



Richmond Education and Enterprise Campus Development

Environmental Statement Volume 3 - Appendices

Produced for Richmond upon Thames College

June 2015

In association with:



Richard Lifford
& Partners
Planning Design Economics



oxford archaeology
Inspiring the human journey

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ENVIRONMENTAL STATEMENT APPENDIX LIST

Chapter 2 – Environmental Impact Assessment Methodology

Appendix 2.1: REEC Development ELA Scoping Report

Appendix 2.2: LBRuT Scoping Opinion

Appendix 2.3: Applicant Response to Scoping Opinion

Appendix 2.4: Consultation Log

Chapter 3 – Existing Site and Surroundings

Appendix 3.1: Topography Survey

Chapter 4 – Alternatives and Design Evolution

Appendix 4.1: The 'Do Nothing' Scenario

Chapter 5 – The Proposed Development

Appendix 5.1: Parameter Plans

Appendix 5.2: Residential Development Phasing and Comparisons

Appendix 5.3: Residential Expected Children and External Space Calculations by Phase

Appendix 5.4: Comparison of Existing and Illustrative External Space Types

Chapter 6 – Demolition and Construction

Appendix 6.1: Outline Construction Environmental Management Plan

Appendix 6.2: Outline Construction Management Plan

Appendix 6.3: Outline Construction Logistics Plan

Appendix 6.4: Indicative Construction Phasing Plans

Appendix 6.5: Indicative Demolition and Construction Programme

Appendix 6.6: 2008 Soiltechnics Ground Investigation Report

Appendix 6.7: Guidance for Protection of Controlled Waters

Chapter 8 – Transport

Appendix 8.1: 2019 Baseline Traffic Flow Diagrams

Appendix 8.2: 2019 Construction Phase 3 Traffic Flow Diagrams

Appendix 8.3: 2019 Completed Development Traffic Flow Diagrams

Appendix 8.4: 2034 Traffic Flow Diagrams

Appendix 8.5: Framework Travel Plan

Appendix 8.6: 2019 Completed Development + Cumulative Traffic Flow Diagrams

Appendix 8.7: 2034 Cumulative Traffic Flow Diagrams

Chapter 9 – Noise and Vibration

Appendix 9.1: Detailed Results of Baseline Noise Measurements

Appendix 9.2: Plant Used for Construction Noise Calculations

Appendix 9.3: Noise from Sports Activities

Chapter 10 – Air Quality

Appendix 10.1: Atmospheric Dispersion Modelling System (ADMS) Roads Model Input Parameters

Appendix 10.2: Model Verification

Chapter 11 – Ground Conditions

Appendix 11.1: Landmark Envirocheck Historical Mapping and Data Report

Appendix 11.2: Soiltechnics Classification of Waste Soils for Off Site Disposal

Chapter 13 – Water Resources and Flood Risk

Appendix 13.1: Flood Risk Assessment

Appendix 13.2: Outline Drainage Assessment

Appendix 13.3: Utilities Statement

Chapter 14 – Daylight Sunlight and Overshadowing

Appendix 14.1: Daylight, Sunlight and Overshadowing Assessment Model

Appendix 14.2: Reference Plans and Window Locations

Appendix 14.3: VSC Results - Neighbouring Properties

Appendix 14.4: Sunlight Results - Neighbouring Properties

Appendix 14.5: Overshadowing Results - Neighbouring Gardens / Open Spaces

Appendix 14.6: ADF Results - Notional Accommodation within Outline Residential Buildings

Appendix 14.7: Sunlight Results - Notional Accommodation within Outline Residential Buildings

Appendix 14.8: Overshadowing Results – Proposed Gardens / Open Spaces within the Development

Chapter 15 – Ecology

- Appendix 15.1: Extended Phase 1 Habitat Survey
- Appendix 15.2: Breeding Birds and Bats Species Report
- Appendix 15.3: Terrestrial Invertebrate Report
- Appendix 15.4: Ecological Impact Characterisation
- Appendix 15.5: Arboricultural Impact Assessment

Chapter 16 – Townscape and Visual Amenity

- Appendix 16.1: Townscape and Visual Assessment Impact Assessment Figures, Photographs and Visualisations
- Appendix 16.2: Assessment Criteria
- Appendix 16.3: List of Parameters Plans and Other Documents
- Appendix 16.4: Extracts from Design Quality
- Appendix 16.5: Local Townscape Character Analysis
- Appendix 16.6: Assessment of Construction Effects on Representative Views
- Appendix 16.7: Summary Assessment of Representative Views – Operation

Chapter 17 – Cultural Heritage

- Appendix 17.1: Gazetteer of Cultural Heritage Features
- Appendix 17.2: Archaeological Geophysical Survey

Chapter 18 – Socio – economics

- Appendix 18.1: Community Infrastructure
- Appendix 18.2: Survey of Users of Craneford Playing Field (Provided by FORCE)
- Appendix 18.3: Richmond upon Thames College, Community Sports Centre Usage
- Appendix 18.4: Craneford Way West Rental by Harlequins 2014/2015 Season
- Appendix 18.5: Richmond upon Thames Child Yield Calculator



CHAPTER 2 – APPENDICES

CONTENTS

Appendix 2.1: REEC Development EIA Scoping Report

Appendix 2.2: LBRuT Scoping Opinion

Appendix 2.3: Applicant Response to Scoping Opinion

Appendix 2.4: Consultation Log



Appendix 2.1: REEC Development EIA Scoping Report



Richmond Education and Enterprise Campus Development

EIA Scoping Report

Final

July 2014

In Association with:



Richard Lottfield
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Planning, Design, Economics



oxford archaeology
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Contents

1	Introduction	1
1.1	Background	1
1.2	Site Context	1
1.3	The Need for EIA	3
1.4	Consultation	3
2	The EIA Process	5
2.1	Overview	5
2.2	EIA Screening	5
2.3	EIA Scoping	5
2.4	Approach to EIA	6
2.5	Approach to Cumulative Effects Assessment	10
3	Scheme Description	12
3.1	Need For the Scheme	12
3.2	The Proposed Development	12
3.3	Demolition and Construction	13
3.4	Potential Sensitive Receptors	15
3.5	Alternatives Assessment	16
4	Policy Review	17
5	Transport	20
5.1	Introduction and Key Issues	20
5.2	Policy Review	20
5.3	Existing Environment	21
5.4	Sensitive Receptors and Potential Environmental Effects	21
5.5	Assessment Methodology	23
5.6	Potential Mitigation	24
5.7	Consultation	25
6	Noise and Vibration	26
6.1	Introduction and Key Issues	26
6.2	Policy Review	26
6.3	Existing Environment	26
6.4	Sensitive Receptors and Potential Environmental Effects	28
6.5	Assessment Methodology	29
6.6	Potential Mitigation	32
6.7	Consultation	33
7	Air Quality	34
7.1	Introduction and Key Issues	34
7.2	Policy Review	34
7.3	Existing Environment	34
7.4	Sensitive Receptors and Potential Environmental Effects	36
7.5	Assessment Methodology	38
7.6	Potential Mitigation	40
7.7	Consultation	40
8	Ground Conditions	42
8.1	Introduction and Key Issues	42
8.2	Policy Review	42
8.3	Existing Environment	42
8.4	Sensitive Receptors and Potential Environmental Effects	44
8.5	Assessment Methodology	45
8.6	Potential Mitigation	47
8.7	Consultation	48
9	Waste	49



9.1	Introduction and Key Issues	49
9.2	Policy Review.....	49
9.3	Existing Environment	50
9.4	Sensitive Receptors and Potential Environmental Effects.....	50
9.5	Assessment Methodology.....	50
9.6	Potential Mitigation.....	51
9.7	Consultation	52
10	Water Resources and Flood Risk	53
10.1	Introduction and Key Issues	53
10.2	Policy Review.....	53
10.3	Existing Environment	54
10.4	Sensitive Receptors and Potential Environmental Effects.....	59
10.5	Assessment Methodology.....	61
10.6	Potential Mitigation.....	65
10.7	Consultation	65
11	Daylight, Sunlight and Overshadowing	66
11.1	Introduction and Key Issues	66
11.2	Policy Review.....	66
11.3	Existing Environment	66
11.4	Sensitive Receptors and Potential Environmental Effects.....	67
11.5	Assessment Methodology.....	68
11.6	Potential Mitigation.....	72
11.7	Consultation	72
12	Ecology	73
12.1	Introduction and Key Issues	73
12.2	Policy Review.....	73
12.3	Existing Environment	73
12.4	Sensitive Receptors and Potential Environmental Effects.....	76
12.5	Assessment Methodology	83
12.6	Potential Mitigation.....	86
12.7	Consultation	87
13	Townscape and Visual Amenity.....	88
13.1	Introduction and Key Issues	88
13.2	Policy Review.....	88
13.3	Existing Environment	89
13.4	Sensitive Receptors and Potential Environmental Effects.....	90
13.5	Assessment Methodology	92
13.6	Potential Mitigation.....	93
13.7	Consultation	93
14	Cultural Heritage	95
14.1	Introduction and Key Issues	95
14.2	Policy Review.....	95
14.3	Existing Environment	95
14.4	Sensitive Receptors and Potential Environmental Effects.....	99
14.5	Assessment Methodology.....	100
14.6	Potential Mitigation.....	103
14.7	Consultation	104
15	Socio-Economics.....	105
15.1	Introduction and Key Issues	105
15.2	Policy Review.....	105
15.3	Existing Environment	105
15.4	Sensitive Receptors and Potential Environmental Effects.....	106
15.5	Assessment Methodology.....	106

15.6	Potential Mitigation.....	108
15.7	Consultation	108
16	Summary of Key Issues	109
17	Proposed Structure of the ES	111

List of Figures

Figure 1.1	Site Location
Figure 4.1	Local Plan Proposals Map July 2013
Figure 6.1	Baseline Noise Monitoring Locations
Figure 10.1	Watercourses in Proximity to the Site
Figure 10.2	Fluvial Flood Risk
Figure 10.3	Surface Water Flood Risk
Figure 10.4	Groundwater Flood Risk
Figure 13.1	Locations of Photo Viewpoints and AVRs
Figure 14.1	Heritage Assets
Figure 14.2	Designated Heritage Sites

List of Tables

Table 1.1	The EIA Team
Table 2.1	Significance Criteria
Table 2.2	Provisional List of Cumulative Schemes
Table 5.1	Scope of Assessment: Transport
Table 6.1	Scope of Assessment: Noise and Vibration
Table 6.2	Significance Criteria for Construction Noise
Table 6.3	Significance Criteria for Construction Vibration
Table 6.4	Significance Criteria for Operational Noise
Table 6.5	Significance Criteria for Traffic Noise
Table 7.1	Scope of Assessment: Air Quality
Table 7.2	Air Quality Standards and Objectives
Table 8.1	Scope of Assessment: Ground Conditions Preliminary Conceptual Model
Table 8.2	Significance Criteria for Contaminated Land
Table 10.1	Environment Agency Monitoring Sites in the River Crane and Duke of Northumberland's River Catchment
Table 10.2	Scope of Assessment: Water Resources and Flood Risk
Table 10.3	Criteria for Determining the Nature of the Water Resources Effect
Table 10.4	Criteria for Determining the Value of the Water Resources Receptor
Table 10.5	Significance Evaluation Matrix
Table 11.1	Scope of Assessment: Daylight and Sunlight
Table 12.1	Scope of Assessment: Ecology
Table 12.2	Criteria for Determining the Value of Ecological Features
Table 12.3	Criteria for Determining the Magnitude of Change



Table 13.1	Scope of Assessment: Townscape and Visual Effects
Table 14.1	Scope of Assessment: Cultural Heritage
Table 14.2	Criteria Used to Determine Importance of Receptor
Table 14.3	Criteria Used to Determine Magnitude of Change
Table 14.4	Significance of Effects
Table 15.1	Scope of Assessment: Socio-Economics
Table 16.1	Summary of Key Issues

List of Appendices

Appendix 1.1	Drawings of Proposed Development
Appendix 6.1	Summary of Baseline Noise Survey
Appendix 12.1	Summary of Extended Phase 1 Habitat Survey Results
Appendix 14.1	Summary of Cultural Heritage and Archaeology Desk Study Results

1 INTRODUCTION

1.1 BACKGROUND

Richmond Education and Enterprise Campus (REEC; hereafter referred to as the 'Applicant'), is seeking to submit an Outline Planning Application (OPA) for the mixed redevelopment of the Richmond upon Thames College (RuTC) site in Twickenham, within the London Borough of Richmond (LBRuT).

The redevelopment of the existing college site offers the opportunity to renew the college and introduce a new secondary school into the LBRuT, re-provide the Clarendon School (special needs secondary school), upgrade the sports fields, and integrate these developments with a shared 'campus', with the development of a new technical media hub on the site, and an element of separate residential development.

There is the potential for a future upgrade of the Harlequins Stadium north stand which is adjacent to the west of the REEC site. The design of the development will therefore consider the interface with the Harlequins site where necessary.

1.2 SITE CONTEXT

The site is located to the north west of Twickenham town centre and occupies approximately 8.6 hectares of land, including the playing fields to the south. **Figure 1.1** shows the site's location and surrounding context, and drawings A100 E and SK-042C in **Appendix 1.1** show the proposed site with boundary.

The site is bounded to the north by the A316 (Chertsey Road), a dual carriageway which eventually joins the A4 and provides access into central London (eastbound). To the north of the A316 is residential housing, beyond which is Twickenham Rugby Club. The site is bounded by Egerton Road to the east. Residential properties are located on this road (including properties immediately adjacent to the site boundary) and the residential area extends to the east towards Twickenham town centre. The south of college site is bounded by residential properties on Craneford Way.

To the south of Craneford Way are the existing sports fields. These are bounded to the east by residential properties located on Heatham Park Road. The southern boundary is formed by the River Crane whilst the western boundary is formed by a second sports field. The two sports fields are separated by an unnamed tarmac path which runs from north to south providing access from Craneford Way to allotments and buildings located to the south of the River Crane.

Figure 1.1 Site Location



1.3 THE NEED FOR EIA

Given the likely scale of proposed development, the location of the site, and the potential for significant environmental effects, it is recognised that the proposed development will constitute 'EIA development' under the Town and Country Planning (Environmental Impact Assessment) Regulations 2011.

Therefore as it is agreed by the Applicant that an Environmental Impact Assessment (EIA) is required, a formal EIA Screening Opinion was not requested from LBRuT.

Cascade Consulting, and its specialist subconsultants as identified in **Table 1.1**, has been appointed by the Applicant to carry out the 'scoping' stage of the EIA process. This Scoping Report therefore sets out the proposed approach to the EIA, including baseline data collection and assessment methodologies, and key issues and receptors to be considered, for agreement with the Local Planning Authority (LPA), in this case LBRuT.

An Environmental Statement (ES) will be prepared to document the findings of the EIA process and will be submitted in support of the OPA.

Table 1.1 The EIA Team

Environmental Topic	Consultant
EIA Coordination	Cascade Consulting
Transport	TPP/Entran
Noise and Vibration	Anglin Consultants
Air Quality	Entran
Water Resources and Flood Risk	Cascade Consulting ESI (flood risk)
Ground Conditions	RMS Environmental
Waste	RMS Environmental
Daylight and Sunlight	NLP
Ecology	Cascade Consulting (supported by Applied Ecology for surveys)
Townscape and Visual Amenity	NLP
Cultural Heritage	Oxford Archaeology
Socio-economics	NLP

1.4 CONSULTATION

Monthly meetings are scheduled to take place with the LBRuT Planning Case Officer during the production of the applications, and this has included two to date to discuss the proposed approach to the planning applications and high level content of the Scoping Report.

Regular meetings are also being held with the Local Community Forum (LCF) to keep the local residents updated on the assessment work being completed, and ensure they have the mechanism available to raise any concerns during this process.

The groups involved in this forum are:

- Dean Estate Residents Association.
- Friends of the River Crane Environment (FORCE).
- Heatham Alliance.
- Court Way Resident's Association.
- Heatham Residents Association.
- Heathfield South Neighbourhood Watch Coordinator.
- Chudleigh Road Neighbourhood Watch Coordinator.
- Court Way Resident Representative.

Initial contact has been made with a number of statutory consultees to agree surveys, assessment methodologies and obtain baseline data. These discussions will be continued as necessary through the EIA, particularly in relation to any issues that might be raised during the scoping process.

2 THE EIA PROCESS

2.1 OVERVIEW

Environmental Impact Assessment (EIA) is an assessment process applied to both new development proposals and changes or extensions to existing developments that are likely to have significant effects on the environment. The EIA process ensures that potential significant effects on the environment are considered in the decision-making process, including natural resources such as water, air and soil; conservation of species and habitats; and community issues such as visual effects and impacts on the population.

EIA provides a mechanism by which the environmental effects resulting from a development can be predicted, allowing them to be avoided or reduced through the inclusion of mitigation measures. The EIA considers all stages of a development from demolition, construction and operation through to decommissioning of the development at the end of its life.

The output of the EIA process is an Environmental Statement (ES) which is required by the Regulations to be submitted with an application for planning permission for EIA development. This allows the Local Planning Authority (LPA), in this case LBRuT, to take the potential environmental effects of a development fully into account in the decision-making process.

2.2 EIA SCREENING

As stated in Section 1.3, it is acknowledged that the proposed development is considered to be 'EIA development' given the size and scale, and the location of the site and potential for significant environmental effects. Therefore a formal EIA Screening Opinion request has not been made to LBRuT.

