Appendix K (VMAP) VISSIM Model Auditing Process

TECHNICAL NOTE

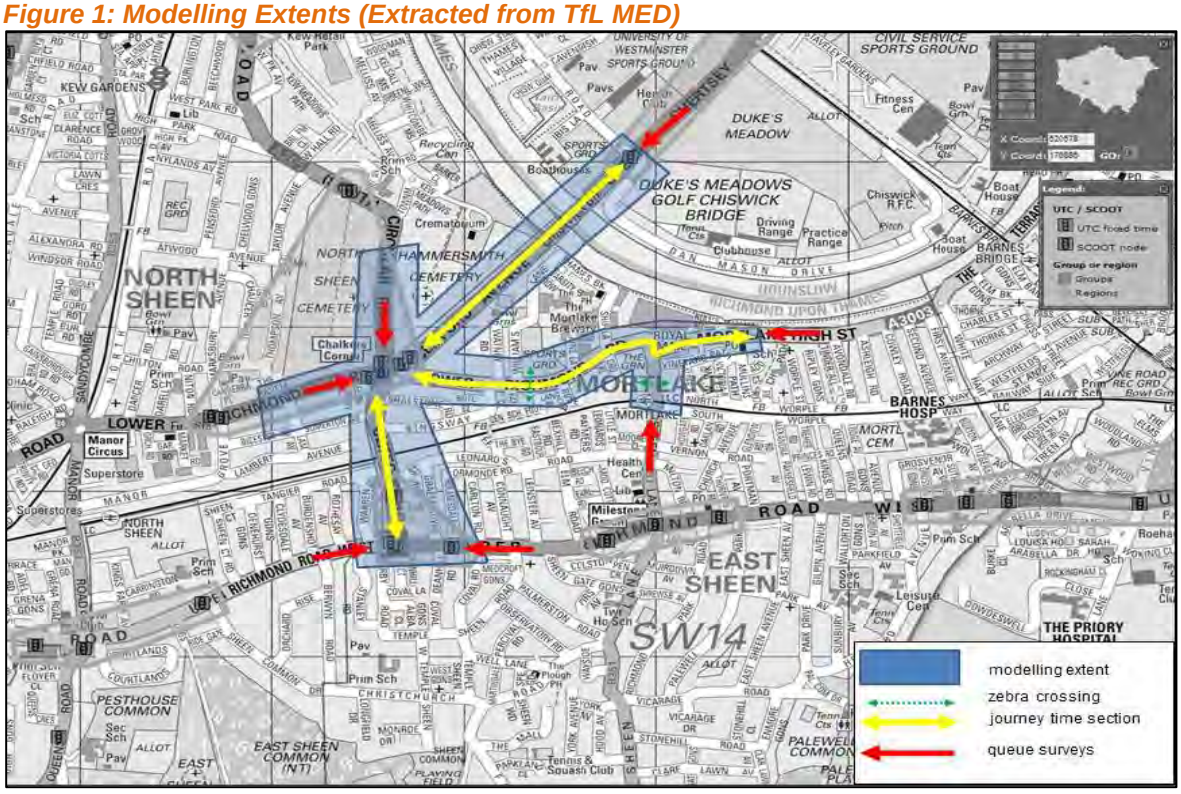
Job Name:	Stag Brewery Development
Job No:	38262/5514
Note No:	TN39a - Draft
Date:	04.01.21
Prepared by:	Siddharth Iyer
Reviewed by:	Peter Wadey
Subject:	**Forecast Modelling Report - VMAP Stage 5**

Introduction

Stantec UK Limited has been commissioned by Reselton Properties Limited to undertake VISSIM modelling to assess the highway impacts and mitigation measures proposed by the redevelopment of the Stag Brewery site in Mortlake, Richmond.

Initial consultation has been undertaken with TfL to confirm the modelling extents. Subsequently, a Modelling Expectations Document was received from TfL on 17.03.20 which indicated the extent illustrated in Figure 1 below.

Figure 1: Modelling Extents (Extracted from TfL MED)



The TfL MED indicated the inclusion of the following junctions within the VISSIM model:

- 20/011, 24/201 & 24/202 - A205 Clifford Avenue/Mortlake Road/A316 Lower Richmond Road/Chalkers Corner
- 24/199 & 24/200 - A316 Clifford Avenue/A3003 Lower Richmond Road/Chalkers Corner
- 25/068 - Great Chertsey Road/Hartington Road/Dan Mason Way
- 24/147 - A205 Clifford Avenue by Tangier Road
- 24/004 - A205 Upper Richmond Road West/A205 Clifford Avenue
- 24/215 - A205 Upper Richmond Road/Deanhill Road by Graemesdyke

- Sheen Lane/Lower Richmond Road/Mortlake High Street Roundabout
- Existing development access road – Lower Richmond Road/Ship Lane Junction
- Lower Richmond Road/Hanson Close Junction

The VMAP stage 3 modelling was approved by TfL on 08/10/2020. Subsequently, Future Year Scenario Models have been produced, the methodology and outputs of which have been presented in this Technical Note.

V501 – SAE- Approved Proposed Method of Control

No Method of Control changes have been undertaken as part of the Future Year Scenario Modelling. Therefore, all Future Year Scenario models retain the 2017 Base Year Method of Control.

V502 - Proposal Report

This report has been produced to detail the methodology and outputs of the future year modelling scenarios. This forecast note should be read in conjunction with Base Modelling Note TN037a – VMAP Stage 3 Submission V2 and Forecast Flow Methodology note TN038b – Forecast Methodology.

V503 – Changes to Model

Method of Control changes

No Method of Control changes have been undertaken as part of the Future Year Scenario Modelling. Therefore, all Future Year Scenario models retain the 2017 Base Year Method of Control.

Base Model

Initial model runs of the future year scenarios indicated some calibration parameters required further refinement due to the increased congestion levels within the models. To ensure consistency between the different modelling scenarios, the calibration changes made to the future year models have been replicated in the approved VMAP Stage 3 models. The changes are as follows:

- Conflict Area 19 amended to give Link 17 priority
- Priority Rule 40 added at Chalkers Corner junction to ensure there is no overlapping of vehicles with oncoming traffic on A316. Although not an issue in the approved base models, it was noted with the increased level of traffic in Future Year Scenarios the right turners into Mortlake were at times impeded by the queue on the EB internal stop line. The above priority rule change addresses this.
- All entry links have been extended to ensure traffic is able to enter the network in the future year scenarios.
- The VMAP stage 3 approved base models have subsequently been re-run with the above changes and the updated results are consistent with the model results approved on 08/10/2020.

Additional Changes after receiving TfL MAE comments on 05/11/2020

- Conflict Area 19 removed from all model scenarios (Approved base and Future Years) and replaced with priority rule conflict marker. The right turn give way movement from Clifford Avenue South is better represented with the use of priority rules.
- Further to MAE comments received on 05/05/2020, Conflict area 306 has been added in ‘Approved Base models’ to ensure consistency between Base and Future Year models.
- Link 10060 lane change distance has been changed to 1000 in ‘Approved Base models’ to ensure consistency between Base and Future Year models.
- All model scenarios including Approved Base have been re-run and updated results presented in this Technical Note.

Additional Changes after receiving TfL MAE comments on 17/11/2020

- Additional pedestrian areas added at proposed school crossing and existing crossing along Ship Lane
- For the proposed signalised pedestrian crossings, the minimum green time for traffic stage has been amended in the VAP file to reduce delay to general traffic on Lower Richmond whilst ensuring the pedestrian stage is not delayed significantly. The pedestrian stage at Lower Richmond/Ship Lane crossing is demanded approximately every 60 and 80 seconds respectively in the AM and PM peak proposed scenarios. The pedestrian stage at Lower Richmond Road/School Road crossing is demanded approximately every 60 seconds in the AM and PM peak proposed scenarios.
- Priority Rule 20 and 21 has been removed
- Conflict area 344 added for right turning traffic from Williams Lane onto main road
- Desired speed decision of 20mph added at entry 49, 51, 119 in the future year scenarios with Stag development
- RSA added at proposed car park access
- Conflict area 220 amended to be consistent in all assessed scenarios
- Desired speed decision 12 amended in Future Base + Existing development models to be consistent with remaining scenarios
- Emergency stop distance amended to 65 at link 10055
- Signal head 47 moved to correct location in respective scenarios
- Proposed Advanced stop lines added on Mortlake road and Clifford Avenue south in relevant scenarios
- Background image updated in Bus lane option models (Scenarios 7 & 8)
- All entry links extended to ensure models do not demonstrate any latent demand

Further to the above, the proposed scheme is anticipated to generate an increase in pedestrian movements across existing and proposed crossing points along Lower Richmond Road. The following assumptions have been made in forecasting the pedestrian numbers due to the introduction of Stag Brewery development:

- 50% of school children travelling by foot use four crossing points. The remaining 50% either travel along the northern side of Lower Richmond Road crossing further away, travel along Mortlake High Street, are internal trips from within the development or travel along Thames path.
- 50% of development walking trips generated use four crossing points. The remaining 50% either travel along the northern side of Lower Richmond Road crossing further away, travel along Mortlake High Street, are internal trips from within the development or travel along Thames path.
- 80% of development train trips use crossings to travel towards Mortlake Train Station, the remaining 20% travel to Barnes Bridge Station.
- 50% of underground trips cross over the road. 50% would walk on northern side of Lower Richmond Road.
- 50% of development bus trips use crossings. Assume 50% travel eastbound and 50% westbound.
- 20% of school bus trips use crossing. Assume 60% of bus trips are school buses that will stop adjacent to school. The remaining 40% are split between eastbound and westbound buses.
- % of pedestrians crossing for each mode are based on location of crossings, proximity to bus stops, proximity to school and routes taken to train stations.

Table below provides a summary of pedestrian numbers based on above assumptions.

				Twoway			N/B			S/B	
Crossing No.	**% Crossing**	**Trip Type**		**AM**	**PM**		**AM**	**PM**		**AM**	**PM**
1	5%	School Ped		18	2		17	0		1	2

	5%	Dev Ped		30	45		13	23		17	21
			Total	**48**	**47**		**29**	**24**		**19**	**23**
2	25%	School Ped		91	12		83	2		7	9
	5%	Dev Ped		30	45		13	23		17	21
	10%	Dev Train		29	37		17	16		12	21
	20%	School Bus		102	13		94	2		8	11
	5%	Dev Bus		9	11		4	5		5	6
			Total	**251**	**107**		**206**	**44**		**45**	**62**
3	15%	School Ped		54	7		50	1		4	6
	30%	Dev Ped		180	269		76	141		105	128
	30%	Dev Bus		54	65		21	32		32	33
	60%	Dev Train		174	224		101	98		73	126
	50%	Dev Tube		58	47		13	29		44	18
			Total	**462**	**565**		**248**	**272**		**214**	**293**
4	5%	School Ped		18	2		17	0		1	2
	10%	Dev Ped		60	90		25	47		35	43
	15%	Dev Bus		27	33		11	16		16	17
	10%	Dev Train		29	37		17	17		12	21
			Total	**134**	**162**		**69**	**80**		**65**	**82**

A summary of existing + proposed pedestrian inputs has been presented in Tables 1 – 3 below respectively.

Table 1: Existing Pedestrian Input

	AM							PM						
	900 s	1800 s	2700 s	3600 s	4500 s	5400 s	6300 s	900 s	1800 s	2700 s	3600 s	4500 s	5400 s	6300 s
Crossing 1 NB	0	0	120	56	100	56	0	0	0	96	76	64	76	0
Crossing 1 SB	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crossing 2 NB	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crossing 2 SB	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crossing 3 NB	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crossing 3 SB	0	0	48	52	44	24	0	0	0	28	28	28	28	0
Crossing 4 NB	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crossing 4 SB	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 2: Proposed Additional Pedestrian Input

	AM							PM						
	900 s	1800 s	2700 s	3600 s	4500 s	5400 s	6300 s	900 s	1800 s	2700 s	3600 s	4500 s	5400 s	6300 s
Crossing 1 NB	0	0	29	29	29	29	0	0	0	24	24	24	24	0
Crossing 1 SB	0	0	19	19	19	19	0	0	0	23	23	23	23	0
Crossing 2 NB	0	0	206	206	206	206	0	0	0	44	44	44	44	0
Crossing 2 SB	0	0	45	45	45	45	0	0	0	62	62	62	62	0
Crossing 3 NB	0	0	248	248	248	248	0	0	0	272	272	272	272	0
Crossing 3 SB	0	0	214	214	214	214	0	0	0	293	293	293	293	0
Crossing 4 NB	0	0	69	69	69	69	0	0	0	80	80	80	80	0
Crossing 4 SB	0	0	65	65	65	65	0	0	0	82	82	82	82	0

Table 3: Proposed Total Pedestrian Input

	AM							PM						
	900 s	1800 s	2700 s	3600 s	4500 s	5400 s	6300 s	900 s	1800 s	2700 s	3600 s	4500 s	5400 s	6300 s
Crossing 1 NB	0	0	149	85	129	85	0	0	0	120	100	88	100	0
Crossing 1 SB	0	0	19	19	19	19	0	0	0	23	23	23	23	0
Crossing 2 NB	0	0	206	206	206	206	0	0	0	44	44	44	44	0
Crossing 2 SB	0	0	45	45	45	45	0	0	0	62	62	62	62	0
Crossing 3 NB	0	0	248	248	248	248	0	0	0	272	272	272	272	0
Crossing 3 SB	0	0	262	266	258	238	0	0	0	321	321	321	321	0
Crossing 4 NB	0	0	69	69	69	69	0	0	0	80	80	80	80	0
Crossing 4 SB	0	0	65	65	65	65	0	0	0	82	82	82	82	0

Future Base Year Model without Stag Development

Transport for London's (TfL) South of London Highway Assignment Model (SoLHAM) was used to undertake an assessment of the highway network for a set of forecast year scenarios with and without the Stag Brewery development in 2017. The model employed was the 2012 SoLHAM base year model updated to a 2015 base year using observed counts and subsequent forecast models for 2031.

Growth factors derived from the above-mentioned Saturn Modelling have been used to develop the 2031 Future Base Year AM and PM peak scenarios. The methodology to provide flows for Vissim from Saturn has been documented in Technical Note TN038b, submitted to TfL on 08/10/2020 and a summary of the same is provided in section V504 – Flow Consistency Check of this Technical Note.

The 2017 Base Year highway layout has been retained in the 2031 Future Base Year AM and PM peak scenarios.

Future Base Year Model with Stag Development

Highway Layout Changes

Lower Richmond Road / Mortlake High Street

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 as part of vision zero and in particular creating a suitable environment for a new secondary school.

The specific proposals are shown on the drawings which are included in **Appendix A** and include the following:

- 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, tabletops 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. However, no further pedestrians have been added to the 2031 Future Year models with Stag development. Base Year pedestrian figures have been retained in all Future Year models.

- 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 one of the Bus Stops.
- 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. This has already been modelled in the 2017 Base Year scenario after discussions with TfL MAE and therefore retained in all Future Year scenario models.
- 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
- 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.
- Relocation of bus stops and bus stands on Mortlake High Street to allow for the new access points and the new crossing.
- Priority rule 37 has been added to the 'with Stag development Vissim Models' on Lower Richmond Road to allow development vehicles to egress the site when the queue on Lower Richmond Road extends up to Ship Lane/Lower Richmond Road junction.

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, increasing the permeability across Lower Richmond Road and improving the public realm and safety within the surrounding area.

Site Access

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.

Since the original application the size of the western basement has reduced, and the entry and exit has been consolidated into a single access point.

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.

