Legend

-78 Pedestrians
+62 Cycles

N

CASCADE

Note: Not to Scale

Project Title:
Richmond Education and Enterprise Campus Development

Figure Title:
Net Impact - Two Way All Uses Pedestrian and Cycle Movements AM 08:00-09:00

For Information Only

Figure Number:
Figure 8.5

Date:
June 2015

Legend

-13 Pedestrians
+7 Cycles

N

CASCADE

Note: Not to Scale

Project Title:
Richmond Education and Enterprise Campus Development

Figure Title:
Net Impact - Two Way All Uses Pedestrian and Cycle Movements PM 16:00-17:00

For Information Only

Figure Number:
Figure 8.6

Date:
June 2015

8.6.54 The weekday AM and PM peak pedestrian and cycle flows net effect are set out in **Table 8.20**.

Table 8.20: Proposed development total (arrival and departure) pedestrian and cycle flows on nearby routes AM and PM peak hours

Route	AM 08:00 – 09:00				PM 16:00 – 17:00			
	Pedestrian increase	% diff	Cycle increase	% diff	Pedestrian increase	% diff	Cycle increase	% diff
Marsh Farm Lane (adjacent to the site northbound)	+204	703%	+18	180%	+57	518%	+9	300%
Marsh Farm Lane (adjacent to the site southbound)	+785	N/A	+25	N/A	+212	N/A	+11	N/A
A316 Chertsey Road	+68	28%	+45	236%	+17	23%	+10	100%
Egerton Road	-78	-10%	+62	214%	-13	-7%	+7	39%
Heathfield South	+62	34%	+11	100%	+9	20%	+2	40%
Court Way	-44	-8%	+16	123%	+21	18%	0	0%
Talma Gardens	+169	845%	+4	80%	+36	514%	+3	300%

8.6.55 The proposed development will introduce a net increase of 579 walking trips in the AM peak hour which results in a 59% increase of pedestrian trips on local routes. In the PM peak hour, there will be an increase of 181 walking trips on local routes which results in a 74% increase. Overall, the effects of walking trips on links would range between **minor adverse** to **major adverse**. However, the calculated percentage increase is so high on links such as Marsh Farm Lane (northbound) and Talma Gardens because of the relatively low existing walking trips on these links. In practical terms an extra 204 and 169 walking trips in the AM peak hour would be on these links **negligible**.

8.6.56 There will be an increase of 81 cycle trips in the AM peak hour which results in a 169% increase of cycle trips on local routes. In the PM peak hour, there will be an increase of 18 cycle trips on local routes which results in a 75% increase. Overall, the

effects of cycle trips would range between **moderate adverse** to **major adverse**. As with the walking trips, the calculated percentage increase in cycle trips is so high on links such as Marsh Farm Lane (northbound) and Talma Gardens because of the relatively low existing cycling trips. In practical terms an extra 18 and 4 cycling trips in the AM peak hour would be **negligible**.

8.6.57 The percentage increase in trips along Marsh Farm Lane (southbound) has been labelled N/A as a definite figure is difficult to quantify as the existing trips are from observations only. Marsh Farm Lane (southbound) would experience the highest increase in walking trips of all the routes. However, the route is located away from any sensitive receptors such as local residents (except where it runs adjacent to the side of 150 Craneford Way) and therefore the effects of the pedestrian flows on this link would be **negligible**.

Effect on Pedestrian Severance, Delay, Fear and Intimidation, Amenity

8.6.58 The pedestrian environment within the proposed development will be of a high quality with areas of attractive open space, well maintained and with legible illuminated pathways, natural / passive surveillance provided by the nearby existing residential units and proposed residential units, and the reception areas of the proposed uses. The proposed development will also contribute to the perception of pedestrian safety by enhancing the public realm and increasing natural surveillance of pedestrian routes.

8.6.59 The proposed development will be designed to be more permeable than the existing site. This includes significant enhancement to the north-south Marsh Farm Lane route. The southern section of the site which will be developed for residential homes will be permeable to the surrounding network of pedestrian and cycle routes for proposed residents only.

8.6.60 The proposed development would therefore offer attractive pedestrian facilities both for users of the site and for passing pedestrian traffic. The effects would be:

- **Minor beneficial** on pedestrian severance given that the proposed development will deliver significant improvements in walking permeability by the widening of the north-south route, Marsh Farm Lane, past the site and the provision of an at grade signal controlled crossing over the A316;
- **Minor beneficial** on pedestrian delay due to new and improved routes including an at grade signal controlled crossing over the A316;
- **Minor beneficial** on pedestrian and cyclist fear and intimidation due to widening and lighting of pedestrian and cycle routes, CCTV and passive surveillance; and

- **Minor beneficial** on pedestrian amenity due to proposed improvements and additions to pedestrian facilities such as landscaping and outdoor spaces.

Public Transport Services Effect– Bus Services

8.6.61 The site is served by three bus routes within a short walk from the site which provides 30 bus services in the AM peak of 08:00 – 09:00 and the 29 bus services in the PM peak of 17:00 – 18:00. A typical London bus has on average 70 seats. Therefore, in the AM peak hour there are 2,100 seats available on local buses. The proposed development will have a net increase in bus passengers of 265 in the AM peak hour, this accounts for 12.6% of the bus seats and results in a **minor adverse** effect. If standing room is taken into account, the effect is reduced.

8.6.62 The site is served by 29 bus services in the PM peak hour. Therefore, in the PM peak hour there are 2,030 seats available on local buses. The proposed development will have a net increase in bus passengers of 25 in the PM peak hour, this accounts for 1.2% of the bus seats and results in a **negligible** effect. If standing room is taken into account, again the effect is decreased further.

Parking

8.6.63 Due to the removal of the student car park, students may opt to park on local roads instead. CPZs to the east of the site would prevent students parking on these roads, but to the north of the site, CPZ 'R' is only in operation during events at Twickenham. Therefore, students could park on these roads. There are 1,442 on-street spaces on the roads between 09:00 and 19:00 of which the parking survey showed there 966 cars parked in the spaces during the same times, resulting in a parking stress of 67%. The student car park has 141 spaces. Therefore, adding the student cars to the 966 cars results in a parking stress of 77%. This results in a 10% increase in stress which is **negligible**.

Public Transport Services effect – Rail Services

8.6.64 Twickenham Station is served by 22 rail services in the AM peak of 08:00 – 09:00 and the 18 in the PM peak of 17:00 – 18:00. The type of rolling stock serving Twickenham Station has on average 256 seats. Therefore, in the AM peak hour there are on average 5,632 seats on the trains. The proposed development will have a net increase in rail passengers of 92 in the AM peak hour, which accounts for 1.6% of the seats on the train. This results in a **negligible** effect. If standing room is taken into account, the percentage decreases further.

8.6.65 In the PM peak hour there are on average 4,608 seats on the trains. The proposed development will have a net increase in rail passengers of 31 in the PM peak hour,

this accounts for 0.7% of the seats on the trains. This results in a **negligible** effect. If standing room is taken into account, again the percentage decreases further.

8.6.66 It should also be noted that in September 2014 South West Trains announced the £210 million commuter train order for Siemens to build 150 carriages for Waterloo suburban routes. The announcement said that over 24,000 extra peak-time seats will be provided when infrastructure improvements have been completed in 2018. The longer trains will complement the lengthening of many platforms including Platforms 1 to 4 at Waterloo allowing longer trains to use them. On the other side of Waterloo, the three mothballed former Eurostar platforms, Nos. 21 to 23 are also expected to be brought back into use.

8.6.67 Further to the improvements above, Twickenham Station has received £1.6M in funding from the Greater London Authority to improve station capacity and undertake general improvements. All of the work will be completed by the summer of 2015.

Traffic flows effect

8.6.68 The AM and PM peak vehicle traffic flows for 2019 plus the fully operational REEC development are set out in **Table 8.21** and **Table 8.22**. **Appendix 8.3** contains the traffic flow diagrams.

Table 8.21: 2019 + Development AM peak hour (08:00 – 09:00) vehicle flows

Road	Two-way flow	% increase from 2019 Baseline
A316 Chertsey Road	3,595	7.3
B361 Whitton Road	778	11.0
Court Way	156	34.5
Langhorn Drive	264	164.0

Table 8.22: 2019 + Development PM peak hour (17:00 – 18:00) vehicle flows

Road	Two-way flow	% increase from 2019 Baseline
A316 Chertsey Road	3,832	4.6
B361 Whitton Road	751	6.2
Court Way	117	3.5
Langhorn Drive	267	142.7

8.6.69 The AM and PM peak vehicle traffic flows for 2034 plus the REEC development are set out in **Table 8.23** and **Table 8.24**. **Appendix 8.4** contains the traffic flow diagrams.

