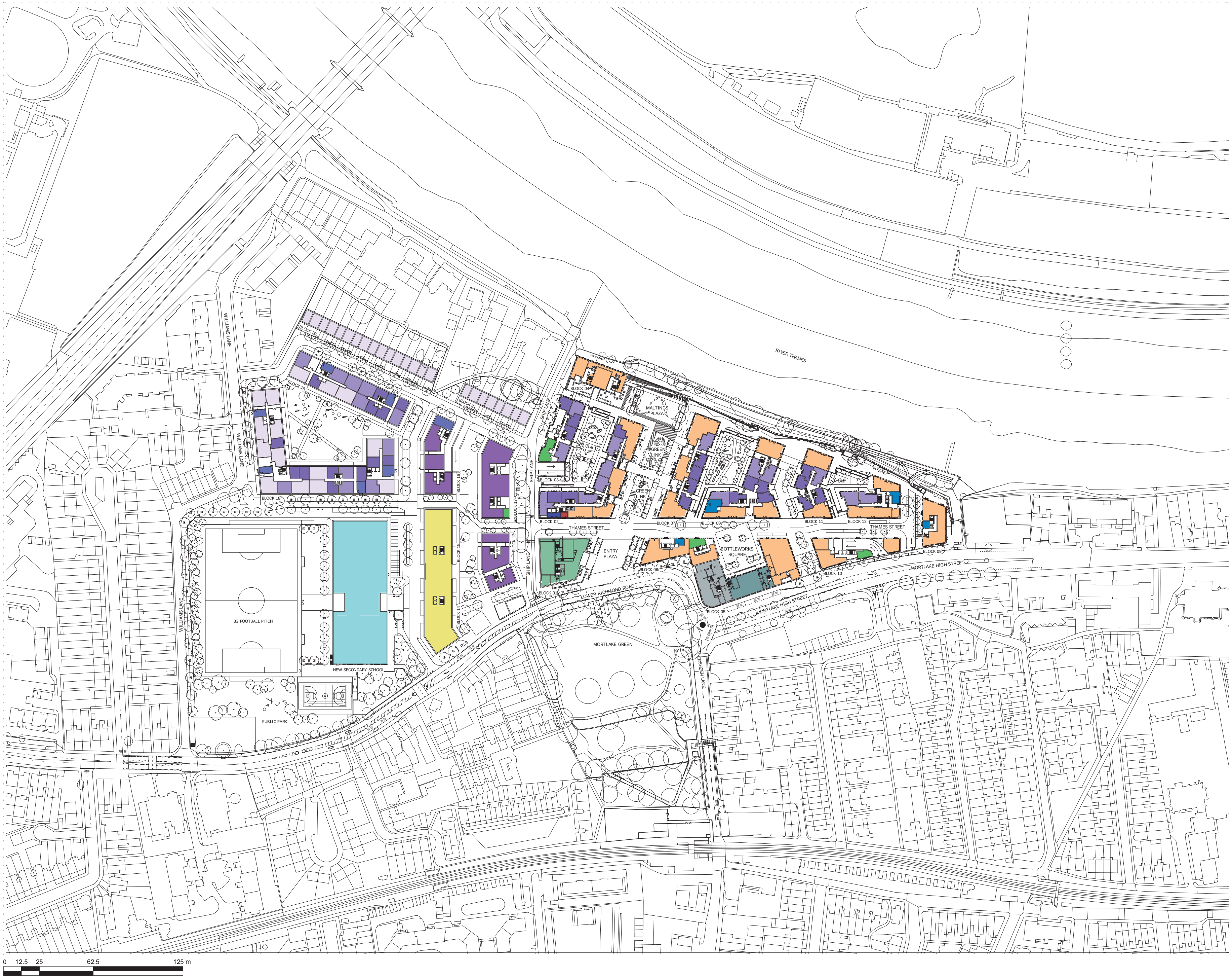

NOTES:

DO NOT SCALE FROM THIS DRAWING. ALL DIMENSIONS TO BE CHECKED ON SITE. ALL OMISSIONS AND DISCREPANCIES TO BE REPORTED TO THE ARCHITECT IMMEDIATELY.

NORTH

- 1 BED
- 1 BED (L)
- 1 BED (S)
- 2 BED
- 2 BED (L)
- 2 BED (M)
- 3 BED
- 3 BED (H)
- 4 BED
- 4 BED (H)
- ASSISTED LIVING
- CAR PARK ENTRANCE
- CARE HOME
- CINEMA
- CORE
- FLEXIBLE USE
- GAS METER ROOM
- HOTEL
- OFFICE
- PLANT
- REFUSE
- REFUSE STORE
- RESTAURANT/BAR
- SCHOOL
- SMOKE
- SUBSTATION

Revision description	Date	Check	Rev
FINAL DRAFT PLANNING APPLICATION	18/01/18	BJ	-

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Project
Stag Brewery
Richmond