Proposed Changes to Bus Stops dwell times for the with Development Scenarios

Removal of bus stop (adjacent to Mortlake Green) 22: 37222 - Ship Lane/Stag Brewery (used by bus routes 419SB) as part of the development proposals is to rationalise bus stops located in close proximity to each other. Therefore, dwell times have been increased at the following bus stops to account for additional development bus passengers:

- 8: R0651 - Ship Lane/Stag Brewery (7: 419 NB)
- 9: FW35 - Sheen Lane/Mortlake Station (7: 419 NB)
- 23: FW44 Sheen Lane/Mortlake Station (8:419SB)
- 21: FW45 - Rosemary Lane (8:419SB)

Table below shows the existing and proposed dwell times:

Table 4: Existing and Proposed Dwell Times

		Existing VISSIM Dwell Times (secs)		Proposed VISSIM Dwell Times Secs)	
		AM	PM	AM	PM
7: 419 NB	8: R0651 - Ship Lane/Stag Brewery	5: 5-10	5: 5-10	30-40	7: 15-20
7: 419 NB	9: FW35 - Sheen Lane/Mortlake Station	5: 5-10	4: 0-5	7: 15-20	7: 15-20
8:419SB	23: FW44 Sheen Lane/Mortlake Station	4: 0-5	4: 0-5	7: 15-20	7: 15-20
8:419SB	21: FW45 - Rosemary Lane	4: 0-5	4: 0-5	30-40	7: 15-20

The dwell times have been calculated by applying the additional number of passengers who are expected to enter the bus at each bus stop, except in the AM Peak for the two bus stops located adjacent to the new secondary school, where times have been calculated based on children leaving the bus.

The following assumptions have been used to derive the dwell times:

- Assume as worst case 100% of bus trips generated by the development will use the bus stops adjacent to the development.
- Assume halve of bus trips generated by the development will travel eastbound (419NB) and halve westbound (419SB).
- Total bus trips will be distributed evenly over the peak hour.
- Average time per passenger entering bus is 1.5s (Based on data for low floor cashless bus).
- Average time per passenger leaving bus is 0.75s. (Based on exiting bus being twice as quick and likely quicker with school children).

Using the above assumptions, the dwell times have been derived as follows for each peak period:

Table 5: Dwell Time Assumption

	AM Peak	PM Peak
Total bus trips departing development in peak hour	150	164
Total number of bus stops	4	4
Total number of buses per hour	4	4
Additional passengers per bus (entering)	9.4	10.25
Total dwell Time / bus stop	14.1 secs	15.4 secs
Proposed dwell times in VISSIM	15-20	15-20

15-20 seconds has been used for the AM and the PM peak periods to ensure the dwell times provide a robust basis for analysis.

In the AM peak for the two bus stops located adjacent to the school (8: R0651 and 21: FW45) it is likely that a large number of children will exit the bus, which will increase dwell times compared with development passengers entering the bus. Based on 0.75 seconds per bus and between 40-50 school children on each bus this gives a dwell time of 30 -40 seconds which has been used for the assessment.

Future Base Year Model with Stag Development + Highway Mitigation

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.

Indicative options have been modelled to alleviate the impact of the development traffic for both general traffic and buses through Chalkers Corner and along Lower Richmond Road. These include the following options:

- Option 1: Chalkers Corner ‘Light’ (Appendix C)
- Option 2: Chalkers Corner ‘Light’ & Bus Lane (Appendix D)

- Option 3: Chalkers Corner Full Scheme Application C (Appendix E)

The key features of the proposed Chalkers Corner 'light' scheme include the following:

- Provision for a left turn flare lane from Lower Richmond Road.
- Relocation of stop lines on A205 closer to the junction.
- Introduction of advanced stop lanes on Mortlake Road and Clifford Avenue South to raise awareness of cyclists.
- Improved crossing facilities.
- Widening of area between junctions by relocating stop line by 2m.
- Intergreen values have been recalculated for pedestrian crossings at Chalkers Corner Junction and Vissim pua files have been updated accordingly. Although, the intergreens between some of the traffic phases are expected to reduce by 1 second following the relocation of Mortlake Road North and Clifford Avenue South stoplines, the Base Model intergreen values for traffic phases has been retained in Future Year Mitigation models as this constitutes a worst-case assessment of the junction capacity.

In addition to the above, the bus lane option would provide a westbound bus lane along Lower Richmond Road, requiring the loss of peak hour parking on the southern side of the carriageway.

The key features of Chalkers Corner Full Scheme Application C include:

- 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 internal storage area between Lower Richmond Road and the WB internal stop line allowing more vehicles to exit Lower Richmond road each signal cycle. 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.
- 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).
- 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.

Signal Timing changes

It has been agreed in MAP Stage 1 that a LMAP compliant LinSig model will not be required to be developed for the purpose of VMAP instead a LinSig model developed in 2017 to support the original Stag Brewery development application will be used to inform timing changes in Vissim. The LinSig model did undergo a LMAP audit in 2017-18 and was subsequently approved by TfL.

Skeleton LinSig models have been developed for 24/004 and 25/068 and these were approved in VMAP Stage 2b.

2017 Base Year signal timings for 25/068 – A316 Great Chertsey Road/Hartington Road Junction have been retained in all future year models as Hartington Road runs the minimum possible stage length in Base Year models and therefore no further refinement is possible at this junction.

Signal timings for Clifford Avenue SB approach at 24/004 – Upper Richmond Road/Clifford Avenue Junction have been altered manually by 1-2 seconds in the 2031 Future Year scenario models to ensure there is no blocking back into Chalkers Corner Junction.

Several iterations of the Chalkers Corner LinSig model have been undertaken to arrive at the final set of optimised timings used in the Future Year Vissim Models. Optimised LinSig models for Chalkers Corner Junction (with and without mitigation) are being enclosed along with the VMAP Stage 5 submission.

The existing Method of Control has been retained for all signalized junction and the demand dependencies at all junctions has been unaltered in the 2031 Future Year with and without Stag Brewery development models.

V504 – Flow Consistency Check

Introduction

This section sets out the approach to modelling the impact of the proposed development on the base model network for the year 2031.

The following forecast scenarios have been produced using validated base models:

- 2031 Reference Case – Base + Existing Traffic development traffic (AM & PM peaks)
- 2031 Do Something – Base + Proposed developments + Proposed Highway layout changes (AM & PM peaks)
- 2031 Do Something – Base + Proposed developments + Proposed Highway layout changes + Chalkers Corner Light Mitigation (AM & PM peaks)
- 2031 Do Something – Base + Proposed developments + Proposed Highway layout changes + Chalkers Corner Light Mitigation + Bus Lane Option (AM & PM peaks)
- 2031 Do Something – Base + Proposed developments + Proposed Highway layout changes + Chalkers Corner Full Scheme Application C (AM & PM peaks)

Further to the above, all scenarios have been further rerun to provide a sensitivity test with increased traffic flows on Clifford Avenue South, details of which has been provided later in this section.

Future Base Flows

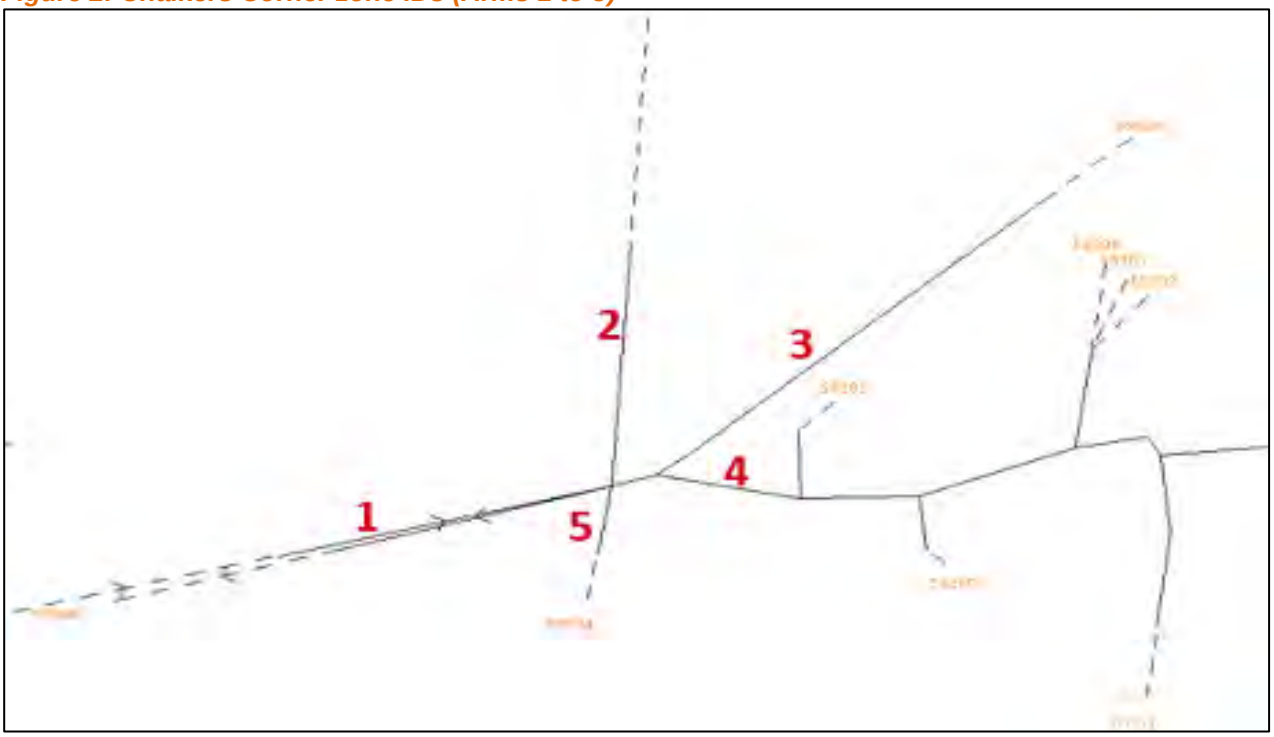
Transport for London's (TfL) South of London Highway Assignment Model (SoLHAM) was used to undertake an assessment of the highway network for a set of forecast year scenarios with and without the Stag Brewery development in 2017.

Stantec undertook a review the base year model to determine the quality of the model in and around the proposed development and concluded that a series of model enhancements were required to provide a more robust representation of the local study area. These enhancements included increasing level crossing delays based on observed data and an adjustment to travel demand matrices through a process of matrix estimation using recent local traffic counts. The local study area was updated using 2015/2016 traffic data.

The detailed forecast flow methodology using the HAM outputs from Saturn modelling undertaken in 2017 has been presented in Technical Note TN038b – Forecast Methodology and the approach to produce growth factors considered acceptable by Strategic Modelling subject to a review of further outputs that will be extracted from the SoLHAM model as per TfL Strategic Modelling team's request in email dated 16/20/2020. Please see Appendix B for further details.

Figure 2 below provides a diagram of the Chalkers Corner junction zone IDs. *(see overleaf)*

Figure 2: Chalkers Corner zone IDs (Arms 1 to 5)



Arm 1 (A) – A316 Lower Richmond Road West
Arm 2 (B) – Mortlake Road North
Arm 3 (C) – Clifford Avenue East
Arm 4 (D) – Lower Richmond Road South
Arm 5 (E) – Clifford Avenue South

The factors documented in TN038b – Forecast Methodology have been presented in *Table 6* and *Table 7* below.

Table 6: Heavies Growth Factors/Vehicle increase

Road Name	ID	AM	AM Growth based on % or absolute increase/decrease in total vehicle numbers	PM	PM Growth based on % or absolute increase/decrease in total vehicle numbers
A316 Lower Richmond Road West	A	37	veh	0.97	%
Mortlake Road North	B	1.22	%	0.90	%
A316 Great Chertsey Road East	C	0.77	%	1.25	%
Lower Richmond Road	D	0.95	%	0.82	%
Clifford Avenue	E	1.00	No growth applied to this arm	1.00	No growth applied to this arm

Table 7: Lights Growth Factors/Vehicle increase

Road Name	ID	AM	AM Growth based on % or absolute increase/decrease in total vehicle numbers	PM	PM Growth based on % or absolute increase/decrease in total vehicle numbers
A316 Lower Richmond Road West	A	209	veh	1.03	%
Mortlake Road North	B	1.05	%	0.86	%
A316 Great Chertsey Road East	C	0.86	%	1.22	%
Lower Richmond Road	D	1.23	%	0.99	%
Clifford Avenue	E	1.00	No growth applied to this arm	1.00	No growth applied to this arm

The above factors have only been applied to the approved base models to develop the 2031 Future Base Year model networks for AM and PM peaks.

Methodology for Surrounding Junctions in the Future Base Year Network

In order to provide a balanced model it is proposed to apply the growth factors shown for Chalkers Corner junction in **Figure 2** on each arm for the downstream junction along that arm. The growth factors recommended by Stantec for the surrounding junctions within the Vissim Model extent are as follows:

- Arm 1 factor applied to A316 EB approach at Chalkers Corner
- Arm 2 factor applied to Mortlake Road North
- Arm 3 factor applied to A316 Chertsey Road (WB entry link) and Hartington Road
- Arm 4 factor applied to Mortlake High Street and Sheen Lane
- Arm 5 factor applied to Upper Richmond Road EB and WB approaches
- Traffic Input F has been included in the Base Models to account for flow balancing between Chalkers Corner and Mortlake roundabout junctions and therefore nil growth has been applied to this link in Future Base Year Model.
- Traffic Input E refers to Dan Mason Drive, a minor link off Great Chertsey Road that leads to Chiswick Rugby Football Club. At this stage, no further information is available about any future committed developments at this site and therefore nil growth has been applied to this link in Future Base Year Model.

Further to the above, TfL has requested a sensitivity test to apply a factor of 1.1 on Arm 5 of Chalkers Corner junction.

The development trips have been layered onto the Future Base network without any reassignment from the SoLHAM model ensuring a robust worst-case assessment. Further details on Existing development and Stag Brewery development trip distribution are provided in the next section.

Existing Development and Stag Brewery Development Traffic

The distribution of trips to/from the existing and proposed Stag Brewery development has been estimated using forecast traffic distribution to/from donor zone 58139 in the SoLHAM model, illustrated below in *Figures 5* – *8*.