Table 8.23: 2034 + Development AM peak hour (08:00 – 09:00) vehicle flows

Road	Two-way flow	% increase from 2034 Baseline
A316 Chertsey Road	3,853	6.8
B361 Whitton Road	831	10.2
Court Way	165	32
Langhorn Drive	273	152.7

Table 8.24: 2034 + Development PM peak hour (17:00 – 18:00) vehicle flows

Road	Two-way flow	% increase from 2034 Baseline
A316 Chertsey Road	4,070	3.5
B361 Whitton Road	803	5.76
Court Way	119	-2.5
Langhorn Drive	287	142.4

A316 Chertsey Road

8.6.70 The effect of increase in traffic on the A316 Chertsey Road for the 2019 + Development and 2034 + Development in the AM and PM peak hours is **negligible**.

B361 Whitton Road

8.6.71 The effect of increase in traffic on the B361 Whitton Road for the 2019 + Development and 2034 + Development in the AM and PM peak hours is **minor adverse** and **negligible** respectively. However, the use of **minor adverse** for the AM peak hour is only required because it is 1% and 0.2% for 2019 + Development and 2034 +Development respectively over the 10% threshold.

Court Way

8.6.72 The effect of increase in traffic on Court Way for the 2019 + Development and 2034 + Development in the AM peak hour is **moderate adverse**. The effect of increase in traffic on Court Way for the 2019 + Development and 2034 + Development in the PM peak hour is **negligible**.

8.6.73 As previously mentioned, Paragraph 32.4 Environmental Capacities of Links and Areas set out in IHT's Transport In The Urban Environment states:

'...the environmental capacity for an access road or local distributor lies, typically, in the range of 300-600 vehicles per hour...'

8.6.74 The flow of 165 vehicles on Court Way in the 2034 + Development in AM will be 135 vehicles less than the lower end of the environmental capacity bracket set out in the IHT document and 435 less than the higher end of the bracket.

8.6.75 The 2019 and 2034 Baseline flows on Court Way are relatively low and therefore, although the percentage increase between the flows requires the use of moderate adverse to explain the increase, this is misleading in practical terms because the 2019 and 2034 Baseline flows are low enough the effect will be not be as excessive as the significance criterion portrays and in practice will not have a significant effect on the environmental capacity of the road.

Langhorn Drive

8.6.76 The effect of increase in traffic on the Langhorn Drive for the 2019 + Development and 2034 + Development in the AM and PM peak hours is **major adverse**. The use of major adverse to describe the effect of traffic increase on Langhorn Drive in the 2019 + Development scenario is misleading. The AM traffic flow for the 2019 Baseline scenario is increasing from 100 to 264 in the 2019 + Development scenario.

8.6.77 The flow of 264 vehicles on Langhorn Drive will be 36 vehicles less than the lower end of the environmental capacity bracket set out in the IHT document and 336 less than the higher end of the bracket.

8.6.78 The 2019 Baseline flows on Langhorn Drive are relatively low and therefore, although the percentage increase between the flows requires the use of major adverse to explain the increase, this is misleading in practical terms because the 2019 Baseline flows are so low the effect will be not be as excessive as the significance criterion portrays and in practice will not have a significant effect on the environmental capacity of the road.

Summary

8.6.79 Overall, the increases in traffic flows on all of the road links assessed will not have a significant adverse effect on the operational capacity and the environmental capacity of the road links and the increase in vehicle trips will be **negligible**.

Junction capacities effect

8.6.80 A summary of the effect of the REEC development on the assessed junctions is set out in **Table 8.25** and **Table 8.26** for the future baseline 2019 and in **Table 8.27** and **Table 8.28** for the future baseline plus 15 years.

Table 8.25: Summary of junction capacity assessment for 2019 + Development AM peak hour (08:00 – 09:00) vehicle flows

Junction	Road arm	Ratio of Flow to Capacity (RFC) %	Average vehicles queuing
A316 Chertsey Road / Langhorn Drive	Langhorn Drive	43.1%	3
	A316 Chertsey Road – East	68.0%	28
	A316 Chertsey Road – West	71.8%	34
A316 Chertsey Road / Egerton Road	Egerton Road	3.5%	0
B361 Whitton Road / Court Way	Whitton Road (north)	6.1%	0
	Court Way	16.5	1

Table 8.26: Summary of junction capacity assessment for 2019 + Development PM peak hour (17:00 – 18:00) vehicle flows

Junction	Road arm	Ratio of Flow to Capacity (RFC) %	Average vehicles queuing
A316 Chertsey Road / Langhorn Drive	Langhorn Drive	63.2%	6
	A316 Chertsey Road – East	74.7%	36
	A316 Chertsey Road – West	68.5%	31
A316 Chertsey Road / Egerton Road	Egerton Road	1.9%	0
B361 Whitton Road / Court Way	Whitton Road (north)	2.3%	0
	Court Way	20.7%	1

Table 8.27: Summary of junction capacity assessment for 2034 + Development AM peak hour (08:00 – 09:00) vehicle flows

Junction	Road arm	Ratio of Flow to Capacity (RFC) %	Average vehicles queuing
A316 Chertsey Road / Langhorn Drive	Langhorn Drive	43.7%	3
	A316 Chertsey Road – East	72.3%	32
	A316 Chertsey Road – West	76.9%	39
A316 Chertsey Road / Egerton Road	Egerton Road	3.7%	0
B361 Whitton Road / Court Way	Whitton Road (north)	6.2%	0
	Court Way	18.3%	1

Table 8.28: Summary of junction capacity assessment for 2034 + Development PM peak hour (17:00 – 18:00) vehicle flows

Junction	Road arm	Ratio of Flow to Capacity (RFC) %	Average vehicles queuing
A316 Chertsey Road / Langhorn Drive	Langhorn Drive	63.2%	6
	A316 Chertsey Road – East	79.3%	42
	A316 Chertsey Road – West	73.2%	35
A316 Chertsey Road / Egerton Road	Egerton Road	2.0%	0
B361 Whitton Road / Court Way	Whitton Road (north)	6.4%	0
	Court Way	22.2%	1

Junction capacities

8.6.81 The junction capacity assessment demonstrates that during the AM and PM peak hours all junctions operate within capacity. The average queue lengths reach one vehicle for the simple priority junctions of A316 Chertsey Road / Egerton Road and B361 Whitton Road / Court Way. It should be noted for the A316 Chertsey Road / Langhorn Drive signal controlled junction, the vehicle queue figure on is spread over two lanes on all arms. The propotion of right turning vehicles from Langhorn Drive for the proposed signal controlled junction has been based on interview surveys undertaken on Langhorn Drive on 17 March 2015.

A316 Chertsey Road / Langhorn Drive

8.6.82 The proposed signal controlled development of Langhorn Drive / A316 Chertsey Road signal has been modelled using the junction capacity assessment software using LinSig 3. In order to allow for daily variation in traffic flows, a 90% RFC is generally regarded as the threshold for a signal controlled junction reaching its operational capacity. Any RFC below 90% is regarded as the junction working within capacity.

8.6.83 The Langhorn Drive arm of the Langhorn Drive / A316 Chertsey Road signal controlled junction has 46.9% and 26.8% spare capacity in the AM and PM peak hours respectively before the threshold of 90% operational capacity is reached for the 2019 plus development scenario. In the 2034 plus development scenario, the same arm has 46.3% and 26.8% spare capacity in the AM and PM peak hours respectively.

8.6.84 The A316 Chertsey Road – East arm of the Langhorn Drive / A316 Chertsey Road

junction has 22.0% and 15.3% spare capacity in the AM and PM peak hours. In the 2034 plus development scenario, the same arm has 17.7% and 10.7% spare capacity in the AM and PM peak hours respectively.

8.6.85 The A316 Chertsey Road – West arm of the Langhorn Drive / A316 Chertsey Road junction has 18.2% and 21.5% spare capacity in the AM and PM peak hours. In the 2034 plus development scenario, the same arm has 13.1% and 16.8% spare capacity in the AM and PM peak hours respectively.

A316 Chertsey Road / Egerton Road

8.6.86 The Egerton Road arm of the Egerton Road / A316 Chertsey Road junction has 81.5% and83.1% spare capacity in the AM and PM peak hours respectively for the 2019 plus development scenario. In the 2034 plus development scenario, the same arm has 81.3% and 83.0% spare capacity in the AM and PM peak hours respectively.

B361 Whitton Road / Court Way

8.6.87 The Court Way arm of the B361 Whitton Road / Court Way junction has 68.5% and 64.3% spare capacity in the AM and PM peak hours respectively for the 2019 plus development scenario. In the 2034 plus development scenario, the same arm has 66.7% and 62.8% spare capacity in the AM and PM peak hours respectively.

8.6.88 The northern arm of Whitton Road (right turn into Court Way) on the B361 Whitton Road / Court Way junction has 78.9% and 82.7% spare capacity in the AM and PM peak hours respectively for the 2019 plus development scenario. In the 2034 plus development scenario, the same arm has 78.8% and 78.6% spare capacity in the AM and PM peak hours respectively. This arm also experiences an increase in vehicle queues from zero vehicles to one vehicle.

Summary

8.6.89 The junction capacity assessment demonstrates that whilst the original latent capacity at each of the existing simple priority junctions assessed is reduced as a result of the REEC development in the AM peak hour, the junctions still have a significant quantity of latent capacity. The vehicle queues do not increase except on one arm, Whitton Road (north), where the queue length increases from zero to one vehicle.

