10 AIR QUALITY

10.1 INTRODUCTION AND KEY ISSUES

10.1.1 This chapter describes the likely air quality 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).

10.1.2 The following air quality effects may arise during the construction phase of the development:

- Suspended and re-suspended fugitive dust emissions from demolition / construction activities, including re suspended dust from heavy goods vehicle movements; and
- Vehicular emissions (primarily nitrogen dioxide (NO_2) and particulate matter (PM_{10} and $PM_{2.5}$) from construction traffic.

10.1.3 During the operational phase, the effects will be limited to vehicular emissions associated with the residential, educational and business uses proposed for the Site.

10.1.4 The type, source and significance of likely effects are identified and the measures that should be employed to minimise impacts are described.

10.2 CONSULTATION

10.2.1 Consultation has been undertaken with Carol Lee and John Coates, Air Quality Officers at LBRuT to agree the scope and proposed methodology for the assessment of air quality impacts.

10.2.2 LBRuT have highlighted the need for verification of modelled concentrations with locally measured concentrations; recent data were provided for this purpose to supplement the data available within their 2013 LAQM report. It was confirmed that due to the close proximity of a LBRuT NO_2 diffusion tube on Chertsey Road, additional monitoring at the proposed development site would not be required.

10.2.3 The content of this ES chapter has been reviewed with regard to LBRuT 's EIA Scoping Opinion (see **Appendix 2.2**).

10.3 LEGISLATION AND PLANNING POLICY

International / European

The European Directive on Ambient Air and Cleaner Air for Europe

10.3.1 European Directive 2008/50/EC of the European Parliament and of the Council of 21st May 2008, sets legally-binding Europe-wide limit values for the protection of public health and sensitive habitats. The Directive streamlines the European Union's air quality legislation by replacing four of the five existing Air Quality Directives within a single, integrated instrument.

10.3.2 The pollutants included are sulphur dioxide (SO2), nitrogen dioxide (NO_2), particulate matter of less than 10 micrometres (μm) in aerodynamic diameter (PM_{10}), particulate matter of less than 2.5 μm in aerodynamic diameter lead ($PM_{2.5}$), lead (Pb), carbon monoxide (CO), benzene (C_6H_6), ozone (O_3), polycyclic aromatic hydrocarbons (PAHs), cadmium (Cd), arsenic (As), nickel (Ni) and mercury (Hg).

National

Air Quality Strategy for England, Scotland, Wales and Northern Ireland (2007)

10.3.3 The Government's policy on air quality within the UK is set out in the Air Quality Strategy for England, Scotland, Wales and Northern Ireland published in July 2007, pursuant to the requirements of Part IV of the Environment Act 1995. The Air Quality Strategy sets out a framework for reducing hazards to health from air pollution and ensuring that international commitments are met in the UK. The Air Quality Strategy is designed to be an evolving process that is monitored and regularly reviewed.

10.3.4 The Air Quality Strategy sets standards and objectives for ten main air pollutants to protect health, vegetation and ecosystems. These are benzene, 1,3-butadiene, carbon monoxide, lead, nitrogen dioxide, particulate matter (PM_{10}, $PM_{2.5}$), sulphur dioxide, ozone and polycyclic aromatic hydrocarbons.

10.3.5 The air quality standards are long-term benchmarks for ambient pollutant concentrations which represent negligible or zero risk to health, based on medical and scientific evidence reviewed by the Expert Panel on Air Quality Standards and the World Health Organisation. These are general concentration limits, above which sensitive members of the public (e.g. children, the elderly and the unwell) might experience adverse health effects.

10.3.6 The air quality objectives are medium-term policy based targets set by the Government which take into account economic efficiency, practicability, technical

feasibility and timescale. Some objectives are equal to the Expert Panel on Air Quality Standards recommended standards or World Health Organisation guideline limits, whereas others involve a margin of tolerance, i.e. a limited number of permitted exceedences of the standard over a given period.

10.3.7 For some pollutants there is both a long-term (annual mean) standard and a short-term standard. In the case of nitrogen dioxide (NO_2), the short-term standard is for a 1-hour averaging period, whereas for fine particulates (PM_{10}) it is for a 24-hour averaging period. These periods reflect the varying impacts on health of differing exposures to pollutants (e.g. temporary exposure on the pavement adjacent to a busy road, compared with the exposure of residential properties adjacent to a road).

10.3.8 Many of the objectives in the Air Quality Strategy were made statutory in England with the Air Quality (England) Regulations 2000[1] and the Air Quality (England) (Amendment) Regulations 2002[2] (the Regulations) for the purpose of Local Air Quality Management.

10.3.9 The Air Quality Standards Regulations 2010[3] have adopted into UK law the limit values required by EU Directive 2008/50/EC and came into force on 10 June 2010. These regulations prescribe the 'relevant period' (referred to in Part I2V of the Environment Act 1995) that local authorities must consider in their review of the future quality of air within their area. The regulations also set out the air quality objectives to be achieved by the end of the 'relevant period'.

10.3.10 Ozone is not included in the Regulations as, due to its trans-boundary nature, mitigation measures must be implemented at a national level rather than at a local authority level.

10.3.11 The Air Quality Objectives (AQO) and EU limit values for the pollutants considered in the assessment are presented in **Table 10.1**.

[1] The Air Quality (England) Regulations 2000 - Statutory Instrument 2000 No.928
[2] The Air Quality (England) (Amendment) Regulations 2002 - Statutory Instrument 2002 No.3043
[3] The Air Quality Standards Regulations 2010 – Statutory Instrument 2010 No. 1001

Table 10.1 Air Quality Standards and Objectives

Pollutant	Standard (µg/m³)	Averaging Period	Number of Exceedences Permitted per Annum
Nitrogen Dioxide (NO_2)	40 (a)	Annual	n/a
	200 (a)	1-Hour	18
Particulate Matter (as PM_{10})	40 (a)	Annual	n/a
	50 (a)	24-Hour	35
Particulate Matter (as $PM_{2.5}$)	25 (b)	Annual	n/a

(a) Air Quality Regulations 2010

(b) Directive 2008/50/EC

Local Air Quality Management (LAQM)

10.3.12 Part IV of the Environment Act 1995 also requires local authorities to periodically review and assess the quality of air within their administrative area. The reviews have to consider the present and future air quality and whether any air quality objectives prescribed in Regulations are being achieved or are likely to be achieved in the future.

10.3.13 Where any of the prescribed air quality objectives are not likely to be achieved the authority concerned must designate that part an Air Quality Management Area (AQMA).

10.3.14 For each Air Quality Management Area, the local authority has a duty to draw up an Air Quality Action Plan setting out the measures the authority intends to introduce to deliver improvements in local air quality in pursuit of the air quality objectives. Local authorities are not statutorily obliged to meet the objectives, but they must show that they are working towards them.

10.3.15 Defra has published technical guidance for use by local authorities in their review and assessment work4. This guidance, referred to in this chapter as LAQM.TG (09), has been used where appropriate in the assessment.

National Planning Policy Framework (2012)

10.3.16 The National Planning Policy Framework (NPPF) sets out the Government's planning policies for England and how these are expected to be applied. It replaces Planning

[4] Department for Environment, Food and Rural Affairs (DEFRA), (2009): Part IV The Environment Act 1995 Local Air Quality Management Review and Assessment Technical Guidance LAQM.TG(09).

Policy Statement 23: Planning and Pollution Control, which provided planning guidance for local authorities with regards to air quality.

10.3.17 At the heart of the NPPF is a presumption in favour of sustainable development. It requires Local Plans to be consistent with the principles and policies set out in the Framework with the objective of contributing to the achievement of sustainable development.

10.3.18 Current planning law requires that applications for planning permission must be determined in accordance with the relevant development plan (i.e. Local Plan or Neighbourhood Plan). The NPPF should be taken into account in the preparation of development plans and therefore the policies set out within the Framework are a material consideration in planning decisions.

10.3.19 The NPPF identifies 12 core planning principles that should underpin both plan-making and decision-taking, including a requirement for planning to 'contribute to conserving and enhancing the natural environment and reducing pollution'.

10.3.20 Paragraph 109 of the NPPF requires the planning system to:

"prevent both new and existing developments from contributing to or being put at unacceptable risk or being adversely affected by unacceptable levels of air pollution"

10.3.21 In dealing specifically with air quality, the NPPF states that:

"planning decisions should ensure that any new development in Air Quality Management Areas is consistent with the local air quality action plan".

National Planning Practice Guidance (NPPG)

10.3.22 The NPPG, published in March 2014, outlines the principles upon which the planning process can take account of air quality impacts associated with new developments[5]. It outlines the role of Local Plans in promoting sustainability and providing limitations on development in areas of poor air quality. An emphasis is placed on consultation with the planning authority to determine whether there are any local issues with the potential to affect the scope of an air quality assessment. Typical air quality mitigation measures are outlined highlighting the use of planning conditions and funding obligations to off-set any significant impacts.

[5] Accessed at: http://planningguidance.planningportal.gov.uk/blog/guidance/air-quality/

Control of Dust and Particulates Associated with Construction

10.3.23 Section 79 of the Environmental Protection Act (1990) states that where a statutory nuisance is shown to exist, the local authority must serve an abatement notice. Statutory nuisance is defined as:

"Any dust or other effluvia arising on industrial, trade or business premises and being prejudicial to health or a nuisance"; and,

"*any accumulation or deposit which is prejudicial to health or a nuisance".*

10.3.24 Failure to comply with an abatement notice is an offence and if necessary, the local authority may abate the nuisance and recover expenses.

10.3.25 In the context of the proposed development, the main potential for nuisance of this nature will arise during the construction phase – potential sources being the clearance, earthworks, construction and landscaping processes.

10.3.26 There are no statutory limit values for dust deposition above which 'nuisance' is deemed to exist – 'nuisance' is a subjective concept and its perception is highly dependent upon the existing conditions and the change which has occurred. However, research has been undertaken by a number of parties to determine community responses to such impacts and correlate these to dust deposition rates.