Figure 3: AM Existing Development Distribution

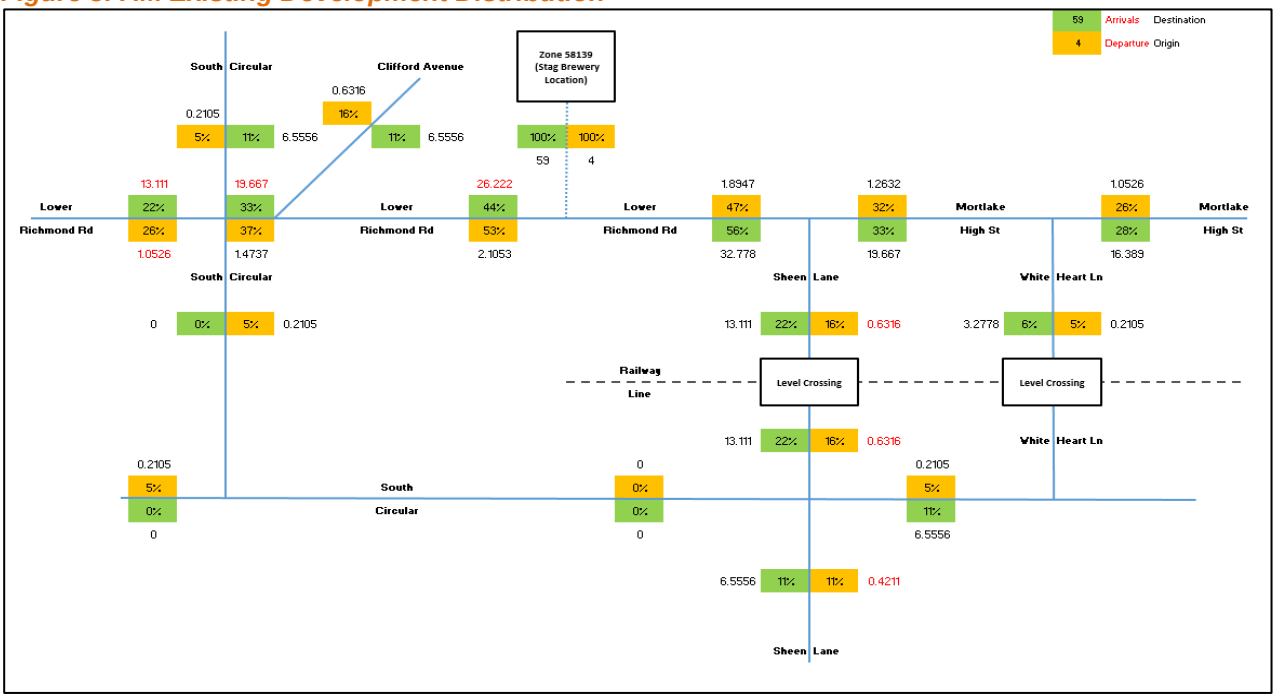


Figure 4: PM Existing Development Distribution

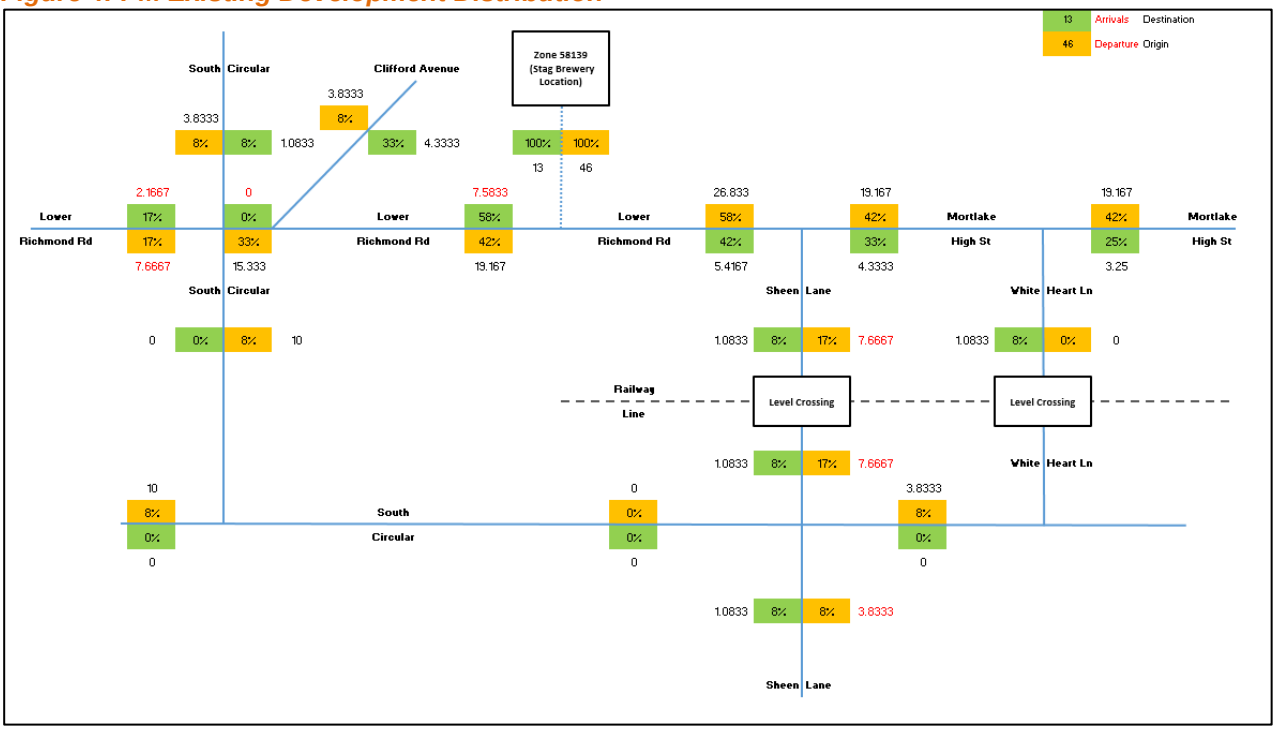


Figure 5: AM Stag Brewery Development Distribution

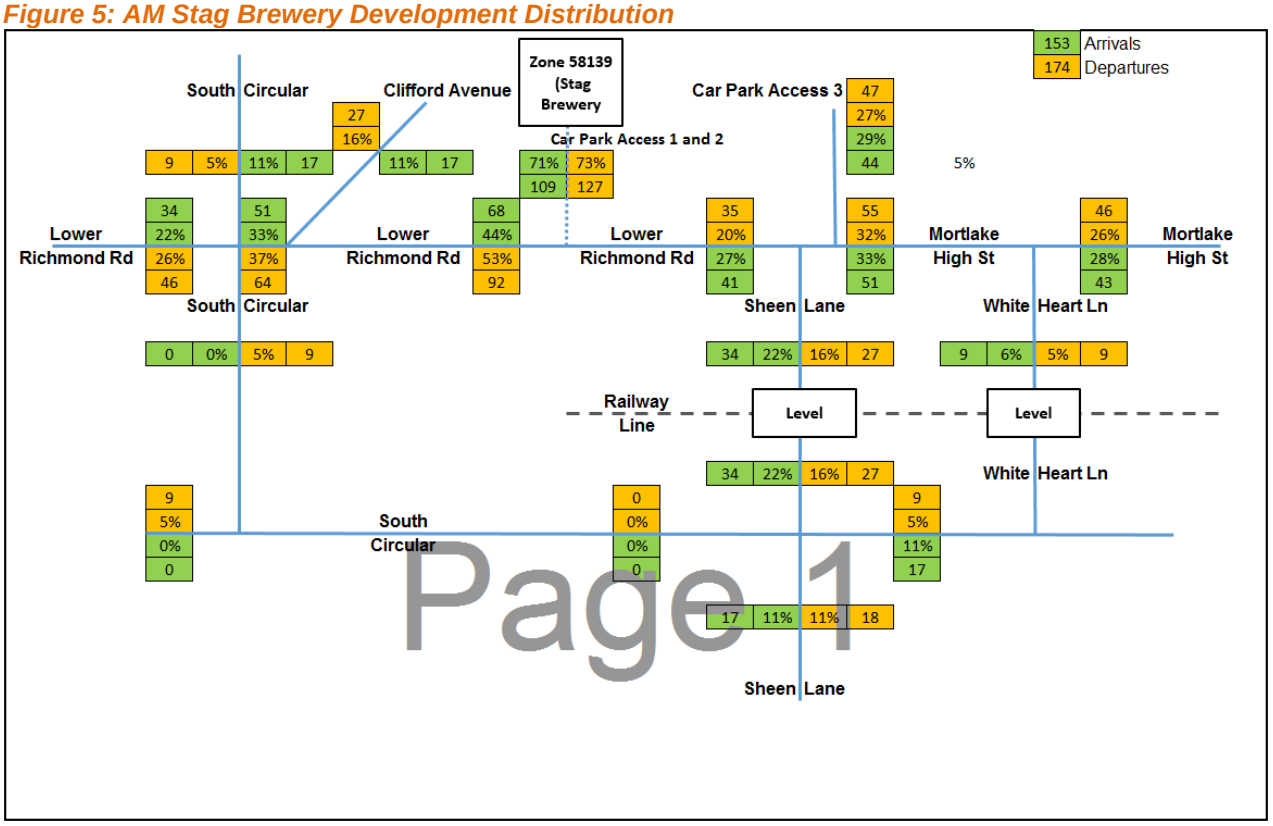
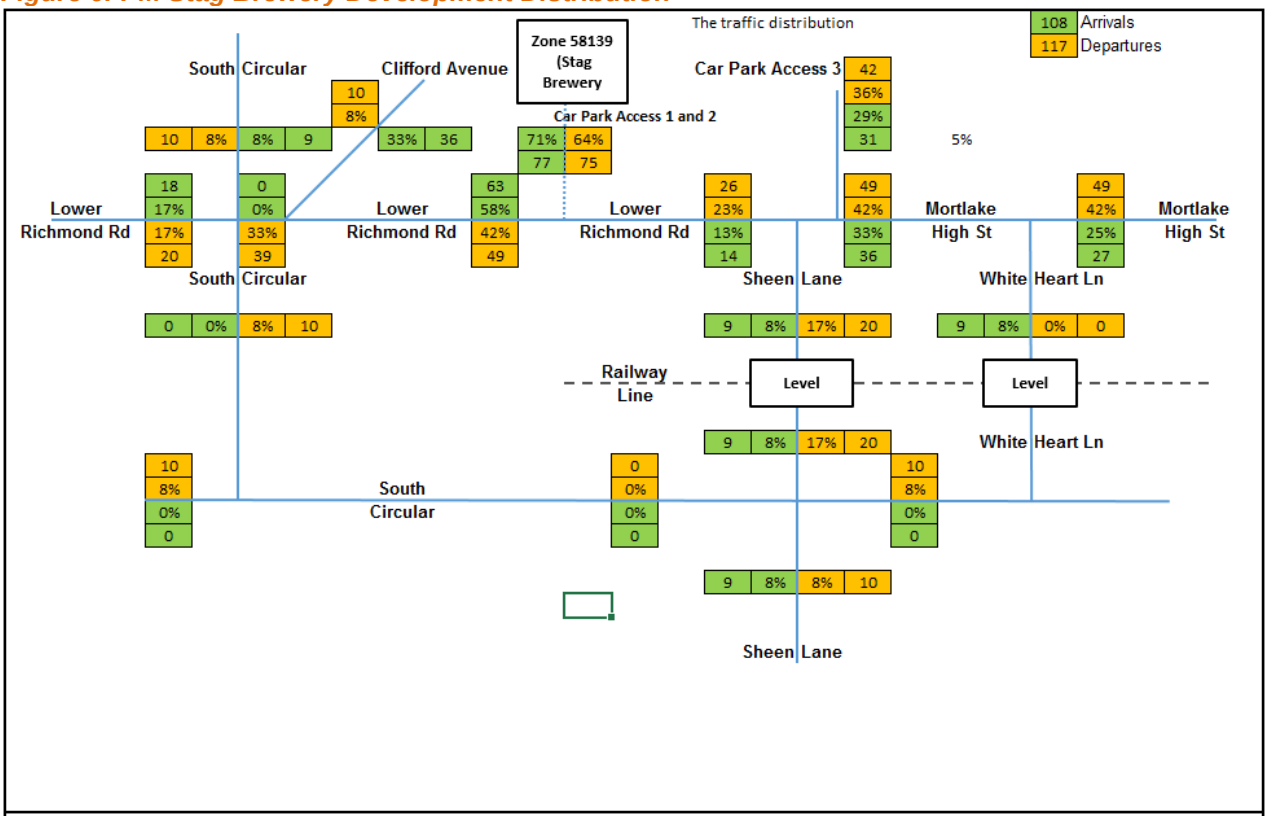


Figure 6: PM Stag Brewery Development Distribution



The above figures indicate a broad distribution of traffic to/from Stag Brewery development. With traffic dissipating relatively quickly, the traffic impact is expected to be largely confined to the local network. The main increase in traffic is expected to be on Lower Richmond Road, immediately adjacent to the

development site. For further details please refer to Trip Generation note - “TN035a - Trip Generation Enlarged Scheme.pdf”.

V505 – VISSIM Modelling Outputs

Introduction

This chapter describes the impact of the 2031 forecast travel demand on the network for each modelled scenario which have been listed below.

- 2031 Reference Case – Base + Existing Traffic development traffic (AM & PM peaks)
- 2031 Do Something – Base + Proposed developments + Proposed Highway layout changes (AM & PM peaks)
- 2031 Do Something – Base + Proposed developments + Proposed Highway layout changes + Chalkers Corner Light Mitigation (AM & PM peaks)
- 2031 Do Something – Base + Proposed developments + Proposed Highway layout changes + Chalkers Corner Light Mitigation + Bus Lane Option (AM & PM peaks)
- 2031 Do Something – Base + Proposed developments + Proposed Highway layout changes + Chalkers Corner Full Scheme Application C (AM & PM peaks)

A summary of network performance statistics, journey times and queues have been provided in subsequent sections within this chapter.

Network Performance

This section summarises the network performance statistics for each modelled forecast scenario in terms of average delay, average speed and latent demand within the model network. This has been presented in ***Table 8*** below.

Table 8: Network Performance Summary

		Average Delay	Average Speed	Vehicles (arrived)	Latent Demand
AM	VMAP Stage 3 approved Base Models - (Entry links extended)	335	17	5130	0
	FB + Existing Dev	390	15	5576	0
	FB + Stag Dev	721	10	3971	9
	FB + Stag Dev + Option 1	463	14	5292	0
	FB + Stag Dev + Option 2	450	14	5353	1
	FB + Stag Dev + Option 3	475	14	5181	1
PM	VMAP Stage 3 approved Base Models - (Entry links extended)	319	17	5401	0
	FB + Existing Dev	386	16	5499	0
	FB + Stag Dev	409	15	5525	0
	FB + Stag Dev + Option 1	390	15	5576	0
	FB + Stag Dev + Option 2	390	15	5595	0
	FB + Stag Dev + Option 3	380	15	5610	0

As demonstrated in the above table, the average delay increases significantly in the 2031 Future Base Year scenario due to background traffic growth. The introduction of Stag Brewery development has a relatively lesser impact, particularly in the PM peak. An increase in average delay of 331 seconds per vehicle has been observed in the AM peak (without any highway mitigation) mainly due to the high pedestrian volume on Lower Richmond Road during the School Peak.

The highway mitigation proposals Option 1 – Chalkers Corner Light, Option 2 – Chalkers Corner Light + Bus Lane and Option 3 – Chalkers Corner Full Scheme (Application C), provide an improvement on the overall operation of the junction by reducing the average delay and total latent demand.

The results for both Options 1, 2 and 3 are broadly similar in terms of Network Performance Statistics.

Saturation Flow

A comparison has been undertaken between the available VISSIM saturation flows for signal-controlled lanes which indicate a good correlation between the base and forecast models. Copies of the saturation flow spreadsheets for all Future Year scenario models have been provided along with this submission.