8.6.90 The junction capacity analysis also demonstrates that the signal controlled junction of Langhorn Drive / A316 Chertsey Road operates within capacity.

8.6.91 Therefore, the proposed development will have a **negligible** effect on the operational capacity of the junctions which link the site to the local highway network.

Mitigation Measures

Pedestrian and cycle

8.6.92 The provision of the Langhorn Drive / A316 Chertsey Road signal controlled junction will provide pedestrians with an at grade crossing over the A316 Chertsey Road. This crossing will have a dedicated pedestrian phase in the signals. An at grade pedestrian crossing will also be provided over Langhorn Drive as part of the signal controlled junction arrangement. The existing footbridge over the A316 will be retained and used as additional crossing. The stepped ramp on the southern side of the carriageway will need to be shortened or replaced with a standard stairway due to its landing point being in the location of the start of the proposed at grade crossing facility. The proposed at grade crossing will provide a fully Disability Discrimination Act (DDA) compliant crossing over the A316 at this location.

8.6.93 The existing good pedestrian and cycle infrastructure would be further improved by the addition of the upgraded Marsh Farm Lane and proposed Twickenham Rough cycle / footpath (as part of a separate application by others). These upgraded and new routes will help to mitigate the increase of pedestrian and cycle trips, particularly towards Twickenham Rail Station and the bus stops to south east of the site where the route would provide a shorter distance. Therefore, the pedestrian and cycle flows shown for Court Way could be reassigned to this off road route, further reducing the levels of pedestrians and cyclists likely to be using Court Way.

8.6.94 The upgrade of Marsh Farm Lane will benefit not just the users of the site, but also the wider community.

8.6.95 The upgrade of the existing shared cycle / footway on both sides of the A316 Chertsey Road between its junction with Langhorn Drive and the Whitton Road signal controlled roundabout will be implemented by Transport for London before the proposed development is operational. Pedestrians and cyclists will therefore benefit from this upgrade in infrastructure. The improvements form part of a larger cross borough segregated cycle route which will ultimately provide a 12 mile cycle route between Hanworth in Hounslow through to Hyde Park Corner, via Cycle Superhighway 9.

8.6.96 Cycle parking at the REEC development will be provided to a level in-line with the local standards. The provision of secure cycle parking will help to encourage use of the mode, helping to shift trips off other modes such as car and bus.

Parking

8.6.97 Parking on local residential roads to the east of the site is prohibited by the existing

CPZs. Section 106 contributions will be provided to fund a study to establish whether residents would like the operation times of CPZ 'R' to the north of the site to be extended from the existing operation times. If the residents deem the extension of the CPZ operation times to be required, sufficient funds commuted through the Section 106 will be used to implement the extended operation times including infrastructure such as signing. Measures set out in the College Travel Plan, which will be developed based on the Framework Travel Plan in **Appendix 8.5**, will also help to discourage students using their cars to travel to the College.

Public Transport Services

8.6.98 The proposed development will provide an increase in bus trips of 265 in the AM peak period. The majority of this increase in bus trips, 83%, will be a result of the Secondary School and are likely to be relatively short bus journeys. The Secondary School is a Free School funded by the Education Funding Agency (EFA). Discussions are ongoing with TfL to develop bus service frequency improvements to accommodate the additional demand on the bus network which equates to 3 to 4 additional bus loads in the AM peak hour period.

Traffic flows

8.6.99 No mitigation is required for the local highway network road links which provide access to the REEC development as the effect of the development will be negligible in respect of increase in vehicle trips at the Langhorn Drive and Egerton Road junctions with the A316. Similarly the minor increase in vehicle movements on the residential roads connecting the site to Whitton Road does not necessitate any mitigation measures.

Junction capacity

8.6.100 No mitigation is required for the local junctions of B361 Whitton Road / Court Way and Egerton Road / A316 Chertsey Road which provide the REEC development uses of the Clarendon school and School with access to the local highway network, as the effect of the development on junction capacity will be minimal.

8.6.101 The new signal controlled A316 Chertsey Road / Langhorn Drive junction has been modelled which demonstrates that it will operate within capacity with future year growth and development trips.

Residual Effects

Pedestrian and Cycle

8.6.102 The residual pedestrian and cycle effects would be:

- Secure cycle parking provision provided to local standards and showers with changing facilities for staff and employees will help to encourage cycling as real alternative to short car, bus and rail trips;
- **Minor beneficial** on pedestrian severance given that the proposed development will deliver significant improvements in walking permeability, including the widening of the north-south route, Marsh Farm Lane, past the site; and
- If Marsh Farm Lane was to take a half of the Replacement College, residential site and Tech Hub pedestrian and cycle trips, the residual effect on Court Way would be **minor beneficial** to **minor adverse**. This is because there would be a reduction in pedestrian trips in the AM on Court Way and a small increase in pedestrian and cycle trips in the PM, plus an increase in cycle trips in the AM. Overall, the increase in walking and cycling trips will be **negligible**.

Pedestrian Severance, Delay, Fear and Intimidation, Amenity

8.6.103 The effects would be:

- **Minor beneficial** on pedestrian severance given that the proposed development will deliver significant improvements in walking permeability by the widening of the north-south route, Marsh Farm Lane, past the site;
- **Minor beneficial** on pedestrian delay due to new and improved routes;
- **Minor beneficial** on pedestrian and cyclist fear and intimidation due to widening and lighting of pedestrian and cycle routes, CCTV and passive surveillance; and
- **Minor beneficial** on pedestrian amenity due to proposed improvements and additions to pedestrian facilities such as landscaping and outdoor spaces.

Parking

8.6.104 Due the existing CPZs to the east of the site and funds made available through the Section 106 to undertake a study of the CPZ to the north of site which, if deemed appropriate will have the CPZ operation times extended, plus measures set out in the College Travel Plan , which will be developed based on the Framework Travel Plan in **Appendix 8.5**, to discourage students using their cars to travel to the College, the likely of effect on on-street parking within walking distance of the site will be **negligible**.

Public Transport Services

8.6.105 Frequency improvements to accommodate the additional demand on the bus network which equates to 3 to 4 additional bus loads in the AM peak hour period will bring the residual effects on buses to **negligible**.

Junction Capacity

8.6.106 The proposed signal controlled junction of the A316 Chertsey Road / Langhorn Drive will reduce the amount of traffic passing the Dene Estate which will be a **moderate beneficial** effect.

Monitoring

8.6.107 A site wide Framework Travel Plan (**Appendix 8.5**) has been prepared for the REEC development. The Framework Travel Plan will be used by each element of the REEC development in order to prepare a site specific Travel Plan. The Travel Plans will be live documents with baseline surveys undertaken within six months of occupation for each land use.

8.6.108 Monitoring surveys will be undertaken on an annual basis for the educational and employment uses and after years one, three and five for the residential land use. Results of the monitoring surveys will reported to LBRuT travel planning officers and be uploaded to travel planning tools such as STARS (Sustainable Travel: Active, Responsible, Safe) for the educational uses.

8.6.109 The results of the surveys will help to show whether targets set out in the Travel Plans, such as shift to sustainable travel modes, are being met and the measures implemented are working to encourage the use of more sustainable methods of travel to the site. The results will also help inform what new targets should be set and what measures are required.

8.6.110 A Delivery and Servicing Plan for each element of the REEC development is expected to be required to satisfy planning conditions to help manage delivery and servicing vehicles and reduce their trips, particularly in the peak hours.

8.7 SUMMARY OF RESIDUAL EFFECTS

8.7.1 A summary of the residual effects of the REEC development and construction phase 3 is set out in **Table 8.29.**

Table 8.29: Summary of residual effect of the proposed development and construction phase 3

Issue	Significance of Effect	Mitigation Measures	Significance of Residual Effect
Site Enabling, Demolition and Construction			
Increased vehicle trip generation	Moderate Adverse	Construction Logistics Plan and Construction Environmental Management Plan measures Use of strategic roads for access	Negligible
Increased pedestrian trips	Negligible	Sections of Marsh Farm Lane upgrade completed providing good link to the north between the site and public transport nodes and Twickenham town centre. Construction Environmental Management Plan measures	Negligible
Increased cycle trips	Negligible	Sections of Marsh Farm Lane upgrade completed providing good link to the north between the site and public transport nodes and Twickenham town centre. Construction Environmental Management Plan measures	Negligible
Pedestrian severance	Negligible	Upgraded Marsh Farm Lane. CCTV, lighting and passive surveillance provided by development. Construction Environmental Management Plan measures	Negligible
On–street parking to north of site	Negligible	Section 106 contributions for a CPZ study and implementation if deemed appropriate. Restriction on parking on-site for contractors. CPZ restrictions help mitigate impact. Construction Environmental Management Plan measures	Negligible
Increased bus trips	Negligible	Transport for London to develop bus service frequency improvements to accommodate the additional demand on the bus network which equates to 3 to 4 additional bus loads in the AM peak hour period. Construction Environmental Management Plan measures	Negligible
Increased rail trips	Negligible	Construction Environmental Management Plan measures	Negligible
Increase in traffic flows	Major Adverse to Negligible	Construction Environmental Management Plan measures Construction Logistics Plan measures Construction Management Plan measures	Negligible
Latent junction capacity reduced	Negligible	Construction Environmental Management Plan measures Construction Logistics Plan measures Construction Management Plan measures	Negligible