2.3 EIA SCOPING

Scoping is an important initial phase of the EIA process and is principally defined through the EIA Directive. The European Commission defines it as follows:

"Scoping is the process of determining the content and extent of the matters which should be covered in environmental information to be submitted to a competent authority for projects which are subject to EIA"

The purpose of scoping is therefore to establish the scope and methodology to be followed in the EIA process, based on a consideration of the potential environmental

⁵ European Commission (EC) (2001) Guidance on Environmental Impact Assessment: Scoping, Office for the Official Publications of the European Communities, Luxembourg.

effects arising from all stages of a scheme. Scoping is not a statutory requirement but it gives the LPA and consultees the opportunity to highlight any areas of concern not already identified, and thereby influence the EIA process and the subsequent ES in the early stages of preparation. The output of scoping informs the ongoing assessment and development of the scheme design.

Various organisations have produced guidance on scoping, including the Institute of Environmental Management and Assessment (IEMA)⁵, the Environment Agency⁶, the Scottish Government⁴ and the London Borough of Tower Hamlets³ while examples of best practice are given in a review by the Department of Communities and Local Governments (CLG)⁷ and the Government's Planning Practice Guidance⁸. Such guidance has been drawn upon in preparing this Scoping Report, and will be used where relevant in the production of the ES.

The overall aims of the scoping stage of EIA are to:

- Provide sufficient information on the proposed scheme to permit the LBRuT Planning Department and other stakeholders and consultees to consider the potential impacts, both adverse and beneficial, of the proposed development.
- Agree the scope of the ES including the geographical and temporal limits of the development, the environmental topics to be assessed, and the most likely significant environmental and social impacts to be considered (this will include scoping out any impacts which are considered unlikely to result in significant effects).
- Agree the extent of baseline surveys and proposed methodologies.
- Agree the methodologies for impact assessment including the criteria to be used for determining significance of impacts.
- Identify other planned or proposed development that may give rise to potential cumulative impacts with the proposed development.
- Agree the material to be provided as part of the EIA process alongside the outline planning application (OPA).

2.4 APPROACH TO EIA

2.4.1 Overview

Each technical chapter of the ES will define the baseline against which the

⁵ IEMA (2011) The State of Environmental Impact Assessment Practice in the UK.

⁶ Environment Agency (2002) Scoping Guidelines for the Environmental Impact Assessment of Projects (currently being updated (2013)).

⁷ Scottish Government (2013) Planning Advice Note 1/2013: Environmental Impact Assessment.

⁸ London Borough of Tower Hamlets (2012) Tower Hamlets Council EIA Scoping Guidance.

³ CLG (2006) Evidence Review of Scoping in Environmental Impact Assessment.

⁴ Planning Practice Guidance (2014) Environmental Impact Assessment. Accessed at <http://planningguidance.planningportal.gov.uk/blog/guidance/environmental-impact-assessment/preparing-an-environmental-statement/>.

environmental impacts of the proposed development will be assessed. The baseline conditions will be informed by desk-based study and survey work to be completed in 2014.

The environmental impacts will be assessed for the demolition, construction, and operation phases of the proposed development. Although the design life of the buildings will be approximately 30 years, the buildings will be designed so that they can be adapted for future uses or extended to meet future demand. This, combined with an ongoing need for these land uses in LBRuT, means that a decommissioning phase is not envisaged, and is therefore not considered further in this Scoping Report.

2.4.2 Determining the Significance of Impacts

The overall significance of the environmental impacts arising from the proposed development will be judged considering the value or sensitivity of the environmental receptor, and the magnitude of the change. No specific guidance exists for the development of significance criteria for the purposes of EIA and it is generally determined through professional opinion or topic specific guidance (such as that prepared for Ecological Impact Assessment by the Chartered Institute of Ecology and Environmental Management).

Effects occur as a result of changes to receptors on or within a certain distance of a development site. Receptors may be human (such as residents, workers and leisure users), sites with environmental designations (such as protected wildlife or archaeological sites) or individual wildlife sites and species. The nature of the effect perceived by each sensitive receptor will be determined using the following judgements:

- extent;
- magnitude;
- duration;
- frequency;
- reversibility;
- nature (direct or indirect); and
- the effect in addition to other developments (cumulative effect).

In order to provide consistency across the whole of the ES, a general approach will be taken to defining the level of significance of effects as outlined in **Table 2.1**.

Table 2.1 Significance Criteria

Magnitude of effect, including duration, frequency and reversibility	Receptor Value, Scale and Sensitivity			
		High	Medium	Low
	High	Major	Major	Moderate or Minor
Medium	Major	Moderate	Minor	
Low		Moderate or Minor	Minor	Negligible

The level of significance set out in **Table 2.1** is defined as follows:

- MAJOR – adverse or beneficial effects of considerable duration, magnitude or extent and therefore represent impacts that are of potential concern.
- MODERATE – adverse or beneficial effects considered to have moderate importance to the immediate local area.
- MINOR – adverse or beneficial effects that are likely to be either slight or very short term.
- NEGLIGIBLE – not considered significant.

Where major or moderate effects have been identified, practicable mitigation measures will be proposed to reduce or eliminate the effect. This will be achieved by modifying the design to minimise impacts, but may also be achieved through implementing specific working practices to control potential effects (such as dust suppression measures) or by proposing appropriate replacements for features that will be permanently lost (such as new tree or hedgerow planting). Where mitigation measures are proposed, the assessment will establish their effectiveness and determine whether any residual effects will remain once the measures have been applied.

Residual effects arising from the assessment will be presented in a separate summary chapter.

As part of the OPA, an outline Construction Environmental Management Plan (CEMP) will be produced ensuring a commitment to implement the necessary mitigation measures during the demolition and construction phase.

2.4.3 Use of Parameter Plans in Assessment

The OPA will establish the principles for future development, in terms of the land use across the application area and the scale of development.

To do this, parameter plans for the layout, scale, access, appearance and landscaping of the proposed development will be produced, along with guidelines under which the Reserved Matter applications will be developed and brought forward.

The EIA will therefore be undertaken using the following three control documents:

- **Parameter plans** - anticipated to consist of: existing site plan, development zones and land parcels, land use plans for basement, ground floor and upper floors, development zone dimensions plans (maximum and minimum storey height and alignments), building dimension plans (maximum and minimum height, width and length), open space allocations, access routes.
- **Development specification** - anticipated to include details of the parameter plans and the type and quantity of development that could be brought forward at the Reserved Matters stage for each development zone.
- **Design code** - anticipated to provide guidelines for the appearance for the open spaces and public realm, landscaping including specifications for the planting, furniture and all other components, including streets and pavements. The code is also likely to include environmental and quality standards that each building and open space must comply with. The transport and energy interfaces between the components of the proposed development will also be considered.

The assessments undertaken and reported in the ES, as outlined in this Scoping Report, will be largely based on the information provided in these three documents.

2.4.4 Use of "Timeslices" in Assessment

The construction phases and occupancy phases of a number of elements of the development are likely to overlap (see Section 3.3 for further details), and therefore to ensure the worst-case scenarios are assessed, a number of timeslices will be considered in the assessments where appropriate:

- 2015 - 2017: demolition.
- 2016: start of construction phase.
- 2017: occupation of technical media hub and part of college, continued construction of outstanding education elements.
- 2018: occupation of technical media hub and all education elements and Harlequins, construction of residential.
- 2020: occupation of technical media hub, all education elements, and occupation of some of residential development.
- 2022: fully occupied and operational (TBC).

As the demolition and construction programme is further developed, these timeslices will be refined.

2.5 APPROACH TO CUMULATIVE EFFECTS ASSESSMENT

Cumulative effects can occur in two ways as a result of development activities:

- Intra-project cumulative effects - effect of individual environmental impacts from the proposed development which when combined give a significant effect.
- Inter-project cumulative effects - combination of effects from the scheme and other off site developments. The potential for inter-project cumulative effects depends on the location of the off site developments and the scale, nature and timing of these developments.

To identify those developments which may give rise to inter-project cumulative effects with the proposed development, the following criteria have been used:

Committed developments comprising:

- Developments with planning consent and under construction.
- Developments with planning consent but construction has not commenced.

Planning developments comprising:

- Submitted planning applications awaiting consent.
- Developments which are likely to be submitted where sufficient information is available for an assessment of cumulative effects to be completed.
- Development projects and proposals identified in relevant local plans.

The EIA will consider schemes within a 1km radius of the proposed development. This radius is considered to be a suitable distance over which schemes have the potential to interact cumulatively. A provisional list of the schemes to be considered within the cumulative effects assessment is provided in **Table 2.2**.

Table 2.2 Provisional List of Cumulative Schemes

Address	Application No.	Description	Status
Twickenham Railway Station London Road Twickenham	10/3465/FUL	Demolition of existing station building and access gantries to the platforms and development to provide; a podium across the existing railway lines; a new station concourse with stair and lifts to platform level; three buildings ranging in height between 8 storeys and 3 storeys comprising 165 residential units, 734 sqm of flexible Use Class A1 (shops), A2 (financial and professional services), A3 (restaurant and café) and D2 (leisure) floorspace, plant space including a combined heat and power plant, and green roofs; sustainable transport facilities to include a taxi rank, kiss and ride and car club spaces, 35 commuter car parking spaces (including disabled spaces), residents disabled spaces, delivery and servicing spaces, electric car charging points,	Preliminary works commenced

Address	Application No.	Description	Status
		250 cycle spaces for commuters and 208 cycle spaces for residents; provision of a new station plaza, river walkway including children's play space, soft and hard landscaping; and off site highway works to include the relocation of the existing bus stop.	
Former Twickenham Postal Sorting Office London Road, Twickenham	12/3650/FUL	Demolition of existing buildings and development of the site to provide a mixed use development comprising of a 3 to 5 storey building accommodating 82 residential units (16 affordable and 66 private sale), 2 restaurants units (A3 Use Class) with basement car, motorcycle and cycle parking, estates office, associated plant equipment and courtyard area; Erection of a 2 to 3 storey community building with associated outdoor space and parking; 28 houses with associated car parking and gardens; New riverside pathway for pedestrians and cyclists, automatic locking gate, public space, internal access road, landscaping and associated infrastructure and utilities.	Under construction
Land Known as Twickenham Rough - Open Land West of Twickenham Sorting Office Site	13/1147/FUL	Proposed change of use to public amenity land and the provision of a 3m wide footpath/cycleway and associated landscaping and fencing.	Approved August 2013

3 SCHEME DESCRIPTION

3.1 NEED FOR THE SCHEME

The REEC development is identified in the Richmond upon Thames Core Strategy as one of the locations where new development is likely to be concentrated over the Plan period (2009-2026).

Policy CP18.B outlines that land in educational use will be 'safeguarded' and the '*potential of existing educational sites will be maximised through redevelopment, refurbishment or re-use to meet educational needs.*'

The vision is to create a new campus for education and enterprise; a college working in partnership with employers on site, which will provide access to resources and work opportunities through work experience, apprenticeships and ultimately, jobs.

The potential to completely redevelop the site provides the college with an opportunity to create a flagship regional centre of excellence, as well as maintaining its strong commitment to its local community.

The college will offer a wide range of courses and subjects including A-Levels and an extensive choice of vocational qualifications from entry level through to level 3 qualifications, including BTECs, NVQs and apprenticeships. It will also offer a number of higher education courses as well as courses for adults, a GCSE pathway and a supported learning offer. The development will enable the college to tailor its offer to ensure it meets the needs of its partners in the enterprise. A post-16 programme that will offer on-site opportunities for pupils graduating from the new secondary school to choose from a very wide range of options. Progression routes for pupils from the Clarendon special school will be provided. The qualifications and skills young people will achieve will make them strong contenders for available employment opportunities with Haymarket, Harlequins, other local employers as well as other major employers operating in the specialist fields.

To fund the above proposed development, part of the college land needs to be sold. The necessary funds will be obtained from an enabling residential development in the southern half of the site. This provides the opportunity to create a new 'education and enterprise' integrated campus.

3.2 THE PROPOSED DEVELOPMENT

The proposed development will comprise: an all new Richmond upon Thames College estate; a new five form entry secondary school; a built for purpose Special Needs School (Clarendon School, relocated from elsewhere in the Borough); and a

new technical media hub to be occupied by Haymarket. Building needs for these users will continue to be considered together to enable the design of an integrated operational and organisational model. Alongside the campus will be a residential development.

Development of the site will replace all of the site's existing buildings. The playing fields on Craneford Way will be retained and enhanced to facilitate improved year-round sport provision.

An indication of the zoning of the education, office, sports and residential elements on site is shown on drawing SK-039F in **Appendix 1.1**. The likely design heights of the buildings across the site will range from up to 10-15m at the south of the site, and up to 20-25m in height to the north and north west adjacent to the A316 Chertsey Road.

Following demolition of the existing college, the development would provide:

- A new campus for education and enterprise – comprising:
 - Replacement college (Use Class D1) of approximately 20,000 square metres (Gross External Area (GEA)) to accommodate up to 3,000 Full-Time Equivalent (FTE) day time students, as well as evening and weekend use.
 - A new five form entry secondary school (Use Class D1) of approximately 6,000 square metres (GEA) for up to 750 students.
 - A secondary school for children with special education needs (Use Class D1) of approximately 3,000 square metres (GEA).
 - New Technical Media Hub for Haymarket (Ancillary Use Class D1) of approximately 2,000 square metres (GEA) including photographic studios, technical testing labs, archive, offices and meeting rooms (up to twenty full time staff), private gallery and creative industries incubator business units).
 - Replacement on-site sports centre (Use Class D2) of up to 4,000 square metres (GEA) to serve both the college and wider community.
 - Possible alterations to existing means of vehicular access to Langhorn Drive together with ancillary on-site parking and landscaping.
- Upgrading of existing Craneford Way Playing Fields for use by the college and local community.
- Enabling residential development of up to 2.5 hectares.
- Energy centre to support the development.

3-3 DEMOLITION AND CONSTRUCTION

A phased programme of enabling works and site set-up, demolition and construction will be required. A brief summary of each of these phases as far as is known at this

time is provided under the relevant headings below.

Whilst specific details of the proposed working methods and approach are not yet available, these will be confirmed prior to undertaking the EIA. This will be to an appropriate level of detail so that a robust assessment can be completed. Proposed working methods and approaches will be provided in the ES.

It is anticipated that enabling works will commence on site in 2015 prior to the start of the main construction and demolition works.

The multi-phased development will initially free-up space for the new education estate and culminate with the vacant possession of the site for residential development. The final form and phasing of the development programme will be subject to a full feasibility study and a detailed logistical and operational review, and will be provided within the planning application. An indication of the likely phasing is as follows:

Enabling Works and Site Set-up

- Enabling works and site set-up (e.g. contractors compound): autumn 2015 (TBC).

Demolition and Construction

- Phase 1 of the college: late 2015/early 2016 - autumn 2017.
- Phase 2 of the college: autumn 2017 - late 2018.
- Schools: late 2015/early 2016 - autumn 2017.
- Technical media hub (Haymarket): autumn 2015 - spring 2017.
- Residential: 2018 onwards.

Operation

- Phase 1 of the college: occupation autumn 2017.
- Phase 2 of the college: occupation autumn 2018.
- Schools: occupation autumn/winter 2017.
- Technical media hub (Haymarket): occupation spring 2017 (TBC).
- Residential: phased occupation from 2018.

Decommissioning

Decommissioning will not be assessed as part of the scope of the EIA because there is currently no intention to decommission the site at any point in the future.

3-4 POTENTIAL SENSITIVE RECEPTORS

A number of receptors have been identified that would potentially be sensitive to effects resulting from the proposed development:

- Existing site users who will remain on site during construction as part of the 'decant' strategy.
- Residents in the immediate vicinity of the site.
- Users of the adjacent road network (e.g. Egerton Road, Craneford Way, Langhorn Drive) and wider strategic network (e.g. A316 Chertsey Road).
- Public transport network (bus, rail) and pedestrians and cyclists.
- LBRuT Air Quality Management Area.
- Water resources and underlying aquifers - Kempton Park Gravel shallow principal aquifer, River Crane, Duke of Northumberland's River, River Thames.
- On site drainage systems and capacity of potable water and sewerage networks to meet demand of new development.
- Residential receptors for daylight and sunlight, both on and offsite.
- Statutory and non-statutory designated conservation sites with 2km - Ham Lands Local Nature Reserve and Isleworth Ait Local Nature Reserve, Sites of Metropolitan Importance for Nature Conservation including the Crane Corridor, Borough Sites of Importance Nature Conservation (Grade 1 and Grade 2) including the Duke of Northumberland's River north and south of Kneller Road, and Local Sites of Importance for Nature Conservation.
- Habitats e.g. River Crane, broadleaved semi-natural woodland, protected and/or valued species.
- Conservation areas, namely the Rosecroft Gardens Conservation Area. Others in the wider study area include Hamilton Road, Twickenham Green, Queen's Road, Amyand Park, Pope's Avenue and Twickenham Riverside within 775m of the site.
- Local and long distance townscape views e.g. from The Terrace on Richmond Hill, Richmond Park.
- Listed buildings within the wider study area specifically the Grade I Listed Building of All Hallows Church, Registered Park and Garden - Pope's Garden.
- Crane Valley Archaeological Priority Area (APA) on site, and Whitton APA and Twickenham and Marble Hill APA in the wider study area.
- Sub-surface archaeological resource - although limited by previous development on the site.
- Open space, green chains and recreational facilities.
- Local community workforce.

3-5 ALTERNATIVES ASSESSMENT

In accordance with the EIA Regulations, the ES will present the main reasonable alternatives considered by the Applicant and an indication of the main reasons for the choice made, taking into account the environmental effects.

The ES will include consideration of the following where applicable:

- 'Do nothing' scenario - the consequences of no development taking place;
- 'Alternative sites' scenario - the potential for the same development to take place on other sites within the borough;
- 'Alternative uses' scenario - the potential for alternative land uses of the site; and
- 'Alternative designs' scenario - documentation of how the design put forward in the OPA has evolved, including selection of massing, alignment, floor heights, materials and landscaping.

The proposed development of the existing site has been the subject of discussions between LBRuT and REEC, to evaluate the concept for the development of the site and produce a masterplan, and is in accordance with local planning policy documents (see Section 4).