Regional

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

10.3.27 Policy 7.14 of the London Plan sets out the Mayor of London's commitment to improving air quality and public health. It states that development proposals should 'minimise increased exposure to poor air quality' by:

- Promoting sustainable transport;
- Promoting sustainable design and construction;
- Being air quality neutral, particularly in AQMAs;
- Ensuring that where a potential impact on air quality is identified, appropriate mitigation measures are proposed which demonstrate a clear benefit to local air quality; and
- Providing detailed air quality assessments for non-transport sources such as on-site biomass boilers and combined heat and power (CHP) plants to assess the potential impact of emissions on air quality.

The Mayor of London's Air Quality Strategy (2010)

10.3.28 The Mayor of London's Air Quality Strategy outlines the Mayor's commitment to improving air quality in London. The objective of the plan is to significantly reduce NO_2 and PM_{10} concentrations through a number of measures including:

- Ensuring all buses meet Euro IV emission standards;
- Introducing age limits for taxis and Private Hire Vehicles to remove older, more polluting vehicles from the roads;
- Including large vans and minibuses in the Low Emission Zone (LEZ)
- Introducing a new NOx standard in the LEZ; and
- Working with Borough to implement traffic management strategies to reduce congestion.

The Mayor of London's Draft Supplementary Planning Guidance on the Control of Dust and Emissions during Construction and Demolition (2013)

10.3.29 The Mayor of London's Draft Supplementary Planning Guidance was published for public consultation in September 2013. It replaces the Best Practice Guidance, published by the London Councils and Mayor of London in 2006.

10.3.30 The guidance describes the methodology for undertaking assessments of construction phase dust impacts, in accordance with the policies set out in the London Plan and Mayor of London's Air Quality Strategy.

Local

The London Borough of Richmond-upon-Thames Review and Assessment of Air Quality

10.3.31 LBRuT carries out frequent review and assessments of air quality within the area and produces Updating and Screening Assessments and Progress Reports in accordance with the requirements of Defra.

10.3.32 Routine monitoring of NO_2 and PM_{10} concentrations within the Borough have identified a large number of areas where the annual mean air quality objectives are exceeded. As a consequence, the Council have declared a borough wide AQMA; consequently the proposed development lies within the designated area.

10.3.33 LBRuT's Air Quality Action Plan (2002) outlines the Council's commitment to improving air quality in the Borough. The key objectives of the plan are to reduce PM_{10} and NO_2 concentrations by:

- Pursuing land-use policies that ensure that new developments are accessible to public transport;
- Traffic management strategies to reduce congestion in 'hot spots' and manage HGV movements through the Borough;
- Promoting Travel Plans to businesses, schools and the Council (low emission vehicle fleets, public transport, cycling and walk to school initiatives); and,
- Encouraging the use of clean fuels and technologies and promoting energy efficiency to reduce fossil fuel usage.

10.3.34 The Action Plan draws on European and National legislation in conjunction with national, regional and local policy to manage and improve air quality across the Borough.

The London Borough of Richmond-upon-Thames Core Strategy and Air Quality Action Plan

10.3.35 Policies relating to improving air quality are contained within the LBRuT's Core Strategy (2009). In particular policy CP1 (Sustainable Development) states that:

"*Local environmental impacts of development with respect to factors such as noise, air quality and contamination should be minimised*".

10.4 ASSESSMENT METHODOLOGY

Evaluation of Effects

10.4.1 A summary of the likely effects of the proposed development on local air quality and the proposed assessment methodology is presented in **Table 10.2**.

Table 10.2 Summary of Air Quality Impacts

Likely Effect	Description	Nature of Effect	Assessment Methodology
Construction Dust (Ecological)	Dust deposition to local habitat sites	Temporary	Institute of Air Quality Management (IAQM) Construction Dust Guidance[6]
Construction Dust (Soiling)	Dust deposition to buildings and parked vehicles		
Construction Dust (Human Health)	Increase in local airborne PM_{10} concentrations		
Construction Traffic	Increase in local NO_2, PM_{10} and $PM_{2.5}$ concentrations	Temporary	Dispersion modelling using ADMS-Roads. Significance of effects assessed in accordance with Environmental Protection UK (EPUK)/ IAQM planning guidance[7]
Operational Traffic	Increase in local NO_2, PM_{10} and $PM_{2.5}$ concentrations	Permanent	

Construction Dust Methodology

10.4.2 To assess the potential impacts associated with dust and PM_{10} releases during the construction phase and to determine any necessary mitigation measures, an assessment based on the latest guidance from the Institute of Air Quality Management (IAQM)[6] has been undertaken.

10.4.3 This approach divides construction activities into the following dust emission sources:

- Demolition;
- Earthworks;
- Construction; and,
- Trackout.

10.4.4 The risk of dust effects (low, medium or high) is determined by the scale (magnitude) and nature of the works and the proximity of sensitive human and ecological receptors.

10.4.5 The IAQM guidance recommends that an assessment be undertaken where there are sensitive human receptors:

[6] Guidance on the assessment of dust from demolition and construction, IAQM, February 2014

[7] Land-use Planning and Development Control: Planning for Air Quality, Guidance from Environmental Protection UK and the Institute of Air Quality Management for the consideration of air quality within the land-use planning and development control process, May 2015.

- Within 350 m of the site boundary; or
- Within 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance(s).

10.4.6 An assessment should also be carried out where there are dust-sensitive ecological receptors:

- Within 50 m of the site boundary; or
- Within 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance(s).

10.4.7 The significance of the dust effects is based on professional judgement, taking into account the sensitivity of receptors and existing air quality.

10.4.8 The magnitude of the dust impacts for each source is classified as small, medium or large depending on the scale of the proposed works. **Table 10.3** summarises the IAQM criteria that may be used to determine the magnitude of the dust emission. These criteria are used in combination with site specific information and professional judgement.

Table 10.3 Dust Emission Magnitude Criteria

Source	Large	Medium	Small
Demolition	• Total building volume >50,000m³ • Potentially dusty material (e.g. concrete) • Onsite crushing and screening • Demolition activities >20m above ground level.	• Total building volume 20,000 - 50,000m³ • Potentially dusty material • Demolition activities 10 - 20m above ground level.	• Total building volume <20,000m³ • Construction material with low potential for dust release • Demolition activities <10m above ground level • Demolition during wetter months
Earthworks	• Total site area >10,000m² • Potentially dusty soil type (e.g. clay) • >10 heavy earth moving vehicles active at any one time • Formation of bunds >8m in height • Total material moved >100,000 tonnes	• Total site area 2,500 - 10,000m² • Moderately dusty soil type (e.g. silt) • - 10 heavy earth moving vehicles active at any one time • Formation of bunds 4 - 8m in height • Total material moved 20,000 - 100,000 tonnes	• Total site area <2,500m² • Soil type with large grain size (e.g. sand) • <5 heavy earth moving vehicles active at any one time • Formation of bunds <4m in height • Total material moved <20,000 tonnes • Earthworks during wetter months
Construction	• Total building volume >100,000m³ • On site concrete batching • Sandblasting	• Total building volume 25,000 - 100,000m³ • Potentially dusty construction material (e.g. concrete) • On site concrete batching	• Total building volume <25,000m³ • Material with low potential for dust release (e.g. metal cladding or timber)
Trackout	• >50 HDV movements in any one day (a) • Potentially dusty surface material (e.g. high clay content) • Unpaved road length >100m	• 10 - 50 HDV movements in any one day (a) • Moderately dusty surface material (e.g. silt) • Unpaved road length 50 - 100m	• <10 HDV movements in any one day (a) • Surface material with low potential for dust release • Unpaved road length <50m
(a) HGV movements refer to outward trips (leaving the site) by vehicles of over 3.5 tonnes			

Source: IAQM Guidance 2014

10.4.9 Factors defining the sensitivity of a receptor are presented in **Table 10.4**. The sensitivity of a receptor will also depend on a number of additional factors including any history of dust generating activities in the area, likely cumulative dust impacts from nearby construction sites, any pre-existing screening such as trees or buildings

and the likely duration of the impacts. In addition, the influence of the prevailing wind direction and local topography may be of relevance when determining the sensitivity of a receptor.

10.4.10 The sensitivity of the area as a whole to dust soiling and health impacts is dependent on the number of receptors within each sensitivity class and their distance from the source. In addition, human health impacts are dependent on the existing PM_{10} concentrations in the area. **Table 10.5** and **Table 10.6** summarise the criteria for determining the overall sensitivity of the area to dust soiling and health impacts respectively. The sensitivity of the area to ecological impacts is presented in **Table 10.7**.

10.4.11 For each dust emission source (demolition, construction, earthworks and trackout), the worst-case area sensitivity is used in combination with the dust emission magnitude to determine the risk of dust impacts. The risk of dust impacts prior to mitigation for each emission source is presented in **Table 10.8** and **Table 10.9**.

10.4.12 The IAQM guidance provides a range of mitigation measures which are dependent on the level of dust risk attributed to the Site. Site specific mitigation measures are also included where appropriate.

10.4.13 The significance of the residual impacts following appropriate mitigation is determined by professional judgement.

Table 10.4 Factors Defining the Sensitivity of a Receptor

Sensitivity	Human Health	Dust Soiling	Ecological
High	• Locations where members of the public are exposed over a time period relevant to the air quality objectives for PM_{10} (a) • Examples include residential dwellings, hospitals, schools and residential care homes.	• Regular exposure • High level of amenity expected. • Appearance, aesthetics or value of the property would be affected by dust soiling. • Examples include residential dwellings, museums, medium and long-term car parks and car showrooms.	• Nationally or Internationally designated site with dust sensitive features (b) • Locations with vascular species (c)
Medium	• Locations where workers are exposed over a time period relevant to the air quality objectives for PM_{10} (a) • Examples include office and shop workers (d)	• Short-term exposure • Moderate level of amenity expected • Possible diminished appearance or aesthetics of property due to dust soiling • Examples include parks and places of work	• Nationally designated site with dust sensitive features (b) • Nationally designated site with a particularly important plant species where dust sensitivity is unknown
Low	• Transient human exposure • Examples include public footpaths, playing fields, parks and shopping streets	• Transient exposure • Enjoyment of amenity not expected. • Appearance and aesthetics of property unaffected • Examples include playing fields, farmland (e), footpaths, short-term car parks and roads	• Locally designated site with dust sensitive features (b)

(a) In the case of the 24-hour objective, a relevant location would be one where individuals may be exposed for eight hours or more in a day.