Journey Time Results

This section describes the impact of the 2031 forecast travel demand on the road network for each modelled scenario and time period. The journey time outputs for vehicles and buses have been presented in **Table 9** and

Table 10 respectively. *(see overleaf)*

Table 9: Vehicle Journey Time Summary

				Vissim Journey Time in seconds						Difference in seconds			
	Route	From	To	VMAP Stage 3 approved Base Models - (Entry links extended)	FB + Existing Dev	FB + Stag Dev	FB + Stag + Option 1	FB + Stag + Option 2	FB + Stag + Option 3	(FB + Stag Dev) - FB + Existing Dev	(FB + Stag + Option 1 - (FB + Existing)	(FB + Stag + Option 2 - (FB + Existing)	(FB + Stag + Option 3)- (FB + Existing)2
AM General Traffic	1: Route 1	Clifford Ave South/Upper Richmond Road Jn	Chalkers Corner NB approach	327	316	547	372	370	387	231	56	54	71
	2: Route 2	Chalkers Corner	Clifford Ave South/Upper Richmond Road Jn	135	106	95	110	111	98	-11	5	5	-7
	3: Route 3	Chalkers Corner	Hartington Road Jn	80	82	79	81	81	78	-3	0	0	-4
	4: Route 4	Hartington Road Jn	Chalkers Corner	132	160	376	176	183	175	217	16	23	15
	5: Route 5	Mortlake Roundabout	Chalkers Corner	341	458	680	433	424	428	222	-25	-34	-30
	6: Route 6	Chalkers Corner	Mortlake Roundabout	144	155	347	231	234	237	192	77	79	83
	4: Route 7	A316 EB Entry	Chalkers Corner A316 EB approach	1142	1339	1469	1373	1376	1355	130	34	37	16
	5: Route 8	Mortlake Road North Entry	Chalkers Corner Mortlake Road SB approach	219	227	369	296	273	304	142	69	46	77
	6: Route 9	A316 Great Chertsey Road Entry	Chalkers Corner A316 WB approach	396	388	393	389	389	389	4	1	1	1
	4: Route 10	Lower Richmond Road Entry	Mortlake Roundabout	597	686	1109	773	695	765	423	87	9	79
	5: Route 11	Sheen Lane Entry	Mortlake Roundabout	905	1350	1370	1388	1343	1354	20	37	-8	4
	6: Route 12	Upper Richmond Road WB Entry	Upper Richmond Road/Clifford Ave Junction	657	631	966	692	681	707	336	61	50	76
	4: Route 13	Upper Richmond Road EB Entry	Upper Richmond Road/Clifford Ave Junction	613	657	858	758	761	764	201	101	104	107
PM Gene	1: Route 1	Clifford Ave South/Upper Richmond Road Jn	Chalkers Corner NB approach	366	333	354	365	367	359	20	31	34	26

ral Traffic	2: Route 2	Chalkers Corner	Clifford Ave South/Upper Richmond Road Jn	131	124	128	132	129	114	4	8	5	-10
	3: Route 3	Chalkers Corner	Hartington Road Jn	80	80	80	80	80	77	0	0	0	-3
	4: Route 4	Hartington Road Jn	Chalkers Corner	226	416	421	415	407	391	6	0	-8	-25
	5: Route 5	Mortlake Roundabout	Chalkers Corner	510	728	733	648	673	638	6	-79	-55	-89
	6: Route 6	Chalkers Corner	Mortlake Roundabout	115	115	191	175	170	174	76	60	54	59
	4: Route 7	A316 EB Entry	Chalkers Corner A316 EB approach	1091	1096	1098	1099	1099	1101	2	3	2	4
	5: Route 8	Mortlake Road North Entry	Chalkers Corner Mortlake Road SB approach	400	232	229	231	234	226	-3	-1	2	-6
	6: Route 9	A316 Great Chertsey Road Entry	Chalkers Corner A316 WB approach	404	417	425	419	421	419	7	2	4	2
	4: Route 10	Lower Richmond Road Entry	Mortlake Roundabout	637	913	1027	865	850	862	114	-48	-64	-51
	5: Route 11	Sheen Lane Entry	Mortlake Roundabout	419	453	460	474	484	477	7	21	31	24
	6: Route 12	Upper Richmond Road WB Entry	Upper Richmond Road/Clifford Ave Junction	688	655	673	684	689	668	18	29	34	13
	4: Route 13	Upper Richmond Road EB Entry	Upper Richmond Road/Clifford Ave Junction	824	779	812	809	821	797	33	29	42	18

Table 10: PT Journey Time Summary

		Vissim Journey Time in seconds						Difference in seconds			
		VMAP Stage 3 approved Base Models - (Entry links extended)	FB + Existing Dev	FB + Stag Dev	FB + Stag + Option 1	FB + Stag + Option 2	FB + Stag + Option 3	(FB + Stag Dev) - (FB + Existing Dev)	(FB + Stag + Option 1) - (FB + Existing)	(FB + Stag + Option 2) - (FB + Existing)	(FB + Stag + Option 3) - (FB + Existing)
AM PT	190 NB	272	262	270	253	266	260	8	-10	4	-2
	190 SB	237	263	504	284	284	289	240	20	20	26
	33 EB	133	149	160	160	164	157	10	11	14	7
	337 EB	140	149	143	163	151	164	-5	14	2	16
	419 NB	344	354	572	432	434	431	217	78	79	77
	419 SB	453	563	787	535	505	535	225	-27	-58	-28
	493 EB	128	139	165	140	148	148	26	1	9	9
	R68 NB	140	137	140	135	134	126	4	-1	-2	-10
	R68 SB	144	149	271	184	186	174	122	35	37	25
PM PT	190 NB	232	240	242	244	251	247	2	4	11	7
	190 SB	329	523	540	532	513	502	18	9	-9	-21
	33 EB	195	193	197	196	202	188	4	3	8	-5
	337 EB	188	174	183	183	184	174	9	9	10	1
	419 NB	259	257	340	339	336	330	83	83	80	73
	419 SB	567	731	730	647	556	650	-1	-84	-175	-81
	493 EB	190	192	191	193	181	182	-1	1	-11	-10
	R68 NB	117	123	125	129	130	134	2	6	7	12
	R68 SB	164	139	146	149	150	141	7	10	11	2

A comparison of the journey time results above indicates that there is an overall benefit at Chalkers Corner Junction in respect to journey times with all three mitigation proposals Option 1 – Chalkers Corner Light, Option 2 – Chalkers Corner Light + Bus lane and Option 3 Chalkers Corner Full Scheme respectively.

The greatest benefits are to journey times along Lower Richmond Road section between Mortlake Roundabout and Chalkers Corner Junction in the PM peak with over a minute saving provided with the inclusion of the left turn flare lane. This benefit on Lower Richmond Road is slightly reduced to 55 seconds in the PM peak in Option 2 with the introduction of the Bus Lane on Lower Richmond Road.

For all three Highway Mitigation Options 1, 2 and 3, it has been possible to reallocate green time to other movements through Chalkers Corner junction and provide better overall junction balance in terms of journey times. However, slight increase in journey times is noted on other approach arms to Chalkers Corner junction with the introduction of the proposed Stag Brewery development. The maximum increase in journey time is limited to within 90 seconds across all journey time routes through Chalkers Corner junction except for route 13 in the AM peak for all three Options (101, 104 and 107 seconds respectively).

Queue Comparison

This section describes the impact on queue length in metres of the 2031 forecast travel demand on the road network for each modelled scenario. These have been summarised in the table below.

Table 11: Queue Comparison

Queue Summary (Vissim queue in m)			VMAP Stage 3 approved Base Models - (Entry links extended)		FB + Existing Dev		FB + Stag Dev		FB + Stag + Option 1		FB + Stag + Option 2		FB+ Stag + Option 3	
Junction	VISSIM Queue Counter	Road	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Chalkers Corner	1	A316 Lower Richmond Road W	409	110	454	133	468	146	460	177	462	172	455	195
	2	Mortlake Road North	37	336	53	62	249	58	168	61	138	66	187	53
	3	A316 Great Chertsey Road East	58	200	74	462	289	460	92	463	98	457	98	453
	4	Lower Richmond Road	271	400	370	455	300	426	238	418	361	455	322	421
	5	Clifford Avenue S	419	425	397	388	463	412	445	414	448	422	447	415
Dan Mason Drive/Hartington Road	6	A316 Great Chertsey Road West	8	9	9	8	6	8	9	8	9	8	9	8
	7	Hartington Road	333	128	106	337	122	342	107	339	106	339	108	336
	8	A316 Great Chertsey Road East	3	5	3	13	19	29	3	15	3	19	5	13
	9	Dan Mason Drive	1	5	1	5	1	6	1	6	1	6	1	5
Sheen Lane/Mortlake High Street	10	Ship Lane	49	12	74	8	40	3	173	3	197	3	165	5
	11	Mortlake High Street	50	150	247	366	419	389	274	318	215	308	275	316
	12	Sheen Lane	242	49	400	85	439	96	422	110	406	115	386	109
Upper Richmond Road/Clifford Avenue	13	Clifford Avenue	119	119	72	105	41	111	82	122	79	114	58	84
	14	Upper Richmond Road E	112	178	80	118	332	145	165	155	153	165	192	150
	15	Upper Richmond Road W	172	329	217	303	297	323	262	320	262	324	262	317

An analysis of the queue results indicate that these are in line with the journey time outputs highlighting benefits of Lower Richmond road in the morning peak hour period and improvements on Mortlake Road North in the evening peak hour period within Options 1 and 3.

A maximum increase of up to 23 PCUs (~134m) is noted along Mortlake Road North in the morning peak hour period with Highway Mitigation Option 3 however, an increase of this level across 2 lanes at a congested junction is considered minor.

Resilience Test

Introduction

Further to TfL's review of TN038b – Forecast Methodology, Stantec UK have been requested to undertake a resilience test on the Future Year models but applying a factor of 1.1 on Clifford Avenue South approach to Chalkers Corner Junction. The results of the resilience test, subject to a review of further outputs extracted from previously undertaken Saturn modelling are provided in this section.

Network Performance

This section summarises the network performance statistics for each modelled forecast scenario in terms of average delay, average speed and latent demand within the model network. This has been presented in Table 3 below.

Table 12: Resilience Test Network Performance Summary

Network Performance Statistics		Average Delay	Average Speed	Vehicles (arrived)	Latent Demand
AM	VMAP Stage 3 approved Base Models - (Entry links extended)	335	17	5130	0
	FB + Existing Dev	445	15	5272	0
	FB + Stag Dev	735	10	4053	8
	FB + Stag Dev + Option 1	489	14	5336	0
	FB + Stag Dev + Option 2	488	14	5330	0
	FB + Stag Dev + Option 3	495	13	5294	0
PM	VMAP Stage 3 approved Base Models - (Entry links extended)	319	17	5401	0
	FB + Existing Dev	482	14	5670	1
	FB + Stag Dev	510	13	5662	1
	FB + Stag Dev + Option 1	498	14	5711	1
	FB + Stag Dev + Option 2	497	14	5707	1
	FB + Stag Dev + Option 3	487	14	5726	1

The AM Peak results in above table are broadly similar to the Stage 5 models without the increased traffic volume on Clifford Avenue South approach arm to Chalkers Corner Junction.

Journey Time Results

This chapter describes the impact of the 2031 forecast travel demand on the network for each modelled scenario which have been listed below.

- 2031 Reference Case – Base + Existing Traffic development traffic + Resilience Test (AM & PM peaks)
- 2031 Do Something – Base + Proposed developments + Proposed Highway layout changes + Resilience Test (AM & PM peaks)
- 2031 Do Something – Base + Proposed developments + Proposed Highway layout changes + Chalkers Corner Light Mitigation + Resilience Test (AM & PM peaks)
- 2031 Do Something – Base + Proposed developments + Proposed Highway layout changes + Chalkers Corner Light Mitigation + Bus Lane Option + Resilience Test (AM & PM peaks)
- 2031 Do Something – Base + Proposed developments + Proposed Highway layout changes + Chalkers Corner Full Scheme Application C + Resilience Test (AM & PM peaks)

A summary of network performance statistics, journey times and queues have been provided in subsequent sections within this chapter.

Table 13: Resilience Test Vehicle Journey Time

				Vissim Journey Time in seconds						Difference in seconds			
	Route	From	To	VMAP Stage 3 approved Base Models - (Entry links extended)	FB + Existing Dev	FB + Stag Dev	FB + Stag + Option 1	FB + Stag + Option 2	FB + Stag + Option 3	(FB + Stag Dev) - FB + Existing Dev	(FB + Stag + Option 1 - (FB + Existing)	(FB + Stag + Option 2 - (FB + Existing)	(FB + Stag + Option 3)- (FB + Existing)2
AM General Traffic	1: Route 1	Clifford Ave South/Upper Richmond Road Jn	Chalkers Corner NB approach	327	337	547	382	384	396	210	45	46	58
	2: Route 2	Chalkers Corner	Clifford Ave South/Upper Richmond Road Jn	135	106	93	113	111	96	-13	7	5	-10
	3: Route 3	Chalkers Corner	Hartington Road Jn	80	81	79	81	82	78	-2	0	0	-4
	4: Route 4	Hartington Road Jn	Chalkers Corner	132	161	340	171	180	176	180	11	19	15
	5: Route 5	Mortlake Roundabout	Chalkers Corner	341	456	669	430	425	428	213	-26	-31	-28
	6: Route 6	Chalkers Corner	Mortlake Roundabout	144	156	341	227	237	236	186	72	82	80
	4: Route 7	A316 EB Entry	Chalkers Corner A316 EB approach	1142	1322	1481	1368	1382	1354	159	46	60	32
	5: Route 8	Mortlake Road North Entry	Chalkers Corner Mortlake Road SB approach	219	227	368	287	285	305	141	59	58	78
	6: Route 9	A316 Great Chertsey Road Entry	Chalkers Corner A316 WB approach	396	388	389	389	389	389	1	1	1	1
	4: Route 10	Lower Richmond Road Entry	Mortlake Roundabout	597	694	1086	750	704	782	392	56	10	88
	5: Route 11	Sheen Lane Entry	Mortlake Roundabout	905	1330	1368	1392	1363	1386	38	62	33	56
	6: Route 12	Upper Richmond Road WB Entry	Upper Richmond Road/Clifford Ave Junction	657	799	1167	957	967	968	369	158	169	170
	4: Route 13	Upper Richmond Road EB Entry	Upper Richmond Road/Clifford Ave Junction	613	848	973	904	885	905	125	55	37	57
PM General	1: Route 1	Clifford Ave South/Upper Richmond Road Jn	Chalkers Corner NB approach	366	373	382	391	390	384	9	18	17	11
	2: Route 2	Chalkers Corner	Clifford Ave South/Upper Richmond Road Jn	131	130	134	129	133	107	4	-1	2	-23

Traffic	3: Route 3	Chalkers Corner	Hartington Road Jn	80	81	81	81	81	77	0	0	0	-3
	4: Route 4	Hartington Road Jn	Chalkers Corner	226	414	435	415	413	394	21	1	-1	-20
	5: Route 5	Mortlake Roundabout	Chalkers Corner	510	726	733	643	671	635	7	-84	-56	-91
	6: Route 6	Chalkers Corner	Mortlake Roundabout	115	116	194	175	172	179	78	59	56	62
	4: Route 7	A316 EB Entry	Chalkers Corner A316 EB approach	1091	1279	1301	1338	1337	1343	22	59	58	64
	5: Route 8	Mortlake Road North Entry	Chalkers Corner Mortlake Road SB approach	400	233	234	235	231	226	1	2	-3	-7
	6: Route 9	A316 Great Chertsey Road Entry	Chalkers Corner A316 WB approach	404	421	432	421	421	419	11	-1	0	-3
	4: Route 10	Lower Richmond Road Entry	Mortlake Roundabout	637	907	1024	859	851	856	117	-48	-56	-51
	5: Route 11	Sheen Lane Entry	Mortlake Roundabout	419	447	461	490	489	472	14	43	42	26
	6: Route 12	Upper Richmond Road WB Entry	Upper Richmond Road/Clifford Ave Junction	688	842	866	881	860	854	25	39	18	12
	4: Route 13	Upper Richmond Road EB Entry	Upper Richmond Road/Clifford Ave Junction	824	1047	1063	1077	1088	1058	17	31	41	11

Table 14: Resilience Test PT Summary

		Vissim Journey Time in seconds					Difference in seconds				
		VMAP Stage 3 approved Base Models - (Entry links extended)	FB + Existing Dev	FB + Stag Dev	FB + Stag + Option 1	FB + Stag + Option 2	FB + Stag + Option 3	(FB + Stag Dev) - (FB + Existing Dev)	(FB + Stag + Option 1) - (FB + Existing)	(FB + Stag + Option 2) - (FB + Existing)	(FB + Stag + Option 3) - (FB + Existing)
AM PT	190 NB	272	263	267	264	264	258	4	1	1	-4
	190 SB	237	265	468	275	285	289	203	10	20	25
	33 EB	133	189	232	190	194	187	43	1	5	-2
	337 EB	140	161	177	172	168	169	15	11	7	8
	419 NB	344	342	619	438	446	453	277	96	104	110
	419 SB	453	555	780	539	529	551	225	-15	-26	-4
	493 EB	128	172	215	186	175	180	43	14	3	8
	R68 NB	140	134	141	131	127	129	7	-3	-7	-5
	R68 SB	144	145	240	181	188	186	95	36	42	41

PM PT	190 NB	232	275	272	270	272	266	-3	-4	-3	-9
	190 SB	329	521	557	528	519	496	36	7	-2	-26
	33 EB	195	225	220	227	228	221	-6	2	2	-4
	337 EB	188	213	215	220	222	215	3	8	9	2
	419 NB	259	291	371	356	363	362	80	66	72	71
	419 SB	567	732	730	642	551	646	-1	-90	-181	-86
	493 EB	190	219	211	223	205	212	-9	4	-15	-7
	R68 NB	117	138	139	139	145	143	1	0	7	4
	R68 SB	164	139	152	148	149	143	14	9	11	4

Analysis of the journey time summary above indicates that the overall journey times through Chalkers Corner Junction are broadly similar for the with and without resilience test modelling scenarios except for route 12 which shows an increase in journey time of 158, 169 and 170 seconds in the AM peak for Option 1, 2 and 3 respectively.