4 POLICY REVIEW

The planning policy context for the site is set out in the following documents:

- National Planning Policy Guidance:
 - National Planning Policy Framework (NPPF) (2012).
 - Planning Practice Guidance (2014).
- Strategic Planning Policy:
 - The London Plan - Spatial Development Strategy for Greater London (2011).
 - The London Plan - Revised Early Minor Amendments (2013).
 - Housing Supplementary Planning Document (SPD) (2012).
- Local Planning Policy:
 - London Borough of Richmond upon Thames Core Strategy (2009).
 - London Borough of Richmond upon Thames Development Management Plan (2011).
 - London Borough of Richmond upon Thames Local Plan Proposals Map (2013).
 - Saved Policies of the LBRuT Unitary Development Plan (UPD) (2005).

The site is currently the subject of a series of designations as shown in **Figure 4-1**.

The designations and supporting policies as defined in the LBRuT Local Plan Proposals Map 2013 are briefly summarised below:

1. Redevelopment Site (T29):

Redevelopment Site T29 carries forward saved policy of the UDP of March 2005; this envisages "the redevelopment to provide college and enabling residential development. Retention and upgrading of Craneford Way East Playing Field".

2. River Crane Area of Opportunity CP12:

The application site is within the "River Crane Area of Opportunity", which is supported by Core Strategy Policy CP12 which states:

"the Council will improve the strategic corridor to provide an attractive open space with improvements to the biodiversity. Developments in and adjacent to the River Crane Corridor will be expected to contribute to improving the environment and access, in line with planning guidance."

3. Metropolitan Open Land DM OS 2:

The playing fields at the south west of the site are designated as Metropolitan Open Land (MOL) and subject to Policy DM OS 2 as well as The London Plan (2011) Policy 7.17.

The site also adjoins the following policy designations:

- Twickenham Area Action Plan (Policies TWP1, TWP2, TWP3, TWP4).
- Public Open Space DM OS5 and OS6.
- Other sites of nature importance CP 4.
- Other Open land of townscape importance DM OS 3.

Any development would also be subject to the advice contained in LBRuT's local adopted Supplementary Guidance on the following matters:

- Affordable Housing.
- Car Club Strategy.
- Design Quality.
- Off Street Parking Standards.
- Sustainable Construction checklist.
- Telecommunications Equipment.
- Design for Maximum Access.
- Nature Conservation and Development.
- Planning Obligations Strategy.
- Security by Design.

The following emerging Local Planning documents may also be relevant dependant on the stage they have reached when the application may be determined:

- Draft LB Richmond Local Plan Site Allocations Development Plan Document (DPD)⁶ designates:
 - the college site as Site TW10 for "Redevelopment to provide a new college, offices, secondary school and special school, residential including affordable and open space"; and
- LB Richmond Community Infrastructure Levy SPD⁷.

Additionally the site has also been the subject of a number of historic Site Development Briefs – including:

- Richmond Upon Thames College Planning Brief – December 2008.
- Crane Valley Planning Guidelines – April 2005.

⁶ The Pre publication draft version was issued Nov 2013 and a revised consultation commenced on additional sites on 9 June 2014. The Publication Draft is due to be issued for consultation in late 2014 with adoption expected in 2015.

⁷ Due for adoption in September 2014 following submission and review by Secretary of State (SoS).

Figure 4.1 Local Plan Proposals Map July 2013



5 TRANSPORT

5.1 INTRODUCTION AND KEY ISSUES

The site has good road access off the A316 Chertsey Road, providing links with the adjacent highway network. Due to the existing multiple access points into the site and complex access arrangements off the A316, surveys may be required to understand the existing local traffic conditions. This will form the baseline against which the proposed development will be assessed.

The OPA will be accompanied by a separate Transport Statement (TS), informed by the transport assessment (TA), and Travel Plans for relevant parts of the proposed development.

Traffic analysis and modelling will be required to look at both the impact of construction and operational traffic on the local highway network and to identify whether any mitigation will be required.

Key issues relevant to the transport assessment (TA) are:

- Traffic generated during the demolition and construction phase (Heavy Goods Vehicles (HGVs), staff car movements etc), car parking provision during demolition and construction.
- Vehicle movements on the local and wider road networks during operation including capacity issues at junctions.
- Operational car parking provision.
- Implications on public transport network during all development phases.

5.2 POLICY REVIEW

In addition to the list of relevant planning policy as set out in Section 4, the following policy and regulatory documents will also be reviewed in preparing the TS:

- Department for Transport, Delivering a Sustainable Transport System (2008).
- Department for Transport, Creating Growth, Cutting Carbon – Making Sustainable Transport Happen (2011).
- Department for Transport Guidance on Transport Assessments (2007).
- Transport for London, London Freight Plan (2008).
- Transport for London's Transport Assessment Best Practice Guidance (2010).
- Transport for London's Guidance for Workplace Travel Planning for Development (2008).
- Greater London Authority, The Walking Plan for London – Mayor of London (2004).

- Greater London Authority, Cycling Revolution: London (2010).

5-3 EXISTING ENVIRONMENT

The site is positioned on the southern side of the A316 Chertsey Road, which forms part of the Transport for London (TfL) Strategic Road Network 'North and West' area. Access to the site is via a 'left in' and 'left out' only priority junction off the A316 via Langhorn Drive. Vehicles approaching from the west must therefore go around the A316 Chertsey Road/B361 Whitton Road signal controlled roundabout to access Langhorn Drive. Vehicles wanting to exit the site, and travel east, must go around the A316 Chertsey Road/B358 Hospital Bridge Road signal controlled roundabout, which is approximately 1 mile west from the Langhorn Drive junction.

The surrounding road network carries significant traffic volumes, focused on the A316, and during periods of peak traffic activity it is clear that the adjacent junctions on the A316 (junctions with the B355, B361 and A310) experience congestion.

The college is well located to take advantage of local public transport facilities, including bus and rail services. There is an extensive network of bus routes which stop on London Road approximately 400-500m from the campus, with further stops on King Street and York Street approximately 600-700m from the campus.

There is no London Underground station providing direct access to the college. Underground users must change at Richmond or Hounslow (East or Central to connect to Hounslow bus station) for connecting bus services 33 and 281 respectively. Access to the overground rail network is available approximately 600m to the east at Twickenham Rail Station.

There is currently a high level footbridge over the A316 Chertsey Road next to the Langhorn Drive junction. The structure appears to have been a temporary construction, although looks to have been in place for a number of years.

5-4 SENSITIVE RECEPTORS AND POTENTIAL ENVIRONMENTAL EFFECTS

The proposed development of the site has the potential to generate more traffic than it does at present, given the additional residential components. The potential transport effects of any increase in travel as a result of the proposed development could include the following:

- Disruption and disturbance caused by construction traffic including HGVs during the construction phase.
- Increase in operational traffic causing detrimental impact on residential amenity and the highway network.

Langhorn Drive will continue to be the main access for all components of the proposed development. Access to the college student car park will continue to be from Egerton Road, whilst the residential element of the development will likely be from Court Way or Heathfield North and Heathfield South. Access from Egerton Road is restricted by a fire access near its junction with the A316 Chertsey Road.

As part of the proposed development, the Langhorn Drive junction with the A316 Chertsey Road (a 'left in' and 'left out' only priority junction) will remain unchanged. It is considered reasonable that vehicles travelling to the site from the west will continue to go around the A316 Chertsey Road/B361 Whitton Road signal controlled roundabout, as the implementation of an all-movements junction would require significant carriageway realignment and has the potential to increase delays to traffic on the A316 Chertsey Road.

Proposed operational parking on the site will be assessed for all land uses. Parking standards set out in The London Plan and LBRuT's Draft Development Plan will be reviewed as part of this assessment.

The overall quantum and breakdown of car and cycle parking provision will be assessed against the two parking standards and agreed with both LBRuT and TfL prior to the submission of the OPA.

The schools and college provision requirements will also be determined with regard to drop-off and access for mini-buses, coaches and taxis.

Table 6.1 provides a summary of the scope of the transport assessment.

Table 6.1 Scope of Assessment: Transport

Potential Sensitive Receptors	Potential Impact	Potential Effect	
		Scoped In	Scoped Out
A316 Chertsey Road and associated junctions and roundabouts	Increased traffic short-term during construction phase and long-term during operational phase causing capacity issues.	✓	
Local road network	Increased traffic during construction phase and inappropriate routing. Long-term increase in traffic during operational phase.	✓	
Parking - on site and off site	Ability to meet parking provision on site for land uses during construction and operation. Implications on off site parking in wider area during operation.	✓	
Pedestrian access	Increased use of high level footbridge over A316.	✓	

5-5 ASSESSMENT METHODOLOGY

5.5.1 Transport Review

An initial transport review will be completed consisting of:

- Site visit during peak hours to assess the existing transport and traffic conditions in the local area, and understand the access arrangements to the site.
- Review accessibility of the site by all modes of transport and review quality of provisions in terms of walking and cycling routes.
- Complete a full multi-modal trip generation assessment for the proposed development and compare to the existing use to assess the potential impact of the proposals on each mode.
- Review the development proposals against local, regional and national policy.

5.5.2 Baseline Surveys

No baseline surveys have been undertaken to date, with the proposed scope to be discussed with TfL and LBRuT.

Due to the multiple access points into the site and the complex situation with regard to access from the A316, including pedestrians crossing the A316, a number of surveys may be required to understand the existing local traffic conditions and level of use.

The following surveys may be required:

- Highways and existing site use surveys:
 - Turning count survey of college student car park and main college accesses on Egerton Road
 - Automatic traffic counter surveys (ATC) for one week to include local road network.
- Parking beat survey for roads close to the college site access .
- Pedestrian survey of use of high level footbridge and informal crossing of A316 Chertsey Road.

The need for surveys of the main junctions on the wider road network will be considered after completion of the initial transport review.

The need for, and scope of these baseline surveys, will be discussed and agreed with TfL and LBRuT.

5.5.3 Transport Assessment

The proposed development will be supported by a TS, informed by the TA, and Travel Plans for the residential and educational elements of the proposed development.

The TA will be prepared in accordance with guidance set out in Section 5.2 and specific TfL and LBRuT requirements.

The TA will consider the impact of trip generation on the road network, which in the first instance would be expressed as a percentage increase against existing traffic flows. The TA will also assess the current capacity of the local public transport network and provide an assessment of how the proposed development is predicted to impact upon its capacity.

The full scope of modelling requirements will need to be agreed with TfL and LBRuT, but will potentially include analysis of highway capacity issues using ARCADY, PICADY and LINSIG.

It terms of construction traffic there are no significant highway safety issues and subject to internal layouts all delivery vehicles should be able to enter and exit the site in a forward gear.

Traffic analysis will also consider the impact of construction traffic on the local highway network and identify whether any mitigation will be required. This analysis will also identify whether certain routes/times should be avoided to reduce the potential for congestion with resultant delays. Swept path analysis will be completed using AutoTrack to assess vehicle movements for car parking and servicing to develop preferred site layout.

5.5.4 Significance Criteria

The transport chapter of the ES will report the findings, data and analysis undertaken within the TA, and identify the significance of the impacts in accordance with **Table 2.1**.

5.6 POTENTIAL MITIGATION

Impacts will not be known until the appropriate transport modelling has been done. At this point, appropriate mitigation measures will be identified. However, potential mitigation measures include:

- Specified haulage and access routes during construction to avoid residential areas.
- Agreement of days of the week and times of the day when construction vehicles would be permitted to access the site specified in agreement with the local

planning authority and highways authorities and set out in the Environmental Management Plan.

- An outline Construction Workforce Travel Plan Framework would be developed to minimise car use, especially sole occupancy car use.
- Operational travel plans for the residential and educational elements of the scheme to maximise use of public transport etc.

The outline Construction Work Force Travel Plan Framework would be agreed with relevant stakeholders. Travel plans are defined as a package of measures aimed at promoting sustainable travel with an emphasis on reducing reliance on single occupancy car use. They must be tailored to the specific circumstances of the site to be effective.

5.7 CONSULTATION

No consultation has been undertaken with respect to traffic impacts to date. Comprehensive discussions will be required with TfL and LBRuT. It is proposed that formal consultation meetings be held to discuss the proposals and scope of the overall content, surveys and methodologies for the TA and any supporting documents. It is proposed that technical notes are produced and presented at these meetings to formalise agreement of the various scope items.

6 NOISE AND VIBRATION

6.1 INTRODUCTION AND KEY ISSUES

Noise and vibration effects associated with the proposed development are likely to occur predominantly during the demolition and construction phase. The ambient noise climate at the site is currently influenced by traffic noise from the A316 Chertsey Road to the north and by noise from aircraft, as the Heathrow flight path crosses the Borough. Impacts are likely to be confined to sensitive receptors located within (during decant phase and as the development is occupied) and close to the site boundaries.

Key issues relevant to noise and vibration are outlined below:

- Noise and vibration sources associated with all activities during demolition and construction of the development and the effects on sensitive receptors both within and around the site.
- Changes to the existing noise climate at sensitive receptors located around the site and the access routes associated with operation of the completed development.
- The effects of existing noise sources on sensitive receptors within the development.

6.2 POLICY REVIEW

In addition to the list of relevant planning policy as set out in Section 4, the following policy and regulatory documents will also be reviewed as part of the EIA process:

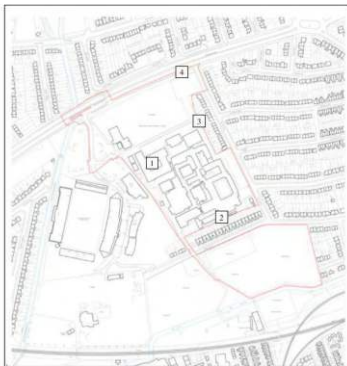
- Noise Policy Statement for England (2010) (part of the NPPF).
- British Standard (BS)8233:1999 Sound insulation and noise reduction for buildings - a code of practice.
- World Health Organisation (WHO) (2000) Guidelines for Community Noise.
- BS4142:1997 Method for rating industrial noise affecting mixed residential and industrial areas.

6.3 EXISTING ENVIRONMENT

As no existing baseline noise information was available, ambient noise levels against which any introduced noise propagating to surrounding sensitive receptors can be compared was obtained in April/May 2014. Survey locations were selected to represent noise sensitive locations closest to the various scheme components. This included positions on the site itself and at nearby residential receptors. The distribution of the survey locations 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. The locations and methodology were agreed with the Environmental Health Officer from LBRuT on 17 April 2014 and are shown in **Figure 6.1**.

Figure 6.1 Baseline Noise Monitoring Locations



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 at the boundary with the A316. Details of the baseline monitoring completed and the results are provided in **Appendix 6.1**.

Baseline vibration measurements were not carried out for two reasons. Firstly, because there were no significant existing sources of vibration in the vicinity of the sensitive receptors closest to the site (Positions 2 and 3) and secondly, because the effects of vibration are normally assessed in terms of absolute levels and not by

difference from a baseline level.

6.4 SENSITIVE RECEPTORS AND POTENTIAL ENVIRONMENTAL EFFECTS

The sensitive receptors that will need to be considered in the EIA have been identified during the baseline survey. These are mainly residential receptors located close to the site boundaries, on the A316 to the north, on Egerton Road to the east and on Craneford Road to the south. The Harlequins Stadium is located to the west of the site, but is not considered a receptor because it is not a sensitive use.

Sensitive receptors will also be located within the development site at the new college and school, and at the proposed residential area.

Construction of the proposed development is likely to affect the noise climate of the area. Construction activities which will be considered as part of the noise assessment would include:

- Enabling works, such as road and drainage diversions, services diversions.
- Phased demolition of parts of the site.
- Infrastructure works including preparation of the construction compound.
- Construction traffic movements within the site and on surrounding roads, associated with the import and export of materials (information required from Transport Assessment).
- Excavation and earthworks.
- General construction of buildings across the whole of the site.

The main construction works would take place within the existing site boundary and noise could therefore affect those sensitive receptors already identified, closest to the boundaries. Vibration from demolition and construction activities such as piling and earthworks, could also affect those properties near the boundaries and will therefore be assessed.

Although operational noise will be considered as part of the assessment, it is not envisaged that there will be any significant effects, as any external plant or machinery noise would be controlled at source by appropriate mitigation measures and operational vehicle movements are expected to be insignificant relative to existing traffic. As there are no anticipated sources of operational vibration this will be scoped out of the assessment.

Table 6.1 Scope of Assessment: Noise and Vibration

Potential Sensitive Receptors	Potential Impact	Potential Effect	
		Scoped In	Scoped Out
Residential, close to the development boundaries. Residential, within the proposed development. Educational, college and school buildings.	Noise and vibration generated during demolition of existing buildings, excavation works and construction of the new buildings, including construction traffic.	✓	
Residential, close to the development boundaries. Residential, within the development. Educational, college and school buildings.	Operational noise from external plant such as air conditioning systems and from traffic generated by the development.	✓	
Residential, within the development. Educational, college and school buildings.	Operational noise from existing ambient sources, aircraft and traffic.	✓	
Residential, close to the development boundaries. Residential, within the development Educational, college and school buildings.	Operational vibration.		✓

6.5 ASSESSMENT METHODOLOGY

6.5.1 Construction Noise

Noise levels from the construction of the proposed development will be predicted at noise sensitive receptors at the site boundaries and at areas of the development which are completed while other construction works continue. Noise levels will be estimated using BS5228¹⁰. The prediction method contained in the standard calculates noise levels at selected receptors based on source noise levels, propagation distance, details of the intervening ground cover, topography and screening. This information will be used to determine construction noise levels at the selected receptors.

The various elements of the construction works will be grouped into phases for the purpose of the noise assessment, with each phase reflecting the different noise exposures that would occur over time at each sensitive receptor location. The calculated noise levels will represent the noisiest periods when the maximum number of activities would be operating simultaneously during any given phase of the work. The predicted noise level will therefore represent the worst-case noise level during each phase and may be lower at other times when not all of the activities are operating at the same time.