(b) Ecosystems that are particularly sensitive to dust deposition include lichens and acid heathland (for alkaline dust, such as concrete).

(c) Cheffing C. M. & Farrell L. (Editors) (2005), The Vascular Plant. Red Data List for Great Britain, Joint Nature Conservation Committee.

(d) Does not include workers exposure to PM_{10} as protection is covered by Health and Safety at Work legislation.

(e) Except commercially sensitive horticulture.

Source: IAQM Guidance 2014

Table 10.5 Sensitivity of the Area to Dust Soiling Effects on People and Property

Sensitivity of Area	Number of Receptors	Distance from the Source			
		<20m	<50m	<100m	<350m
High	>100	High	High	Medium	Low
	10-100	High	Medium	Low	Low
	1-10	Medium	Low	Low	Low
Medium	>1	Medium	Low	Low	Low
Low	>1	Low	Low	Low	Low

Source: IAQM Guidance 2014

Table 10.6 Sensitivity of the Area to Human Health Impacts from Dust

Sensitivity of Area	Annual Mean PM_{10}	Number of Receptors	Distance from the Source				
			<20m	<50m	<100m	<200m	<350m
High	>32	>100	High	High	High	Medium	Low
		10-100	High	High	Medium	Low	Low
		1-10	High	Medium	Low	Low	Low
	28 - 32	>100	High	High	Medium	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	High	Medium	Low	Low	Low
	24 - 28	>100	High	Medium	Low	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	<24	>100	Medium	Low	Low	Low	Low
		10-100	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Medium	-	>10	High	Medium	Low	Low	Low
	-	1-10	Medium	Low	Low	Low	Low
Low	-	>1	Low	Low	Low	Low	Low

Source: IAQM Guidance 2014

Table 10.7 Sensitivity of the Area to Ecological Impacts from Dust

Receptor Sensitivity	Distance from the Source	
	<20m	<50m
High	High	Medium
Medium	Medium	Low
Low	Low	Low

Source: IAQM Guidance 2014

Table 10.8 Risk of Dust Impacts – Demolition, Earthworks and Construction

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Medium Risk
Medium	High Risk	Medium Risk	Low Risk
Low	Medium Risk	Low Risk	Negligible

Source: IAQM Guidance 2014

Table 10.9 Risk of Dust Impacts – Trackout

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Low Risk	Negligible
Low	Low Risk	Low Risk	Negligible

Source: IAQM Guidance 2014

Construction and Operational Traffic

10.4.14 The recently published Environmental Protection UK (EPUK)/ IAQM planning guidance[7], states that within an AQMA a detailed air quality assessment is required where:

- There is a change in the annual average daily traffic (AADT) flow of light goods vehicles (LGV) flow of more than 100 vehicles;
- There is a change in the AADT flow of heavy goods vehicles (HGV) of more than 25 vehicles;
- There is a change in the road-realignment by more than 5m; and
- A new junction is introduced, which will significantly alter vehicle speeds.

10.4.15 A summary of the baseline, construction and operational phase annual average daily traffic flows on road links affected by the REEC development is presented in **Tables 10.10**, **10.11**, **10.12** and **10.13.**

10.4.16 The baseline annual average daily traffic flows have been derived from a recent automated traffic count survey (described in Chapter 8 - Transport). The future baseline traffic flows include traffic associated with other committed developments in the area.

10.4.17 The following scenarios have been considered in the assessment:

- 2014 existing baseline;
- 2019 baseline (anticipated completion year);
- 2019 baseline + peak construction phase traffic + operational phase traffic prior to completion of residential phase 2;
- 2019 baseline + maximum operational phase traffic;
- 2034 baseline (15 years after completion); and
- 2034 baseline + maximum operational phase traffic.

Table 10.10 Existing Baseline Annual Average Daily Traffic Flows (2014)

Road Link	**Baseline**	
	LDV	**HGV**
A316 EB	20,279	2,698
A316 WB	20,225	2,077
B361 Whitton Road	8,740	733
Court Way	870	44
Langhorn Drive	1,552	382

Table 10.11 2019 Baseline, Construction and Operational Phase Annual Average Daily Traffic Flows

Road Link	Baseline		Baseline + Operational (a)+ Construction		Change in Flow (b)	
	LDV	HGV	LDV	HGV	LDV	HGV
A316 EB	21,008	2,789	21,758	2,831	750	42
A316 WB	20,951	2,147	21,515	2,187	564	40
B361 Whitton Road	9,389	765	9,572	759	183	-6
Court Way	899	45	785	35	-114	-10
Langhorn Drive	1,603	395	2,892	471	1,289	76
(a) Residential phase 2 traffic not included. (b) Change in flow compared with the future baseline.						

Table 10.12 2019 Baseline and Maximum Operational Phase Annual Average Daily Traffic Flows (Completion Year)

Road Link	Baseline		Baseline + Operational		Change in Flow (a)	
	LDV	HGV	LDV	HGV	LDV	HGV
A316 EB	21,008	2,789	21,926	2,822	918	33
A316 WB	20,951	2,147	21,682	2,178	731	31
B361 Whitton Road	9,389	765	9,658	755	269	-10
Court Way	899	45	785	35	-114	-10
Langhorn Drive	1,603	395	3,228	453	1,625	58
(a) Change in flow compared with the future baseline.						

Table 10.13 2034 Baseline and Operational Annual Average Daily Traffic Flows (15 Years Post Completion)

Road Link	Baseline		Baseline + Operational		Change in Flow (a)	
	LDV	HGV	LDV	HGV	LDV	HGV
A316 EB	22,584	2,998	23,502	3,031	918	33
A316 WB	22,522	2,308	23,253	2,339	731	31
B361 Whitton Road	10,068	822	10,336	812	268	-10
Court Way	966	49	852	39	-114	-10
Langhorn Drive	1,724	424	3,348	483	1,624	59
(a) Change in flow compared with the future baseline.						

10.4.18 The data show that the proposed development is expected to reduce the traffic flow on Court Way, therefore this road link has been scoped out of the assessment.

10.4.19 In accordance with the EPUK / IAQM guidance, a detailed assessment has been undertaken using the ADMS-Roads model to quantify the impact of traffic associated with the development at sensitive receptor locations close to the A316, Whitton Road and Langhorn Drive.

10.4.20 ADMS-Roads, a version of the Atmospheric Dispersion Modelling System (ADMS), is a PC based model for simulating the dispersion in the atmosphere of pollutants released from industrial and road traffic sources in urban areas. The model simulates the dispersion of emissions using point, line, area and volume source models. It is designed to allow consideration of dispersion problems ranging from simple (e.g. a single isolated point source or a single road) to complex problems (e.g. multiple industrial and road traffic emissions over a large area).

10.4.21 The model uses detailed information regarding traffic flows on the local road network and local meteorological conditions to predict pollution concentrations at specific locations selected by the user. Meteorological data for 2013 from Heathrow Airport Meteorological Station (approximately 6 km west of the REEC development) has been used for the assessment.

10.4.22 The model has been used to predict concentrations of oxides of nitrogen (NO_x) and particulate matter (as PM_{10} and $PM_{2.5}$) at selected receptors using emission factors for the relevant year from version 6.0.1 of the Emissions Factors Toolkit (EFT)[8]. The EFT

[8] http://laqm.defra.gov.uk/review-and-assessment/tools/emissions-factors-toolkit.html

only contains vehicle emission factors up to 2030, therefore the 2030 factors have been used for the 2034 predictions.

10.4.23 Predicted concentrations of NOx have been converted to NO_2 using version 4.1 of the calculator provided on the Defra air quality website[9] .

10.4.24 A summary of the input parameters to the ADMS-Roads Model is presented in **Appendix 10.1**.

10.4.25 LAQM.TG (09) recommends that modelled concentrations should be within 25% of monitored concentrations, ideally within 10%. Where there is a large discrepancy between modelled and measured concentrations, it is considered necessary to adjust the model results to more accurately reflect local air quality.

10.4.26 The modelled 2014 NO_2 baseline concentrations have been verified using recent concentrations measured by diffusion tube on the A316 Chertsey Road, approximately 75m east of the proposed development. Full details of the model verification process are provided in **Appendix 10.2**.

10.4.27 A quantitative assessment of the effects of construction and operational traffic emissions on air quality at sensitive receptor locations has been completed against the current statutory standards set out in **Table 10.1**.

10.4.28 The contribution of vehicle emissions to local pollutant concentrations declines rapidly from the kerbside to imperceptible levels by 200m. There are a number of residential receptors in close proximity to the above road links; these are identified as sensitive receptors in Section 10.5.

Significance of Effects

10.4.29 The EPUK / IAQM planning guidance sets out descriptors for evaluating the significance of a predicted impact at individual receptor locations; these criteria are presented in **Table 10.14**.

[9] http://laqm.defra.gov.uk/tools-monitoring-data/no-calculator.html.

Table 10.14 Impact Descriptors for Individual Receptors

Long-term average concentration at receptor in assessment year	% Change in Concentration relative to Air Quality Assessment Level (AQAL)			
	1%	2 – 5%	6 – 10%	>10%
75% or less of AQAL	Negligible	Negligible	Minor	Moderate
76 – 94% of AQAL	Negligible	Minor	Moderate	Moderate
95 – 102% of AQAL	Minor	Moderate	Moderate	Major
103 – 109% of AQAL	Moderate	Moderate	Major	Major
110% or more of AQAL	Moderate	Major	Major	Major

10.4.30 The guidance states that percentage changes in concentration, relative to the air quality assessment level (AQAL), of less than 1%, but greater than or equal to 0.5%, should be rounded up to 1%. Changes of less than 0.5% are described as 'negligible'.