The benefits for general traffic and buses on Lower Richmond Road are reduced slightly in the AM peak within the resilience test modelling scenarios.

Queue Comparison

This section describes the impact on queue length in metres of the 2031 forecast travel demand on the road network for each modelled scenario. These have been summarised in the table below.

Table 15: Resilience Test Queue Comparison

Queue Summary (Vissim queue in m)			VMAP Stage 3 approved Base Models - (Entry links extended)		FB + Existing Dev		FB + Stag Dev		FB + Stag + Option 1		FB + Stag + Option 2		FB+ Stag + Option 3	
Junction	VISSIM Queue Counter	Road	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Chalkers Corner	1	A316 Lower Richmond Road W	394	61	409	110	454	391	468	403	460	420	462	421
	2	Mortlake Road North	34	270	37	336	53	65	252	67	159	68	160	61
	3	A316 Great Chertsey Road East	49	148	58	200	76	459	267	461	87	462	96	458
	4	Lower Richmond Road	361	412	271	400	357	459	291	429	261	416	355	455
	5	Clifford Avenue S	324	421	419	425	457	464	483	468	470	466	470	467
Dan Mason Drive/Hartington Road	6	A316 Great Chertsey Road West	7	8	8	9	9	9	6	9	9	9	9	9
	7	Hartington Road	303	153	333	128	106	339	117	345	106	341	107	340
	8	A316 Great Chertsey Road East	3	4	3	5	3	22	14	45	3	18	3	19
	9	Dan Mason Drive	1	5	1	5	1	5	1	7	1	6	1	6
Sheen Lane/Mortlake High Street	10	Ship Lane	41	12	49	12	84	8	40	4	156	5	158	5
	11	Mortlake High Street	79	137	50	150	236	369	421	389	274	316	213	308
	12	Sheen Lane	268	60	242	49	401	80	450	101	416	119	419	116
Upper Richmond Road/Clifford Avenue	13	Clifford Avenue	141	112	119	119	73	122	37	128	86	119	84	126
	14	Upper Richmond Road E	50	99	112	178	328	342	435	355	406	351	418	341
	15	Upper Richmond Road W	101	332	172	329	320	412	347	413	330	416	325	417

An analysis of the queue results indicate that these are in line with the journey time outputs highlighting benefits of Lower Richmond road in the morning peak hour period and improvements on Mortlake Road North in the evening peak hour period.

A maximum increase of up to 23 PCUs (~134m) is noted along Mortlake Road North in the morning peak hour period with Highway Mitigation Option 3 however, an increase of this level across 2 lanes at a congested junction is considered minor.

Summary

This technical note has been produced by Stantec on behalf of Reselton Properties to detail the methodology and outputs for the Forecast Modelling undertaken to mitigate the highway impacts of the Stag Brewery development, Mortlake.

This technical note describes the impact of the 2031 forecast travel demand on the network for each modelled scenario which have been listed below.

- 2031 Reference Case – Base + Existing Traffic development traffic (AM & PM peaks)
- 2031 Do Something – Base + Proposed developments + Proposed Highway layout changes (AM & PM peaks)
- 2031 Do Something – Base + Proposed developments + Proposed Highway layout changes + Chalkers Corner Light Mitigation (AM & PM peaks)
- 2031 Do Something – Base + Proposed developments + Proposed Highway layout changes + Chalkers Corner Light Mitigation + Bus Lane Option (AM & PM peaks)
- 2031 Do Something – Base + Proposed developments + Proposed Highway layout changes + Chalkers Corner Full Scheme Application C (AM & PM peaks)

Network Performance Statistics suggest that there is a notable increase in the average delay per vehicle within the model network in the 2031 Future Base Year scenario due to background traffic growth. The introduction of Stag Brewery development has a relatively lesser impact, particularly in the PM peak. An increase in average delay of 331 seconds per vehicle has been observed in the AM peak (without any highway mitigation) mainly due to the high pedestrian volume on Lower Richmond Road during the School Peak.

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. The following Options have been included in this modelling assessment:

- Option 1: Chalkers Corner 'Light'
- Option 2: Chalkers Corner 'Light' & Bus Lane
- Option 3: Chalkers Corner Full Scheme Application C

The Highway Mitigation Proposals, Options 1, 2 and 3 all provide overall benefit at the junction with regards to journey times and network performance in comparison with the proposed development scenario without any highway mitigation. The greatest benefits are to journey times for general traffic and buses along Lower Richmond Road section between Mortlake Roundabout and Chalkers Corner junction in the PM peak, with over a minute saving provided in Option 1 with the inclusion of the left turn flare lane. This benefit on Lower Richmond Road is reduced slightly for general traffic in Option 2 with the introduction of the Bus Lane on Lower Richmond Road. Bus journey times along Lower Richmond Road, as expected improve in Option 2 with the introduction of the bus lane.

It has been possible to reallocate green time to other movements through Chalkers Corner junction and provide better overall junction balance in terms of journey times for all Highway Mitigation proposals. However, slight increase in journey times is noted on other approach arms to Chalkers Corner junction with the introduction of the proposed Stag Brewery development.

The maximum increase in journey time is limited to within 90 seconds across all journey time routes through Chalkers Corner junction except for A205 Upper Richmond Road West Arm in the AM peak for all three Highway Mitigation Options (101, 104 and 107 seconds respectively).

Furthermore, a resilience test has been undertaken as part of this assessment by increasing the traffic volume on Clifford Avenue South arm in the Future year models by applying a growth factor of 1.1. Analysis of the journey time summary above indicates that the overall journey times through Chalkers Corner Junction are broadly similar for the with and without resilience test modelling scenarios except for

A205 Upper Richmond Road East arm which shows an increase in journey time of 158, 169 and 170 seconds in the AM peak for Option 1, 2 and 3 respectively.

Additionally, the benefits for general traffic and buses on Lower Richmond Road are reduced slightly in the resilience test modelling scenarios.

Overall, bus journey time results for both with and without resilience test flows indicate that the impact on bus journey times with the introduction of the Stag Brewery development is alleviated through all three highway mitigation proposals discussed in this technical note.

Bus route 419NB is the only route highlighting an increase of more than 60 seconds in journey time for both AM and PM peak periods and this is due to increased dwell times used in the development scenario models.

In addition, due to large bus contribution (£3,675,000) it is likely that additional bus services will be added to the 419 in each direction, which would reduce dwell time further. The figures generated above are therefore considered robust for the assessment.

Furthermore, it is noted that with the closure of Hammersmith Bridge, bus route 533 has been re-routed to travel along Mortlake High Street, Lower Richmond Road, through Chalkers Corner and across Chiswick Bridge. The Chalkers Corner improvements with / without the implementation of the bus lane will therefore provide added benefits to both Routes 419 and 533 in the westbound direction along Lower Richmond Road.

Based on the assessment undertaken in this technical note, it is considered that the proposed mitigation measures, Options 1, 2 and 3 sufficiently alleviate the impact of the proposed Stag Brewery development. The Vissim Models submitted along with this technical note are considered fit for purpose.

Appendix L TN039 Hammersmith Bridge Closure Impact

TECHNICAL NOTE

Job Name: Stag Brewery, Mortlake

Job No: 38262

Note No: TN039 – Rev Final

Date: January 2021

Prepared By: Peter Wadey

Checked By: Greg Callaghan

Subject: **Implications of Hammersmith Bridge Closure**

1.1 Introduction

1.1.1 This technical note has been prepared by Stantec to discuss the implications of the Hammersmith Bridge closure on the Stag Development during both the operational and construction phases. A number of comments have been raised during the consultation process, requesting clarification of the implications of the development with the closure of Hammersmith Bridge and this note provides further analysis on this.

1.1.2 There has been no opportunity to gather any further data due to Covid – 19, however new traffic surveys and modelling will be undertaken prior to the implementation of the highway improvements. The Environmental Statement and modelling work undertaken for the Transport Assessment have therefore been based on traffic data obtained prior to the closure of the bridge and pre-Covid 19 and are representative of the reasonable likely traffic conditions in the area, as agreed with Transport for London (TfL). This note provides analysis of the implications of the bridge closure using the most up to date information available for Hammersmith Bridge.

1.1.3 Hammersmith Bridge is a suspension bridge that crosses the River Thames in west London. It links the southern part of Hammersmith in the London Borough of Hammersmith and Fulham (LBHF), on the north side of the river, and Barnes in the London Borough of Richmond upon Thames (LBRuT), on the south side of the river.

1.1.4 Hammersmith Bridge was closed to motorists in April 2019 after critical faults in the cast iron casing were found. Hammersmith and Fulham Council then shut the bridge to pedestrians and cyclists in August 2020, after it was considered unsafe due to large cracks that were formed during the heatwave in the summer.

1.1.5 In addition, all river traffic under the bridge is also prevented, including closing of the pedestrian walkways under Hammersmith Bridge.

1.1.6 The bridge forms part of a key north- south route linking LBHF and LBRuT. The Department for Transport (DfT) have recently confirmed that they have put together a Task Force, which includes members of Transport for London (TfL), Greater London Authority (GLA), LBHF and LBRuT. They will first work towards reopening the bridge for cyclists and pedestrians, before moving on to enabling the return of motor traffic.

1.1.7 At a meeting held with the public on 28th October 2020, the Task Force confirmed that a study had been undertaken that showed there was a 10-1 benefit to cost ratio for the bridge to be re-opened and consider this as a high priority for SW London. They stated that they had a Detailed Design package ready for both Phase 1 Emergency Stabilisation and Phase 2 Permanent Stabilisation. In addition, they had completed the Concept Design for Phase 3 Main Strengthening Works.

1.1.8 Subject to agreeing a funding package they stated that the following timeline would be required for the re-opening of the bridge:

- 66 Working days to start of ferry contract – service commencement targeted for spring 2021.
- 4 months to understand condition of all pedestals – possible controlled opening to pedestrians and cyclists.
- 7 months emergency stabilisation – Open to pedestrians and cyclists for a limited period.
- 21 months permanent stabilisation – open to pedestrians and cyclists.
- 30 months strengthening – open to previous traffic loading.
- **Total time to full bridge re-opening – 64 months (5 years and 4 months)**

1.1.9 The Stag Brewery development is currently proposed to be fully operational in September 2027 with peak construction currently identified for 2023, subject to gaining all of the relevant approvals.

1.1.10 While no start dates have been confirmed, the Task Force were confident that they would be able to agree on a funding package shortly. Based on the proposed programme for Hammersmith Bridge (5 years and 4 months) and full operation of the Stag Development (September 2027), if funding is agreed before May 2022 then the bridge should be fully operational before September 2027.

1.1.11 This technical note provides a comparison of traffic on the local highway network before and after the bridge closure and discusses the implications of the bridge closure during both the operational and construction phases of the project. However, it is noted that it is likely the bridge could be reopened to all vehicles before the development is proposed to be fully operational. The development will however be opened in phases, which will likely be prior to the bridge re-opening. Further details are provided within this technical note.

1.2 Implications of Bridge Closure on Local Highway Network

1.2.1 In order to assess the implications of the bridge closure on the highway network surrounding the development, data has been provided by TfL and collected by a third party sub-consultant for the number of vehicles travelling over Chiswick Bridge and for each link through Chalkers Corner. Chiswick Bridge is the next crossing of the Thames to the west of Hammersmith Bridge and leads directly into Chalkers Corner.

1.2.2 The data provided by TfL includes a traffic counter located on Chiswick Bridge. Data has been gathered for 2017, 2018 and 2019 (post closure) and the daily average has been provided by TfL over the year for Tues to Thurs only. The data is provided from a counter located on the south side of the Bridge and provides accurate data of two-way vehicular movements crossing Chiswick Bridge.

1.2.3 Figures 2.1 – 2.4 show the results of the vehicles per hour crossing the bridge in both directions in the AM and PM peak periods for the different years.

Figure 2.1 Southbound Traffic over Chiswick Bridge - AM Peak

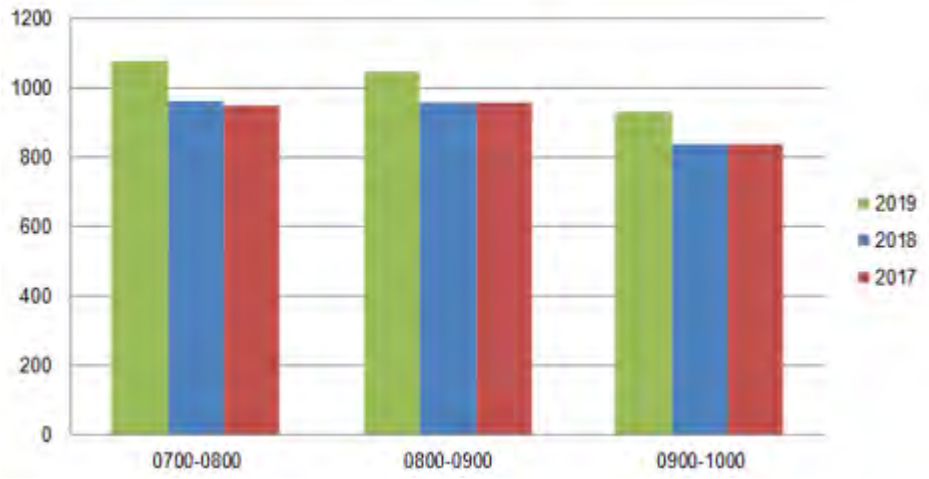


Figure 2.2 Southbound Traffic over Chiswick Bridge - PM Peak

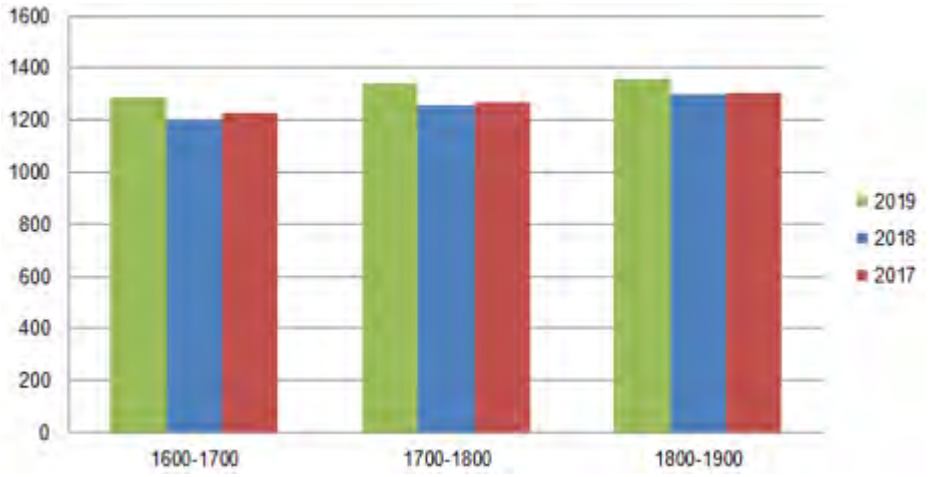


Figure 2.3 Northbound Traffic over Chiswick Bridge - AM Peak

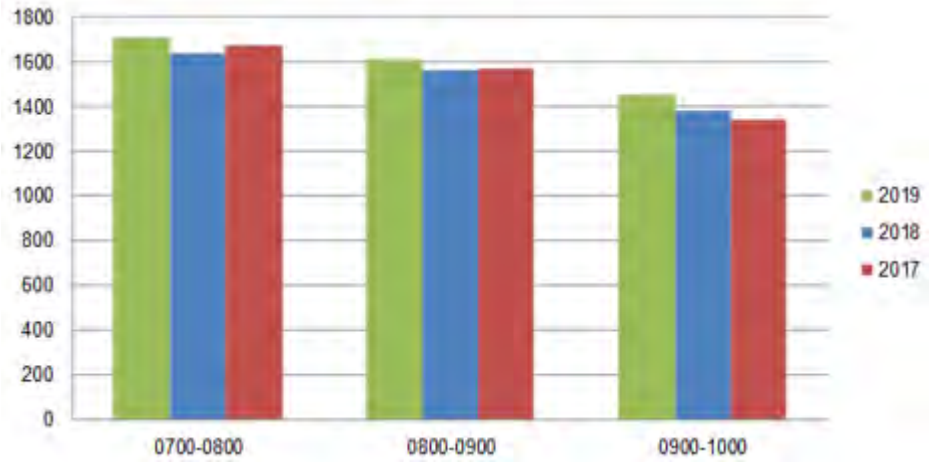
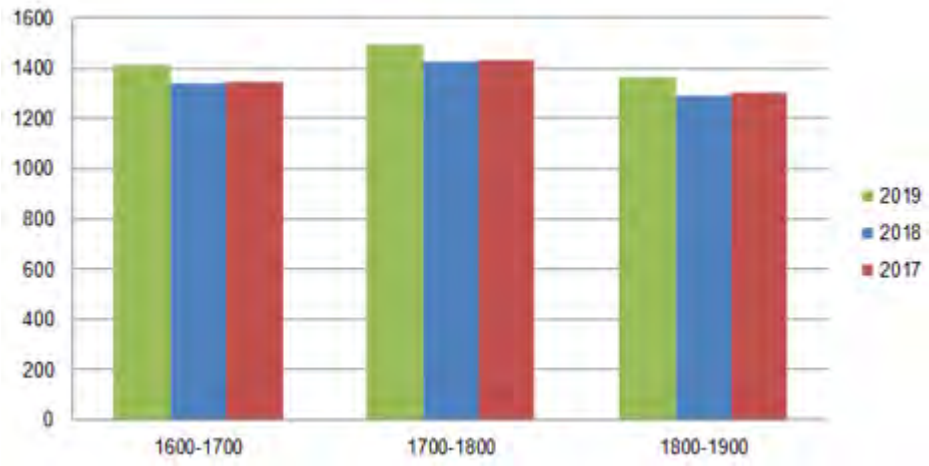