Issue	Significance of Effect	Mitigation Measures	Significance of Residual Effect
Operation			
Increased vehicle trip generation	Moderate Adverse	Framework Travel Plan measures New A316 Chertsey Road / Langhorn Drive signal controlled junction	Negligible
Increased pedestrian trips	Negligible	Marsh Farm Lane upgrade providing good north-south link between the site and public transport nodes and Twickenham town centre. Framework Travel Plan measures	Negligible
Increased cycle trips	Negligible	Marsh Farm Lane upgrade providing good north-south link between the site and public transport nodes and Twickenham town centre. Provision of on-site cycle parking and showers with changing facilities. Framework Travel Plan measures	Negligible
Pedestrian severance	Minor Beneficial	Upgraded Marsh Farm Lane. CCTV, lighting and passive surveillance provided by development.	Minor Beneficial
On–street parking to north of site	Negligible	Section 106 contributions for a CPZ study and implementation if deemed appropriate. Framework Travel Plan measures	Negligible
Increased bus trips	Negligible to Minor Adverse	Transport for London to develop bus service frequency improvements to accommodate the additional demand on the bus network which equates to 3 to 4 additional bus loads in the AM peak hour period. Framework Travel Plan measures	Negligible
Increased rail trips	Negligible	Framework Travel Plan measures	Negligible
Increase in traffic flows	Major Adverse to Negligible	Framework Travel Plan measures	Negligible
Junction capacity reduced	Negligible	Framework Travel Plan measures	Negligible

8.8 CUMULATIVE EFFECTS ASSESSMENT

8.8.1 The committed developments of Twickenham Rail Station and the Former Royal Mail Sorting Office in Twickenham have been considered as part of the cumulative assessment.

Site Enabling, Demolition and Construction

8.8.2 Given that there is an uncertainty over when some of the cumulative schemes would come forward, the methods of construction which would be employed, the management measures that would be adopted at each site or the periods of peak

construction, it is difficult to accurately predict cumulative assessment of construction activities, particularly where the most vehicle intensive construction operations are of short duration and of temporary nature.

8.8.3 It is understood that the Royal Mail site now has contractors on site and that site clearance has been completed with spoil and waste removed, and that the initial phases are now under construction. Given that these initial works and deliveries often result in the greatest volume of construction traffic, it is anticipated that any remaining construction traffic for the site during the construction of the proposed development will be minimal and the cumulative effects **negligible**.

8.8.4 It is anticipated that each cumulative development site would be required to develop their own CEMP and Construction Logistics Plan, and therefore agree vehicular numbers and vehicular routes with LBRuT and Transport for London. It is therefore considered that on this basis and subject to the implementation of best practice construction traffic management measures, the residual cumulative effects on all modes of transport would be **negligible** and that the cumulative increase would leave sufficient capacity on the local roads, particularly in respect of the strategic high capacity A316 which will be used by the development's construction traffic.

Operation

Pedestrian Movement, Capacity, Severance, Delay, Fear and Intimidation, and Amenity

8.8.5 Each cumulative development would generate their individual number of pedestrian trips, but as with the REEC development, be required to deliver schemes that enable easy pedestrian movement, do not restrict capacity, provide high environmental and design quality and improved public realm.

8.8.6 These would translate as mitigation measures and when considered collectively, would be expected to result in **negligible** to minor beneficial effects on pedestrian movement, capacity, severance, delay, fear and intimidation, and amenity.

Cycling

8.8.7 Each cumulative development would generate their individual number of cycling trips, but similar to the REEC development, be required to deliver schemes of high environmental and design quality, improved public realm and sufficient cycle parking space provided for staff, students, employees, residents and visitors.

8.8.8 These would translate as mitigation measures and when considered collectively is expected to result in **negligible** effects on cycling capacity.

Bus Services

8.8.9 As part of current Transport for London guidance, proposed developments are required to provide the likely bus trip generation associated with their sites together with an associated trip purpose and distribution analysis. Transport for London subsequently undertake their own capacity analysis based on their current and proposed level of services. It is therefore not necessary to predict the level of significance for cumulative effects on bus services as each development will mitigate their trips. Furthermore, the additional demand of the committed developments on bus services would be mitigated directly by each cumulative scheme through bus service enhancements secured as contributions towards services and frequencies.

Traffic Flows

8.8.10 The average weekday AM and PM peak motor traffic flows for 2019 plus the REEC development and cumulative developments are set out in **Table 8.30** and **Table 8.31**. **Appendix 8.6** contains the traffic flow diagrams.

Table 8.30: 2019 + Development + Cumulative Developments average weekday AM peak hour (08:00 – 09:00) vehicle flows

Road	Two-way flow	% increase from 2019 Baseline
A316 Chertsey Road	3,601	7.5%
B361 Whitton Road	795	13.6%
Court Way	156	34.5%
Langhorn Drive	264	164

Table 8.31: 2019 + Development + Cumulative Developments average weekday PM peak hour (17:00 – 18:00) vehicle flows

Road	Two-way flow	% increase from 2019 Baseline
A316 Chertsey Road	3,839	4.8%
B361 Whitton Road	773	9.3%
Court Way	117	3.5%
Langhorn Drive	267	142.7%

8.8.11 The average weekday AM and PM peak motor traffic flows for 2034 plus the proposed development and cumulative developments are set out in **Table 8.32** and

Table 8.33. Appendix 8.7 contains the traffic flow diagrams.

Table 8.32: 2034 + Development + Cumulative Developments average weekday AM peak hour (08:00 – 09:00) vehicle flows

Road	Two-way flow	% increase from 2034 Baseline
A316 Chertsey Road	3,858	7.0%
B361 Whitton Road	849	12.5%
Court Way	165	32%
Langhorn Drive	273	152.8%

Table 8.33: 2034 + Development + Cumulative Developments average weekday PM peak hour (17:00 – 18:00) vehicle flows

Road	Two-way flow	% increase from 2034 Baseline
A316 Chertsey Road	4,077	3.6%
B361 Whitton Road	825	8.7%
Court Way	119	-2.5%
Langhorn Drive	287	142.4%

A316 Chertsey Road

8.8.12 The effect of increase in traffic on the A316 Chertsey Road for the 2019 + Development + Cumulative Developments and 2034 + Development + Cumulative Developments in the AM and PM peak hours is **negligible**.

B361 Whitton Road

8.8.13 The effect of increase in traffic on the B361 Whitton Road for the 2019 + Development + Cumulative Developments and 2034 + Development + Cumulative Developments in the AM and PM peak hours is **minor adverse** and **negligible** respectively.

Court Way

8.8.14 As with the 2019 +Development scenario, the effect of increase in traffic on Court Way for the 2019 + Development + Cumulative Developments and 2034 + Development + Cumulative Developments in the AM peak hour is **moderate adverse**. The effect of increase in traffic on Court Way for the 2019 + Development +

Cumulative Developments and 2034 + Development + Cumulative Developments in the PM peak hour is **negligible**.

Langhorn Drive

8.8.15 As with the 2019 +Development scenario, the effect of increase in traffic on the Langhorn Drive for the 2019 + Development + Cumulative Developments and 2034 + Development + Cumulative Developments in the AM and PM peak hours is **major adverse**. The flows on Langhorn Drive remain unchanged from the 2019 + Development scenario because cumulative traffic will not use Langhorn Drive.

Summary

8.8.16 As mentioned earlier, the baseline flows on the local roads requires the use of certain criterion to explain the increase in traffic flows. However, this is misleading, because in practical terms the effect will be not be as excessive as the significance criterion portrays and in practice will not have a significant effect on the environmental capacity of the road. Therefore. overall, the increases in traffic flows on all of the road links assessed will not have a significant adverse effect on the operational capacity and the environmental capacity of the road links.

Junction capacities effect

8.8.17 A summary of the effect of the 2019 + Development + Cumulative Developments traffic flows on the assessed junctions is set out in **Table 8.34** and **Table 8.35** for the future baseline 2019 and in **Table 8.36** and **Table 8.37** for the future baseline plus 15 years.