10.4.31 The overall significance of a proposed development is determined by professional judgement, taking into account the significance at individual receptors and other factors such as the number of people or properties that will be exposed to a change in air quality.

Limitations of Assessment

10.4.32 There is an inherent level of uncertainty associated with any assessment process, however the methodology presented has been developed to minimise errors where possible. Potential errors in predicted traffic impacts due to uncertainties in the traffic assessment source activity data (e.g. vehicle flows and emission factors) and the estimated background concentration are minimised by the verification of modelled concentrations using local monitoring data. The air quality assessment used information from the Site Building Zones Parameter Plan and the Illlustrative Masterplan.

10.5 BASELINE

Introduction

10.5.1 This section presents the baseline pollutant concentrations for the REEC development and the surrounding sensitive receptors.

Current Baseline

Local Monitoring Data

10.5.2 LBRuT undertake a comprehensive air quality monitoring programme to ascertain

concentrations of key pollutants in the Borough. There are four automatic monitoring stations (three static, one mobile) in the Borough, including a suburban site in Teddington, which is run by the National Physical Laboratory (NPL) and affiliated to the DEFRA Automatic Urban and Rural Monitoring Network (AURN). These sites continuously monitor concentrations of NO_2 and PM_{10}, with the exception of the AURN site (NO_2 only).

10.5.3 The nearest automatic monitoring site to the proposed development is the Teddington AURN (2.4km south), which is a suburban background site. Annual mean concentrations measured at this location are within the air quality objective of 40 µg/m^3. There have also been no recorded exceedences of the 1-hour mean objective in recent years.

10.5.4 An extensive network of passive diffusion tubes also monitors ambient NO2 concentrations, largely at kerbside or roadside locations. A summary of annual mean NO_2 concentrations measured in the vicinity of the Site and at urban background locations between 2010 and 2013 is presented in **Table 10.15**.

Table 10.15 Annual Mean NO_2 Concentration Measured in in LBRuT (µg/m^3)

Site ID	Location	Type (a)	2010	2011	2012	2013	2014
13	Whitton Road, Whitton	K	53	42	48	48	45
31	A316 (near Chudleigh Road)	R	53	50	59	61	60
59	Whitton Road, Twickenham	K	n/a	n/a	44	46	41
RUT03	Alexandra Hall, Cromwell Place, Mortlake	UB	29	29	n/a	n/a	n/a
RUT04	Waldegrave Road, Teddington	UB	29	29	n/a	n/a	n/a
28	Holly Lodge, Richmond Park	UB	24	20	22	21	20
AQMS	NPL – Teddington AURN	S	24	21	36	21	27
(a) K = Kerbside, R = Roadside, UB = Urban Background, SB = Suburban							

10.5.5 The nearest monitoring location to the proposed development is a roadside diffusion tube on the A316 Chertsey Road, approximately 75m from the north-eastern site

boundary. Concentrations measured at this location significantly exceed the annual mean air quality objective, however the tube is situated 1.0m from the kerb and does not represent relevant exposure. LBRuT have used the data to estimate the concentration at the nearest residential receptor façade (6.4m from the kerb), which also indicates an exceedence of the annual mean air quality objective.

10.5.6 The data presented in **Table 10.15** suggest that annual mean NO_2 concentrations away from main roads (urban background locations) are well within the air quality objective.

10.5.7 The automatic monitoring data presented in LBRuT 2013 Progress Report indicate that there have been no recorded exceedences of the long or short-term air quality objectives for PM_{10} in Richmond upon Thames in recent years. Annual mean roadside PM_{10} concentrations measured by the LBRuT mobile air quality monitoring station and permanent site at Castelnau between 2010 and 2012 were up to 70% of the air quality objective.

10.5.8 The nearest particulate monitoring site to the REEC development is the Teddington AURN, which measures suburban $PM_{2.5}$ concentrations. The data indicate that annual mean concentrations are between 45 and 70% of the EU limit value. Urban background concentrations of PM_{10} measured at the London Wetlands Centre in Barnes (a suburban site, approximately 7.5 km east-northeast of the REEC development) are around 50% of the annual mean air quality objective.

10.5.9 With regards to air quality at the proposed development site, the highest pollutant concentrations are expected to occur at the site boundary with the A316, where it is possible that there will be exceedences of the annual mean air quality objective for NO2. The Parameter Plans (see Appendix 5.1 in Chapter 5 – Proposed Development) for the REEC development indicates that the buildings adjacent to the A316 will comprise business and education facilities and therefore short-term impacts will be of primary concern.

10.5.10 Research has concluded[10] that exceedences of the 1-hour mean air quality objective may occur where annual mean concentrations are over 60 µg/m^3. Annual mean concentrations at the Chertsey Road monitoring site in 2012 and 2013 were 59 µg/m^3 and 61 µg/m^3 respectively indicating that there may be exceedences of the short-term air quality objective close to the roadside. However, since the façade of the proposed development would be set back from the road, compliance with the air quality objective is likely to be achieved.

10.5.11 The proposed residential development would adjoin Egerton Road, which is a

[10] D. Laxen and B Marner (2003) Analysis of the relationship between 1-hour and annual mean nitrogen dioxide at UK roadside and kerbside monitoring sites

comparatively minor road. Existing annual mean NO_2 and PM_{10} concentrations at this location are likely to be well within the air quality objective.

Defra Mapped Background Pollutant Concentrations

10.5.12 In the absence of background monitoring sites in the vicinity of the proposed development, pollutant concentrations for use in the assessment have been obtained from the Defra UK Background Air Pollution maps[11]. These 1 km grid resolution maps are derived from a complex modelling exercise that takes into account emissions inventories and measurements of ambient air pollution from both automated and non-automated sites.

10.5.13 The latest background maps for NO_2, PM_{10} and $PM_{2.5}$ were issued in June 2014 and are based on 2011 monitoring data. DEFRA guidance issued in conjunction with the new background maps[12] suggests that unusually high particulate concentrations were measured in 2011. A scaling factor of 0.91 is provided to adjust the mapped concentrations to more typical levels.

10.5.14 A summary of the 2014 annual mean mapped background concentrations is presented in **Table 10.16**. The concentrations were derived from contour plots of the mapped data to determine the maximum at the Site and sensitive receptor locations.

Table 10.16 Annual Mean Mapped Background Concentrations in the vicinity of the REEC development for 2014 (µg/m³)

Pollutant	Annual Mean	Air Quality Standard
NO_2	26.3	40
PM_{10}	18.6	40
$PM_{2.5}$	13.0	25

10.5.15 The mapped data indicate that existing background concentrations of NO_2, PM_{10} and $PM_{2.5}$ are well within the relevant air quality standards.

10.5.16 To determine the likely validity of the mapped data, the 2014 NO_2 concentration for Holly Lodge (diffusion tube 28) was obtained for comparison with the measured concentrations. The mapped background concentration at Holly Lodge is 21 µg/m³, which is in excellent agreement with the measured concentrations presented in **Table 10.15**. On this basis it is considered that the mapped data provides a

[11] http://uk-air.defra.gov.uk/data/laqm-background-home

[12] http://laqm.defra.gov.uk/documents/Background-maps-user-guide-v1.0.pdf

reasonable estimate of background pollutant concentrations in the vicinity of the proposed development.

Future Baseline

10.5.17 There is no underlying trend in the measured urban background concentrations which would suggest that a reduction in background pollutant concentrations is likely to occur in the future. On this basis, the 2014 mapped background concentrations are assumed to be representative of future assessment years.

Baseline Limitations

10.5.18 Ideally a detailed assessment of air quality impacts would utilise background concentrations measured in close proximity to the proposed development. The use of mapped background concentrations introduces an element of uncertainty; however a comparison with measured concentrations at Holly Lodge indicates that the concentrations are likely to be reasonably representative of the actual background concentrations in the vicinity of the Site.

10.6 SENSITIVE RECEPTORS

10.6.1 LAQM.TG(09) describes in detail typical locations where consideration should be given to pollutants defined in the Regulations. Generally, the guidance suggests that all locations 'where members of the public are regularly present' should be considered. At such locations, members of the public will be exposed to pollution over the time that they are present, and the most suitable averaging period of the pollutant needs to be used for assessment purposes.

10.6.2 For instance, on a footpath, where exposure will be transient (for the duration of passage along that path) comparison with short-term standard (i.e. 15-minute mean or 1-hour mean) may be relevant. In a school, or adjacent to a private dwelling, however; where exposure may be for longer periods, comparison with long-term (such as 24-hour mean or annual mean) standards may be most appropriate.

10.6.3 For the completion of this assessment, consideration of the potential impacts of the REEC development on local air quality has been undertaken by predicting pollutant concentrations at existing receptors in close proximity to the road links considered. In addition, several receptors have been chosen within the proposed development representing the facades of the Tech-Hub, the main college/ school buildings and outdoor games area.

10.6.4 The locations of the receptors and details of the locations for the assessment are presented in and **Figure 10.1** and **Table 10.17** respectively.

Legend

1 Air Quality Sensitive Receptors

N

CASCADE

0 100m

Note: All locations are approximate

Project Title:
Richmond Education and Enterprise Campus Development

Figure Title:
Air Quality Sensitive Receptors

For Information Only

Figure Number:	Date:
Figure 10.1	June 2015

Table 10.17 Sensitive Receptors

ID	Receptor	OS Grid Reference	
		Easting	Northing
1	29 Kendrey Gardens	515100	173906
2	42 Chudleigh Road	515464	174058
3	Twickenham Guest House	515611	174069
4	117 Whitton Road	515656	174057
5	74 Whitton Road	515833	173935
6	College Building Zone 1	515331	173953
7	Schools Building Zone	515367	173904
8	Tech-Hub Building Zone	515212	173892
9	College Building Zone 2	515262	173855
10	School Development Zone: Outdoor Games Area	515296	173873

10.8 IMPACT ASSESSMENT

Site Enabling, Demolition and Construction Dust

Introduction

10.8.1 The REEC development is situated in a built up area adjacent to existing residential areas and Harlequins FC's Twickenham Stoop. Construction works at the site will be undertaken in three phases, as set out in Chapter 6, **Table 6.2**. The remodelling of the Langhorn Road/ Chertsey Road junction will be undertaken in Phase 3.