¹⁰ British Standards Institution, BS 5228 Noise and Vibration Control on Construction and Open Sites.

The baseline survey data will be used to evaluate whether the predicted construction noise levels would be prominent over the baseline levels, from which the likely significance of potential effects can be assessed.

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 its temporary nature means that it cannot be assessed using the same criteria as an operational noise source which could result in a permanent effect. When assessing construction noise the guidance in BS5228 identifies a number of key factors in relation to the acceptability of noise (and vibration) to people living and working around the site. Many of these reflect the considerations of the Institute of Acoustics (IOA)/Institute of Environmental Management and Assessment (IEMA)⁹ draft guidance for the assessment of significance.

The factors cited in BS5228 include the duration of the construction works, hours of working, attitude to the site operator, impulsive or tonal characteristics of the noise and the influence of existing ambient noise levels. To assess the likely significant effect of construction noise on sensitive receptors, the 'ABC Method' provided in BS5228-1:2009 will be employed. This method defines category threshold values which are determined by 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. The criteria also take account of the duration of the construction works. The proposed significance criteria to be used in the assessment are provided in **Table 6.2**.

Table 6.2 Significance Criteria for Construction Noise

Significance 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

6.5.2 Construction Vibration

The potential for vibration effects will be considered where construction works are likely to be close enough to residential properties for there to be perceptible vibration. This is particularly relevant for dwellings on the site boundaries. The

⁹ 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.

methodology of BS5228, based on historic vibration data, will be used to estimate vibration from demolition, piling and compaction at relevant stages of construction.

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 will be determined using BS5228, BS7385¹², measured data from similar activities elsewhere and professional judgement. The proposed significance criteria to be used in the assessment are provided in **Table 6.3**.

Table 6.3 Significance Criteria for Construction Vibration

Significance 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

6.5.3 Operational Noise

It is considered that the design of the new buildings would ensure that operational effects associated with the proposed development are likely to be negligible. However, any relevant potential noise sources (such as traffic generation, plant machinery and any other miscellaneous activities) will be identified and assessed as the scheme design develops. The residual effects of noise from buildings or structures housing plant and machinery would normally be assessed using particular criteria of the assessment framework described in BS4142¹³. This method describes the likelihood of complaints in terms of the difference between the background noise level and the rating level of the noise source. The significance of the change in noise level is rated as part of this process as shown in **Table 6.4**.

Table 6.4 Significance Criteria for Operational Noise

Significance Criteria for Operational Noise	
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

Traffic noise, particularly from freely flowing traffic (which is regarded as the worst

¹² British Standards Institute, BS7985:1993 Evaluation and measurement for vibration in buildings: Part 2 - Guide to damage levels from groundborne vibration

¹³ British Standards Institution (1997) BS 4142 Method for rating industrial noise affecting mixed residential and industrial areas, British Standards Institution.

case), is a relatively uniform noise source without strong tonal or impulsive characteristics. The significance of traffic noise effects is commonly assessed simply on the degree of change anticipated. A 3dB(A) change in traffic noise is associated with a halving or doubling of traffic flow. Many of the guidance documents (past and present) relating to traffic noise assessment note 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. Based on the relevant guidance⁶⁴, the threshold at which traffic noise change becomes noticeable, and therefore significant, is generally accepted as being a noise change of approximately 3dB. Thus the following significance criteria are proposed in **Table 6.5**.

Table 6.5 Significance Criteria for Traffic Noise

Significance Criteria for Traffic Noise	
Negligible	L _{Aeq,16hr} noise level change of less than 3dB
Minor adverse	L _{Aeq,16hr} noise level change of more than 3dB but less than 5dB
Moderate adverse	L _{Aeq,16hr} noise level change of more than 5dB but less than 10dB
Major adverse	L _{Aeq,16hr} noise level change of more than 10dB but less than 15dB

6.6 POTENTIAL MITIGATION

6.6.1 Construction

The guidance given in BS5228 Parts 1 and 2 – Noise and Vibration Control on Construction and Open Sites⁶⁵, will be followed to control construction noise. This requires that noise control measures would be adopted according to ‘best practicable means’ which includes measures such as specification of plant equipment, hours of operation and HGV access routes. These principles will be set out in the outline CEMP.

Noise emissions from plant machinery would be controlled through the use of modern and therefore quieter models, with regular servicing and maintenance to maintain machinery to original specifications. Static machinery such as generators would be positioned as far away from noise sensitive receptors as possible, and acoustically screened.

Permanent noise barriers or site hoardings would be constructed as early as possible in the construction programme where these would benefit noise sensitive receptors.

General working hours would be agreed with LBRuT, and as stated in their Considerate Contractor advice note are likely to be 08:00 – 18:00 Mondays to Fridays and 08:00 to 13:00 Saturdays. Any necessary noise limits would also be

⁶⁴ Department for Transport (2007) Tag Appraisal Guidance (TAG) Unit 3.3.2 – The Noise Sub-objective, Department for Transport.

⁶⁵ British Standards Institute BS 5228-1:2009 – Noise and Vibration Control on Construction and Open Sites.

agreed.

6.6.2 Operation

Plant and machinery, such as ventilation and air conditioning plant, would be screened or housed in buildings which incorporate appropriate noise and vibration attenuation measures designed to minimise the possibility of disturbance to nearby sensitive uses. Regard would be paid to the provisions of BS4142:1997⁶, by ensuring that operational noise emissions as determined at the nearest residential premises are at least 10dB below the prevailing LA90 levels.

6.7 CONSULTATION

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 schools and BS4142 for operational noise.

⁶ British Standards Institute, BS4142:1997 'Method of Rating Industrial Noise affecting Mixed Residential and Industrial Areas'.

7 AIR QUALITY

7.1 INTRODUCTION AND KEY ISSUES

The site enabling, demolition, construction and operation of the proposed development have the potential to result in air quality impacts in the area surrounding the site.

The LBRuT has declared a Borough-wide Air Quality Management Area (AQMA), due to exceedances of the nitrogen dioxide (NO₂) and particulate matter (PM₁₀) objectives. Consequently, the redevelopment site falls within the designated AQMA.

The key issues to be considered as part of this section are listed below:

- Localised changes in levels of road traffic pollutants caused by exhaust emissions from construction traffic, traffic congestion or increased traffic flows on the local road network including diversionary routes during construction.
- Creation of dust emissions from construction materials, plant and machinery, and associated nuisance.
- Localised changes in levels of road traffic pollutants resulting from traffic on routes to and from the site, during the operational phase.

7.2 POLICY REVIEW

In addition to the list of relevant planning policy as set out in Section 4, the following policy and regulatory documents will also be reviewed as part of the EIA process:

- The European Directive on Ambient Air and Cleaner Air for Europe (2008).
- Air Quality Strategy for England, Scotland, Wales and Northern Ireland (2007).
- Local Air Quality Management (LAQM) - Part IV of the Environment Act 1995 requires local authorities to periodically Review and Assess.
- National Planning Policy Framework (2012)- replaces Planning Policy Statement 23: Planning and Pollution Control.
- The Mayor of London's Draft Supplementary Planning Guidance on the Control of Dust and Emissions during Construction and Demolition (2013).
- Mayor of London's Air Quality Strategy - Cleaning the Air (2010).
- London Borough of Richmond upon Thames Air Quality Action Plan (2002).
- London Borough of Richmond upon Thames Review and Assessment of Air Quality and Air Quality Progress Report (2013).

7.3 EXISTING ENVIRONMENT

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), 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_x and PM_{10} , with the exception of the AURN site (NO_x only). An extensive network of passive diffusion tubes also monitors ambient NO_x concentrations, largely at kerbside or roadside locations.

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

Annual mean NO_x concentrations are measured at a number of urban background locations and indicate that concentrations away from main roads are well within the air quality objective ($<30\mu\text{g}/\text{m}^3$).

Data presented in LBRuT 2013 Progress Report for the AQMA indicate that there have been no recorded exceedances of the long or short-term air quality objectives for PM_{10} in the Borough in recent years. Annual mean roadside PM_{10} concentrations measured at 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.

The nearest particulate monitoring site to the proposed development is the Teddington AURN (2.4km south), which measures suburban $\text{PM}_{2.5}$ 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 7.5km east-northeast of the proposed development) are around 50% of the annual mean air quality objective.

With regards to air quality at the site, the highest pollutant concentrations are expected to occur at the site boundary with the A316, where it is possible that there will be exceedances of the annual mean air quality objective for NO_x .

Research has concluded¹⁷ that exceedances of the 1-hour mean air quality objective may occur where annual mean concentrations are over $60\mu\text{g}/\text{m}^3$. Annual mean concentrations at the A316 Chertsey Road monitoring site between 2010 and 2012 were below this level, therefore assuming that there are no significant increases in

¹⁷ D. Loxton and B. Marner (2003) Analysis of the relationship between 1-hour and annual mean nitrogen dioxide at UK roadside and kerbside monitoring sites.

traffic flows, compliance with the short-term air quality objective is likely to be achieved at the façade of the proposed development.

The proposed residential development would adjoin Craneford Way, which is a comparatively minor road. Existing annual mean NO_x concentrations at this location are likely to be well within the air quality objective.

7-4 SENSITIVE RECEPTORS AND POTENTIAL ENVIRONMENTAL EFFECTS

7-4.1 Construction Phase

In accordance with the Institute of Air Quality Management (IAQM) guidance⁹⁸, an assessment of demolition and construction dust impacts will be undertaken for dust sensitive receptors:

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

The impact of demolition and construction activities on dust-sensitive ecological receptors will also be considered where applicable:

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

The construction traffic assessment will consider the impacts of construction vehicle movements on the AQMA and existing residential receptors.

7-4.2 Operational Phase

The current design for the development indicates that the buildings adjacent to the A316 Chertsey Road will comprise office and education facilities and therefore short-term impacts will be of primary concern.

LAQM.TG(09) describes in detail typical locations where consideration should be given to pollutants defined in the legislation. 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.

For instance, on a footpath, where exposure will be transient (for the duration of

⁹⁸ Institute of Air Quality Management (February 2014) Guidance on the assessment of dust from demolition and construction.

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. In general terms, concentrations associated with long-term standards are lower than short-term standards owing to the chronic health effects associated with exposure to low level pollution for longer periods of time.

The Environmental Protection UK (EPUK) Planning Guidance⁹⁹ provides a set of criteria to help determine whether changes in traffic have the potential to adversely impact on local air quality.

For a development, air quality impacts associated with traffic are only likely to be significant where there is a change in the:

- annual average daily traffic (AADT) flow or peak hour flow of 10% (5% in an AQMA);
- annual average daily heavy goods vehicle (HGV) flow of 200 or more; or
- average speed of 10 km/hr or more on roads with an AADT of 10,000 (or 5,000 on narrow congested roads).

Only properties and designated sites within 200m of roads affected by a project need be considered since beyond this distance the impact of traffic emissions is negligible.

The impact of operational traffic associated with the proposed development will therefore be assessed for sensitive receptors closest to roads links where a significant impact is likely to occur based on the above criteria and professional judgement.

Consideration will also be given to the impacts of emissions from the energy centre required as part of the development.

A summary of the scope of the air quality assessment is presented in **Table 7.1**.

⁹⁹ EPUK (April 2010), Development Control: Planning for Air Quality (2010 Update).

Table 7.1 Scope of Assessment: Air Quality

Potential Sensitive Receptors	Potential Impact	Potential Effect	
		Scoped In	Scoped Out
Existing residential properties/ businesses/ schools etc. within 350m of the site boundary.	Health and dust soiling impacts from demolition, earthworks and construction activities.	✓	
Dust sensitive ecological sites within 50m of the site boundary.	Dust soiling impacts from demolition, earthworks and construction activities.	✓	
Existing residential properties/ businesses/ schools etc. and dust sensitive ecological areas within 30m of roads used by construction traffic, up to 500m from the site entrances.	Health and dust soiling impacts from trackout.	✓	
Existing residential properties/ businesses/ schools /ecological sites etc. within 200m of road links affected by construction and operational traffic.	Health impacts due to increased airborne NO _x , PM ₁₀ and PM _{2.5} concentrations from construction and operational traffic emissions.	✓	
Existing residential properties/ businesses/ schools etc. within 200m of the site boundary.	Health impacts due to emissions from on-site plant and machinery.	✓	
Existing residential properties/ businesses/ schools and ecological sites within 10km.	Impact of stack emissions from energy centre on residential areas and designated ecological sites.	✓	

7.5 ASSESSMENT METHODOLOGY

A qualitative assessment will be carried out to assess the potential impacts associated with dust and PM₁₀ releases during the construction and operational phases of the proposed development and to determine any necessary mitigation measures that will be required.

The assessment will be based on the latest guidance from the IAQM²⁰ which divides construction activities into the following four categories:

- Demolition – demolition of existing structures and other materials not required on-site;
- Earthworks – excavation of material, haulage, tipping and stockpiling;
- Construction – buildings and infrastructure associated with the development; and

²⁰ IAQM (February 2014) Guidance on the assessment of dust from demolition and construction, Institute of Air Quality Management.

- Trackout – re-suspended dust from vehicles travelling over un-made dusty haul roads and onto the public highway.

The risk of dust effects (low, medium or high) is determined by the scale and nature of the works and the proximity of sensitive human and ecological receptors. The significance of the dust effects is based on professional judgement, taking into account the sensitivity of the local area. Appropriate mitigation measures will be recommended and these will be detailed in the outline CEMP.

The impact of emissions from on-site plant and machinery during the construction phase is not expected to be significant; however a detailed dispersion modelling assessment of impacts would be undertaken using Breeze AERMOD 7 for any significant sources that are identified.

A detailed dispersion modelling assessment of construction and operational traffic impact will be undertaken using ADMS-Roads (Version 3.2). The assessment will take account of all relevant national and local policies and DEFRA technical guidance relating to air quality. The assessment will focus on emissions of nitrogen dioxide (NO₂) and fine particulate matter (PM₁₀ and PM_{2.5}), taking into account all relevant national and local policies and DEFRA technical guidance. Where possible, verification of the modelled concentrations will be undertaken using data from nearby air quality monitoring sites.

Of the pollutants included in the AQS, NO₂, PM₁₀ and PM_{2.5} will be particularly relevant as these are the primary pollutants associated with road traffic. The air quality standards and objectives for these pollutants are presented in **Table 7.2**.

Table 7.2 Air Quality Standards and Objectives

Pollutant	Standard (µg/m ³)	Averaging Period	No. of Permitted Exceedances
NO ₂	200 (a)	1-Hour	18 per annum (99.8th percentile)
	40 (a)	Annual	-
PM ₁₀	200 (a)	24-Hour	35 per annum (90.4th percentile)
	50 (a)	Annual	-
PM _{2.5}	25 (a)	Annual	-

(a) Air Quality Standards Regulations (2010)
 (b) EU Directive Limit Value

The impact of existing road traffic on occupants of the proposed development will be assessed in addition to the impact of any construction and operational traffic associated with the site on existing sensitive receptor locations (e.g. nearby residential properties). Air quality impacts will also be identified at sensitive ecological sites where relevant.

The Breeze AERMOD 7 dispersion model (a new generation dispersion model that incorporates the latest understanding of the atmospheric boundary layer) will be used to predict pollutant concentrations at sensitive human health and ecological receptor locations due to emissions from the proposed on-site energy centre. This will be used to determine likely impacts alone and in-combination with traffic emissions, and determine potential changes to the stack heights, locations etc if mitigation is necessary. The modelling will be undertaken using five years of hourly sequential meteorological data from Heathrow Airport to allow the worst-case impacts to be identified. The cumulative impact of traffic and stack emissions will also be determined.

The significance of the predicted traffic and stack impacts will be determined in accordance with the EPUK planning guidance.

7.6 POTENTIAL MITIGATION

For construction dust, mitigation measures are likely to include enclosure of site with solid hoardings, use of water spraying for particularly dusty construction sites/compounds during dry periods, careful consideration of construction plant, and speed controls for vehicles on unpaved roads and over construction sites. The contractor would be required to work to a strict code of practice to ensure that good site practices are followed to minimise the generation of dust in particular, and reference will be made to relevant guidance including the Mayor's Guidance on the Control of Dust and Emissions during Construction and Demolition.

Mitigation measures could also include access restrictions (particularly restrictions on HGVs), speed restrictions, traffic calming and the use of vegetative screens. These will be detailed in the CEMP.

Construction traffic impacts will also be minimised by good practice, using well maintained vehicles and plant, and by traffic management measures which may include controls over HGV routing and peak hour movements. These principles will be set out in the outline CEMP.

Mitigation of operational air quality impacts will also focus on traffic management to avoid congestion.

All of the above mitigation is anticipated to be 'built-in' to the scheme design and approach to construction management.

7.7 CONSULTATION

Consultation was undertaken with the Air Quality Officer at LBRuT on 8 May 2014 regarding monitoring data availability for the area surrounding the proposed



development. It was confirmed that there was adequate existing LBRuT air quality monitoring in place to determine appropriate baseline concentrations for the assessment and facilitate model verification. Consequently, it was agreed that additional baseline monitoring would not be required to support the EIA.

8 GROUND CONDITIONS

8.1 INTRODUCTION AND KEY ISSUES

The potential impacts of contaminated land, both within the proposed site and on adjacent and nearby sites from where contaminant migration could impact the proposed development, will be considered.

Land contamination in the context of this assessment is defined as the presence of substances in, on or under the land, that have the potential to cause harm, whether this is to the environment (i.e. groundwater or controlled waters) or to human health. Potential geoenvironmental impacts with respect to proposed development construction, operation and waste management are also considered. Impacts to surface water quality are considered in Section 10: Water Resources and Flood Risk.