Figure 2.4 Northbound Traffic over Chiswick Bridge - PM Peak



1.2.4 The results show that there was an increase in vehicles from 2017 to 2019 in both directions over Chiswick Bridge in both the AM and PM peak periods. In addition, 2017 and 2018 figures are relatively flat, which was when Hammersmith Bridge was open. The increase in number of vehicles between 2017 – 2019 in the AM Peak (08.00 – 09.00) and PM Peak (17.00 – 18.00) and as a % of the traffic are detailed below.

- Southbound AM Peak = +87 (+8%)
- Southbound PM Peak = +65 (+5%)
- Northbound AM Peak = +42 (+3%)
- Northbound PM Peak = +62 (+4%)

1.2.5 This increase in traffic is to be expected as Hammersmith Bridge is closed and vehicles re-route to alternative crossing points over the Thames. Notably however the increase in traffic shown relates only to a small portion of existing Hammersmith Bridge traffic, which DfT traffic data suggests was used by approximately 1,300 vehicles in the peak hours.

1.2.6 Traffic surveys were also undertaken by a third-party sub consultant at Chalkers Corner both before and after the closure of Hammersmith bridge on the following dates:

- Pre-Bridge Closure – 27th June 2017
- Post Bridge Closure – 2nd July 2019

1.2.7 As part of the assessment the peak hours used as part of the Transport Assessment have been considered:

- AM Peak – 08:00 - 09:00
- PM Peak – 17:00 – 18:00

1.2.8 A comparison of recorded traffic flows both entering and exiting (travelling away) from Chalkers Corner for the pre and post Hammersmith Bridge closure is shown on Figures 2.5 and 2.6 for the AM and PM peaks, respectively. In addition, the total traffic along each link for both directions are shown on Figure 2.7.

Figure 2.5 Total Vehicles Entering / Exiting Chalkers Corner – AM Peak

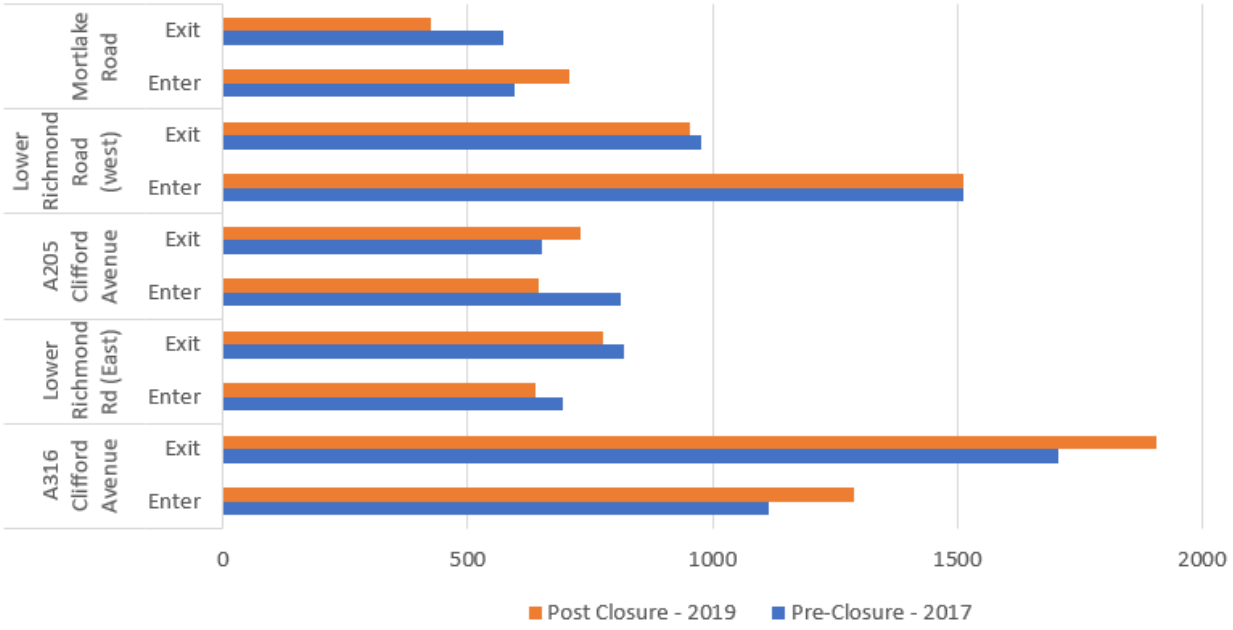


Figure 2.6 Total Vehicles Entering / Exiting Chalkers Corner – PM Peak

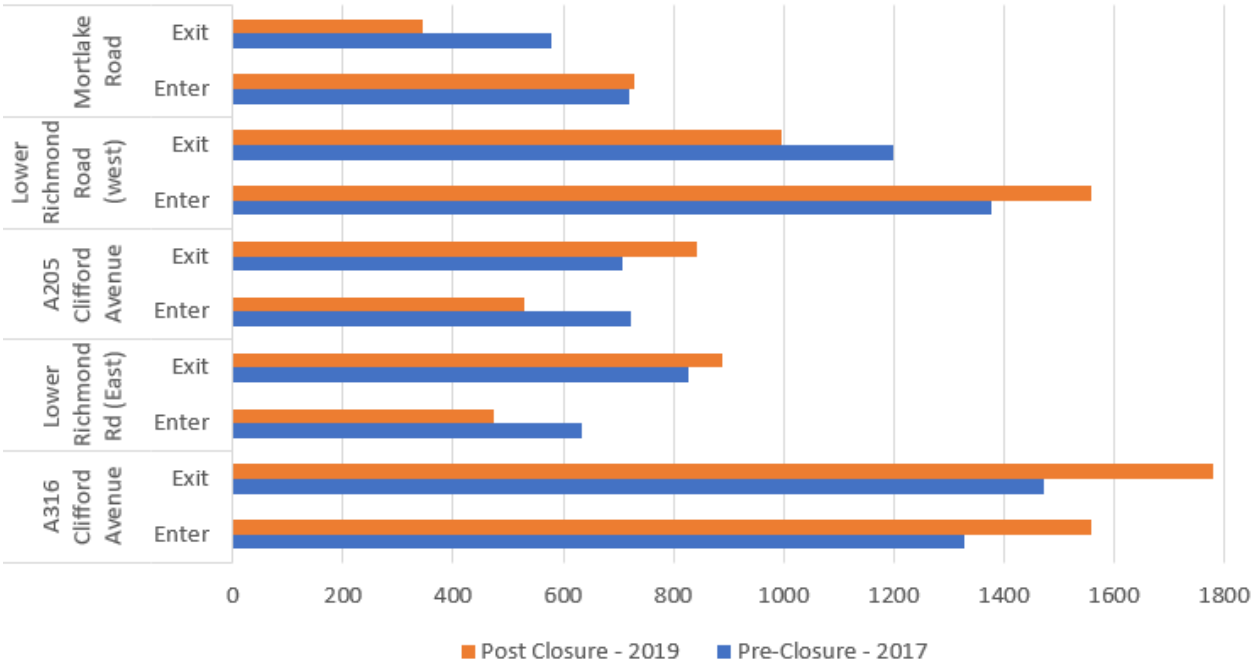
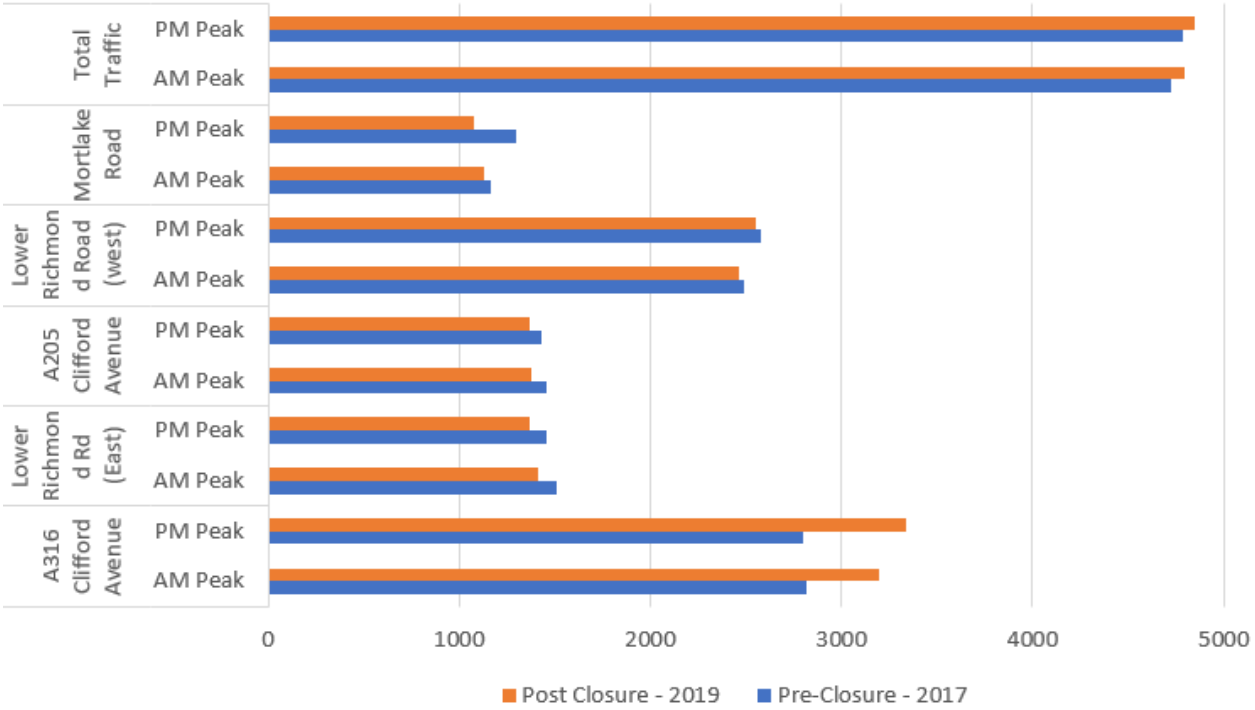


Figure 2.7 Total Vehicles along each Link through Chalkers Corner



1.2.9 The key findings from the comparison of traffic through Chalkers Corner as a result of Hammersmith Bridge Closure are as follows:

- Increase of vehicles entering junction from Clifford Avenue (east) and A205 Mortlake Road in AM Peak.
- Increase of vehicles entering the junction from Clifford Avenue (east), Clifford Avenue (west) and Mortlake Road in PM Peak.
- A reduction of vehicles entering the junction from the A205 Clifford Avenue and Lower Richmond Road (east) in both AM Peak and PM Peak.
- Total traffic along Lower Richmond Road (east) decreases by 99 vehicles (6.5%) in the AM Peak and 94 vehicles (6.4%) in the PM peak.
- Overall Increase of 67 (1.4%) vehicles in AM Peak through the junction.
- Overall Increase of 67 (1.3%) vehicles in PM peak through the junction.

1.2.10 Notably the survey data indicates that traffic along Lower Richmond Road adjacent to the development has decreased as a result of the Hammersmith Bridge Closure. However, traffic along A316 Clifford Avenue from the bridge over the Thames has increased, which is consistent with the ATC data provided by TfL. Overall, the survey data indicates an increase in traffic levels following the closure of Hammersmith Bridge through Chalkers Corner, however this represents only an overall 1.4% and 1.3% increase to the AM and PM peaks respectively through the junction.

1.2.11 While the results are based on a small data set, the results of the traffic surveys show very similar results to the outputs provided by TfL. It can therefore be concluded that the increase in total traffic travelling through Chalkers Corner as a whole is minimal (1.4% or less) and that there is a decrease in traffic using Lower Richmond Road, adjacent to the development.

1.2.12 In addition, while the overall traffic volumes have not significantly increased, there has been a shift in the volume of traffic on certain links. TfL have confirmed that signal timing changes have been made following the Hammersmith Bridge closure to reflect this shift in volume providing additional green time to certain movements to manage demand.