10.8.2 The assessment of dust impacts has been based on the proximity of the most sensitive receptors to the construction works. A summary of the receptor sensitivity and corresponding area sensitivity to health and dust soiling impacts is presented for each phase in **Table 10.18**.

10.8.3 There are two locally designated sites of importance for nature conservation (SINC) within 50m of the Site; Duke of Northumberland's River South of Knellar Road Borough SINC and Twickenham Junction Rough Local SINC. Both sites are considered to be of low sensitivity to dust impacts according to IAQM dust guidance.

Table 10.18 Sensitivity of Receptors and the Local Area to Human Health and Dust Soiling Impacts

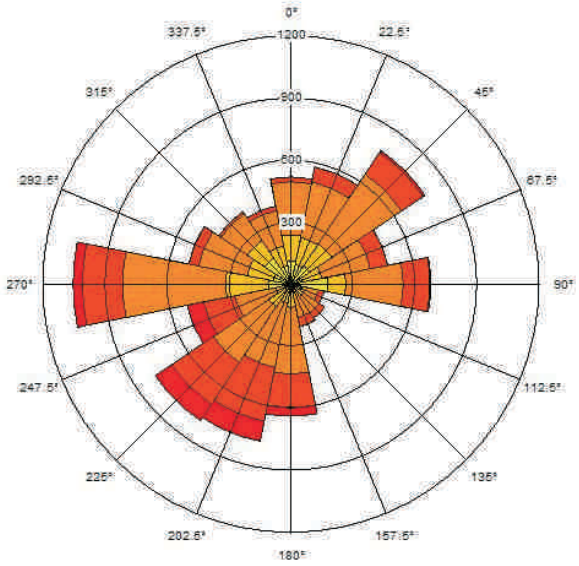
Receptor	Distance from Construction Works	Number of Receptors	Health Impacts		Dust Soiling	
			Receptor	Area	Receptor	Area
Phase 1						
Site users (existing college) and car parking	<20m	-	High	Low	High	High
Residential properties on Egerton Road, Heathfield North, Heathfield South, Court Way, Craneford Way and Heatham Park	<20m	<50	High	Low	High	High
Twickenham Stoop car park and Nuffield Health Club	<20m	-	Low	Low	High	High
Allotments	<20m	-	Low	Low	Medium	Medium
Play Area/ Open Space (Craneford Way playing fields)	<20m	-	Low	Low	Low	Low
Overall Sensitivity of the Area during Phase 1			**Low**		**High**	
Phase 2						
Site users (including new college and schools) and car parking	<20m	-	High	Low	High	High
Residentialproperties on Heathfield South, Court Way and Craneford Way)	<20m	<30	High	Low	High	High
Twickenham Stoop car park and Nuffield Health Club	<20m	-	Low	Low	Medium	Medium
Play Area/ Open Space (Craneford Way playing fields)	<20m	-	Low	Low	Low	Low
Overall Sensitivity of the Area During Phase 2			**Low**		**High**	

Receptor	Distance from Construction Works	Number of Receptors	Health Impacts		Dust Soiling	
			Receptor	Area	Receptor	Area
Phase 3						
Site users (including occupants of the first phase of the residential development) and car parking	<20m	50 - 100	High	Low	High	High
Residential properties on Craneford Way and Chertsey Road	<20m	<10	High	Low	High	High
Nuffield Health Club	<20m	-	Low	Low	Medium	Medium
Play Area/ Open Space (Craneford Way playing fields)	<20m	-	Low	Low	Low	Low
Overall Sensitivity of the Area During Phase 3			**Low**		**High**	

10.8.4 The overall sensitivity of the area to dust soiling impacts is high for all three construction phases, however since the annual mean background PM_{10} concentration is less than 50% of the air quality objective the sensitivity of the area to human health impacts is considered to be low.

10.8.5 The precise behaviour of the dust, its residence time in the atmosphere, and the distance it may travel before being deposited will depend upon a number of factors. These include wind direction and strength, local topography and the presence of intervening structures (buildings, etc.) that may intercept dust before it reaches sensitive locations. Furthermore, dust would be naturally suppressed by rainfall.

10.8.6 A wind rose for Heathrow Airport is provided in **Figure 10.2**, which shows that the prevailing wind is from the west and southwest, therefore receptors to the east and northeast of the active construction and demolition areas are the most likely to experience dust impacts from the Site.



Legend

Wind Speed

0	3	6	10	16	Knots
0	1.5	3.1	5.1	8.2	m/s

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Note: Note to Scale

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Figure Title:
Wind Rose Diagram

For Information Only

Figure Number:
Figure 10.2

Date:
June 2015

Predicted Effects

10.8.7 Substantial demolition works will be required as part of the re-development of the Site and as a consequence the magnitude of the dust emission during the demolition phase is considered to be large.

10.8.8 Earthworks will primarily involve excavating material, haulage, tipping and stockpiling. This may also involve levelling of the Site and landscaping. The Site covers an area of approximately 9 ha and it is likely that there will be large numbers of earth moving vehicles on-site and the potential for long-term stockpiling of dusty materials. The magnitude of the dust emission for the earthworks phase is therefore considered to be large.

10.8.9 Dust emissions during construction will depend on the scale of the works, method of construction, construction materials and duration of build. For the purposes of the assessment, it has been assumed that the development will be of standard brick and concrete construction and there is potential for on-site concrete batching to be undertaken on-site. Given the scale of the proposed development, the dust emission magnitude for construction is considered to be large.

10.8.10 Factors influencing the degree of trackout and associated magnitude of effect include vehicle size, vehicle speed, vehicle numbers, geology and duration. Construction traffic will access the site via Langhorn Drive, where there is car parking associated with the Twickenham Stoop and the Nuffield Health Club within a couple of meters of the kerbside. The site is expected to generate up to 24 HGV movements per day, therefore the dust emission magnitude due to trackout is considered to be medium.

10.8.11 A summary of the potential risk of dust impacts, based on the low overall sensitivity of the area to human health impacts, high sensitivity to dust soiling impacts and low sensitivity to ecological impacts is presented in **Table 10.19**.

Table 10.19 Risk of Dust Impacts Prior to Mitigation

Source	Phase	Emission Magnitude	Human Health	Dust Soiling	Ecological
Demolition	1 and 2	Large	Medium	High	Medium
Earthworks	All	Large	Medium	High	Medium
Construction	All	Large	Medium	High	Medium
Trackout	All	Medium	Low	Medium	Low

Mitigation Measures

10.8.12 London Best Practice Guidance for dust control will be implemented, as appropriate, during the construction phase through the contractor's CEMP (see **Appendix 6.1**):

- Locating machinery and dust causing activities away from sensitive receptors;
- Erecting solid barriers around the Site boundary and ensuring these are kept clean at all times;
- Vehicle engines switched off when not in use i.e. no idling vehicles;
- No site runoff of silty water or mud allowed;
- Stockpiles kept for the shortest time possible and if necessary, the use of sprinklers and hoses for dampening of exposed soil and materials employed;
- Providing an adequate supply of water on site where sprinklers and hoses are used for dust suppression;
- Using enclosed chutes and covering skips where possible;
- Observation of wind speed and direction prior to conducting dust-generating activities to assess the potential for dust nuisance to occur, minimising potentially dust-generating activities during periods when wind direction may carry dust into sensitive areas and minimising dust-generating operations during periods of high or gusty winds;
- Stockpiles of soils and materials located as far as possible from sensitive properties, taking account of prevailing wind directions and seasonal variations in the prevailing wind;
- Completed earthworks will be covered or vegetated as soon as is practicable;
- Regular inspection of local highways and site boundaries to check for dust deposits (and removal if necessary);
- Visual inspection of site perimeter to check for dust deposition (evident as soiling and marking) on vegetation, cars and other objects and taking remedial measures if necessary;
- Use of dust-suppressed tools where practicable;
- All construction plant and equipment maintained in good working order;
- Supply adequate equipment on site to clean any dry spillages;
- Use registered waste carriers to remove waste from site using properly sheeted or covered vehicles; and
- No unauthorised burning of any material anywhere on site.

10.8.13 Construction vehicles should be kept clean and sheeted when on public highways. Timing of large-scale vehicle movements to avoid peak hours on the local road network will also be beneficial.

10.8.14 It is recommended that liaison with LBRuT be maintained throughout the

construction process, and any incidents which lead to excessive elevation of dust deposition and / or PM_{10} concentrations at neighbouring sensitive receptors are reported to the Environmental Health Department. If complaints are received from local residents, these will be documented in a diary or log held on site by the Site Manager and acted upon as set out in the outline Construction Environmental Management Plan (CEMP). A nominated member of the construction team (e.g. Site Manager) will also act as a point of contact for residents who may be concerned about elevated deposition of dust.

Residual Effects

10.8.15 Actions to avoid or minimise potential impacts are integral to the design process and included in the CEMP for the proposed development. The significance of likely dust impacts on nearby receptors following the implementation of appropriate and best practice mitigation is therefore considered to be **negligible**.

Monitoring

10.8.16 The effectiveness of the mitigation measures will be monitored through the CEMP for the scheme.

Operational Traffic

Introduction

10.8.17 Annual mean concentrations of NO_2, PM_{10} and $PM_{2.5}$ due to baseline, construction and operational construction traffic emissions have been predicted at the identified sensitive receptor locations presented in **Table 10.17**. The significance of the impact in 2019 and 2034 has been assessed in accordance with the EPUK / IAQM criteria.

Predicted Effects: Nitrogen Dioxide

10.8.18 Predicted existing (2014) annual mean baseline concentrations of NO_2 at the identified sensitive receptor locations are presented in **Table 10.20.** The predicted concentrations indicate that the long-term air quality objective for NO_2 is currently exceeded at the existing sensitive receptors.