Table 8.34: Summary of junction capacity assessment for 2019 + Development + Cumulative Developments AM peak hour (08:00 – 09:00) vehicle flows

Junction	Road arm	Ratio of Flow to Capacity (RFC) %	Average vehicles queuing
A316 Chertsey Road / Langhorn Drive	Langhorn Drive	43.1	3
	A316 Chertsey Road – East	68.1	28
	A316 Chertsey Road – West	71.8	34
A316 Chertsey Road / Egerton Road	Egerton Road	3.5%	0
B361 Whitton Road / Court Way	Whitton Road (north)	6.2%	0
	Court Way	16.9%	1

Table 8.35: Summary of junction capacity assessment for 2019 + Development + Cumulative Developments PM peak hour (17:00 – 18:00) vehicle flows

Junction	Road arm	Ratio of Flow to Capacity (RFC) %	Average vehicles queuing
A316 Chertsey Road / Langhorn Drive	Langhorn Drive	63.2%	6
	A316 Chertsey Road - East	74.8%	36
	A316 Chertsey Road - West	68.7%	31
A316 Chertsey Road / Egerton Road	Egerton Road	1.9%	0
B361 Whitton Road / Court Way	Whitton Road (north)	3.9%	0
	Court Way	18.8%	1

Table 8.36: Summary of junction capacity assessment for 2034 + Development + Cumulative Developments AM peak hour (08:00 – 09:00) vehicle flows

Junction	Road arm	Ratio of Flow to Capacity (RFC) %	Average vehicles queuing
A316 Chertsey Road / Langhorn Drive	Langhorn Drive	43.7%	3
	A316 Chertsey Road - East	72.4%	32
	A316 Chertsey Road - West	77.0%	40
A316 Chertsey Road / Egerton Road	Egerton Road	3.7%	0
B361 Whitton Road / Court Way	Whitton Road (north)	6.2%	0
	Court Way	18.5	1

Table 8.37: Summary of junction capacity assessment for 2034 + Development + Cumulative Developments PM peak hour (17:00 – 18:00) vehicle flows

Junction	Road arm	Ratio of Flow to Capacity (RFC) %	Average vehicles queuing
A316 Chertsey Road / Langhorn Drive	Langhorn Drive	63.2%	7
	A316 Chertsey Road - East	79.7%	42
	A316 Chertsey Road – West	73.4	36
A316 Chertsey Road / Egerton Road	Egerton Road	2.0%	0
B361 Whitton Road / Court Way	Whitton Road (north)	3.1%	0
	Court Way	20.0%	1

A316 Chertsey Road / Langhorn Drive

8.8.18 The Langhorn Drive arm of the Langhorn Drive / A316 Chertsey Road signal controlled junction has 46.9% and 26.8% spare capacity in the AM and PM peak hours respectively before the threshold of 90% operational capacity is reached for the 2019 + Development + Cumulative Developments scenario. In the 2034 + Development + Cumulative Developments scenario, the same arm has 46.3% and

26.8% spare capacity in the AM and PM peak hours respectively.

8.8.19 In the 2019 + Development + Cumulative Developments scenario, the A316 Chertsey Road – East arm of the Langhorn Drive / A316 Chertsey Road junction has 21.9% and 15.2% spare capacity in the AM and PM peak hours. In the 2034 + Development + Cumulative Developments scenario, the same arm has 17.6% and 10.3% spare capacity in the AM and PM peak hours respectively.

8.8.20 In the 2019 + Development + Cumulative Developments scenario, the A316 Chertsey Road – West arm of the Langhorn Drive / A316 Chertsey Road junction has 18.2% and 21.3% spare capacity in the AM and PM peak hours. In the 2034 + Development + Cumulative Developments scenario, the same arm has 13.0% and 16.6% spare capacity in the AM and PM peak hours respectively.

A316 Chertsey Road / Egerton Road

8.8.21 In the 2019 + Development + Cumulative Developments scenario, the Egerton Road arm of the Egerton Road / A316 Chertsey Road junction has 81.5% and83.1% spare capacity in the AM and PM peak hours respectively for the 2019 plus development scenario. In the 2034 + Development + Cumulative Developments scenario, the same arm has 81.3% and 83.0% spare capacity in the AM and PM peak hours respectively.

B361 Whitton Road / Court Way

8.8.22 The Court Way arm of the B361 Whitton Road / Court Way junction has 68.1% and 66.2% spare capacity in the AM and PM peak hours respectively for the 2019 + Development + Cumulative Developments scenario. In the 2034 + Development + Cumulative Developments scenario, the same arm has 66.5% and 65.0% spare capacity in the AM and PM peak hours respectively.

8.8.23 The northern arm of Whitton Road (right turn into Court Way) on the B361 Whitton Road / Court Way junction has 78.8% and 81.1% spare capacity in the AM and PM peak hours respectively for the 2019 + Development + Cumulative Developments scenario. In the 2034 plus development scenario, the same arm has 78.8% and 81.9% spare capacity in the AM and PM peak hours respectively. This arm also experiences an increase in vehicle queues from zero vehicles to one vehicle.

Summary

8.8.24 The junction capacity assessment demonstrates that whilst the original latent capacity at each of the existing simple priority junctions assessed is reduced as a result of the REEC development plus cumulative developments in the AM peak hour, the junctions still have a significant quantity of latent capacity. The vehicle queues do not increase except on one arm, Whitton Road (north), where the queue length

increases from zero to one vehicle.

8.8.25 Therefore, the proposed development and cumulative developments will have a **negligible** effect on the operational capacity of the junctions which link the site to the local highway network.

Mitigation

8.8.26 Due to the negligible impact of the cumulative developments on local transport network, no mitigation is needed.

Residual Effects

8.8.27 The residual impacts of the cumulative developments on local transport network is negligible.

8.9 SUMMARY AND CONCLUSION

8.9.1 An assessment of the whole REEC development's effects on the local transport network has been undertaken. Also undertaken is an assessment of the baseline scenario, an assessment of the worst case construction phase including the completed REEC development uses within that construction phase, and an assessment of the whole REEC development plus cumulative developments on the local transport network.

8.9.2 In order to complete the assessments, surveys have been commissioned, site visits undertaken and industry standard modelling software used. Consultation has also been undertaken with LBRuT, Transport for London and local stakeholders.

8.9.3 The above scenarios include a capacity assessment of the local road links of the A316 Chertsey Road, the B361 Whitton Road, Court Way and Langhorn Drive, and the local road junctions of the A316 Chertsey Road / Langhorn Drive , B361 Whitton Road / Court Way and the A316 Chertsey Road / Egerton Road. For the proposed development assessment, the road junction of the A316 Chertsey Road / Langhorn Drive has been assessed as a 'left-in, left-out, right-out' signal controlled junction. The assessments demonstrate that all road links and junctions for all scenarios operate within capacity and with further mitigation measure in place, the effects of the development on the road network is likely to be negligible.

8.9.4 Assessments of the above scenarios on local bus and rail services have also been undertaken. The REEC development will put increased demand on the local bus network. However, proposals to provide 3 to 4 extra bus loads in the AM peak hour will result in the effects on the bus network being negligible. Similarly, the effects on the local rail network is likely to be negligible and will then be indiscernible with the proposed improvements by others to Twickenham Station and the rail line capacity.

8.9.5 An assessment of pedestrian and cycle trips has also been undertaken. Whilst the increases in pedestrian and cycle movements appear high, the existing pedestrian and cycle flows are low, hence the percentage increase figures are misleading. In practical terms the effects of the increase in pedestrians and cycles on local routes is likely to be negligible. The assessment demonstrates that with the improvements made to Marsh Farm Lane and the implementation of the Twickenham Rough cycle/footpath, a more desirable route to Twickenham Station and the bus stops nearby, and Twickenham town centre will be created. This will in turn lead to a reduction of pedestrian movements on Court Way. Upgrades to the pedestrian and cycle infrastructure on the A316 will also help to encourage the use of the walking and cycling as a mode of travel to and from the REEC development, whilst also improving the capacity of the route.

8.9.6 The RREC development is providing sufficient on-site parking spaces to meet local parking standards and the CPZs around the site prevent unauthorised parking on local roads. However, funds will be made available through the Section 106 to undertake a study of the CPZ to the north of site which is only in operation on event days, and if deemed appropriate will have the CPZ operation times extended. Also, measures set out in the College Travel Plan , which will be developed based on the Framework Travel Plan in **Appendix 8.5**, to discourage students using their cars to travel to the College will mean the effect of the REEC development on parking is likely to be negligible.

8.9.7 Overall, the proposed REEC development will not have a significant adverse effect on the local transport network or the local environment in transport terms.

9 NOISE AND VIBRATION

9.1 INTRODUCTION AND KEY ISSUES

9.1.1 This chapter describes the likely noise and vibration effects of the proposed Richmond Education and Enterprise Campus (REEC) development at Richmond upon Thames College (RuTC) in Twickenham, within the London Borough of Richmond upon Thames (LBRuT).

9.1.2 The key noise and vibration issues are considered to be:

- Construction: noise and vibration effects on sensitive receptors located around the Site, the construction compounds and its access routes, due to plant and activities associated with the phased construction of the new buildings, including site enabling and extensive demolition work; and
- Operation: noise and vibration effects on sensitive receptors close to the site boundaries associated with the operational phase, including noise from existing traffic and aircraft sources, additional road traffic, noise from mechanical plant associated with the new buildings and noise from sports activities. The effects of noise and vibration on users of the completed buildings are also assessed.