1.3 Phased Development Opening Implications

1.3.1 Comments received on the planning application consultation suggested that the implications of the development phasing and bridge closure are considered in more detail. The proposed phasing of the development is shown in Figure 3.1 and detailed in Table 3.1 below:

Figure 3.1: Development Phasing

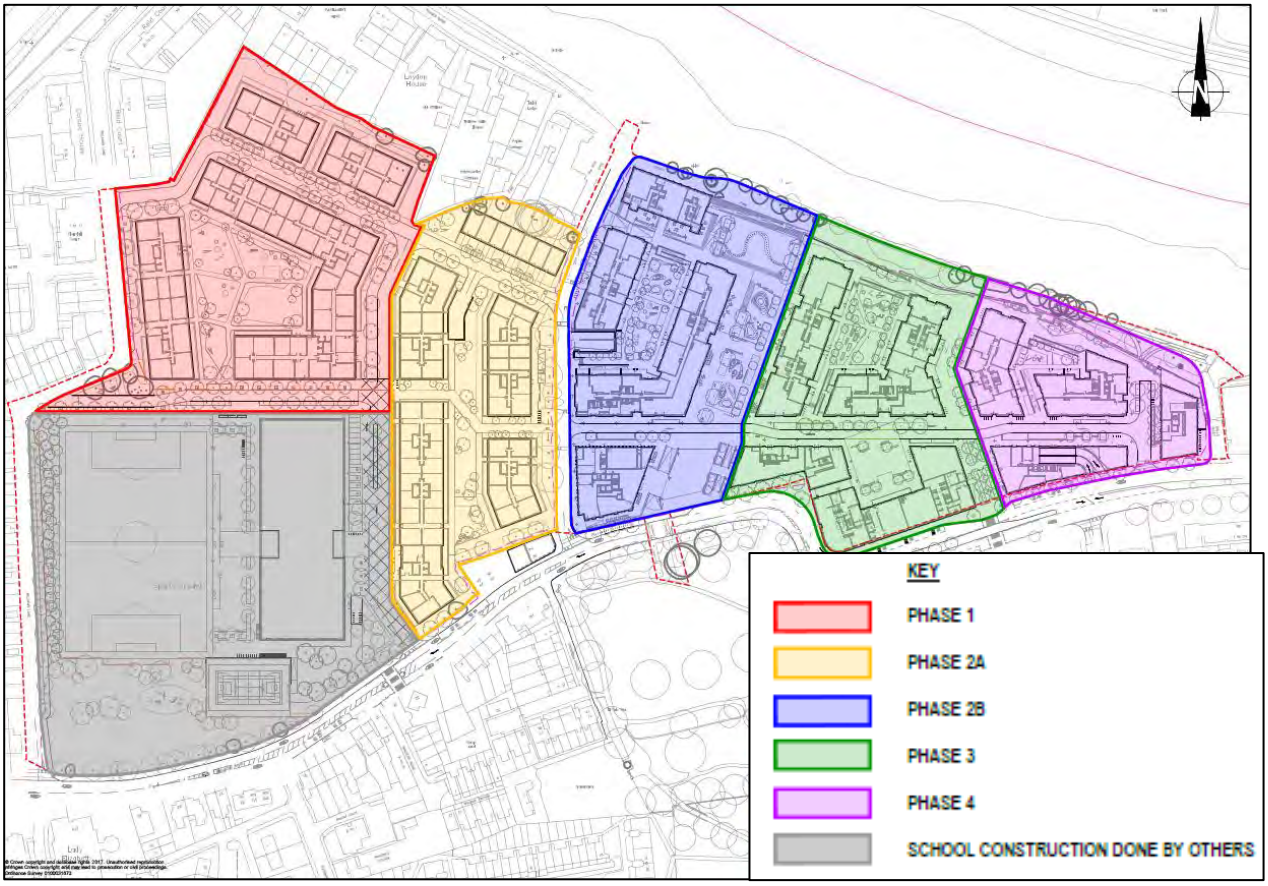


Table 3.1: Development Proposed Phasing Details

Phase	Blocks	Residential Units*	Car Spaces	Occupation Year Post Planning Consent	Estimated Completion Date
School	N/A	Nil	15	3 years	Oct-23
1	18,19,20,21	284	0	4 years	Jun-24
2a	13,14,15,16,17,22	390	70	4-6 years	Feb-26
2b	2,3,4	207	126	4-5 years	Feb-25
3	5,6,7,8,	219	135	6-7 years	Jan-27
4	9,10,11,12	150	147	6-7 years	Sept-27
	Dev Total	**1250**	**478**		

*Non-residential land uses, including flexible use located in buildings 1-12

1.3.2 Notably Phases 3 and 4 of the development accounts for 58% (282/478) of the available parking spaces at the development. In addition, both phases are not anticipated to be completed until 2027, when the bridge could be re-opened. The non-residential, excluding the school will not be brought forward until the later stages of development in Phases 2b, 3 and 4. However it is more likely that non-residential properties will be let once the development is more fully developed.

1.3.3 The total vehicle trips generated by the development have been calculated for each year for all land uses and proportioned with the number of car parking spaces that will be available in each phase. As agreed with TfL it is assumed that the school will not be fully occupied from opening and instead will take a number of years to be full. The school trips have therefore been split over three years. For the purposes of the analysis it is assumed that 50% of the school will be occupied on the first year, 25% on second year and 25% on third year. This assumption is based on Year 7 being oversubscribed, sixth form and later years being more difficult to fill in the earlier years. The calculated accumulated trip generation for the development by year is provided in Table 3.2.

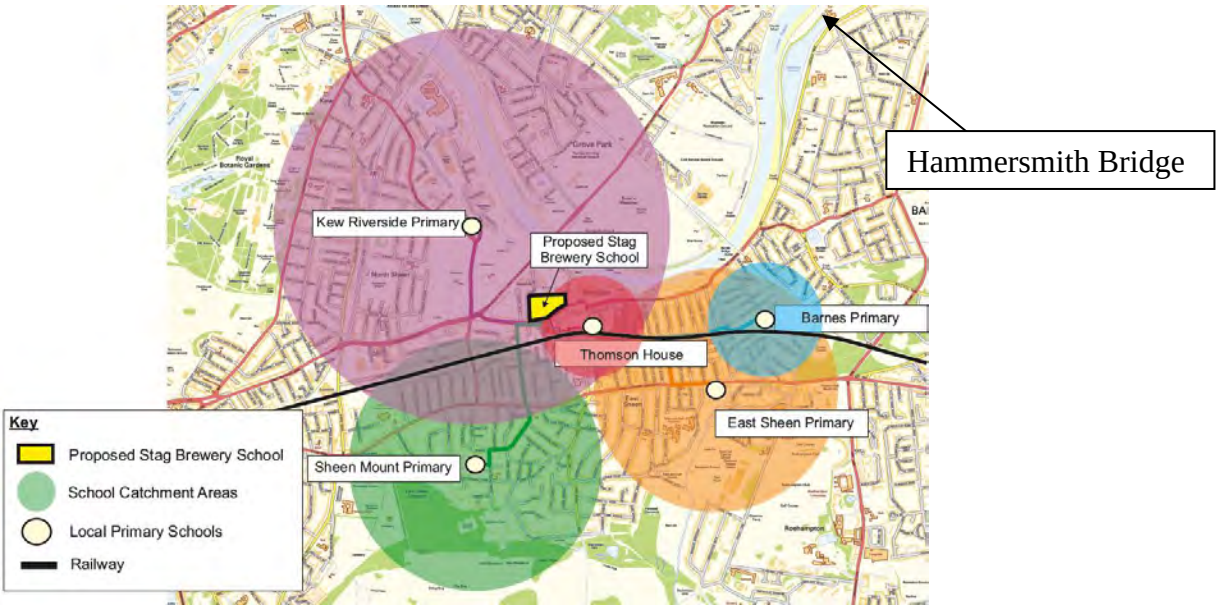
Table 3.2: Development Accumulative Yearly Vehicular Peak Hour Trip Generation

Year	AM Peak 08:00 – 09:00			PM Peak 17:00 – 18:00		
	Arr	Dep	2-way	Arr	Dep	2-way
2023	41	36	76	5	7	12
2024	61	53	114	7	11	17
2025	90	100	191	32	25	57
2026	95	116	213	45	31	76
2027	153	174	326	108	117	225

1.3.4 Notably a large proportion (46%) of the vehicular trips are associated with the school in the AM Peak.

1.3.5 A review of the likely school catchment area using data for local primary schools provided by LBRuT is presented on Figure 3.2.

Figure 3.2: School Catchment Area



NB, Catchments based on data provided by LBRuT / Achieving for Children

1.3.6 The local primary school catchment areas, which the new secondary school is likely to cater for and the distance that Hammersmith Bridge is located from the school shows that it is unlikely that any school trips would be affected by the bridge closure.

1.3.7 Notably, the majority of the remaining development trips are associated with the later phases of the development, which is when the car parking will be operational. Should funding be made available for the bridge repairs early in 2021, then using the Task Forces predicted programme (5yrs and 4 months), the bridge could be re-open in 2026.

1.3.8 With the mitigation proposed at Chalkers Corner, together with other highway improvements proposed to be constructed prior to the development being operational, the suggested limited number of vehicles that would use Hammersmith Bridge and the reduced number of trips with the phased opening of the development the implications of the bridge closure is considered to be no significant change to that presented in the TA and ES documents.

1.4 Implications during Operation of Development

1.4.1 While no start dates have been confirmed for the works to Hammersmith Bridge, the Task Force were confident that they would be able to agree on a funding package and begin work shortly. Based on the proposed programme for Hammersmith Bridge and opening of the Stag Development if funding is secured before May 2022 then the bridge should be fully operational before September 2027, which is the proposed date for the development to be fully operational. It is therefore considered reasonably likely that the bridge will be re-opened prior to the development being fully operational.

1.4.2 However, should Hammersmith Bridge not be re-opened by the time the development is fully operational some development traffic travelling towards Hammersmith would be re-routed through Chalkers Corner and across A316 Great Chertsey Road bridge. This would also be the case for the phased development; however, the implications would notably be less with less development traffic.

1.4.3 The distribution of the development traffic as agreed with TfL/LBRuT as part of the original application with Hammersmith Bridge open is shown in Figure 4.1 and 4.2 below for both the AM and PM peak periods respectively. This has been based on TfL's strategic model for the surrounding area, which is the agreed methodology for determining the distribution of traffic for the development.

Figure 4.1 Development Traffic Trip Distribution – AM Peak

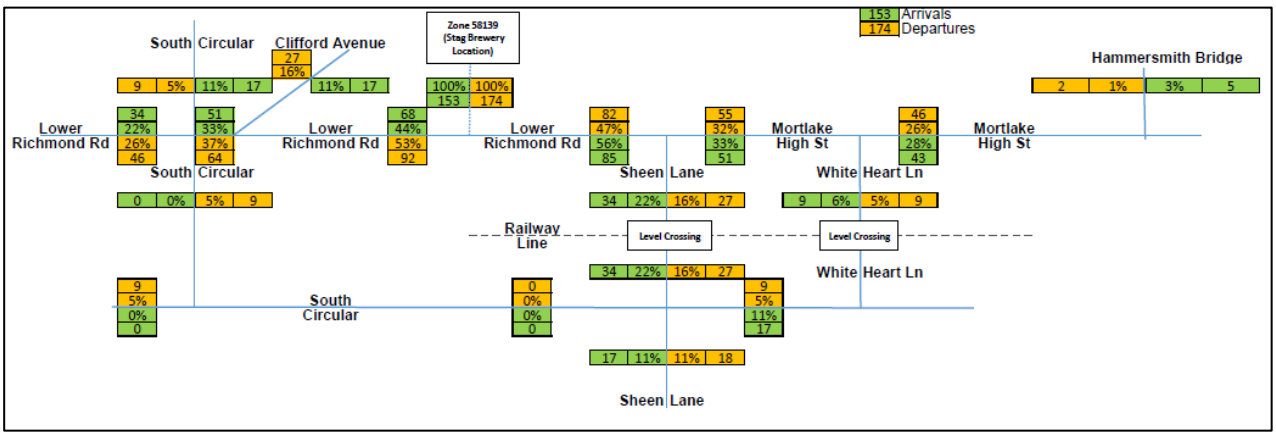
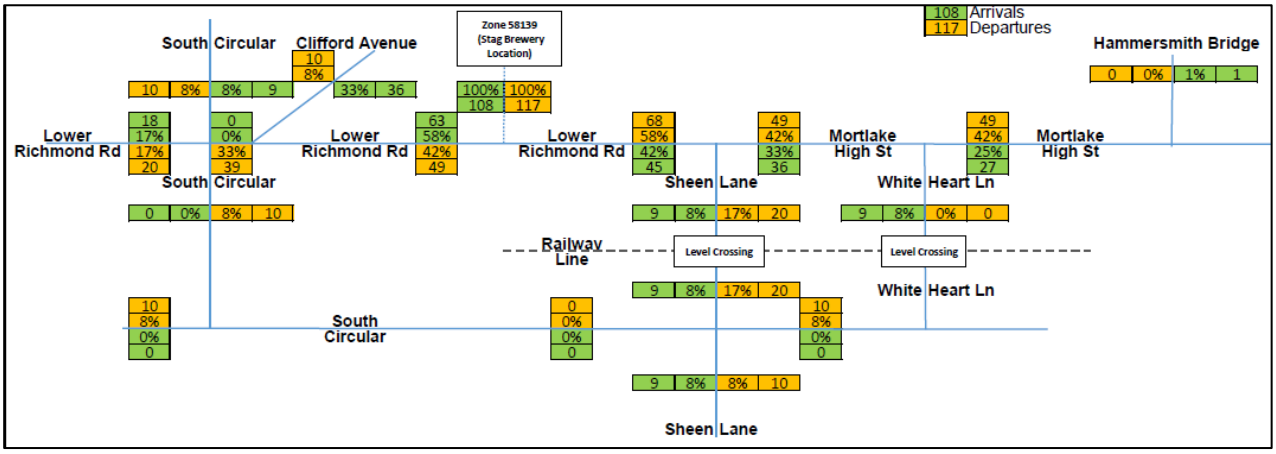


Figure 4.2 Development Traffic Trip Distribution – PM Peak



1.4.4 The development traffic distribution shows that the level of vehicle trips using Hammersmith Bridge are minimal.

1.4.5 The vehicles that would have used Hammersmith Bridge if it was open and still require to cross over The Thames would be redistributed via other bridges which could include Chalkers Corner and Chiswick Bridge. However, the number of vehicles to be redistributed is shown to be very low.

1.4.6 Overall, the low number of development trips using Hammersmith Bridge and the relatively low numbers of additional traffic travelling through Chalkers Corner (1.4% increase) indicate that the impacts on Chalkers Corner would be low. In addition, discussions held with TfL have highlighted that the proposed mitigation scheme is still relevant and provides a suitable mitigation for the fully built out development. The implications of the bridge closure are therefore considered to not be significant and the conclusions of the Transport Assessment and ES remain valid.

1.4.7 Furthermore, should the bridge not be re-opened until after the development is fully operational, providing that the proposed mitigation is delivered, it is considered with the small overall change in baseline traffic that the development trips will be able to be accommodated on the highway network. This would require changes to the signal timings at Chalkers Corner which would be picked up by further traffic surveys and modelling work undertaken prior to the implementation of the proposed mitigations.

1.5 Implications during Construction

1.5.1 The consultation responses have also queried whether the implications of the closure of Hammersmith Bridge have been considered during construction.

1.5.2 A framework Construction Management Plan produced by Aecom details that prior to the commencement of the main contract works the Principal Contractor will be required to register and comply with all of the requirements of the Considerate Contractors Scheme (CCS) ensuring that their project methodology is tailored to the specific requirements of the CCS Code of Practice and the requirements of the London Borough of Richmond upon Thames. This industry recognised body is the leading initiative to encourage construction projects to recognise their surroundings with sensitivity, employment awareness and positive considerations. It is a voluntary code of practice that encourages:

- Recognition of neighbors and maintaining a good neighbor policy.
- Minimise environmental damage.
- Use of sustainable materials, methods and resources.

- Clean site and local vicinity.
- Safety.

1.5.3 The project specification will identify a grade to which the Principal Contractor must attain, and it is recommended that the Principal Contractor is contractually obliged to achieve this grade. This will include ensuring that all vehicle routes to / from the site are along strategic routes avoiding local roads where possible.

1.5.4 A review of the strategic road network indicates that vehicles travelling from the wider network should not be directly impacted by the Hammersmith Bridge Closure. Only vehicles travelling from local areas such as Hammersmith from the north-east direction would be impacted, which is an unlikely route that construction vehicles would take. In addition, these routes could even be banned as part of the full Construction Management Plan. The strategic routes to the development from north, south, east and west London are illustrated on Figure 5.1.

1.5.5 The peak construction year for the development is likely to be during the demolition and excavation of the proposed basements and is proposed to be 2023. This has been estimated to be 164 two-way vehicle trips over the day. Notably only a limited number of these trips would occur in peak hours and would be spread out over the day.

1.5.6 The re-opening of the bridge due to the extensive repairs required will not be reopened prior to this date. Any construction vehicles travelling towards the development from Hammersmith or North-east London direction would therefore be re-routed across A316 Great Chertsey Road (Chiswick Bridge). The routes vehicles could use both with Hammersmith Bridge open and closed are illustrated on Figure 5.2.

1.5.7 The route via Hammersmith Bridge is 4.2km / 2.6 miles to the development, whereas the route across A316 Great Chertsey Road (Chiswick Bridge) is 5km / 3.1 miles.