The key issues to be considered are listed below:

- Location and nature of any potentially contaminated land within the site, construction area and other areas in close proximity.
- Identification of potential sources of contaminant migration into the site, including migration of ground gases.
- Impacts of potential contamination arising during demolition and site clearance, excavation and construction.
- Impacts of potential contamination left in-situ.
- Management of potentially contaminating materials arising from clearance, demolition and construction.

8.2 POLICY REVIEW

In addition to the list of relevant planning policy set out in Section 4, the following policy and regulatory documents will also be reviewed as part of the EIA process:

- Part IIA of the Environmental Protection Act (EPA) 1990 (the Contaminated Land Regime).
- Contaminated Land (England) Regulations 2006.
- Contaminated Land (England) (Amendment) Regulations 2012.
- The Water Resources Act 1991 (as amended).
- The Environmental Damage (Prevention and Remediation) Regulations 2009.

8.3 EXISTING ENVIRONMENT

A Phase 1 Contaminated Land study, including site walkover and Landmark Information Group Envirocheck data request (including historical Ordnance Survey

mapping) has been completed for the proposed development and wider area. Reference has also been made to site investigations (including trial pits and boreholes) completed in 2008 by Soiltechnics, to determine data on contaminant levels.

The site is occupied by the buildings of existing college and its associated open spaces, including car parks and sports fields. Ground level across the site varies typically between about 9.5mAOD and 12.0mAOD.

A review of historical mapping indicates that the site was covered mainly by open fields in 1869. Buildings identified as "Marsh Farm" stood in the southern part of the site near to the course of the River Crane. The north eastern part of the site was occupied by orchards which appear to be connected to a building beyond the northern site boundary on Whitton Road identified as "Orchard Cottage".

The situation within the main site was largely unchanged by 1896. However, an area adjacent to but outside the south western corner of the site is shown as being developed as a sewage works. The 1896 map appears to show some unidentified features of the works on both sides of the River Crane, whose original course ran through the site at that time. The sewage works appeared to be connected to Whitton Road by a tramline which ran across the site.

The 1896 map shows a gravel pit beyond the southern site boundary immediately south of the railway line.

The 1920 map shows that there were a number of filter beds at the sewage works, mostly lying outside the site. However, the edges of some of the filter beds were close to the river as it ran through the main site at that time. By 1920, the tramway across the site was no longer shown and the gravel pit to the south had been infilled and partly redeveloped.

By 1935 the sewage works had expanded, partly into the areas currently occupied by the Harlequins Stadium but also partly into the eastern area of the site. On the later 1938 map, the extended areas are labelled as allotment gardens. Also, by 1938 the first of the current college buildings which presently occupy the main site had been built.

The 1960 - 1966 mapping shows the sewage works to have been replaced by a depot on the site of the current council depot. The River Crane had been realigned to its present course along the southern boundary of the site. Allotment gardens are still shown to the west and south west of the college buildings. However, the area to the south of the buildings is shown as a playing field.

The 1975 map shows further extensions to the college buildings. This situation appeared largely unchanged in 1992. By 2006, the full development of the college is shown. The most recent map, dated 2014, also shows the new housing areas to the east of the Harlequins Stadium.

The superficial geology of the sites and surrounding area consists of the sands and gravels of the Kempton Park Gravel formation which overlies the London Clay. The gravel is classified as a principal aquifer, but the bedrock is unproductive. The nearest licensed groundwater abstraction is over 1.5 km from the sites.

Site investigations completed in 2008³¹ encountered between 0.3-1.0m of topsoil or made ground, grading into orange brown clays becoming sand and gravel (considered to be Kempton Park Gravel) to depths of between 4.2m and 5.3m, and locally 9.3m. Stiff grey dark grey clay considered to be London Clay was encountered underlying the Kempton Park Gravel. Groundwater was encountered at between 1.1-3.5m in exploratory excavations and water levels of between 1.33-2.54m were observed in standpipes installed across the site.

During the site walkover survey, no obvious features of the main site or its current or former uses suggested that there may be a risk of soil contamination. All boilers for heating and hot water purposes are gas fired, although one location was identified where solid or liquid fuel may have been used previously.

Although there were no obvious areas of infill on the sites, it is understood that there were bunkers in use during the second World War and that these have since been backfilled.

During the 2008 site investigations, elevated concentrations of benzo(a)pyrene were measured in one location (in existing playfield to north of site) and was presumed to be associated with ash and clinker contained in the soil. Some hydrocarbon contamination also measured in two locations in the near surface soils (along western boundary of site, south of Langhorn Drive entrance). Based on gas monitoring undertaken, the site is classified as characteristic gas situation two, based on the definitions in CIRIA guidance document C665, which could require mitigation depending on the final location of the buildings.

8.4 SENSITIVE RECEPTORS AND POTENTIAL ENVIRONMENTAL EFFECTS

The potential impacts of contaminated land will be assessed based on a conceptual model of both sites. This is based on the source - pathway - receptor concept.

³¹ Solitechnic (2008) Proposed Redevelopment of Richmond upon Thames College - Ground Investigation Report and Classification of Waste Soils for Offsite Disposal Report.

The following sources of contamination, potential receptors of this contamination and the potential pathways linking the two have been identified based on work undertaken to date and have assisted in developing a preliminary conceptual model relating to the site, as provided in **Table 8.1**.

Table 8.1 Scope of Assessment: Preliminary Conceptual Model

Sources	Pathway	Receptors
On-Site Historical or liquid fuel storage Made ground and/or infill. Possible encroachment of sewage treatment filter beds/sludge lagoons into south west corner of site. Asbestos. Off-Site Former sewage works (now Council depot and waste transfer station). Electrical sub-station.	Surface water run-off into surface water features, including River Crane and the Duke of Northumberland's River. Migration of leachable contaminants from made ground into shallow aquifer. Migration of contaminants within groundwater in shallow aquifer into surface water features. Dermal contact/ingestion/ inhalation of dust, soil or liquids. Insulation of ground gases, vapours and dust. Migration of ground gases and vapours. Direct contact of aggressive contaminants with concrete or pipes.	Controlled waters; ground-water including the shallow principal aquifer (Kempton Park Gravel), River Crane to south of site, Duke of Northumberland's River to west of site. Human health; construction workers, future site users; and adjacent site users. Construction materials and structures: concrete and pipes.

8.5 ASSESSMENT METHODOLOGY

The principal guidance document on managing contaminated land is Contaminated Land Report 11 (CLR11), published by the Environment Agency. This provides a technical framework for identifying and remediating contaminated land through the application of a risk management process. CLR11 also sets out the approach to remediation of contaminated land.

The question of whether risk is unacceptable in any particular case involves not only scientific and technical assessments, but also appropriate criteria to judge the risk and conclude on exactly what risk would be unacceptable.

The process of risk assessment is summarised as follows:

- Develop a Conceptual Site Model – carry out a desk study review of available documentary information and identify the potential sources, pathways and receptors relevant to the site, and the potential pollutant linkages.
- Gather site-specific information on the Conceptual Site Model – through available site investigation.
- Gather information on the nature and extent of contamination, details of pathways for migration of contamination and specific information on the receptors to update the model.
- Risk assessment – apply criteria that will enable a judgement as to whether the

concentrations of contaminants in soil represent an unacceptable risk. These criteria must be relevant to each pollutant linkage, and can be generic (conservative) criteria, or can be site-specific (less conservative). Generic assessment criteria are concentrations of a contaminant in soil below which the risk is acceptable. Site specific assessment criteria are concentrations of a contaminant in soil above which there is likely to be an unacceptable risk.

The need for further intrusive site investigation will be assessed in relation to the Conceptual Model.

If a site passes based on the application of generic assessment criteria, then it is likely that no remedial action is required. If a site fails, then there may be a benefit in gathering further information and deriving site specific assessment criteria. If a site then also fails on the application of site specific criteria, then remedial action will be required.

The Environment Agency has published extensive guidance on the technical aspects of risk assessment, which forms the recognised basis of the UK approach to identifying whether land affected by contamination presents an unacceptable risk. Derivation of relevant assessment criteria is done using the Contaminated Land Exposure Assessment (CLEA) model. The Environment Agency has published a number of generic assessment criteria in the form of Soil Guideline Values (SGVs) for a number of contaminants, while a wide range of generic values have been published independently by various agencies using CLEA.

Risks arising from gas in the ground would be assessed and managed in accordance with the guidance in CIRIA report C665.

For the purposes of the EIA, the assessment of likely significant effects and likely residual effects will be based on significance criteria derived in line with the good practice provided in the CIRIA Report C552. The criteria consider controlled waters, human health, ecological and property receptors listed in the contaminated land statutory guidance and Environment Agency Model Procedures (CLR11). They are set out in **Table 8.2**.

Table 8.2 Significance Criteria for Contaminated Land

Effect	Description
Major adverse	Severe or irreversible detrimental effect to human health. Severe temporary or irreversible reduction in the quality of a potable groundwater or surface water resource of local, regional or national importance. Irreversible or severe temporary detrimental effect on animal or plant populations. Irreversible detrimental effect to nationally important geological feature. Irreversible detrimental effect to building structure resulting in collapse or demolition.
Moderate adverse	Long-term minor or short-term moderate detrimental effect to human health. A minor or moderate, local-scale reduction in the quality of potable groundwater or surface water resources of local, regional or national importance, reversible with time. Reversible widespread reduction in the quality of groundwater or surface water resources used for commercial or industrial abstractions. Medium-term, reversible detrimental effect on animal or plant populations. Medium-term, reversible detrimental effect to nationally important geological features. Detrimental effect to building structure requiring remedial engineering works.
Minor adverse	Short-term minor detrimental effect to human health. A minor or moderate temporary detrimental effect in the quality of groundwater or surface water resources that are used for, or have the potential to be used for, commercial or industrial abstractions. Short-term reversible detrimental effect on animal or plant populations. Short-term reversible detrimental effect to nationally important geological feature. Detrimental effect to building structures not requiring remedial engineering works.
Negligible	No appreciable effect on human, animal or plant health, potable groundwater or surface water resources or geological features of importance.
Minor beneficial	Minor reduction in risk to human, animal or plant health. Minor local-scale improvement to the quality of potable groundwater or surface water resources. Moderate local-scale improvement to groundwater or surface water resources that are used for, or have potential to be used for industrial or commercial abstractions.
Moderate beneficial	Moderate reduction in risk to human, animal or plant health. Moderate local scale improvement to the quality of potable groundwater or surface water resources. Major local scale, or moderate wide scale, improvement to the quality of groundwater or surface water resources used for commercial or industrial abstraction only.
Major beneficial	Major reduction in risk to human, animal or plant health. Major local-scale/moderate to major improvement in the quality of a potable groundwater or surface water resource of local, regional or national importance.

8.6 POTENTIAL MITIGATION

Preliminary assessment indicates that the risk of contamination being present on the site is low with contamination being confined to small areas of the site. Depending on the form of the proposed development, remediation may not be considered necessary.

The most likely mitigation for excavated contaminated material is disposal at a landfill after treatment and processing. It is classified as waste by virtue of its contamination. It therefore cannot be re-deposited on site, nor used in construction on site or elsewhere (except under a Pollution Prevention and Control (PPC) permit). The suitability of landfills to accept such material will be based on its classification according to the Landfill Regulations²² and the Environment Agency Waste Acceptance Criteria²³. Preliminary analysis indicates that while some contaminated excavated material could be disposed of at landfill permitted to accept inert waste,

²² Landfill (England and Wales) Regulations 2002.

²³ Environment Agency (2010) Waste acceptance at landfill: Guidance on waste acceptance procedures and criteria.

some would require disposal at non-hazardous and hazardous waste sites.

Where contaminated material is to remain undisturbed on site potential health impacts will be mitigated where required by containment beneath a capping layer. Where there is a risk to construction material such as pipes and cable runs, these will be laid in clean fill.

Other opportunities for remediation on site will be explored, but at present it is considered unlikely that on-site remediation of excavated material, if needed, would be possible because there will be a lack of space and the potential quantities of contaminated soil will be very small.

The impacts of ground gases can be mitigated by providing sensitive structures with gas barriers (e.g. gas proof membranes within a flood slab structure) or by ventilation of enclosed spaces.

Potential impacts on groundwaters and surface waters during construction could be mitigated by use of containment and prevention of run-off and during operation of the site through the use of containment and cover systems.

8.7 CONSULTATION

Contaminated land is the statutory responsibility of LBRuT, and they will be consulted on the proposed remedial strategy in the case of any significant contaminated land risks requiring mitigation.

9 WASTE

9.1 INTRODUCTION AND KEY ISSUES

The waste assessment will consider the impacts of solid waste arisings, mitigation of those arisings and management of waste streams.

The principal waste streams to be assessed in the EIA are demolition, excavation and construction waste arisings. Waste arisings during the operational phase of the proposed development may change from the present. Therefore, it will be necessary to estimate future operational waste arisings in order to define the waste servicing requirements for the new development.

The key issues to be considered are listed below:

- Management and disposal of wastes arising during construction of the proposed development.
- Identifying opportunities for waste minimisation and reuse and recycling of materials and waste during construction and during operational phase.
- Identifying opportunities for use of recycled materials in construction (e.g. the use of recycled aggregates).
- Achieving compliance with waste legislation in all phases.
- Waste servicing requirements during operation.

9.2 POLICY REVIEW

In addition to the list of relevant planning policy set out in Section 4, the following planning policy and guidance documents will also be reviewed as part of the EIA process:

- UK Government “Waste not, Want not” strategy which put forward the Waste Hierarchy.
- Waste (England and Wales) Regulations, 2011.
- Planning Policy Statement 10: Planning for Sustainable Waste Management.
- National Waste Strategy, 2007.
- UK Government Waste Review of June 2011 and Action Plan.
- The Site Waste Management Plan Regulations, 2008 (repealed in 2013).

Department for Communities and Local Government and Defra are currently finalising the Updated National Waste Planning Policy and Waste Management Plan for England respectively, drafts of which were consulted on in 2013. These documents will supersede the Planning Policy Statement when published in final form.

9.3 EXISTING ENVIRONMENT

There is currently no significant demolition, excavation or construction waste generation at the site. The current major operational waste stream of significance is commercial and catering waste from the college and associated uses.

It is proposed that the commercial contracts currently in place for collection and disposal/recycling of waste be used in the assessment, or waste arisings will be estimated for different uses based on likely head counts.

It is considered unlikely that LBRaT collect any waste from the site through its domestic waste collection rounds, so the impacts on the Borough's waste collection, recycling and disposal facilities from the college development should not be an issue.

For the new housing provision the existing baseline would be zero.

9.4 SENSITIVE RECEPTORS AND POTENTIAL ENVIRONMENTAL EFFECTS

Potential environmental effects of waste during the construction phase include:

- Noise, vibration and dust associated with waste handling plant.
- Air quality impacts from waste handling and storage (odour, dust).
- Surface water quality impacts from stormwater runoff and waste soil stockpiles and other waste storage areas.
- Soil and groundwater impacts from waste storage.

Potential environmental effects during the operational phase include impacts associated with the management and disposal of domestic and commercial waste from offices, workshops, canteens and ancillary facilities. The quantities and types of these wastes will be estimated for the purposes of defining waste servicing the environmental impacts of these wastes post-collection will not be assessed as these are not under the control of the owners and operators of the development.

9.5 ASSESSMENT METHODOLOGY

Compliance with relevant waste management legislation will serve to minimise many potential environmental impacts and the application of good practice will reduce any residual impacts. Key legislation includes the following:

- Duty of Care imposed by Section 34 of the Environmental Protection Act 1990.
- Site Waste Management Plans Regulations 2008 (repealed in 2013).
- Environmental Permitting Regulations 2007, particularly provisions relating to registered exemptions from permitting.
- Hazardous Waste Regulations 2005.

Current Environment Agency guidance relating to waste management on development sites will also be followed.

Although there is no longer a statutory requirement to prepare Site Waste Management Plans (SWMP), the Applicant proposes to provide an outline SWMP for the development. It is the intention that the outline plan will be prepared broadly in accordance with the former regulations and the non-statutory guidance which supports them.

When the measures to achieve legislative compliance have been established, many of the potential impacts arising from the management of wastes will be considered in other sections of the ES. For example the transport and air quality assessments will consider the impact of vehicle movements associated with waste haulage.

As such, the waste management assessment section of the ES will be limited to the consideration of how the opportunities for sustainable waste management have been incorporated into the proposed development and the identification of additional mitigation measures necessary to minimise residual impacts associated with waste management. This assessment will be undertaken using professional judgment and experience.

9.6 POTENTIAL MITIGATION

Waste management planning within the context of the EIA relates primarily to the adoption of good working practices to encourage the reduction, reuse and recycling of materials and wastes. The Applicant is committed to a strategy to ensure that waste minimisation and sustainable waste management practices are considered from an early stage and throughout the design, demolition, construction and operational phases of the proposed development. In addition, the cost-effective use of recycled and secondary materials, such as aggregates from construction and demolition wastes, would be used in the design. This will be confirmed during the detailed design stage.

The clearance, demolition and construction work will be the subject of a SWMP which informs, takes forward and develops the mitigation measures set out in the ES. The outline SWMP will provide a framework for compliant management of all waste streams, consider opportunities for minimisation, reuse and recycling and compliance with waste policies that apply to contractors, including objectives in relation to minimising waste to landfill.

At detailed design, the design and specifications of the proposed development will include consideration of opportunities for the reuse and recycling of materials, and the cost-effective use of imported recycled/secondary materials in the works.

Therefore, mitigation measures to minimise environmental impacts from the storage and transportation of wastes are likely to include at outline:

- careful location of stockpiles and other storage areas;
- segregation of waste streams to maximise opportunities for reuse and recycling (using on-site recycling plant where appropriate);
- use of good practice in the design of waste storage areas and the use of suitable waste containers;
- use of sheeting, screening, damping and seeding where appropriate and practicable;
- control and treatment of runoff from soil and waste soil stockpiles;
- minimising storage periods;
- minimising haulage distances and consideration of the use of alternatives to road transport; and
- sheeting of vehicles.