10.8.19 Research has concluded[13] that exceedences of the 1-hour mean air quality objective are generally unlikely to occur where annual mean concentrations are less than 60 μg/m^3. The modelled concentrations indicate a possible exceedence of the short-term air quality objective at Twickenham Guest House, which is at the junction of Whitton Road and the A316 Chertsey Road, under baseline conditions.

[13] D. Laxen and B Marner (2003) Analysis of the relationship between 1-hour and annual mean nitrogen dioxide at UK roadside and kerbside monitoring sites.

10.8.20 A contour plot showing the existing annual mean NO_2 concentrations across the REEC development Site is presented in **Figure 10.3**. The 40 µg/m^3 and 60 µg/m^3 contours are highlighted in red and purple respectively. The modelled concentrations within the proposed Site boundary are below 60 µg/m^3, indicating that there is currently unlikely to be an exceedence of the short-term air quality objective at any location on site. The 40 µg/m^3 contour extends approximately 40m into the Site, however since the residential development zone is situated towards the rear (south) of the Site, there will be no long-term public exposure in this area.

Table 10.20 Predicted 2014 Annual Mean NO_2 Concentrations (µg/m^3)

Source	**2014 Baseline**	**Concentration as a percentage of the AQAL (a)**
29 Kendrey Gardens	51.6	129%
42 Chudleigh Road	52.2	130%
Twickenham Guest House	69.0	172%
117 Whitton Road	47.9	120%
74 Whitton Road	41.5	104%
College Building Zone 1	42.3	106%
Schools Building Zone	33.1	83%
Tech-Hub Building Zone	41.3	103%
College Building Zone 2	33.2	83%
School Development Zone: Outdoor Games Area	33.2	83%
(a) Air Quality Assessment Level (AQAL)		

10.8.21 Predicted annual mean NO_2 concentrations for 2019 are presented in **Table 10.21**.

Legend

Predicted NO_2 Concentrations (ug/m^3)

- 60
- 50
- 40
- 30

N

0 100m

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Note: All locations are approximate

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Figure Title:

Predicted 2014 Annual Mean NO_2 Concentrations (ug/m^3)

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Figure Number:	Date:
Figure 10.3	June 2015

Table 10.21 Predicted 2019 Annual Mean NO_2 Concentrations (µg/m³)

Existing Receptors (Maximum Construction Phase Traffic) (a)				
	Baseline	**Baseline + Construction + Operational**	**% Change in Concentration relative to AQAL**	**Impact Significance**
29 Kendrey Gardens	42.5	43.0	1.1%	Moderate
42 Chudleigh Road	44.0	44.5	1.2%	Moderate
Twickenham Guest House	55.6	56.2	1.5%	Moderate
117 Whitton Road	41.0	41.2	0.70%	Moderate
74 Whitton Road	36.6	36.7	0.35%	Negligible
Existing Receptors (Maximum Operational Phase Traffic)				
	Baseline	**Baseline + Operational**	**% Change in Concentration relative to AQAL**	**Impact Significance**
29 Kendrey Gardens	42.5	43.0	1.3%	Moderate
42 Chudleigh Road	44.0	44.6	1.4%	Moderate
Twickenham Guest House	55.6	56.3	1.8%	Moderate
117 Whitton Road	41.0	41.2	0.70%	Moderate
74 Whitton Road	36.6	36.6	0.23%	Negligible
REEC Development (Maximum Operational Phase Traffic)				
	Baseline + Operational		**Concentration as a Percentage of the AQAL**	
College Building Zone 1	36.5		91%	
Schools Building Zone	30.6		77%	
Tech-Hub Building Zone	36.1		90%	
College Building Zone 2	30.8		77%	
School Development Zone: Outdoor Games Area	30.7		77%	
(a) Including all operational traffic, except Phase 2 residential.				

10.8.22 The predicted NO_2 concentrations at existing receptor locations are lower than the 2014 concentrations due to the projected reduction in vehicle emission factors as a result of improvements in emissions abatement technologies and the gradual renewal of the vehicle fleet.

10.8.23 At the REEC development the annual mean NO_2 concentrations are predicted to be within the air quality objective at the facades of the Tech Hub Building Zone and College Building Zone 1, which are closest to Chertsey Road.

10.8.24 A contour plot showing the 2019 annual mean NO2 concentrations across the REEC development site is presented in **Figure 10.4** showing that compliance with the annual mean air quality objective is achieved across the Site. It is therefore considered that the risk of an exceedence of the hourly mean NO_2 objective at the REEC development is negligible.

10.8.25 The significance of the change in the predicted concentrations at existing receptors ranges from negligible to moderate adverse. The highest NO_2 concentrations (56.3 $\mu g/m^3$) are predicted at the Twickenham Guest House, but are considerably lower at the facades of the other receptors. The vast majority of the development traffic will access the site via Langhorn Drive rather than Whitton Road, consequently the impact on properties adjacent to Whitton Road is minimal, with the exception of those in close proximity to the junction with Chertsey Road.

10.8.26 The predicted 2019 concentrations are lower than for the existing emissions scenario due to anticipated improvements in vehicle emissions technologies and the gradual renewal of the vehicle fleet. However, since an exceedence of the annual mean air quality objective is predicted at receptors in close proximity to Chertsey Road, the overall significance of the 2019 development impact is considered to be **moderate adverse**.

Legend

Predicted NO_2 Concentrations (ug/m^3)

- 60
- 50
- 40
- 30

N

0 100m

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Note: All locations are approximate

Project Title:

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Figure Title:

Predicted 2019 Annual Mean NO_2 Concentrations:
Baseline + Development + Construction ($ug.m^3$)

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Figure Number:	Date:
Figure 10.4	June 2015

10.8.27 Predicted annual mean NO_2 concentrations for 2034, 15 years after the REEC development is operational, are presented in **Table 10.22**.

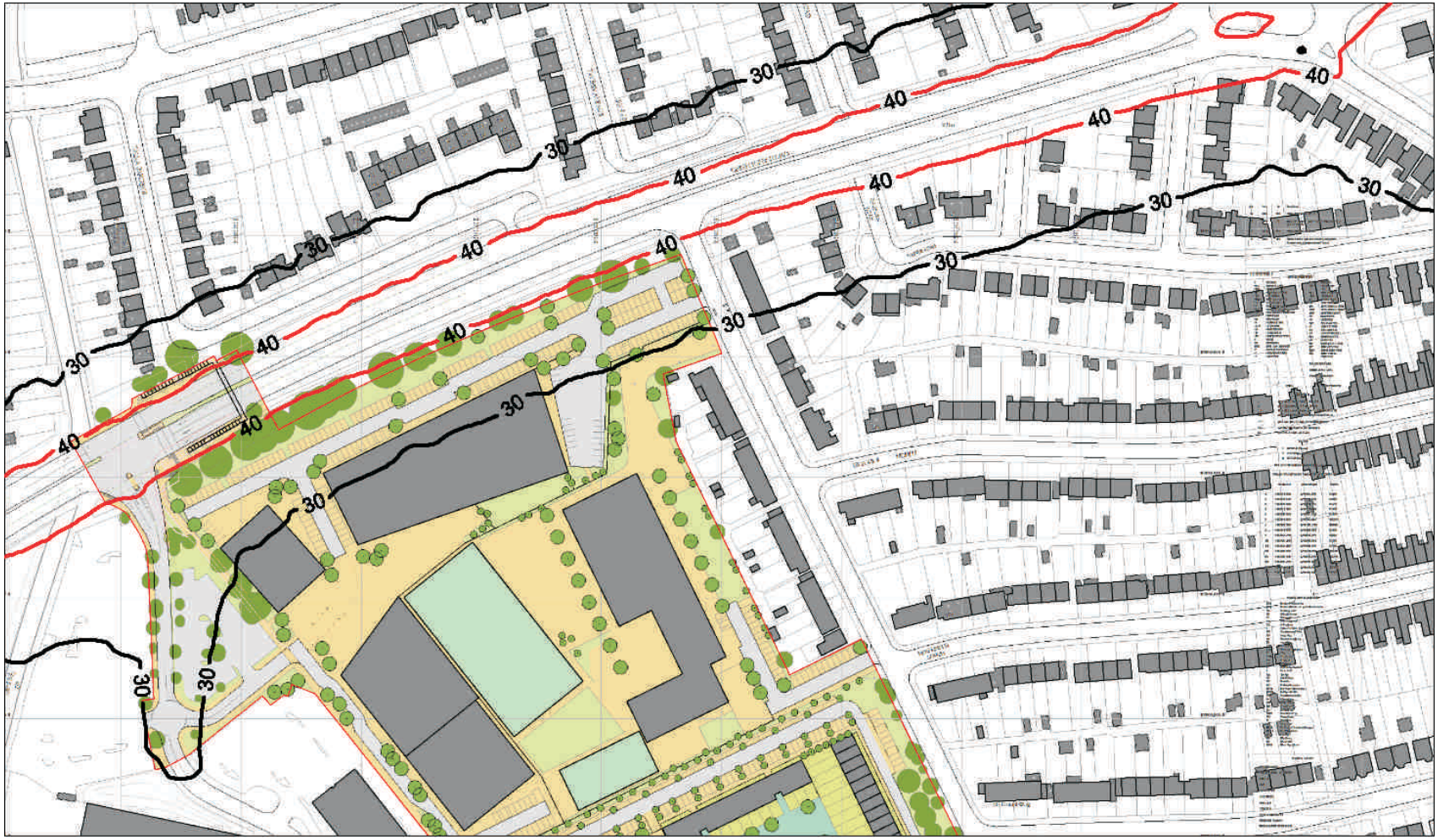
Table 10.22 Predicted 2034 Annual Mean NO_2 Concentrations (µg/m³)

Existing Receptors				
	Baseline	**Baseline + Operation**	**% Change in Concentration relative to AQAL**	**Impact Significance**
29 Kendrey Gardens	33.4	33.6	0.60%	Negligible
42 Chudleigh Road	35.1	35.4	0.70%	Negligible
Twickenham Guest House	40.5	40.9	0.90%	Minor
117 Whitton Road	33.2	33.4	0.43%	Negligible
74 Whitton Road	31.0	31.1	0.23%	Negligible
REEC Development				
	Baseline + Operation		**Concentration as a Percentage of the AQAL**	
College Building Zone 1	30.8		77%	
Schools Building Zone	28.2		71%	
Tech-Hub Building Zone	30.6		76%	
College Building Zone 2	28.2		71%	
School Development Zone: Outdoor Games Area	28.2		71%	

10.8.28 The predicted 2034 annual mean NO_2 concentrations following the completion of the development are presented as a contour plot in **Figure 10.5**.