Drawing
PROPOSED MASTERPLAN
GROUND FLOOR LEVEL

Drawn	Date	Scale
TC	01/18/18	1 : 1250 @ A1 1 : 2500 @ A3

Job Number	Drawing number	Revision
16019	C645_MP_P_00_001	-

Appendix C TA Scoping Report and TfL comments

Stag Brewery, Mortlake

Transport Scoping Report

On behalf of **Reselton Properties Ltd**

Project Ref: 38262 | Rev: A | Date: July 2016

Office Address: 16 Brewhouse Yard, Clerkenwell, London EC1V 4LJ
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Document Control Sheet

Project Name: **Stag Brewery, Mortlake**

Project Ref: **38262**

Report Title: **Transport Assessment Scoping Report**

Doc Ref: **A**

Date: **July 2016**

	Name	Position	Signature	Date
Prepared by:	Matt Bolshaw and Nicole Newe	Graduate Engineer		July 2016
Reviewed by:	Robert Parker	Director		July 2016
Approved by:	Greg Callaghan	Partner		July 2016
For and on behalf of Peter Brett Associates LLP				

Revision	Date	Description	Prepared	Reviewed	Approved

Contents

Figures

Tables

1 Introduction

1.1 Background

1.1.1 Peter Brett Associates LLP (PBA) has been commissioned by Reselton Property Ltd to prepare a Transport Assessment (TA) in support of a planning application for the redevelopment of the Stag Brewery site in Mortlake, London Borough of Richmond upon Thames (LBRuT).

1.1.2 Figure 1-1 shows the location of the proposed development site in relation to its wider surrounding area. The proposed development site is bound to the north by the river Thames, to the east by Bulls Alley, to the south by the A3003 and to the west by Williams Lane.

Figure 1-1: Strategic Site Location

1.1.3 Masterplanning work for the site is still underway and so there are no final proposals. However a residential led, mixed use scheme is envisaged which will be in accordance with the Planning Brief for the Site which was adopted as Supplementary Planning Guidance in July 2011. As such the development is likely to include local employment and community facilities. The Local Authority has also indicated that it wishes the site to accommodate a new secondary school and sixth form college.

1.2 Report Objective

1.2.1 This scoping report sets out the proposed method to be applied and the scope of work to be undertaken in the preparation of the TA report that will form part of a suite of supporting documents for the planning application.

1.2.2 It is intended that this scoping report will be agreed at an early stage with LBRuT and Transport for London (TfL).

1.3 Transport Requirements for Application Submission

1.3.1 In considering TfL and LBRuT guidance and PBA experience of working on developments of similar type and scale, it is assumed that the following transport documents will be required to accompany the application submission:

a. A Transport Assessment; and

b. A full Residential as well as School Travel Plan.

1.4 Guidance Documents

1.4.1 The scope of work described in this report is based on guidance in the following documents:

- Transport Assessment Best Practice Guidance Document (TfL, April 2010)
- Guidance on Transport Assessment (Department for Transport (DfT), March 2007)
- Travel Planning Guidance (TfL, November 2013)

1.5 Scoping Report Structure

1.5.1 The remainder of this scoping report is structured as follows:

- Section Two provides a summary of the previous site use and baseline transport conditions;
- Section Three sets out the proposed development details;
- Section Four sets out in detail the proposed structure for the TA:
- Section Five identifies the main data sources that will be used in the TA; and
- Section Six sets out the intended programme.

2 Existing Site Context

2.1 Site Location and Current Land Use

2.1.1 The Proposed Development is located in Mortlake within the London Borough of Richmond upon Thames. The 21.2 acre site (8.6 hectares) is immediately bordered by the River Thames to the north, Lower Richmond Road and Mortlake High Street to the south, existing employment (offices) to the east and existing residential areas to the west. The site is formed of two parts separated by Ship Lane.

2.1.2 Within the site boundary lies the Stag Brewery which includes the Watney's Sports Ground. The Stag Brewery recently ceased operation in December 2015. The buildings which supported the brewery operation have an overall floor area 32,749m^2 gross internal area (GIA).

2.1.3 The two parts of the site are accessed directly off Lower Richmond Road. There are existing pedestrian bridge links over Ship Lane linking the two parts of the site.

2.2 Existing Transport Networks

Pedestrian and Cycle Network

2.2.1 Footways are provided on both sides of all roads in the surrounding area of the development site. Street lighting is also present on all roads in the area. On Ship Lane, however, a footway is only provided on the western side of the link.

2.2.2 A signalised pedestrian crossing is situated on Lower Richmond Road, adjacent to Ship Lane. A zebra crossing is provided to the west of Watney's Sports Ground, also on Lower Richmond Road.

2.2.3 On Sheen Lane, a zebra crossing is provided approximately 60m to the north of Mortlake station. Further pedestrian crossings facilities are provided at the Lower Richmond Road / Sheen Lane / Mortlake High Street roundabout.

2.2.4 Within the immediate vicinity of the site the provision of formal cycle facilities comprises of the following, as shown on Figure 2-1:

- An advisory cycle route along Mortlake High Street from the east of the site towards Barnes Bridge;
- A further advisory route along North Worpole Way, along the north side of the railway line, providing a connection to Mortlake Station from the east;
- A signed on street route connecting the cycle facilities on Chiswick Bridge with the A303 Lower Richmond Road; and
- A further signed on street route providing access to the station from the south west.