9.7 CONSULTATION

Consultation on waste management issues will be undertaken with LBRuT as appropriate during the production of the ES.

10 WATER RESOURCES AND FLOOD RISK

10.1 INTRODUCTION AND KEY ISSUES

The following chapter sets out the proposed approach to the assessment of significant effects in relation to water quality, surface water drainage and run-off, flood risk, and network capacity requirements. An assessment of potential environmental effects in relation to groundwater quality is included in Section 8: Ground Conditions.

The key issues to be considered are listed below:

- Changes to water quality and turbidity in surrounding watercourses during construction.
- Changes to groundwater flow as a result of below ground works and structures.
- Changes to flood risk within the catchment of the River Crane.
- Changes to site drainage and runoff patterns from the new operational site and the requirement for Sustainable Drainage Systems (SUDs).
- Changes in potable water supply and foul water drainage capacity.

According to the NPPF, a Flood Risk Assessment (FRA) will be required to support the OPA as the development covers a site greater than 1 hectare and part of the site is located in Flood Zone 2. As such, an outline FRA will be prepared and will identify and assess all forms of flooding to and from the proposed development and demonstrate how these flood risks will be managed so that the proposed development remains safe throughout its lifetime, taking into account the potential impact of climate change.

10.2 POLICY REVIEW

In addition to the list of relevant planning policy set out in Section 4, the following legislation and policy documents will also be reviewed as part of the EIA process:

- Water Framework Directive (WFD).
- Urban Waste Water Treatment Directive (UWWTD).
- Nitrates Directive.
- Water Resources Act 1991.
- Environment Agency Catchment Abstraction Management Strategies (CAMS).
- The London Regional Flood Risk Appraisal (2009).
- The London Borough of Richmond upon Thames Strategic Flood Risk Assessment (SFRA) (2008).
- Thames Catchment Flood Management Plan (2009).
- Local Flood Risk Management Strategy for Richmond upon Thames (2014, under

development).

- The London Borough of Richmond upon Thames Preliminary Flood Risk Assessment (PRFA) (2011).
- Surface Water Management Plan for the London Borough of Richmond upon Thames (2011).

10.3 EXISTING ENVIRONMENT

10.3.1 Water Resources

Figure 10.1 provides an overview map of the watercourses that flow through or near to the proposed development site.

Figure 10.1 Watercourses in Proximity to the Site



The River Crane is a moderate sized watercourse and tributary of the tidal River Thames. It flows adjacent to the southern boundary of the site, eventually joining the River Thames approximately 2km downstream of the site at Isleworth. The Duke of Northumberland's River is a tributary and distributary of the River Crane. It joins the River Crane upstream of the site (at Hounslow Heath) and the two rivers combine as the River Crane for approximately 2 miles. Just upstream of the site, the Duke of Northumberland's River takes the form of a distributary of the River Crane and is diverted to flow through Mogden Sewage Works (noting that the Sewage Treatment Works treated effluent is piped to the River Thames).

The River Crane and Duke of Northumberland's River are typical urban watercourses and both have been designated as heavily modified under the WFD. The WFD waterbody containing the site (River Crane including part of the Yeading Brook, GB106039023030), the River Crane and part of the Duke of Northumberland's River is located between the M4 motorway to the north and Isleworth to the east and has been classified as poor ecological potential. The River Crane alongside the site is within an artificial culvert which is uniform. The Duke of Northumberland River, although artificial in nature, resembles a more natural river albeit consisting of a straightened channel with reinforced banks. Upstream of the River Crane WFD waterbody, the Duke of Northumberland's River flows across three more WFD waterbodies, which have all been designated as heavily modified and have all been classified as moderate ecological potential. From upstream to downstream, these are: GB106039023090 (Colne and Grand Union Canal from confluence with Chess to Ash), GB106039023480 (Ash and Stanwell Brook) and GB106039023450 (Port Lane Brook). The WFD potential of these waterbodies is moderate.

The River Thames downstream of the River Crane and Duke of Northumberland's River falls within transitional and coastal (TraC) WFD Waterbody GB530603911403 (Thames Tideway Upper), which is designated as heavily modified with moderate ecological potential.

Table 10.1 provides an overview of hydrology (flow), surface water quality, ecology and fish data that have been requested from the Environment Agency and will be used to inform the existing baseline.

Environment Agency hydrological (flow) data is available for on the River Crane at Cranford Park (upstream of the confluence with the Duke of Northumberland's River) and immediately adjacent to the site at Marsh Farm Road. Hydrology data is available for the Duke of Northumberland's River downstream and north of the site at Mogden Sewage Works. No hydrology data is available for the Duke of Northumberland's River between the River Colne and the River Crane. Downstream of the site, hydrology data is available at Mogden Sewage Works.

Environment Agency routine water quality baseline sites on the River Crane are located immediately upstream from the site at Mereway Road and further upstream at A315 Staines Road, Hounslow. Water chemistry data is also available downstream of the site for the River Crane at Northcote Road, Isleworth. No water quality sites are located on the Duke of Northumberland's River upstream of the site and River Crane. Downstream of the site, water quality data is available for the Duke of Northumberland's River at Kidd's Mill, Isleworth.

With regard to aquatic ecology, three Environment Agency monitoring sites are located upstream of the site at Watersplash Lane, immediately upstream of the Duke

of Northumberland's River and at Crane Park with no aquatic ecology monitoring sites located downstream of the site. The only aquatic ecology monitoring site on the Duke of Northumberland's River is located immediately upstream of the River Crane at (Upper) River Gardens.

Finally, Environment Agency fish monitoring sites are located upstream of the site on the River Crane at Cranford Park, Hounslow Heath and at Crane park with no sites located downstream of the site. On the Duke of Northumberland's River, two sites are located upstream of the site and the River Crane at Moor Lane and Hatton Road, with two sites downstream of the site on Riverside Walk and Mill Platt.

No other surface water features are present on or immediately adjacent to the site.

Table 10.1 Environment Agency Monitoring Sites in the River Crane and Duke of Northumberland's River Catchment

Data type	River Crane		Duke of Northumberland's River	
	Upstream site	Downstream site	Upstream site	Downstream site
Hydrology	Cranford Park (ID3660TH)	Twickenham, Marsh Farm (ID3680TH)	None	Hounslow, at Mogden Sewage Works (ID3695TH)
Water Quality	North Hyde Road (PCR0084) Mereway Road (REF the)	Northcote Road, Isleworth (PCR0006)	None	Kidd's Mill, Isleworth (PCR0025)
Aquatic Ecology	At Watersplash Lane (34253) Above Dulan of Northumberland's River (34254) Crane Park, Hanworth (33880)	None	(Upper) River Gardens (34257)	None
Fish	Cranford Park (14618) Hounslow Heath (14617) Crane Park (17230)	None	Moor Lane (14620) Hatton Road (16390)	Riverside Walk (14615) Mill Platt (16391)

Geological mapping (www.bgs.co.uk) of this site indicates that the bedrock geology underlying the site is the London Clay Formation which is not associated with groundwater flooding and has no aquifer designation. However, there are superficial deposits of Kempton Park Gravel Formation (sand and gravels) beneath the site and these are classified as a principal aquifer.

As part of a previous study for the development, a survey of the existing services feeding the site was undertaken which included site drainage. The main drainage, both foul and surface water, connects to the Thames Water sewer located in Cranford Way. The information source suggests there to be both pumped and gravity outlets, but it is uncertain if these are combined at the sewer. It is understood

there are a series of soakaways across the site but are not available.

10.3.2 Flood Risk

The playing fields to the south of Craneford Way are located in Flood Zone 2 and are at risk of fluvial flooding from the River Crane (**Figure 10.2**). Several areas at medium and low risk of surface water flooding are identified by the Environment Agency within the site boundary (**Figure 10.3**).

Groundwater flooding occurs when the water table rises above the ground surface. The British Geological Survey (BGS) has identified the site as having “potential for groundwater flooding at surface”.

The risk of groundwater flooding at the site is considered as high based on the map in **Figure 10.4**. The sand and gravels below the site are most likely in hydraulic continuity with the River Thames. The groundwater response, to a river flood event, could exceed the ground level in these locations, even if river bank defences are not overtopped.

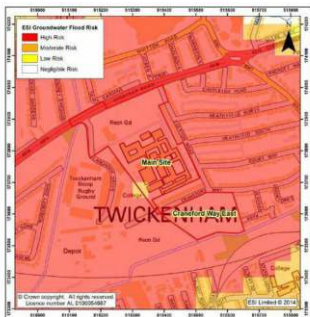
Figure 10.2 Fluvial Flood Risk



Figure 10.3 Surface Water Flood Risk



Figure 10.4 Groundwater Flood Risk



An assessment of historical flooding will be undertaken to set the context for the assessment of current and future baseline conditions. The assessment of historical flooding will be based on available information from the Environment Agency and LBRuT and on previous reviews of historic flooding in the Borough reported in the Strategic Flood Risk Assessment (SFRA) and Preliminary Flood Risk Assessment (PFRA) and other flood risk plans and assessments referred to in Section 10.2.

10.4 SENSITIVE RECEPTORS AND POTENTIAL ENVIRONMENTAL EFFECTS

10.4.1 Construction

Water Resources

During enabling works, demolition and construction associated with the development, materials such as fuel, dirt, cement, concrete and other debris could enter the River Crane or the Duke of Northumberland's River.

Demolition and construction have the potential to disturb contaminants in the soil and cause them to be released into the local watercourses. The watercourses could experience increases in turbidity and decreases in water quality as a result. As a result of the large flows and high sediment load of the tidal River Thames compared to the River Crane and Duke of Northumberland's River, the confluence of the River Crane with the tidal River Thames immediately downstream of the A3004 in Isleworth (TQ 16579 75377) and the confluence of the Duke of Northumberland's River with the tidal River Thames downstream of Church Street in Isleworth (TQ 16628 75963) is considered the limit of extent of any potential effects.

Flood Risk

The site, and therefore construction workers, are at risk of fluvial flooding from two sources:

- a large-scale catchment wide flooding event of the River Crane which may cause riverine flooding; and
- more localised heavy rainfall events falling on the heavily urbanised catchments that drain into the River Crane.

Information to enable an assessment of other (non-fluvial) sources of flooding, such as groundwater flooding, will be gathered from a variety of sources referred to above, notably the LBRuT SFRA and PFRA.

During the construction phase, and in operation, there is the potential for flow routes for surface water runoff generated on site and flowing through the site (from upstream sources) to be modified. The works may also impact the volume of surface

water runoff generated on site due to changes in impermeable areas. Any green space or landscaping has the potential to reduce surface water runoff leaving the site.

These impacts are not expected to be significant but cannot be scoped out of the assessment at this stage. The ES and FRA will include a full surface water assessment including runoff calculations pre- and post-development works.

10.4.2 Operation

Water Resources

Sediment and runoff dynamics from the site have the potential to be affected by changes in operational layout on the site such as a reduction or increase in the percentage of hard-standing area. These changes have the potential to change the flow and flow patterns in the River Crane and Duke of Northumberland's River, but are unlikely to influence water chemistry. The confluence of the River Crane and the Duke of Northumberland's River with the tidal River Thames is considered the limit of extent of any potential effects.

The increase in land uses on the site, especially residential, could impact the existing drainage infrastructure and result in capacity issues to provide potable water and deal with foul drainage. Surveys for all the mains utilities have been undertaken for the site, and the results are awaited to understand the need for diversions and new supplies. Additional consultation will be undertaken with Thames Water as required to understand any capacity issues. Water recycling, rainwater collection and the use of water efficient fixtures and fittings in the buildings will be considered.

Flood Risk

The majority of the development is located outside the flood zones, with only changes to the playing fields potentially resulting in an increase in flood risk. The change in impermeable surfaces and potential increase in surface water runoff from the site will need to be considered and a surface water drainage strategy produced to ensure baseline runoff rates are not exceeded. Consideration will also be given to other (non-fluvial) sources of flooding.

A summary of the scope of the water resources and flood risk assessment is provided in **Table 10.2**.

Table 10.2 Scope of Assessment: Water Resources and Flood Risk

Potential Sensitive Receptors	Potential Impact	Potential Effect	
		Scoped In	Scoped Out
River Crane and Duke of Northumberland's River	Pollution incidents and sediment runoff during construction. Changes in runoff from site during operation resulting in water quality issues.	✓	
Principal aquifer (Kempton Park Gravel)	Changes to flow because of below ground works and structures.	✓	
Infrastructure Site Users	Increased demand on existing foul water drainage capacity and potable water supply during operation. Changes to surface water drainage regime as a result of changes to impermeable land surface during operation.	✓	
Infrastructure Site Users	Increased risk of flooding during construction and operation.	✓	

10.5 ASSESSMENT METHODOLOGY

10.5.1 Water Resources

Overview

A description of the baseline conditions for the assessment will be developed from existing Environment Agency and Thames Water monitoring data and will be used to illustrate the variations and trends in flow, water levels, sediment characteristics and water quality over time and spatially downstream of the site where possible.

The heavily modified nature of the River Crane and Duke of Northumberland's River combined with large areas of hard standing within the catchment mean that the watercourses are susceptible to low flows during periods of drought and to high flows during periods of heavy rainfall. In addition, the watercourses are subject to a number of upstream diffuse pollution sources in the catchment, carrying elevated sediment loads, nutrients and pollutants, particularly during periods of heavy rainfall. In turn, the in-stream aquatic ecology is likely to be heavily influenced by habitat availability, flows and water quality.

The impact assessment will evaluate the future projected baseline with and without the proposed development against relevant standards. These will include the WFD ecological and water quality standards. The impact assessment will focus on any changes in hydrology, flows and water quality (including sediment dynamics) as part of the proposed development construction activities, such as (temporary) increases in the area of hard standing resulting in run-off, stockpiling on-site and pollution

control measures to prevent spills.

Significance Criteria

The assessments outlined above will allow judgements to be made on the likely impacts as a result of the proposed development and their significance. The potential significance of effects will be assessed based on the criteria set out in **Tables 10.3-10.4**.

The significance criteria are based on the nature of the effect (in terms of magnitude, probability, reversibility, duration and direction) and the receptor (in terms of sensitivity and value/ importance). The closer the proximity of the receptor to the site, greater the likelihood of direct and indirect effects on hydrology, water quality and geomorphology, which is captured by the "probability" criterion in **Table 10.3**.

It should be noted that these criteria form a starting point to guide decisions on significance of effects. Decisions will be based on professional judgement and in some circumstances it may be judged necessary to deviate from the criteria. Any deviations will be clearly recorded and justified.

Table 10.3 Criteria for Determining the Nature of the Water Resources Effect

	Magnitude	Probability	Reversibility	Duration
High	<p>Large-scale (regional to waterbody) effects on flows, water levels and/or wetted areas, significantly influenced outside their normal operating envelope.</p> <p>Large-scale (regional to waterbody) effects on the river channel, banks or sediment dynamics, which are likely to have a consequent effect on watercourse hydrodynamics.</p> <p>Large-scale (regional to waterbody) effects on water quality, which affects suitability of the water quality to support Good or High WFD status for river ecology.</p>	High likelihood of direct effects on hydrology, water quality and geomorphology	Effects on hydrology, water quality and geomorphology are irreversible	Long term effects on hydrology, water quality and geomorphology
Medium	<p>Medium-scale (local to waterbody) changes to flows, water levels and/or wetted areas.</p> <p>Medium-scale (local to waterbody) effects on the river channel, banks or sediment dynamics, such as changes to erosional and depositional character that have a limited influence on channel function.</p> <p>Medium-scale (local to waterbody) effects on water quality, but not predicted to lead to deterioration in WFD status for river ecology.</p>	Medium likelihood of direct effects OR high likelihood of indirect effects on hydrology, water quality and geomorphology	Effects on hydrology, water quality and geomorphology are partially reversible	Medium term effects on hydrology, water quality and geomorphology
Low	<p>Small-scale (up to local) changes to flows, water levels and/or wetted areas, within their normal operating envelope.</p> <p>Small-scale (up to local) effects on the river channel, banks or sediment dynamics, with little or no consequent effects on watercourse hydrodynamics.</p> <p>Small-scale (up to local) effects on water quality, within the usual variability for the site.</p>	Low likelihood of direct effects OR medium likelihood of indirect effects on hydrology, water quality and geomorphology	Effects on hydrology, water quality and geomorphology are mostly reversible	Short term effects on hydrology, water quality and geomorphology
Negligible	<p>Little or no changes to flows, water levels and/or wetted areas.</p> <p>Little or no effects on the river channel, banks or sediment dynamics.</p> <p>Little or no effects on water quality.</p>	Low likelihood of direct or indirect effects on hydrology, water quality and geomorphology	Effects on hydrology, water quality and geomorphology are fully reversible	At most temporary effects on hydrology, water quality and geomorphology
	Direction of Effect			
Adverse	Negative effects on the quantity and quality of water resources and sediments available for use by people and wildlife			
Beneficial	Positive effects on the quantity and quality of water resources and sediments available for use by people and wildlife			

Table 10.4 Criteria for Determining the Value of the Water Resources Receptor

	Sensitivity	Value/Importance
High	Hydrology, water quality and geomorphology support Good or High WFD status. High vulnerability to temporary or permanent changes in hydrology, water quality and geomorphology	Designated for relevant environmental features at national (SSSI, NNR or equivalent) or international level (SPA, SAC or Ramsar). This includes WFD protected areas (e.g. Drinking Water Protected Area DrWPA). Frequently used by people e.g. for recreation, abstraction
Medium	Hydrology, water quality or geomorphology supports Good or High WFD status or potential. Medium vulnerability to temporary or permanent changes in hydrology, water quality and geomorphology	Designated for relevant environmental features at regional (e.g. Sites of Metropolitan Importance) or district level (e.g. Local Nature Reserves) Occasionally used by people e.g. for recreation, abstraction
Low	Hydrology, water quality or geomorphology supports Less than Good WFD status or potential. Low vulnerability to temporary or permanent changes in hydrology, water quality and geomorphology	Not designated for relevant features, but may contain habitats or populations/assemblages of species that appreciably enrich the local habitat resource (e.g. species rich hedgewoods, ponds). Infrequently used by people e.g. for recreation, abstraction
Negligible	Hydrology, water quality and geomorphology support Less than Good WFD status or potential Not vulnerable to temporary or permanent changes in hydrology, water quality and geomorphology	Not designated for relevant features Not used by people e.g. for recreation, abstraction

For context, based on the criteria in **Table 10.4** and baseline information available to date as outlined in Section 10.3, the River Crane has low sensitivity (based on less than Good WFD status, high degree of modification and subsequent low vulnerability to changes in water quality, hydrology and hydromorphology) and medium importance (based on the relative proximity of non-statutory designated sites and recreational use of the watercourse); whereas the Duke of Northumberland's River has low sensitivity and less than and low to negligible importance (based on the absence of designations and infrequent or less than infrequent use of the watercourse for recreation or abstraction).