10.8.29 The predicted concentrations within the REEC development Site are less than 31 µg/m³; it is therefore considered unlikely that an exceedence of the long or short-term air quality NO_2 objectives will occur at any location on Site.

10.8.30 An exceedence of the annual mean air quality objective is predicted to occur at Twickenham Guest House in 2034 and the significance of the development impact at this location is minor adverse. At all other locations, the predicted concentrations are well within the air quality objective and the significance of the impact is negligible.



Legend

Predicted NO_2 Concentrations (ug/m^3)

40

30

N

0 100m

CASCADE

Note: All locations are approximate

Project Title:

Richmond Education and Enterprise Campus Development

Figure Title:

Predicted 2034 Annual Mean NO_2 Concentrations: Baseline + Development ($ug.m^3$)

For Information Only

Figure Number:	Date:
Figure 10.5	June 2015

10.8.31 Since a minor adverse impact is predicted at just one receptor location, the overall significance of the development impact on NO2 concentrations in 2034 is considered to be **negligible**.

Predicted Effects: Particulate Matter (as PM_{10})

10.8.32 Predicted existing (2014) annual mean baseline concentrations of PM_{10} at the identified sensitive receptor locations are presented in **Table 10.23.** Since there is no local monitoring data with which to verify the predicted concentrations, the concentrations have been adjusted using the verification factor derived for NO_2. The predicted PM_{10} concentrations at existing receptors and at the proposed development site are well within the annual mean air quality objective of 40 µg/m3.

10.8.33 LAQM.TG(09) provides a relationship between predicted annual mean concentrations and the likely number of exceedences of the short-term (24-hour mean) PM_{10} objective of 50 µg/m3. The objective allows 35 exceedences per year, which equates to an annual mean of 32 µg/m3. On this basis, compliance with the short-term objective is currently achieved at all of the identified receptor locations.

Table 10.23 Predicted 2014 Annual Mean PM_{10} Concentrations (µg/m3)

Source	Baseline	Concentration as a percentage of the AQAL
29 Kendrey Gardens	22.7	57%
42 Chudleigh Road	23.6	59%
Twickenham Guest House	26.7	67%
117 Whitton Road	22.0	55%
74 Whitton Road	20.6	52%
College Building Zone 1	21.5	54%
Schools Building Zone	19.8	49%
Tech-Hub Building Zone	21.0	52%
College Building Zone 2	19.6	49%
School Development Zone: Outdoor Games Area	19.7	49%

10.8.34 Predicted annual mean PM_{10} concentrations for 2019 and 2034 are presented in **Tables 10.24** and **10.25** respectively.

Table 10.24 Predicted 2019 Annual Mean PM_{10} Concentrations (µg/m³)

Existing Receptors (Maximum Construction Phase Traffic) (a)				
	Baseline	**Baseline + Construction + Operational**	**% Change in Concentration relative to AQAL**	**Impact Significance**
29 Kendrey Gardens	22.4	22.5	0.30%	Negligible
42 Chudleigh Road	23.3	23.4	0.36%	Negligible
Twickenham Guest House	26.0	26.2	0.48%	Negligible
117 Whitton Road	21.7	21.8	0.18%	Negligible
74 Whitton Road	20.5	20.5	0.081%	Negligible
Existing Receptors (Maximum Operational Phase Traffic)				
	Baseline	**Baseline + Operational**	**% Change in Concentration relative to AQAL**	**Impact Significance**
42 Chudleigh Road	22.4	22.5	0.36%	Negligible
Twickenham Guest House	23.3	23.4	0.43%	Negligible
117 Whitton Road	26.0	26.3	0.59%	Negligible
74 Whitton Road	21.7	21.8	0.21%	Negligible
29 Kendrey Gardens	20.5	20.5	0.079%	Negligible
REEC Development (Maximum Operational Phase Traffic)				
	Baseline + Operational		**Concentration as a Percentage of the AQAL**	
College Building Zone 1	21.3		53%	
Schools Building Zone	19.7		49%	
Tech-Hub Building Zone	20.9		52%	
College Building Zone 2	19.6		49%	
School Development Zone: Outdoor Games Area	19.7		49%	
(a) Including all operational traffic, except Phase 2 residential.				

Table 10.25 Predicted 2034 Annual Mean PM_{10} Concentrations (µg/m³)

Existing Receptors				
	Baseline	**Baseline + Operational**	**% Change in Concentration relative to AQAL**	**Impact Significance**
29 Kendrey Gardens	22.3	22.5	0.30%	Negligible
42 Chudleigh Road	23.3	23.4	0.38%	Negligible
Twickenham Guest House	26.0	26.2	0.51%	Negligible
117 Whitton Road	21.7	21.8	0.21%	Negligible
74 Whitton Road	20.5	20.5	0.10%	Negligible
REEC Development				
	Baseline + Operational		**Concentration as a Percentage of the AQAL**	
College Building Zone 1	21.3		55%	
Schools Building Zone	19.7		52%	
Tech-Hub Building Zone	20.9		54%	
College Building Zone 2	19.6		49%	
School Development Zone: Outdoor Games Area	19.6		53%	

10.8.35 The predicted 2019 and 2034 annual mean PM_{10} concentrations are well within the air quality objective at both existing sensitive receptors and within the Site. The change in concentration due to traffic associated with the development is predicted to be 0.51% of the air quality objective or below therefore the significance of the impact is considered to be **negligible**.

10.8.36 Since the predicted annual mean concentrations are less than 32 µg/m³, the risk of an exceedence of the short-term PM_{10} objective is also considered to be negligible at all identified receptor locations.

Predicted Effects: Particulate Matter (as $PM_{2.5}$)

10.8.37 Predicted existing (2014) annual mean baseline concentrations of $PM_{2.5}$ at the identified sensitive receptor locations are presented in **Table 10.26.** Since there is no local monitoring data with which to verify the predicted concentrations, the

concentrations have been adjusted using the verification factor derived for NO_2. The predicted $PM_{2.5}$ concentrations at existing receptors and at the proposed development site are well within the EU limit value of 25 μg/m³.

Table 10.26 Predicted 2014 Annual Mean $PM_{2.5}$ Concentrations (μg/m³)

Source	Baseline	Concentration as a percentage of the AQAL
29 Kendrey Gardens	15.1	61%
42 Chudleigh Road	15.6	63%
Twickenham Guest House	17.2	69%
117 Whitton Road	14.8	59%
74 Whitton Road	14.1	56%
College Building Zone 1	14.5	58%
Schools Building Zone	13.6	54%
Tech-Hub Building Zone	14.2	57%
College Building Zone 2	13.6	54%
School Development Zone: Outdoor Games Area	13.6	54%

10.8.38 Predicted annual mean PM2.5 concentrations for 2019 and 2034 are presented in **Tables 10.27 and 10.28** respectively.

Table 10.27 Predicted 2019 Annual Mean $PM_{2.5}$ Concentrations (µg/m³)

Existing Receptors (Maximum Construction Phase Traffic) (a)				
	Baseline	**Baseline + Construction + Operational**	**% Change in Concentration relative to AQAL**	**Impact Significance**
29 Kendrey Gardens	15.1	15.2	0.27%	Negligible
42 Chudleigh Road	15.6	15.7	0.32%	Negligible
Twickenham Guest House	17.2	17.3	0.44%	Negligible
117 Whitton Road	14.8	14.8	0.17%	Negligible
74 Whitton Road	14.1	14.1	0.074%	Negligible
Existing Receptors (Maximum Operational Phase Traffic)				
	Baseline	**Baseline + Operational**	**% Change in Concentration relative to AQAL**	**Impact Significance**
29 Kendrey Gardens	15.1	15.2	0.32%	Negligible
42 Chudleigh Road	15.6	15.7	0.39%	Negligible
Twickenham Guest House	17.2	17.3	0.53%	Negligible
117 Whitton Road	14.8	14.8	0.19%	Negligible
74 Whitton Road	14.1	14.1	0.072%	Negligible
REEC Development (Maximum Operational Phase Traffic)				
	Baseline + Construction + Operational		**Concentration as a Percentage of the AQAL**	
College Building Zone 1	14.5		58%	
Schools Building Zone	13.6		54%	
Tech-Hub Building Zone	14.3		57%	
College Building Zone 2	13.6		54%	
School Development Zone: Outdoor Games Area	13.6		54%	

Table 10.28 Predicted 2034 Annual Mean $PM_{2.5}$ Concentrations (µg/m³)

Existing Receptors				
	Baseline	**Baseline + Operational**	**% Change in Concentration relative to AQAL**	**Impact Significance**
29 Kendrey Gardens	15.0	15.0	0.26%	Negligible
42 Chudleigh Road	15.5	15.6	0.32%	Negligible
Twickenham Guest House	16.9	17.0	0.44%	Negligible
117 Whitton Road	14.6	14.7	0.18%	Negligible
74 Whitton Road	14.0	14.0	0.086%	Negligible
Proposed Development				
	Baseline + Operational		**Concentration as a Percentage of the AQAL**	
College Building Zone 1	14.4		58%	
Schools Building Zone	13.6		54%	
Tech-Hub Building Zone	14.2		57%	
College Building Zone 2	13.5		54%	
School Development Zone: Outdoor Games Area	13.6		54%	

10.8.39 The predicted 2019 and 2034 annual mean $PM_{2.5}$ concentrations are well within the EU limit value at both existing sensitive receptors and within the proposed development site. The change in concentration due to traffic associated with the development is predicted to be less than 0.5% of the limit value, therefore the significance of the impact is considered to be **negligible**.