9.1.3 This chapter describes the policy context and legislation, methodology and assessment criteria used to assess the potential noise and vibration effects of the REEC development. Any limitations, constraints and assumptions relating to the assessment are described in the relevant section. The baseline conditions of the Site and its environs are set out both in terms of measured noise levels as well as qualitatively.

9.1.4 The likely direct and indirect noise effects arising from the construction and operational phases are addressed, with appropriate mitigation measures recommended to prevent, reduce or offset the effects and the significance of the residual effects.

9.2 CONSULTATION

9.2.1 A site meeting was held on 17 April 2014 with Chris Hurst, from the Environmental Health Department of LBRuT. The noise monitoring locations used for the baseline survey were agreed and the general assessment methodologies for construction and operational noise were discussed. These included the use of BS5228 for construction noise, BS8233 for noise standards inside buildings, BB93 for the College and School buildings and BS4142 for operational noise from fixed plant, such as ventilation equipment.

9.2.2 The consultation exercise included one response on noise and vibration which

requested the inclusion of noise from sporting activities on the College playing fields south of Craneford Way as an operational noise source. An assessment of the effects of noise from use of the proposed sports field has therefore been included.

9.3 LEGISLATION AND PLANNING POLICY

National

National Planning Policy Framework (2012)

9.3.2 As background to formulating the assessment methodology, consideration has been given to the NPPF[1] which states that the planning system is required to contribute to and enhance the natural and local environment. Consequently, the aim is to prevent both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by, unacceptable levels of noise pollution. Therefore the NPPF states that planning policies and decisions should aim to:

'Avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;

mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions;

recognise that development will often create some noise and existing businesses wanting to develop in pursuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established; and

identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.'

Noise Policy Statement for England (2010)

9.3.3 These requirements are consistent with the Noise Policy Statement for England (NPS)[2] which seeks to clarify the underlying principles and aims of the NPPF. The Statement sets out the long term vision of the government's noise policy which is to:

'promote good health and a good quality of life through the effective management of noise within the context of policy on sustainable development'.

[1] DCLG (2012) *National Planning Policy Framework*
[2] DEFRA (2010) *Noise Policy Statement for England*

9.3.4 The Statement aims to:

- Avoid significant adverse impacts on health and quality of life;
- Mitigate and minimise adverse effects on health and quality of life; and,
- Where possible, contribute towards the improvement of health and quality of life.

9.3.5 The NPS also requires ancillary activities, such as traffic movements, to be considered and noise assessment of construction and operational sources to be carried out to relevant British Standards. The results of noise assessments should be used to inform the ecological assessment where required.

9.3.6 There is a distinction between 'adverse effects' which must be minimised and mitigated and 'significant adverse effects' which must be avoided. There is no current definition in the policy of significant effects in terms of noise levels, thus care has been taken to recommend criteria that define where adverse effects become significant, particularly in respect of construction noise.

9.3.7 It is possible to apply objective standards to the assessment of noise which uphold these policy aims. The effect of introducing a certain noise source may be determined by several methods, as follows:

- The effect may be determined by reference to guideline noise values. BS8233:2014[3] and World Health Organisation 'Guidelines for Community Noise'[4] contain such guidelines;
- The effect may be determined by considering the change in noise level that would result from the proposal in an appropriate noise index for the characteristic of the noise in question; and
- The resultant noise level can be compared against the background noise level of the area, as used in BS4142:2014[5] to determine the potential impact of noise of an industrial nature.

9.3.8 The Statement also implies that opportunities should be sought to improve quality of life, for example by aiming to reduce prevailing noise levels as a result of implementing the development, rather than ensuring negligible impacts or no change.

Planning Practice Guidance – Noise (2014)

9.3.9 Further guidance is given in the recently published Planning Practice Guidance on

[3] British Standards Institute, BS8233:2014, *Sound insulation and noise reduction for buildings – A code of practice*
[4] World Health Organisation (WHO) (2000) *Guidelines for Community Noise*
[5] British Standards Institute, BS4142:2014 *Method for rating industrial noise affecting mixed residential and industrial areas*

noise[6]. This follows the Noise Policy Statement for England, describing in more detail the perception of noise, examples of outcomes, the effect levels and appropriate actions. It describes factors to consider in deciding whether noise could be a concern and how adverse effects can be mitigated.

Regional

The London Plan – The Spatial Development Strategy for London Consolidated with Alterations since 2011 (2015)

9.3.10 Relevant planning guidance is found in the London Plan Policy 7.15 'Reducing and managing noise, improving and enhancing the acoustic environment and promoting appropriate soundscapes'. This policy includes strategic and planning advice in line with national guidance but it also includes advice for London Boroughs:

Boroughs and others with relevant responsibilities should have policies to:

a) manage the impact of noise through the special distribution of noise making and noise sensitive uses;

b) identify and nominate new Quiet Areas and protect existing Quiet Areas in line with the procedure in Defra's Noise Action Plan for Agglomerations.

Local

LBRuT Development Management Plan (2011)

9.3.11 *Specific guidance on planning and noise is included in the LBRuT Development Management Plan,* adopted in 2011. Policies DM SD 1, 'Sustainable Construction', DM SD 2, 'Renewable Energy' and DM SD 3, 'Retrofitting', all refer to the use of PPG24 'Planning and Noise' however this guidance has now been withdrawn.

9.3.12 Policy DM TC 5, 'The evening economy' refers to:

'Impacts from a building, its curtilage (including gardens) and the surrounding environs, should not negatively affect the amenity of nearby areas, particularly residential areas. Negative impacts could include on street parking, noise and disturbance from equipment, music or customers smoking or drinking outside or leaving the premises'.

9.3.13 Policy DM HO 3, 'Backland' states that there will be '*a presumption against loss of back gardens due to the need to maintain local character, amenity space and biodiversity and in particular that vehicular access or car parking must not have an adverse impact on neighbours in terms of visual impact, noise or light.'*

[6] *DCLG Planning Practice Guidance – Noise*, Ref ID 30-001-20140306, March 2014

9.3.14 Policy DM TC 5, 'Neighbourliness, sunlighting and daylighting' states that:

'In considering proposals for development, the Council will seek to protect adjoining properties from unreasonable loss of privacy, pollution, visual intrusion, noise and disturbance.'

Crane Valley Planning Guidelines

9.3.15 The 'Crane Valley Guidelines SPG and Planning Brief' makes reference to noise in the build environment in Policy BLT16:

In considering proposals for development the Council will seek to protect adjoining properties from unreasonable loss of privacy, pollution, visual intrusion, noise and disturbance.

9.3.16 Reference to noise is also made in Policy TRN2(g)

Transport Assessments will be required to support development proposals where there are significant transport issues to be addressed. New development should be acceptable in terms of impact on air quality and noise levels caused by traffic generated.

9.4 ASSESSMENT METHODOLOGY

Evaluation of Effects

9.4.1 The impact of noise at a particular location is generally assessed by considering the change in noise level resulting from activities associated with a new development. The sensitivity of the noise receptor to that change of noise level would depend on whether the location is inside a building or outdoors and on the absolute noise level that is being generated. For instance, staff in an industrial building during the day would be far less sensitive to noise than a resident in a bedroom at night. Criteria and guidelines for the assessment of noise impact take this sensitivity into account.

9.4.2 The noise and vibration effects likely to be generated by the construction of the REEC development have been fully evaluated. Similarly, on completion of construction, noise likely to be generated by operational plant, traffic generation and sports field activities have been assessed.

9.4.3 Noise levels during demolition and construction works have been predicted at surrounding noise sensitive locations. Noise and vibration levels have been estimated and evaluated using British Standard 5228:Parts 1 and 2 2009[7] together

[7] British Standards Institution, BS 5228:2009 *Noise and Vibration Control on Construction and Open Sites*.

with the Defra construction noise database[8]. The prediction method contained in the Standard calculates noise levels at selected locations based on source noise levels of construction plant, propagation distance, details of the intervening ground cover, topography and screening. The Standard also gives a method of assessing the impact of construction noise based on pre-existing ambient noise levels at a particular location.

9.4.4 Noise sensitive receptors were examined in the area surrounding the site, including residential properties, commercial buildings, leisure facilities and protected ecological sites, however, only residential receptors were identified as noise sensitive. The receptors selected for detailed calculation of construction noise and vibration are described in the Section 9.6 of this chapter as similar locations were used to collect ambient noise data.

9.4.5 The effects of traffic noise during construction and operation are assessed on the degree of change anticipated. A 3dB(A) change in traffic noise is associated with a halving or doubling of traffic flow. Guidance[9] relating to traffic noise assessment notes that a change of less than 3dB(A) is not generally perceptible and it would follow that a significant effect cannot occur if the change is not perceptible.

9.4.6 Changes in traffic noise levels due to changes in traffic flows have been predicted using the methodology of 'Calculation of Road Traffic Noise'[10]. This methodology calculates a basic noise level in terms of $L_{A10,18hr}$ from traffic flow, % heavy goods vehicles, traffic speed and road surface characteristics. This is then used to determine noise levels at receptors, taking account of distance attenuation and screening effects.