Table 2.1 in Section 2 will be used for determining the significance of the impact.

10.5.2 Flood Risk Assessment and Preliminary Surface Water Drainage Strategy

As stated previously, a separate outline FRA will be produced to support the OPA, ensuring that all potential flood risk sources to the site have been considered and that appropriate mitigation measures will be put in place where potential impacts are identified. A desktop study will focus on the flooding mechanisms at the site from rivers, groundwater and surface water run-off.

In addition a drainage assessment will be undertaken to assess the potential of the proposed development to increase flood risk to the surrounding areas due to the surface water run-off generated as a result of the proposed development. Available discharge routes for surface water will be assessed including discharge to ground, watercourse and sewer. Design calculations will be undertaken to support the design of a preliminary surface water drainage strategy for the OPA. An assessment of the foul sewer and surface water drainage requirements and existing capacity will also be undertaken.

10.6 POTENTIAL MITIGATION

There is potential for adverse impacts on surface waters during construction, however most of these risks can be addressed through normal good practice construction techniques. For example, all construction activities should follow the Pollution Prevention Guidelines (PPG) issued by the Environment Agency. These principles will be detailed in the outline CEMP.

There is potential for adverse and beneficial impacts on flood risk during construction and operation of the proposed development. Most of the adverse impact risk (e.g. change in surface water runoff) are considered capable of mitigation with normal good practice construction techniques. For example, detailed design (including of construction activities) will need to consider the height of floor levels where sensitive uses are required, the use of SuDS and guidance on flood resistant and resilient construction techniques where the level of risk is high. If appropriate, these measures will be incorporated into the outline design, to minimise the need for the ES to identify further mitigation.

10.7 CONSULTATION

At present no consultation has been undertaken, with exception of collating baseline data from the Environment Agency. During the assessment process, consultation will be undertaken with LBRuT and the Environment Agency around the flood risk issues, and Thames Water regarding network capacity.

11 DAYLIGHT, SUNLIGHT AND OVERSHADOWING

11.1 INTRODUCTION AND KEY ISSUES

Key daylight, sunlight and shadow effects associated with the proposed development will be considered quantitatively during the operational stage. This will include analysis of the development's effects on existing neighbouring residential properties and gardens/open spaces. It will also consider the levels of natural light that are likely to be experienced by proposed residential units and open spaces within the proposed development.

The assessment will be undertaken in accordance with the guidelines set out in the revised Building Research Establishment (BRE) report "Site Layout Planning for Daylight and Sunlight: A Guide to Good Practice" (2011).

It is anticipated that the key issues to be considered are as follows:

- Effects on daylight and sunlight levels on existing residential properties and gardens on Egerton Road, Craneford Way and Langhorn Drive.
- Effects on daylight and sunlight within the new residential element.

Under the BRE guidance there is a requirement to assess the effects of development on the natural light levels received by residential (and quasi-residential) accommodation. The analysis of commercial floorspace and other non-residential uses is therefore not required.

11.2 POLICY REVIEW

National, strategic and local planning policy and guidance of relevance to the assessment of daylight and sunlight effects will be reviewed and summarised in the chapter. This includes the following:

- Twickenham Area Action Plan (2013).
- Saved Richmond Unitary Development Plan Policy (2005).
- Building Research Establishment (BRE) Site Layout Planning for Daylight and Sunlight: A Guide to Good Practice (2011).

11.3 EXISTING ENVIRONMENT

In order to assess the likely daylight, sunlight and shadow effects arising from the proposed development, the baseline natural light conditions experienced by neighbouring residential properties, gardens and open spaces in the immediate vicinity of the site will be modelled and assessed.

The baseline daylight conditions will be considered in terms of the following methods of assessment:

- Daylight: Vertical Sky Component (VSC) and Daylight Distribution (DD).
- Sunlight: Annual and Winter Probable Sunlight Hours (A/WPSH).
- Shadow: Two hour sunlight contour analysis.

These methods of assessment are discussed in more detail in Section 11.5 below.

11.4 SENSITIVE RECEPTORS AND POTENTIAL ENVIRONMENTAL EFFECTS

On the basis of an initial site walkover, the following neighbouring properties will need to be considered in the daylight and sunlight assessment:

- Nos. 1-33 (odd), 16-20 (even) and 28-36 (even) Egerton Road.
- Nos. 94 and 97 Heathfield South.
- No. 96 Court Way.
- Nos. 70-148 and 150-156 (even) Cranford Way.
- Nos. 1-43 Challenge Court.
- No. 29 Kendry Gardens.
- Nos. 23-75 (odd) and 28 Talma Gardens.
- Nos. 7-11 (odd) and 16 Tayben Avenue.

Other neighbouring properties are situated at sufficient distance from the site to be unaffected by the scheme in terms of daylight and sunlight, and/or are non-residential.

The following neighbouring gardens, public open spaces and landscape features will need to be considered in the shadow assessment:

- Rear gardens serving Nos. 1-33 (odd) Egerton Road.
- Gardens serving Nos. 94 and 97 Heathfield South.
- Garden serving No. 96 Court Way.
- Garden serving Nos. 8 Gladstone Avenue.
- Gardens serving No. 29 Kendry Gardens.
- Gardens/ open spaces serving Nos. 23-75 (odd) and 28 Talma Gardens.
- Gardens serving Nos. 7-11 (odd) and 16 Tayben Avenue.
- Public open space adjacent to Challenge Court.

In addition to these neighbouring receptors, the ES chapter will consider the levels of natural light (daylight and sunlight) received by the residential units proposed within the proposed development. It will also assess the levels of sunlight and shadow that will be experienced within the gardens, communal amenity spaces and public spaces

within the development.

As the technical media hub, education and sports buildings will rely on artificial lighting, these are outside the scope of assessment (in accordance with BRE guidance).

Table 11.1 provides a summary of the scope of the assessment.

Table 11.1 Scope of Assessment: Daylight and Sunlight

Potential Sensitive Receptors	Potential Impact	Potential Effect	
		Scoped In	Scoped Out
Neighbouring residential properties and open spaces.	Material reduction in daylight and sunlight due to scale/massing/orientation of development and potential increased shadowing in the context of the BRE guide levels.	✓	
Residential elements of development.	Insufficient natural light experienced by new residential accommodation in the context of the BRE guide levels.	✓	
Technical media hub, education and sports buildings.	Rely on artificial lighting therefore outside scope of assessment (in accordance with BRE guidance).		✓
Construction effects.	None (only the completed scheme will be assessed).		✓

11.5 ASSESSMENT METHODOLOGY

11.5.1 Daylight Methodology

The daylight analysis for neighbouring properties and new residential properties will be based on the calculation of VSC and DD. The internal daylight analysis for the proposed accommodation may also consider Average Daylight Factor (ADF). The ADF values will be calculated where there are failures of the other standards, to demonstrate if the rooms have sufficient daylight, where the parameters to undertake these calculations are known. These methods of assessment are summarised below. Where maximum and minimum parameters are defined, consideration will be given to the worst case.

Vertical Sky Component

The level of ambient daylight received by a window is quantified in terms of its VSC, which represents the amount of vertical skylight falling on a vertical window. The

daylight assessment will be based on three dimensional AutoCAD models constructed for the site and surroundings as existing and with the proposed development in place. The heights and locations of the surrounding buildings and the proposed development will be taken from measured site survey information, OS digital plan data, site observations, aerial photography of the site and surroundings and drawings produced by the project architects.

The VSC level at each of the windows requiring assessment will be quantified using Waldram Tools daylight and sunlight software (MBS Software Ltd).

The BRE good practice guide outlines numerical guidelines that represent flexible targets for new developments in relation to the vertical sky component at nearby reference points. The document states that:

- "If the vertical sky component, with the new development in place, is **both** less than 27% **and** less than 0.8 times its former value, then the loss of light is likely to be noticeable."
- The guidelines therefore require that **either** the VSC target **or** the degree of change in daylighting are met (i.e. if the 27% target is adhered to, there is no requirement under the BRE guidelines for the resultant VSC level to remain at 0.8 times the former VSC level).

Daylight Distribution

The analysis of DD considers the area of a room which can receive an unobstructed view of the sky. It is quantified at working plane height (+0.85m) using the Waldram Tools software.

The BRE (2011) guide states:

- "If, following construction of a new development, a no-sky line moves so that the area of the existing room which does not receive direct skylight is reduced to less than 0.8 times its former value, this will be noticeable to the occupants."
- The analysis of daylight distribution provides a more sophisticated method of assessing daylight than VSC as it takes into account the size of a room and the size and number of its windows.

Average Daylight Factor

The BRE guide advises that the calculation of ADF provides an alternative means of assessing the level of daylight received by the interior of the room served by a window. It is an appropriate means of assessment for proposed accommodation where the parameters required for the ADF calculations are known.

The calculation of ADF again provides a more sophisticated method of calculating the daylight level experienced within a room than VSC as it takes into account the size and reflectance of room's surfaces and the number, size and transmittance of its window(s), as well as the ambient daylight level (VSC) received at the window(s).

The ADF is defined as the average internal illuminance as a percentage of the unobstructed external illuminance under standard overcast conditions.

ADF can be calculated using the following formula (amended in the updated BRE guide, 2011):

$$df = \frac{T \Delta w \theta}{A(1-R^2)} \%$$

Where:

- T is the diffuse visible transmittance of the glazing (a value of 0.65 is typical for double glazed clear glass; a value of 0.18 is used for obscured glazing).
- Aw is the net glazed area of the window (m²).
- θ is the angle of visible sky in degrees.
- A is the total area of the room surfaces: ceiling, floor, walls and windows (m²).
- R is the average reflectance (a value of 0.7 is applicable for new/proposed accommodation with light internal surface treatments).

The updated BRE guide (2011) introduces a separate procedure for floor to ceiling windows and glazed doors. It states that areas of glazing below the working plane should be treated as a separate window and an extra factor is applied to it to take account of the reduced effectiveness of low level glazing in lighting the room. The BRE states that a value equivalent to the floor reflectance can be taken for this factor. An adjustment factor of 0.3 is appropriate for medium timber floors and has been used in this case.

The approach to assessing internal daylighting using the ADF method is set out at Appendix C of the BRE guide. The BRE guide and British Standard BS8206 set the following minimum recommended ADF levels for different room types:

- Kitchens: 2%.
- Living rooms: 1.5%.
- Bedrooms: 1%.

11.5.2 Sunlight Methodology

Of the neighbouring windows considered in the daylight assessment, the window reference points that are orientated within 90 degrees of due south will also require

assessment in terms of annual and winter sunlight availability.

The levels of sunlight availability at the window reference points assessed have been calculated based on the three dimensional AutoCAD models of the site and surroundings as existing and with the development in place, using the WalDRAM Tools daylight and sunlight software. The calculations provide the percentage year round sunlight availability and the percentage of sunlight availability received during the winter months.

The BRE good practice guide states that the sunlighting of an existing dwelling may be adversely affected by a development "...if the centre of the window:

- receives less than 25% of annual probable sunlight hours, or less than 5% of annual probable sunlight hours between 21 September and 21 March and receives less than 0.8 times its former sunlight hours during either period and has a reduction in sunlight received over the whole year greater than 4% of annual probable sunlight hours"
- As with daylight, the guidelines require that **either** the sunlight availability targets **or** the degree of change in sunlighting **or** a reduction less than 4% of APSH are achieved (i.e. if the 25%/5% targets are adhered to, there is no requirement under the BRE guidelines for the resultant sunlight levels to remain at 0.8 times the former levels etc.).

11.5.3 Overshadowing Methodology

The BRE 'test' for a development's overshadowing impacts relates to the area of an amenity space that receives more than two hours of sunlight on 21 March (the Spring Equinox). The guide states:

"...for it to appear adequately sunlit throughout the year, at least half of a garden or amenity area should receive at least two hours of sunlight on 21 March. If, as a result of new development, an existing garden or amenity area does not meet the above, and the area which can receive two hours of sun on 21 March is less than 0.8 times its former value, then the loss of sunlight is likely to be noticeable".

The assessment would therefore consider the areas of existing and proposed gardens, amenity spaces, public spaces and landscape features that would receive more than two hours of direct sunlight on this date with the development in place. This analysis will be applied to both existing and proposed areas of amenity space.

11.5.4 Significance Criteria

The significance criteria used in the daylight, sunlight and overshadowing analyses

will be based on the BRE guidance.

The adverse effects of the proposed development on neighbouring properties can be classified based on the following categories of impact:

- **Beneficial:** Enhancement of natural light conditions.
- **Negligible:** Compliant with BRE daylight distribution/VSC or annual/winter sunlight availability guide levels.
- **Minor adverse:** Retained daylight distribution/VSC or annual/winter sunlight availability level within 20% of BRE guide levels.
- **Moderate adverse:** Retained daylight distribution/VSC or annual/winter sunlight availability level within 50% of BRE guide levels.
- **Significant adverse:** Retained daylight distribution/VSC or annual/winter sunlight availability level more than 50% below BRE guide levels.

11.6 POTENTIAL MITIGATION

A daylight and sunlight audit of the development will be undertaken during the ongoing design process and any measures necessary to mitigate against potentially adverse environmental effects will be incorporated, where possible, prior to finalising the design. As such it is anticipated that limited additional mitigation will be required in the ES.

11.7 CONSULTATION

The scope of the assessment and the assessment methodology will be agreed with the LBRuT through this scoping process.

12 ECOLOGY

12.1 INTRODUCTION AND KEY ISSUES

The site enabling, demolition, construction and operation of the proposed development have the potential to give rise to impacts upon designated sites, habitats and species within and surrounding the development site. The Ecological Impact Assessment (EiA) will consider these impacts upon features of nature conservation importance and identify any mitigation measures that may be required to avoid or minimise impacts.

The key issues to be considered are listed below:

- Direct habitat loss to adjacent designated sites and ecologically significant habitats.
- Mortality or harm to protected or ecologically significant species within the footprint of the site.
- Deterioration or fragmentation of surrounding habitats and disturbance of protected or ecologically significant species within surrounding habitats.
- Opportunities for biodiversity enhancement and gain.

12.2 POLICY REVIEW

In addition to the list of relevant planning policy set out in Section 4, the following topic specific planning policy, guidance documents and legislation will also be reviewed and considered as part of the EIA process:

- Biodiversity Action Plans - national (UK), regional (London) and local (LBRuT) and the Post-2010 Biodiversity Framework²⁴.
- Conservation of Habitats and Species Regulations 2010 (as amended).
- Wildlife and Countryside Act 1981 (as amended).
- Natural Environment and Rural Communities Act 2006.
- Countryside and Rights of Way Act 2000.
- Environmental Damage (Protection and Remediation) Regulations 2009.

12.3 EXISTING ENVIRONMENT

Baseline information on nature conservation is available for the site through publicly available resources, such as the National Biodiversity Network (NBN), a biodiversity records request to Greenspace Information for Greater London (GIGL) and an Extended Phase 1 Habitat survey of the site, carried out in April 2014. The

²⁴ Joint Nature Conservation Committee and Defra (on behalf of the Four Countries Biodiversity Group) (2012) UK Post-2010 Biodiversity Framework. July 2012. Available from <http://jnc/defra.gov.uk/page-6189>.

desk based information has been gathered for a study area of 2km surrounding the site²⁰ with walkover information including the site and adjacent habitats.

Further details of the baseline data collected is provided in **Appendix 12.1**, with the following providing an overview.

Within the 2km study area, there are no European (Special Areas of Conservation, Special Protection Areas or Ramsar sites), or nationally designated sites (Sites of Special Scientific Interest or National Nature Reserves). The study area did contain two Local Nature Reserves (LNRs), three Sites of Metropolitan Importance for Nature Conservation (SMINCs), one Borough (Grade 1) Site of Nature Conservation Importance (SINC), four Borough (Grade 2) SINC and six Local SINC.

UK Biodiversity Action Plan (BAP) habitats were not identified on the site, however the grassland habitats outside the college's grounds are considered to comprise part of the local and regional Urban Greenspace BAP. The scope of the London Parks and Green Spaces Habitat Action Plan is limited to land managed for public access. With the recreational fields falling under the ownership of RuTC, they are therefore not considered to fall within this definition. The closest UK BAP habitat was identified as deciduous woodland, approximately 120m east of the site, with additional areas of mudflat and undetermined grassland BAP habitats about 2km from the site.

The site is dominated by a variety of buildings and hardstanding that comprise the college with landscaped areas interspersed between the buildings. To the north and the south of the college are recreational fields with scattered mature trees surrounding them. The site also includes part of the hardstanding car park and access road to the north-west of the site.