Predicted Effects: Sensitive Habitat Sites

10.8.40 The Duke of Northumberland's River South of Knellar Road Site of Borough Importance for Nature Conservation (SINC) is located adjacent to Chertsey Road, close to the western boundary of the Site. The river is an artificial waterway which supports important marginal vegetation.

10.8.41 As a locally designated site, there are no site specific critical loads with which to compare potential impacts associated with an increase in traffic on Chertsey Road.

However, the detailed dispersion modelling assessment has predicted a reduction in predicted concentrations in future years, despite the additional traffic associated with the REEC development; therefore the habitat site is unlikely to be adversely affected.

Mitigation Measures

10.8.42 The following mitigation measures are proposed to reduce the operational traffic associated with the development:

- An upgrade to Marsh Farm Lane within the Site boundary to enable a new 3m shared footway / cycleway to be provided between London Road and Marsh Farm Lane routed on the southern side of the River Crane. This will open up a new convenient route between the site and Twickenham Station for pupils, staff, visitors and residents.
- Secure cycle parking provision provided to local standards and showers with changing facilities for staff and employees will help to encourage cycling as an alternative to short car, bus and rail trips.

Residual Effects

10.8.43 The overall residual effect on air quality of additional traffic associated with the development in 2019 and 2034 is predicted to be **minor adverse**.

Monitoring

10.8.44 Routine monitoring of ambient air quality is carried out by LBRuT in the local area, therefore additional monitoring is not considered necessary.

10.9 SUMMARY OF RESIDUAL EFFECTS

10.9.1 A summary of residual air quality effects is presented in **Table 10.29**.

Table 10.29 Summary of Residual Effects

Issue	Likely Significant Effect	Mitigation Measures	Likely Residual Effect
Site Enabling, Demolition and Construction			
Dust generated by demolition, earthworks, construction and vehicle trackout.	Dust deposition to local habitat sites. Dust deposition to buildings and parked vehicles. Increase in local airborne PM_{10} concentrations.	Best practice dust mitigation in accordance with the CEMP.	Negligible
Vehicle emissions from additional traffic associated with the maximum construction phase (including operational traffic without phase 2 residential)	Increase in local NO_2 concentrations	Construction Logistics Plan and enhanced pedestrian and cycling provision	Moderate adverse
	Increase in local PM_{10} concentrations		Negligible
	Increase in local $PM_{2.5}$ concentrations		Negligible
Operational Traffic			
Vehicle emissions from operational traffic in completion year (2019)	Increase in local NO_2 concentrations	Enhanced pedestrian and cycling provision	Moderate adverse
	Increase in local PM_{10} concentrations		Negligible
	Increase in local $PM_{2.5}$ concentrations		Negligible
Vehicle emissions from operational traffic in completion year + 15 years (2034)	Increase in local NO_2 concentrations	Enhanced pedestrian and cycling provision	Negligible
	Increase in local PM_{10} concentrations		Negligible
	Increase in local $PM_{2.5}$ concentrations		Negligible

10.10 AIR QUALITY NEUTRAL ASSESSMENT

10.10.1 An assessment has been carried out to determine whether the REEC development will be air quality neutral in accordance with the methodology presented in the Air Quality Neutral Planning Support Guidance[14].

10.10.2 Transport related emissions for residential (C3) and office (B1) uses has been calculated using trip lengths, emission factors and Transport Emission Benchmarks (TEB) for Outer London. For the purposes of the assessment, 'office-uses' includes traffic associated with the proposed schools and college.

[14] Air Quality Neutral Planning Support Update, GLA 80371, April 2014

10.10.3 A summary of the transport-related emissions calculations for residential and office uses is presented in **Tables 10.30** and **10.31** respectively. The air quality neutral calculation is presented in **Table 10.32** and shows that the total development emissions for NOx and PM_{10} are considerably lower than the benchmarked emissions. On this basis the REEC development is considered to be **Air Quality Neutral**.

Table 10.30 Transport-Related NOx and PM_{10} Emissions for Residential Uses

Parameter	**Value**
Number of dwellings	180
AADT (trips)	419
Annual trips per dwelling (trips/dwelling/yr)	850
Average distance travelled per trip (km)	11.4
Annual distance travelled per dwelling (km/dwelling/yr)	9,690
NOx Emission Factor for Outer London (g/km)	0.353
NOx emission per dwelling (g/dwelling/yr)	3,419
Residential NOx Emission (kg/yr)	**615**
Residential NOx TEB for Outer London (g/dwelling/yr)	1,553
Benchmarked NOx Emission (kg/yr)	**280**
PM_{10} Emission Factor for Outer London (g/km)	0.0606
PM_{10} emission per dwelling (g/dwelling/yr)	587
Residential PM_{10} Emission (kg/yr)	**106**
Residential PM_{10} TEB for Outer London (g/dwelling/yr)	267
Benchmarked PM_{10} Emission (kg/yr)	**48**

Table 10.31 Transport-Related NOx and PM_{10} Emissions for Office Uses

Parameter	**Value**
Gross External Area: Tech Hub, Schools and College (m^2)	38,700
AADT (trips)	485
Annual trips (trips/m^2/yr)	4.6
Average distance travelled per trip (km)	10.8
Annual distance travelled per m^2 (km/m^2/yr)	49.4
NOx emission factor for Outer London (g/m^2)	0.353
NOx emission per m^2 (g/m^2/yr)	17.4
Office NOx emission (kg/yr)	**675**
Office NOx TEB for Outer London (g/m^2/yr)	68.5
Benchmarked NOx emission (kg/yr)	**2,651**
PM_{10} emission factor for Outer London (g/km)	0.0606
PM_{10} emission per m^2 (g/m^2/yr)	3.0
Office PM_{10} emission (kg/yr)	**116**
Office PM_{10} TEB for Outer London (g/m^2/yr)	11.8
Benchmarked PM_{10} emission (kg/yr)	**457**

Table 10.32 Air Quality Neutral Calculation

Parameter	Value
Residential NOx emission (kg/yr)	615
Office NOx emission (kg/yr)	675
Total Development NOx emission (kg/yr)	**1,290**
Benchmarked Residential NOx emission (kg/yr)	280
Benchmarked Office NOx emission (kg/yr)	2,651
Total Benchmarked NOx emission (kg/yr)	**2,931**
Development - Benchmarked NOx emission (kg/yr)	**-1,641** **Air Quality Neutral**
Residential PM_{10} emission (kg/yr)	106
Office PM_{10} emission (kg/yr)	116
Total Development PM_{10} emission (kg/yr)	**222**
Benchmarked Residential PM_{10} emission (kg/yr)	48
Benchmarked Office PM_{10} emission (kg/yr)	457
Total Benchmarked PM_{10} emission (kg/yr)	**505**
Development - Benchmarked PM_{10} emission (kg/yr)	**-283** **Air Quality Neutral**

10.11 CUMULATIVE EFFECTS ASSESSMENT

Site Enabling, Demolition and Construction

10.11.1 There are two major committed developments in the area which have the potential to result in cumulative dust impacts at sensitive receptor locations, these are:

- Twickenham Railway Station London Road Twickenham (10/3465/FUL) (redevelopment of station and new retail and residential units); and
- Former Twickenham Postal Sorting Office London Road, Twickenham (1.5ha mixed-used development – Brewery Wharf).

10.11.2 Construction works at the Sorting Office site have already begun and given the relatively small scale of the development it is considered unlikely that the construction phase will overlap with that of the proposed development.

10.11.3 Twickenham Railway Station is approximately 500m from the south-eastern boundary of the proposed development and over 600m from the main residential and college construction areas. According to the IAQM guidance unmitigated dust impacts are unlikely to be significant beyond 350m from a construction site boundary therefore the risk of cumulative impacts at receptors between the two sites is considered to be very low.

10.11.4 A proposed 3m width footpath through Twickenham Rough, south of the River Crane, is being implemented by the Sorting Office developer but is likely to have been completed in 2016, before works on the College playing fields south of Craneford Way are undertaken in 2017/18, thus localised cumulative impacts are unlikely to arise.

10.11.5 These developments would be required to develop and implement their own CEMPs, which would minimise any potential off-site impacts.

10.11.6 Since off-site impacts associated with the REEC development are predicted to be negligible following the implementation of best practice dust mitigation measures, it is therefore considered that the significance of any cumulative dust impact will be **negligible**.

Operation

10.11.7 Traffic associated with the committed developments at Twickenham Rail Station and the Former Royal Mail Sorting Office in Twickenham has been included in the 2019 and 2034 future baselines presented in **Tables 10.12 and 10.13**. As such the cumulative impact of these sites is integral to the assessment of future air quality at existing and proposed receptor locations.

Mitigation

10.11.8 No additional mitigation measures are considered necessary.

Residual Effects

10.11.9 The residual effects arising from cumulative impacts are as presented in **Table 10.29**.

10.12 SUMMARY AND CONCLUSION

10.12.1 A detailed assessment has been undertaken to assess the likely impact of the REEC development on local air quality.

10.12.2 The overall significance of the likely dust impacts are considered to be **negligible** following the implementation of appropriate and best practice mitigation measures as detailed in the CEMP. Other proposed and committed developments in the area

will also be subject to their own CEMP and the significance of cumulative dust impacts during the construction phase is considered to be **negligible**.

10.12.3 Increased NO_2 emissions of due to traffic generated during the construction and operational phases of the REEC development are assessed to have a **moderate adverse** impact on local air quality in 2019, where concentrations at locations close to Chertsey Road are predicted to exceed the air quality objective with baseline traffic alone. By 2034 (15 years post completion) the predicted NO_2 concentrations are considerably lower due to the projected reduction in vehicle emissions. The significance of the 2034 operational REEC traffic is predicted to be **negligible**. The significance of the impact of the proposed development traffic on PM_{10} and $PM_{2.5}$ concentrations is predicted to be **negligible**.

10.12.4 The REEC development has been assessed as Air Quality Neutral with respect to emissions of NO_2 and PM_{10} from traffic sources.