Significance of Effects

Construction noise

9.4.7 There are no nationally established significance criteria for the assessment of construction noise. Noise from construction sources can be highly variable in its intensity and character and is always of a temporary nature. When assessing construction noise the guidance in BS 5228 identifies a number of key factors in relation to the acceptability of noise (and vibration) to people living and working around a site. Many of these adopt the considerations of the Institute of Acoustics /

[8] Department of Environment, Food and Rural Affairs (2005) *Update of noise database for prediction of noise on Construction and Open Sites*

[9] The Highways Agency (November 2011*) 'The Design Manual for Roads and Bridges' Volume II Section 3, Part 7 'Noise and Vibration' (HD213/11).*

[10] Department of Transport, '*Calculation of Road Traffic Noise'*, 1988.

IEMA[11] draft guidance for the assessment of significance.

9.4.8 These factors include:

- Duration of the works;
- Hours of working;
- Attitude of the site operator;
- Impulsive or tonal characteristics of the noise; and,
- The influence of existing ambient noise levels.

9.4.9 The factors considered above affect the acceptability of introduced noise. As noted, construction noise is more complex than other more constant noise sources and its significance cannot be assessed solely by the exceedance of a threshold, it has to take account of a certain increase in noise level above ambient levels.

9.4.10 To assess the likely significant effect of construction noise on sensitive receptors, 'The ABC Method' provided in BS5228-1:2009 can been employed. This method defines category threshold values which take account of the time of day and existing measured ambient noise levels. The noise generated by construction activities, corrected to take account of ambient noise levels, is then compared with the 'threshold value'. If the total noise level exceeds the threshold value then a significant impact is deemed to occur.

9.4.11 The criteria in **Table 9.1** show the descriptions of significance criteria for construction noise. The significance described refers to adverse impacts only as there cannot be a beneficial impact from construction noise.

Table 9.1 Criteria for Construction Noise

Criteria for Construction Noise	
Negligible	An increase in LAeq,10hr of less than 3dB, as a result of construction or an assessed level below 55dB LAeq,10hr
Minor adverse	An increase in LAeq,10hr of more than 3dB, as a result of construction, for a period of less than 8 weeks and the assessed level to be above 55dB LAeq,10hr
Moderate adverse	An increase in LAeq,10hr of more than 3dB, as a result of construction, for a period of more than 8 weeks and the assessed level to be above 55dB LAeq,10hr
Major adverse	An increase in LAeq,10hr of more than 10dB, as a result of construction, for a period of more than 8 weeks and the assessed level to be above 55dB LAeq,10hr

9.4.12 The significance of effects is determined by reference to the above magnitude in conjunction with the sensitivity of the receptor, as shown in Chapter 2, **Table 2.5**.

[11] IOA/IEMA (2002) *Guidelines for Noise Impact Assessment (Consultation Draft) produced by the joint working party of the Institute of Acoustics and the Institute of Environmental Management and Assessment.*

9.4.13 As the identified receptors are all residential, the high sensitivity description applies.

Construction Vibration

9.4.14 The potential sources of construction vibration would be associated with demolition of the existing college as these are closest to the receptors in Egerton Road and Craneford Way. Works during piling (which is not anticipated to be required; see Section 6.4 in Chapter 6) and ground compaction for the new college and school buildings have the potential to be a source of construction vibration. The prediction of vibration from such activities is difficult as propagation depends on a number of factors, including the power of the equipment, surface and subsoil formations and the foundations, distance and condition of the receptor building.

9.4.15 Construction vibration is normally measured as Peak Particle Velocity (PPV). PPV values of less than 0.3mm/s are rarely detectable by the human body, levels of 1mm/s are perceptible and become disturbing, and levels above 3mm/s are likely to be annoying and occupiers of buildings become disturbed about the safety of the building. However, guidance in BS7385:1993[12] indicates that minor cosmetic damage to buildings does not occur until vibration levels reach 12mm/s.

9.4.16 BS5228 gives similar data on the effects of construction vibration. The identification of significant vibration effects at residential properties is complex due to the highly variable nature and durations of vibration impacts arising from construction work. The significance of vibration effects from construction work is difficult to assess quantitatively and has been determined using the absolute criteria of BS5228 and BS7385 as shown in **Table 9.2**. The criteria described refer only to adverse impacts as there cannot be a beneficial impact from construction vibration.

Table 9.2: Criteria for Construction Vibration

Criteria for Construction Vibration	
Negligible	Vibration PPV levels of less than 0.3mm/s
Minor adverse	Vibration PPV levels of more than 0.3mm/s but less than 1mm/s
Moderate adverse	Vibration PPV levels of more than 1mm/s but less than 3mm/s
Major adverse	Vibration PPV levels of more than 3mm/s

9.4.17 Construction vibration levels have been estimated, based on guidance in BS5228 which uses historical measured data from similar activities taken elsewhere and gives

[12] British Standards Institute, BS7385:1993 *Evaluation and measurement for vibration in buildings: Part 2 – Guide to damage levels from groundborne vibration.*

empirical predictors for various sources of groundbourne vibration. Vibration attenuates rapidly with distance and according to this methodology, is rarely perceptible inside buildings at distances of greater than 50m.

Operational Noise

9.4.18 It is considered that the design of the new building structures would ensure that operational effects associated with traffic and aircraft noise sources are likely to be negligible. However, an assessment of the potential noise effects of all operational sources has been carried out. The criteria for noise inside the commercial and new residential buildings have been assessed using BS8233 and noise inside the educational buildings using BB93. The effects of operational plant noise on existing nearby receptors have been determined using BS4142.

9.4.19 This method describes the likelihood of complaints in terms of the difference between the background noise level and the rating level of the source of noise. The method takes account of tonal or impulsive characteristics of the noise sources. The significance of the change in noise level is rated as part of this process, as shown in **Table 9.3**.

9.4.20 Beneficial operational noise impacts would occur if existing cumulative operational noise levels were to be negligible and reduced as a result of the works.

Table 9.3: Criteria for Operational Noise

Criteria for Operational Noise	
Major beneficial	Rating level more than 10dB less than existing operational noise level and more than 10dB below background level
Moderate beneficial	Rating level 3 to 10dB less than existing operational noise level and more than 10dB below background level
Minor beneficial	Rating level 1 to 3dB less than existing operational noise level and more than 10dB below background level
Negligible	Rating Level more than 10dB below background level
Minor adverse	Rating Level less than 10dB below background level and less than 5dB above background level
Moderate adverse	Rating Level 5dB to 10dB above background level
Major adverse	Rating Level more than 10dB above background level

Operational Vibration

9.4.21 All operational plant and machinery are located at such distances from sensitive receptors that vibration would not be perceptible. Operational vibration has therefore been scoped out of the assessment.

Traffic Noise

9.4.22 Additional traffic will be generated during construction and when the development becomes operational.

9.4.23 Traffic noise, particularly from freely flowing traffic, is a relatively uniform noise source without strong tonal or impulsive characteristics. Based on the relevant guidance[13] the threshold at which traffic noise change becomes noticeable, and therefore significant, is generally accepted as being a noise change of approximately 3dB(A). An increase of traffic noise would be of adverse significance and a decrease of traffic noise would be of beneficial significance. Thus the following criteria in **Table 9.4** have been used.

Table 9.4: Significance Criteria for Traffic Noise

Significance Criteria for Traffic Noise	
Major beneficial	LAeq,16hr noise level decrease of more than 10dB
Moderate beneficial	LAeq,16hr noise level decrease of more than 5dB but less than 10dB
Minor beneficial	LAeq,16hr noise level decrease of more than 3dB but less than 5dB
Negligible	LAeq,16hr noise level change of less than 3dB
Minor adverse	LAeq,16hr noise level increase of more than 3dB but less than 5dB
Moderate adverse	LAeq,16hr noise level increase of more than 5dB but less than 10dB
Major adverse	LAeq,16hr noise level increase of more than 10dB but less than 15dB

Limitations of Assessment

9.4.24 The assessment of construction noise is based on experience of noise from plant and equipment used on similar constructions. The appointed contractor may use alternative methodologies resulting in different noise levels, however, wherever possible the calculations have been based on a worst case scenario, thus minimising the risk of higher predicted noise levels.

9.4.25 The assessment of construction noise has determined distances of receptors from the proposed buildings by reference to the Parameter Plans, taking the closest approach of each receptor to the nearest building zone, thus ensuring a worst case impact. Reference has been made to the following Building Zone Plans:

[13] Department for Transport (2007) *Tag Appraisal Guidance (TAG) Unit 3.3.2 – The Noise Sub-objective*, Department for Transport.

- PL-13 Residential
- PL-07 College
- PL-09 Tech Hub
- PL-11 Schools

9.4.26 Reference was also made to the Illustrative Masterplan PL-17 (see **Figure 5.1** in Chapter 5) for the location of the Cranefield Way sports pitches.

9.5 BASELINE

Introduction

9.5.1 The baseline methodology focuses on obtaining background noise levels against which any introduced noise propagating to surrounding sensitive receptors can be compared. The survey positions were generally chosen to represent noise sensitive locations closest to the various scheme components. The distribution is such that the noise climate at any sensitive locations where measurements were not taken could be approximated by interpolating the results from a monitoring location nearby.