1.5.8 Due to the low number of construction vehicles likely to be impacted and the small increase in travel distance as a result of the Hammersmith Bridge Closure the implications of the bridge closure is considered to be negligible for construction traffic.

1.5.9 In addition, in response to queries raised by LBRuT for construction traffic a full Construction Management Plan will be completed as part of the planning conditions, as agreed with the original scheme. This will include further details of the impact on the network during peak construction, condition of the highway asset and agreement on construction routes.

1.5.10 After the peak construction year (2023), the amount of development construction traffic will reduce. Also, most of the construction generated traffic will be outside of peak hours. Based on the phasing and yearly predicted development traffic as shown on Table 3.2, the traffic generated by the development once fully operational would be greater than any time during construction when less of the development is operational. Therefore, the conclusions that the mitigation for Chalkers Corner are adequate for the scheme once fully operational would also remain for the construction phases of the development.

Figure 5.1 Vehicle Routes to Development

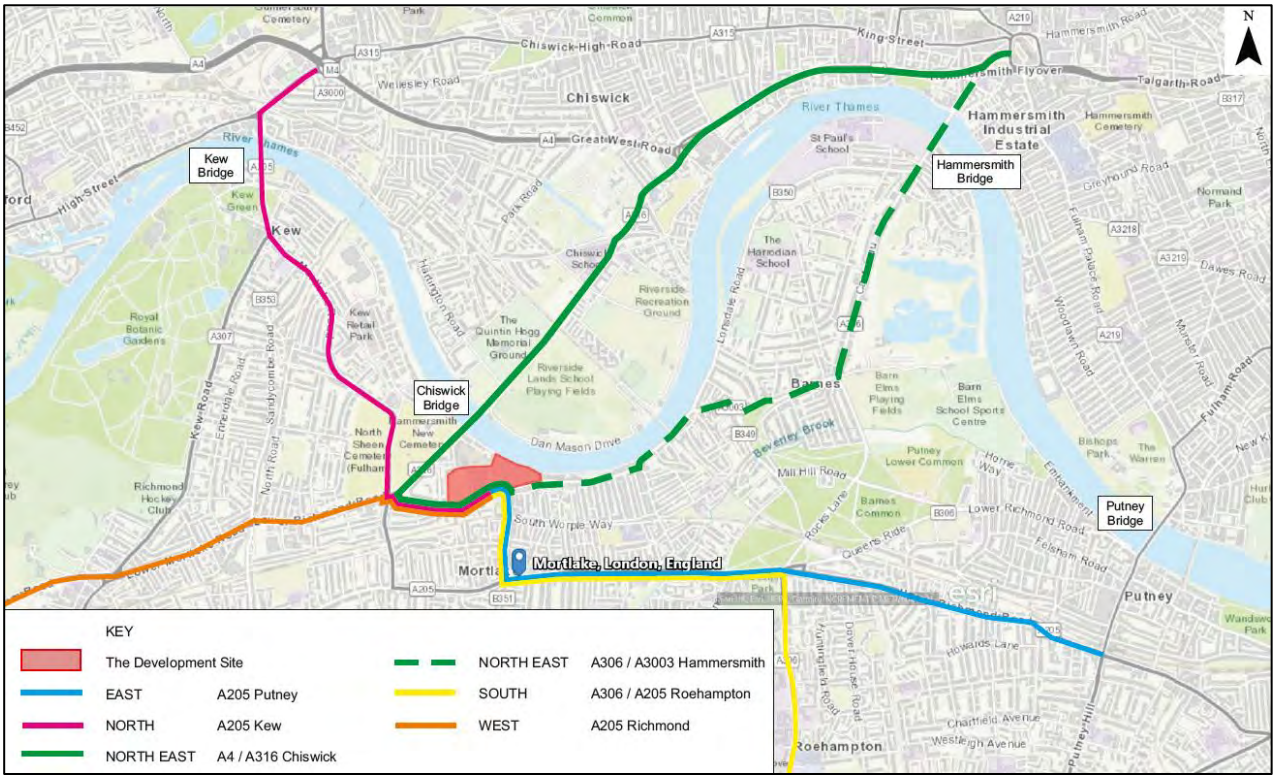
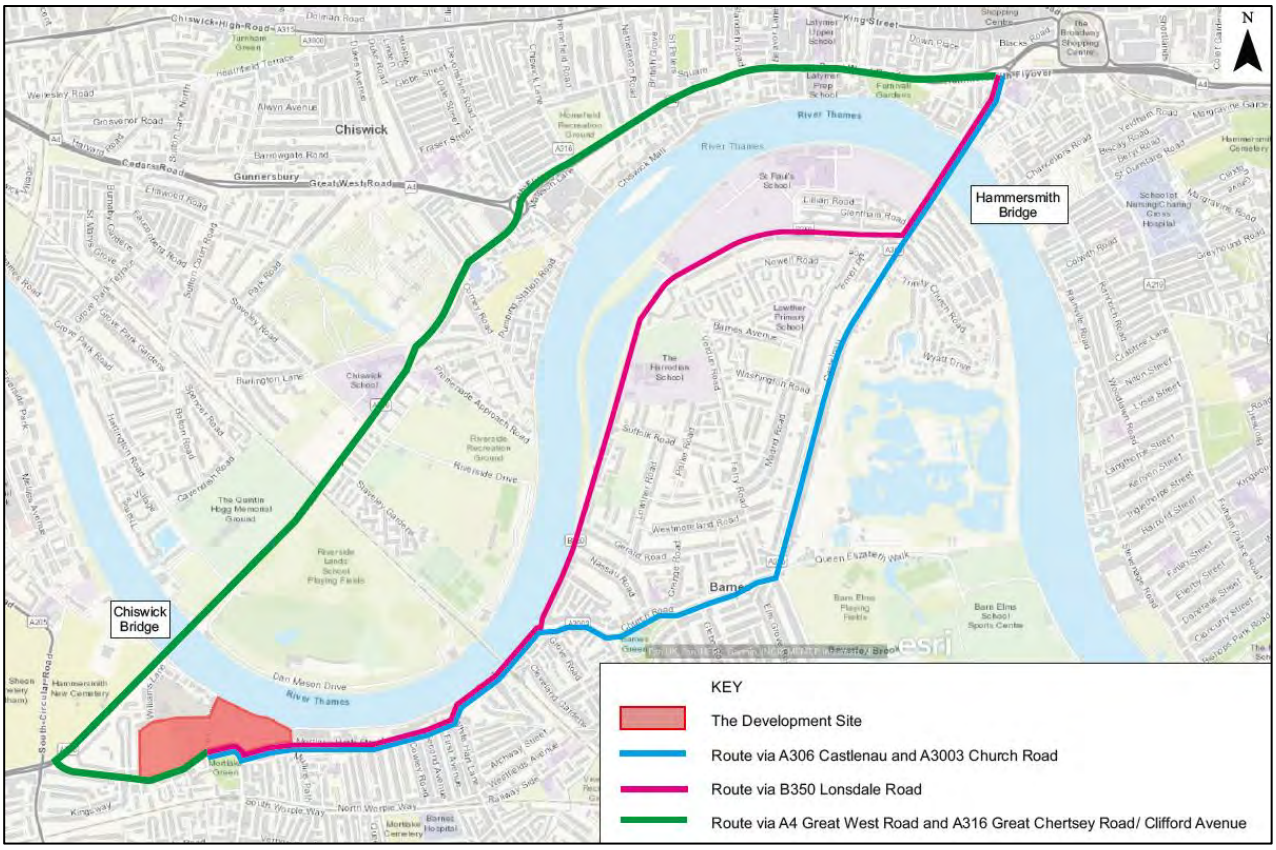


Figure 5.2 Vehicle Routes with Hammersmith Bridge Closed



1.6 Summary

1.6.1 This technical note has been prepared by Stantec to discuss the implications of the Hammersmith bridge Closure on the Stag Development during both the operational and construction phases. Several comments have been raised during the consultation process, requesting clarification of the implications of the development with the closure of Hammersmith Bridge.

1.6.2 A Task Force has been set up by Department for Transport (DfT), which includes members of Transport for London (TfL), Greater London Authority (GLA), LBHF and LBRuT for the reopening of the bridge. While no start dates have been confirmed, the Task Force were confident that they would be able to agree on a funding package and begin work shortly. Studies undertaken to date for the bridge re-opening have suggested that construction on the bridge would take 5 years and 4 months before it would be fully operational and open to all traffic.

1.6.3 The note has concluded the following points

- Total traffic increase through Chalkers Corner is low with an increase of 1.4% and 1.3% in the AM and PM peaks respectively following the bridge closure.
- Development traffic predicted to use Hammersmith Bridge is minimal in both peak periods.
- School Catchment suggests no school children would use Hammersmith Bridge.
- Chalkers Corner proposals provide adequate mitigation for the fully constructed development.
- Bridge likely to be open before the development is fully operational if funding is agreed before May 2022.
- Phased opening will begin in 2023, however majority of trips not on network until 2027.
- Phased development trips and construction trips will be less than total trips generated for fully operational development.

1.6.4 With the mitigation proposed at Chalkers Corner, highway improvements proposed along Lower Richmond Road, Mortlake High Street and Sheen Lane, the suggested limited number of vehicles that would use Hammersmith Bridge and small overall impact on traffic volume through Chalkers Corner, the implications of the bridge closure is considered to be no significant change to that presented in the TA and ES documents, which is based on a worse case full development traffic distribution.

1.6.5 Furthermore, should the bridge not be re-opened until after the development is fully operational, providing that the proposed mitigation is delivered, it is considered with the small overall change in baseline traffic that the development trips will be able to be accommodated on the highway network. This would require changes to the signal timings at Chalkers Corner which would be picked up by further traffic surveys and modelling work undertaken prior to the implementation of the proposed mitigations.

1.6.6 While the bridge is likely to be re-opened before the development is fully operational, this would not be case during the construction period. However, during the construction phase the routes available to the development show that a low number of construction vehicles will be impacted by the closure of Hammersmith Bridge. In addition, after the peak construction year (2023), the amount of development construction traffic will reduce and will be outside of peak hours. Based on the phasing and yearly accumulation of predicted development traffic, the traffic generated by the development once fully operational would not be greater than any time during construction when less of the development is operational. Therefore, the conclusions that the mitigation for Chalkers

Corner are adequate for the scheme once fully operational would also remain for the construction phases of the development.

Appendix M Highway Options

WILLIAMS LANE
BLOCK 20
BLOCK 21
BLOCK 19
BLOCK 18
BLOCK 16
BLOCK 17
BLOCK 15
BLOCK 13
BLOCK 14
BLOCK 04
BLOCK 03
BLOCK 02
BLOCK 01
BLOCK 07
BLOCK 08
BLOCK 06
BLOCK 05
BLOCK 11
BLOCK 12
BLOCK 09
BLOCK 10
SHIP LANE
LOWER RICHMOND ROAD
MORTLAKE HIGH STREET
MORTLAKE GREEN
RIVER THAMES
Leyden House
Combe House
Reid Court
Churchill Court
Cromwell House
Old Stables
Thames Bank House
Tudor Lodge
Aspin Cottage
Aynescombe Cottage
Bishop's Palace (site of)
Brewery
Sorting Office
Mortlake Business Centre
Information Bureau
Nursery
Garage
Butler House
Rann House
Lady Elizabeth House
Day Care Centre
Employment Development Centre
Sports Ground
Kendal Court
Woodbine Cottage
Eton Lodge
Rosemary Terrace
Chertsey Court
Watney Cottages
Verge / utility strip / potential footway
Town houses to have private driveways
Existing kerb line and wall retained
On-street parking spaces
Informal on-street parking retained
Carriageway widening to ensure space for two-way movements
Shared footpath / cycleway
Proposed raised crossing point
Location of access to underground car park
Visitor car park
Proposed bus stop to accommodate 2 buses. Existing shelter to be replaced with new shelter in new position
Proposed right turn lane
Proposed pedestrian crossing with raised surface
Existing parking bay to be retained
New dropped kerb access to no. 43 Oliver House
Relocated bus stop with realigned kerb and new shelter
Existing Zebra crossing to have surface raised
Existing on-street parking retained
Relocated signal controlled crossing with raised surface
Existing bus stop and shelter to be removed
New footpath link to crossing
Existing footpath to be removed and landscaped
Existing signal controlled crossing to be removed
Existing refuge enlarged
New 'KEEP CLEAR' markings on roundabout
Nearside & offside lanes 73m long
Relocated bus stands (for 3 buses)
Proposed Zebra crossing with raised surface
Relocated bus stop with new shelter
Existing bus stop and shelter to be removed
New right turn lane
New traffic island to restrict right turns from car park
Proposed raised crossing point and bellmouth narrowing
Existing parking bays retained
Car Club bays
Proposed raised crossing points
Set back stop lines to create advance areas for cyclists
Improve lighting and general refurbishment of existing footbridge
Move bollards back to provide an increased area with enhanced paving for pedestrians to wait whilst the barriers are down.
Additional bridge signage to indicate alternative route for pedestrians to use footbridge rather than wait for barriers
FOR CONTINUATION SEE MAIN PANEL
FOR CONTINUATION SEE INSET 1
FOR CONTINUATION SEE INSET 2
FOR DETAILS OF CHALKERS CORNER JUNCTION IMPROVEMENTS SEE DRAWING NO. 38262/5520/01
New bus stop cage markings
Existing bus stop retained
Tie into existing road markings
0 10 20 30 40 50m
SCALE 1:500

KEY

AREA OVER WHICH UNOBSTRUCTED VISIBILITY MUST BE PROVIDED FOR:

PEDESTRIANS
40m TO CROSSING 1.5m BEHIND KERB, AT 30mph (TRAFFIC SIGNS MANUAL CHAPTER 6)

CYCLISTS
40m TO CROSSING 2.4m BEHIND KERB, AT 30mph (TRAFFIC SIGNS MANUAL CHAPTER 6).

VEHICLES
70m TO PRIMARY SIGNAL HEAD AT 30mph (SEE TfL SPECIFICATION SQA-0064)

MATURE TREES WHICH AFFECT VISIBILITY

VISIBILITY 40m TO ZEBRA CROSSING 1.5m BEHIND KERB, AT 30mph (SEE TRAFFIC SIGNS MANUAL CHAPTER 6)

VISIBILITY SPLAYS AT JUNCTIONS 2.4m x 43m AT 30mph (MANUAL FOR STREETS)

VISIBILITY SPLAYS AT JUNCTIONS 2.4m x 25m AND FORWARD VISIBILITY ON BENDS 25m AT 20mph (MANUAL FOR STREETS)

FORWARD VISIBILITY ON BENDS 17m AT 15mph (MANUAL FOR STREETS)

VEHICLE / PEDESTRIAN INTER-VISIBILITY AT CAR PARK EXITS 2.4m x 2.4m

PROPOSED CARRIAGEWAY TO BE RESURFACED

PROPOSED FOOTWAY AREAS TO BE REMOVED AND LANDSCAPED

Mark	Revision	Date	Drawn	Chkd	Appd
A	Masterplan updated & MHS layout revised. Level crossing added	07.03.22	REM	PW	PW

UTILITIES NOTE: The position of any existing public or private sewers, utility services, plant or apparatus shown on this drawing is believed to be correct, but no warranty to this is expressed or implied. Either such plant or apparatus may also be present but not shown. The Contractor is therefore advised to undertake their own investigation where the presence of any existing sewers, services, plant or apparatus may affect their operations.

Drawing Issue Status

FOR PLANNING

STAG BREWERY, MORTLAKE
PROPOSED HIGHWAY LAYOUT
LOWER RICHMOND RD/MORTLAKE HIGH ST

Client
RESELTON PROPERTIES LTD

Stantec
stantec.com/uk

Date of 1st Issue	Designed	Drawn
18.01.2022	REM	REM
A0 Scale	Checked	Approved
1:500 @A0	GD	PW

Drawing Number: 38262/5520/02
Revision: A

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