9.5.2 The extent of the area likely to be affected by noise from a new development rarely extends beyond 200m from the site boundary in an urban area as the presence of other buildings screens noise propagation from more distant locations. It is regarded as best practice to assess impact at the closest receptors to the site on the assumption that the impact would be less at those located further away. It may become necessary to consider receptors at further distances if impacts at the closest receptors cannot be adequately mitigated.

9.5.3 The area surrounding the Site is predominately residential but with the Harlequin FC to the west. The main existing noise sources in the area are from traffic on the A316 Chertsey Road and flight-paths for aircraft using Heathrow.

9.5.4 Noise sensitive receptors located close to the Site were selected for baseline noise measurements and these were carried out at the locations shown in **Figure 9.1** and listed in **Table 9.5**.

Legend

Noise Monitoring Location

N

0

CASCADE

100m

Note: All locations are approximate

Drawing Source: HoK Number SK-042

Project Title:
Richmond Education and Enterprise Campus Development

Figure Title:
Baseline Noise Monitoring Positions

For Information Only

Figure Number:	Date:
Figure 9.1	June 2015

Table 9.5: Noise Sensitive Receptors used for Baseline Noise Measurements

Position	Location	Use	Sensitivity
1	Roof of College catering building	Educational	High
2	Rear of Craneford Way	Residential	High
3	Rear of Egerton Road North	Residential	High
4	A316, opposite Talma Gardens	Residential	High
5	Front of Egerton Road South	Residential	High
6	Heatham Park	Residential	High

9.5.5 As there were not any identifiable sources of environmental or operational vibration near the sensitive receptors, baseline vibration measurements were not undertaken. Furthermore, the significance of vibration impact is based on predicted absolute levels and not on comparison with baseline levels

Current Baseline

9.5.6 In April 2014 a long term measurement over seven days was taken at the site of the existing College, two 24 hour measurements were taken at residential locations close to the site boundaries and day and night attended measurements were taken alongside the A316. Further attended measurements were carried out in March 2015 at residential locations in Egerton Road and in Heatham Park.

9.5.7 All measurements were taken in acoustically 'free field' conditions, at least 3.5m away from any vertical reflective surfaces. A windshield was fitted to the microphone at all times to minimise the effects of wind-induced noise across the microphone diaphragm. Instruments used for the measurements were calibrated before and after the surveys and no significant drifting of the calibration signals were observed. Calibration certificates for all instruments are available.

9.5.8 Position 1 was located on the first floor roof of the College catering building so as to measure aircraft noise as well as background noise levels, primarily from distant traffic on the A316. An environmentally protected measurement system was left at this position for 7 days from 24 April to 1 May 2014, recording continuously. Weather data was obtained from Heathrow so that data measured during periods of high wind could be identified and disregarded as this can distort the results due to overloading of the microphone signal. This data is shown in **Appendix 9.1**. Data on air traffic movements was also obtained such that periods of westerly and easterly operations could be distinguished.

9.5.9 Position 2 was located at the southern boundary of the College, adjacent to the rear gardens of properties at 70-148 Craneford Way. Measurements were carried out over a 24 hour period from1st to 2 May again using an environmentally protected system,

in order to establish ambient and background noise levels at these properties.

9.5.10 Position 3 was located on the eastern boundary of the College at the rear of properties at 1-33 Egerton Road where measurements were also carried out for a 24 hour period from 2 to 3 May, in order to establish ambient and background noise levels at these properties.

9.5.11 Position 4 was at a distance of 20m from the edge of the A316 near the northern boundary of the College sports field and was representative of noise levels at the properties on the opposite side of the A316 at 25-35 Talma Gardens. Attended noise measurements were carried out at this position covering day and night time periods, and were used to quantify traffic noise levels along this boundary.

9.5.12 Position 5 was further south on Egerton Road opposite the proposed location of the new residential housing on the development, where daytime attended measurements were carried out.

9.5.13 Position 6 was in Heatham Park at the boundary of the college playing field with residential gardens. Daytime attended measurements were also carried out at this position in order to establish ambient noise levels at the sports field boundary.

9.5.14 The detailed results are shown in **Appendix 9.1** and are summarised in **Tables 9.6** to **9.8**. This shows the daytime average $L_{Aeq,12hr}$ over the period 07:00 to 19:00 and the highest value of LA1 (the level exceeded for 1% of the time) over that period; the daytime $L_{Aeq,16hr}$ average over the period 07:00 to 23:00; the night time $L_{Aeq,8hr}$ over the period 23:00 to 07:00; the lowest night time L_{A90} and the highest night time L_{Amax}. These parameters are all used for different aspects of the assessment, as explained later in this chapter.

Table 9.6: Summary of Results of 7 Day Baseline Noise Monitoring at Position 1, Roof of College Building

Date	$L_{Aeq,12hr}$	L_{A1} max Day 12hr	$L_{Aeq,16hr}$	$L_{Aeq,8hr}$	L_{A90} min Night 8hr	L_{Amax} Night 8hr
24-Apr	59.5	72.7	60.6	57.8	44.3	77.8
25-Apr	62.2	79.3	62.0	56.8	44.9	83.3
26-Apr	60.9*	81.9*	61.5*	56.1	45.0	80.7
27-Apr	63.5	81.6	63.3	57.7	45.7	76.5
28-Apr	63.0	80.9	62.7	58.3	44.9	79.4
29-Apr	63.6	83.1	63.8	57.4	45.6	76.3
30-Apr	60.9	72.2	60.4	57.6	45.0	73.8

*High wind during this period

Table 9.7: Summary of Results of 24 hour Baseline Noise Monitoring at Positions 2 and 3, Rear of Craneford Way and Egerton Road.

Posn.	Date	$L_{Aeq,12hr}$	L_{A1} max Day 12hr	$L_{Aeq,16hr}$	$L_{Aeq,8hr}$	L_{A90} min Night 8hr	L_{Amax} Night 8hr
2	01-May	58.6	84.2	58.2	55.0	30.4	81.9
3	02-May	61.1	80.8	60.7	57.1	31.9	83.7

Table 9.8: Summary of Results of Attended Baseline Noise Monitoring

Position	Location	Result	dB
4	A316	$L_{Aeq,6hr}$ Day	69.3
		L_{A1} max Day 12hr	75.1
		$L_{Aeq,8hr}$	64.4
		L_{A90} min Night 8hr	44.3
		L_{Amax} Night 8hr	77.3
5	Egerton Rd South	$L_{Aeq,8hr}$ Day	55.5
		L_{Amax}	75.7
		L_{A90}	45.1
6	Heatham Park	$L_{Aeq,8hr}$ Day	49.5
		L_{Amax}	67.3
		L_{A90}	42.2

Future Baseline

9.5.15 Future baseline traffic flows may be affected by cycle lane works on the A316 planned by TfL. Such changes have been taken into account in the baseline 2022 cumulative data, as described in Chapter 9 - Transport. The operational noise assessment also takes account of these traffic flow changes.

Baseline Limitations

9.5.16 Noise levels measured during the baseline survey were considered to be representative of the existing ambient noise levels. There may be seasonal variations in noise levels due to college holidays or traffic flows, however, the variations are not considered to be likely to cause significant changes to the measured noise levels as these were taken during normal term time. Measurements were taken at locations

which were considered to be representative of typical ambient noise levels, however, there may be locations which show minor variations of ambient noise when compared to those selected.

9.6 SENSITIVE RECEPTORS

9.6.1 The receptors identified for the baseline noise measurements which were located closest to the Site in Egerton Road, Craneford Way and Heatham Park were regarded as the most sensitive, however, eleven receptors were selected where construction and operational noise levels were potentially significant at locations outside the site boundaries. Noise levels were calculated at these positions and their locations are listed in **Table 9.9**. The locations of these external receptors are shown in **Figure 9.2**.

Table 9.9: Noise Sensitive Receptors Outside the Site Used for Assessment of Effects

Position	Location	Use	Sensitivity
1	31 Talma Gardens	Residential	High
2	Rear of 33 Egerton Road	Residential	High
3	Rear of 9 Egerton Road	Residential	High
4	Rear of 78 Heathfield South	Residential	High
5	96 Court Way	Residential	High
6	71 Craneford Way	Residential	High
7	78 Craneford Way	Residential	High
8	148 Craneford Way	Residential	High
9	1 Challenge Court	Residential	High
10	8 Gladstone Avenue	Residential	High
11	20 Heatham Park	Residential	High

9.6.2 Six receptors were also identified within the site boundaries where demolition and construction works could affect users of the new buildings. The location of the internal receptors are described in **Table 9.10** and shown in **Figure 9.3**.

Table 9.10: Sensitive receptors at new buildings within the development site

Receptor	Location
S1	South façade of College
S2	West façade of School
S3	South/west façade of SEN
S4	South façade of Sports
S5	West end of Residential
S6	North façade of STEM