The Extended Phase 1 Habitat survey recorded few semi-natural habitats present on or in the adjacent habitats: broadleaved semi-natural woodland; scrub/shrub; poor semi-improved grassland; scattered trees; amenity grassland; tall ruderals; running water and intact species-poor hedge. Many of these habitats on the site originate from amenity planting, and therefore are considered of intrinsic biodiversity value within the immediate survey area only or at the local scale. As such, the requirement to consider impacts to habitats of these values is unlikely (see Section 12.5), unless they contribute to planning policy requirements.

Upon completion of the Extended Phase 1 Habitat Survey, the following detailed surveys were recommended; breeding birds, bats, hedgehog and terrestrial invertebrates. These surveys are being carried out in summer 2014.

²⁰ For the collation of desk-based records, only those recorded in the last 10 years have been considered as species distributions often change over time, for example otter *Lutra lutra* underwent a dramatic loss of distribution in the mid-1930s to the late-1970s and is only recovering that distribution now.

Desk-based information identifies the importance of the River Crane corridor, including the Duke of Northumberland's River, adjacent to the site, for bird habitat in the area and identifies a number of species listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended) and/or as species of conservation concern. The breeding bird survey will follow the Common Bird Census methodology, over three separate survey visits. These visits will be undertaken in summer 2014, and consist of the surveyor walking the development site and adjacent habitats slowly, within 30m of all cover habitats, and plotting registrations of individual singing birds to allow the number of territories of each species to be identified. The value of the site for breeding birds will be established following the methodology proposed by Fuller (1980)²⁶.

The semi-natural habitats, including the river corridors, and some features on the buildings provide a variety of habitat opportunities for bats. A walkover survey of the site will be completed by an experienced bat ecologist to confirm any potential roosting opportunities within the site. If any roosts are discovered, this will be followed by dusk surveys following appropriate survey guidance, with the number of visits depending upon the value of the roosts identified. Activity surveys of the site will also be completed using a walked transect, which will be completed over two evening visits following the Bat Survey Guideline²⁷ recommendations.

The scrub, tall ruderal and areas of longer grassland adjacent to the site have some potential to support common reptiles. However, the area is relatively isolated from the railway corridor and is of very limited extent and therefore is unlikely to support anything greater than a very low population of common reptiles. No further survey is considered necessary.

The semi-natural habitats present have some potential to support invertebrate species, particularly where these provide nectar rich sources of food. A walkover survey will be completed by an experienced entomologist to identify key habitats on the site for invertebrates and consider the potential invertebrates that are likely to be present on site. During the walkover, invertebrates will be collected as encountered and identified to provide a general list of species commonly present on the site.

The habitats on site have potential to support hedgehogs, particularly the woodland and amenity grassland habitats to the south and north of the college, and alongside Challenge Court, where these are connected to residential gardens. Although not legally protected, the species is considered to be ecologically significant due to declines in populations, as highlighted by its inclusion as a UK BAP and London BAP

²⁶ Fuller, R. J. (1980) A Method for Assessing the Ornithological Interest of Sites for Conservation. *Biological Conservation* 17: 319 - 329.

²⁷ Bat Conservation Trust (2012) *Bat Surveys - Good Practice Guidelines - 2nd Edition*. Bat Conservation Trust, London.

priority species. A targeted survey is not proposed, however a watching brief will be undertaken during the completion of the evening bat activity surveys and any sightings of the species noted.

The riparian habitats of the River Crane and the Duke of Northumberland's River are not considered to be suitable for the presence of water vole *Arvicola amphibious*, as the banks are reinforced and provide very little shelter in the form of vegetation cover. Furthermore, the absence of marginal macrophytes and shallow depth are unsuitable for the species. No records of otter *Lutra lutra* have been identified in the desk study and the habitats are not considered to hold great value for the species.

No other legally protected or ecologically significant species are considered likely to be present on the site.

12.4 SENSITIVE RECEPTORS AND POTENTIAL ENVIRONMENTAL EFFECTS

12.4.1 Value of Sensitive Receptors

In order to provide a focussed assessment of impacts on ecology and nature conservation, Chartered Institute of Ecology and Environmental Management (CIEEM) guidelines recommend establishing which receptors are considered to be of sufficient value to warrant inclusion within the Ecological Impact Assessment (EclA; which will form a chapter of the ES). This approach ensures the assessment focuses on those receptors likely to be susceptible to significant effects. As a result, the following thresholds are proposed for identification of receptors that will be included within the EclA:

- any sites, habitats and/or species that are considered to be of at least Local biodiversity value;
- sites, habitats and/or species that receive legal protection or are referenced in policy (e.g. BAPs); and
- habitats forming corridors and commuting networks for important species.

12.4.2 Potential Environmental Effects

The following potential environmental effects will be considered through the assessment, although are dependent upon the outcomes of baseline surveys being completed in summer 2014:

Habitat loss - restricted to semi-natural habitats present within the footprint of the development which are generally of low ecological value. This in turn may effect bird and bat populations through loss of nesting/roosting opportunities and foraging or commuting opportunities.

Whilst some areas of habitat loss will occur, the loss will only be considered where the baseline habitat meets the threshold for inclusion. For example, there will be a loss of amenity grassland due to the inclusion of astro turf pitches, however as amenity grassland is considered to be of ecological value within the immediate survey area only, does not receive legal protection or form part of a BAP habitat or contribute to the River Crane corridor or form a commuting network for species, the loss is not considered through the EIA.

Habitat fragmentation - restricted movement of species and potential reduction in population viability because habitat corridors have been broken and smaller areas of habitat support few species.

Habitat deterioration - construction and demolition activities could cause deterioration of onsite and adjacent habitats including broadleaved semi-natural woodland, Urban Greenspace BAP habitat, scattered trees and the River Crane and the Duke of Northumberland's River (falls within the Borough SINC). This could include encroachment, changes to air quality (e.g. dust) and effluent runoff. These activities could result in direct harm/mortality and disturbance of species.

The area over which dust impacts are considered will follow the IAQM guidance⁶⁶, which identifies that appropriate screening criteria for detailed assessment of impacts associated with dust are 50m surrounding the site and 50m from haulage roads for up to 500m from the site (as discussed further in Section 10: Water Resources and Flood Risk).

Changes to water quality have the potential to influence the River Crane and Duke of Northumberland's River, along with the designated sites that fall downstream of the site. Any discharges to the river, in the form of run-off or accidental spillages, could result in a deterioration in habitat and influence the downstream floral and faunal habitats.

Direct harm/mortality - harm or mortality of species during vegetation clearance or building demolition (breeding birds, bats, invertebrates, hedgehog).

Disturbance - disturbance of bird species and bats both during construction and operation through noise and inappropriate lighting.

Considering the urbanised setting of the site, impacts arising from noise generation during construction or operation are unlikely to be significant to ecological receptors beyond 500m from the proposed development. Consideration of noise impacts will therefore only be given to designated sites and bird populations within this zone of

⁶⁶ Institute of Air Quality Management (2014) *Guidance on the assessment of dust from demolition and construction*. IAQM, London.

influence. As no works are proposed to take place over night, consideration of impacts associated with noise upon bats is not considered necessary.

Inappropriate lighting has the potential to impact upon habitat usage (including foraging and commuting) onsite and offsite by nocturnal species, in particular bat populations and their activity on site, and those utilising the habitats for rest/shelter, for example nesting birds. Although parts of the site are currently lit overnight as a result of their urban context, the construction or operation of the proposed development may result in a change to current levels.

Recreational pressure - increases in the residential population will increase recreational pressures on semi-natural habitats in the area during operation, notably open greenspace such as the footpath along the River Crane.

This has the potential to result in deterioration in habitat quality, for example as a result of inappropriate use that causes damage to the habitat or littering. Whilst the increase in residential properties has potential to impact upon the urban greenspace, broadleaved woodland and watercourse habitats immediately adjacent to the proposed development, these are already subject to significant recreational use and, in the case of the greenspace and woodland, are managed for such use.

The designated sites are either managed with public access in mind or are inaccessible to the public, for example the Twickenham Junction Rough Local SINC, and therefore are unlikely to change significantly as a result of the proposed development with visits resulting from the proposed development likely to be infrequent and recreational use is likely to be concentrated closer to the proposed development. Therefore, the impacts associated with increases in recreational pressure are not considered to be significant and thus will be scoped out of the ES.

Table 12.3 Scope of Assessment: Ecology

Potential Sensitive Receptors	Potential Impact	Potential Effect	
		Scoped In	Scoped Out
<i>Designated Sites</i>			
Ham Lands LNR (9.40m south-east of the site)	No significant effects expected because of distance.		✓
Isleworth Air LNR (2km north-east of the site)	No significant effects expected because of distance.		✓
Crane Corridor SMINC (450m south-west of the site)	Construction Noise	✓	
Ham Lands SMINC (9.40m south-east of the site)	No significant effects expected because of distance.		✓
River Thames and Tidal Tributaries SMINC (1.3km south-east of the site)	No significant effects expected because of distance.		✓
Duke of Northumberland's River north of Kneller Road Borough I SINC (160m north of the site)	Construction Dust deposition Noise Water quality and run-off Operation Water quality and run-off	✓ ✓ ✓ ✓	
Mogden Sewage Works Borough I SINC (790m north of the site)	No significant effects expected because of distance.		✓
Duke of Northumberland's River south of Kneller Road Borough II SINC (alongside the western boundary of the site)	Construction Dust deposition Noise Lighting Water quality and run-off Operation Increased recreational pressure Water quality and run-off	✓ ✓ ✓ ✓ ✓	✓
River Crane at St. Margaret's (including Richmond Site) Borough II SINC's (200m north-east of the site)	Construction Noise Water quality and run-off Operation Increased recreational pressure Water quality and run-off	✓ ✓ ✓ ✓	✓
Strawberry Hill Golf Course Borough II SINC (1.2km north-east of the site)	No significant effects expected because of distance.		✓
Petersham Lodge Wood & Ham House Meadows Borough II SINC (1.4km north-east of the site)	No significant effects expected because of distance.		✓
Duke of Northumberland's River at Woodlands Borough II SINC (1.5km north of the site)	No significant effects expected because of distance.		✓



Potential Sensitive Receptors	Potential Impact	Potential Effect	
		Scoped In	Scoped Out
Hounslow, Feltham and Whitton Junctions Borough II SINC (1.5km west of the site)	No significant effects expected because of distance.		✓
Hounslow Loop Railsides Borough II SINC (1.6km north-west of the site)	No significant effects expected because of distance.		✓
Fulwell & Twickenham Golf Courses Borough II SINC (1.7km south-west of the site)	No significant effects expected because of distance.		✓
The Copse, Holly Hedge Field & Ham Avenues Borough II SINC (1.9km south-east of the site)	No significant effects expected because of distance.		✓
Petersham Meadows Borough II SINC (2km east of the site)	No significant effects expected because of distance.		✓
Twickenham Junction Rough Local SINC (alongside the southern boundary of the site)	Construction Dust deposition Noise Lighting Operation Lighting	✓ ✓ ✓ ✓	
Moor Mead Local SINC (800m east of the site)	No significant effects expected because of distance.		✓
Marble Hill Park and Orleans House Gardens Local SINC (1.2km east of the site)	No significant effects expected because of distance.		✓
Twickenham Cemetery Local SINC (1.3km west of the site)	No significant effects expected because of distance.		✓
Teddington Cemetery Local SINC (1.6km south of the site)	No significant effects expected because of distance.		✓
Inwood Park Local SINC (1.8km north-west of the site)	No significant effects expected because of distance.		✓
Twickenham Road Meadow Local SINC (2km east of the site)	No significant effects expected because of distance.		✓
Habitats			
River Crane	Construction Dust deposition Air quality Lighting Water quality and run-off Operation Increased recreational pressure Lighting Water quality and run-off	✓ ✓ ✓ ✓ ✓	
Duke of Northumberland's River	Construction Dust deposition Air quality Lighting Water quality and run-off	✓ ✓ ✓ ✓	



Potential Sensitive Receptors	Potential Impact	Potential Effect	
		Scoped In	Scoped Out
	Operation		
	Increased recreational pressure	✓	
	Lighting Water quality and run-off	✓	
Urban Greenspace RAP habitat	Construction		
	Habitat deterioration as a result of encroachment of works	✓	
	Dust deposition	✓	
Broadleaved semi-natural woodland	Operation		
	Increased recreational pressure		✓
	Construction		
Poor semi-natural grassland	Habitat loss or deterioration as a result of encroachment of works	✓	
	Dust deposition	✓	
	Operation		
Scattered trees	Increased recreational pressure		✓
	Construction		
	Dust deposition	✓	
Species	Habitat loss	✓	
	Habitat loss or deterioration as a result of encroachment of works	✓	
	Dust deposition	✓	
Schedule 9 invasive species Wall cotoneaster	Operation		✓
	No significant effects expected.		✓
	Construction		
Breeding birds	Potential spread of the species through removal or inappropriate landscaping.	✓	
	Construction		
	Potential loss or fragmentation of habitats	✓	
	Direct harm, mortality or disturbance	✓	
	Deterioration of habitats as a result of dust deposition.	✓	
	Noise	✓	
	Lighting	✓	
	Operation		
	Lighting	✓	
	Noise		✓



Potential Sensitive Receptors	Potential Impact	Potential Effect	
		Scoped In	Scoped Out
Bats	<u>Construction</u>		
	Potential loss or fragmentation of habitats	✓	
	Direct harm, mortality or disturbance	✓	
	Deterioration of habitats as a result of dust deposition.	✓	✓
	Noise		
Lighting		✓	
	Operation		
	Lighting	✓	
Common reptiles	<u>Construction</u>		
	Potential loss or fragmentation of habitats	✓	
	Direct harm, mortality or disturbance	✓	
	Deterioration of habitats as a result of dust deposition.	✓	
	Noise		
Hedgehogs	<u>Construction</u>		
	Potential loss or fragmentation of habitats	✓	
	Direct harm, mortality or disturbance	✓	
	Deterioration of habitats as a result of dust deposition.	✓	
	Noise		
Lighting		✓	
	Operation		
	Lighting	✓	
Invertebrates	<u>Construction</u>		
	Potential loss or fragmentation of habitats	✓	
	Direct harm, mortality or disturbance	✓	
	Deterioration of habitats as a result of dust deposition.	✓	
	Noise		

12.5 ASSESSMENT METHODOLOGY

The ecological assessment will be undertaken with reference to recognised guidance given in the Institute of Environmental Management and Assessment (IEMA) and CIEEM study guidelines^{29,30}. It is noted that the CIEEM EcIA guidelines are currently under review, if possible these will be incorporated within the ES should the revised guidelines be issued early enough during the completion of the assessment.

The assessment methodology itself is semi-quantitative, based on empirical data and professional judgement.

The aims and objectives of the assessment are to:

- determine the value of ecological features (or receptors) to be affected by the scheme (to be finalised based on the baseline information above and comments received during the scoping consultation period);
- assess the significance of the impacts on both the ecology of the site and surrounding features by magnitude or severity of the effect against the value of the features;
- identify mitigation measures to avoid, minimise and/or reduce the likely significant effects and identify additional enhancement measures; and
- establish residual effects likely after mitigation has been implemented.

Ecological features will be attributed a value according to the criteria set out in **Table 12.4**, which has been created following CIEEM guidelines. Consideration will also be given to distinguishing both *biodiversity value* and *legal status*.

²⁹ Institute of Environmental Management and Assessment (IEMA) (1995), *Guidelines for Baseline Ecological Assessment*.
³⁰ Chartered Institute of Ecology and Environmental Management (CIEEM) (2006) *Guidelines for Ecological Impact Assessment in the United Kingdom* (version 7 July 2006).

Table 12.4 Criteria for Determining the Value of Ecological Features

Value	Criteria
International	<p>An internationally designated site or candidate site, i.e. a Special Protection Area (SPA), provisional SPA, Special Area of Conservation (SAC), candidate SAC, Ramsar site, or area which would meet the published selection criteria for designation. [Note: none in study area].</p> <p>A viable area of a habitat type listed in Annex I of the Habitats Directive, or smaller areas of such habitat that is essential to maintain the viability of a larger whole.</p> <p>Sites supporting populations of internationally or European important species.</p>
National (England)	<p>A nationally designated site, i.e. Site of Special Scientific Interest SSSI, National Nature Reserve (NNR) or discrete area which would meet the published selection criteria for national designation (e.g. SSSI selection guidelines). [Note: none in study area].</p> <p>A viable area of a priority habitat identified in the UK BAP, or smaller areas of such habitat essential to maintain wider viability.</p> <p>Viable populations of nationally important species that are threatened or rare conservation status, including those identified as priority species in the UK BAP.</p>
Regional (South East)	<p>Sites that exceed the Metropolitan-level designation but fall short of SSSI selection criteria.</p> <p>Smaller areas of key habitat identified in the UK BAP that is essential to maintain wider viability.</p> <p>Viable populations of nationally scarce species identified in the UK and London BAP and/or regularly occurring populations of a regionally important species.</p>
Metropolitan/County (Greater London)	<p>Sites recognised by local authorities, e.g. Sites of Metropolitan Importance for Nature Conservation (SMINC), or considered to meet published ecological selection criteria for such designation.</p> <p>A viable area of key habitat identified in the London BAP or significant resource or ancient semi-natural woodland.</p> <p>Viable populations of regionally scarce species identified in the UK and London BAP and/or regularly occurring populations of a species important at the metropolitan scale.</p>
Borough/ District (Richmond upon Thames)	<p>Sites recognised by local authorities, e.g. Sites of Borough Importance for Nature Conservation or Local Nature Reserves (LNRs), or considered to meet published ecological selection criteria for such designation.</p> <p>A diverse and/or ecologically valuable hedgerow network and smaller areas of ancient semi-natural woodland. A viable area of habitat identified in the Borough BAP.</p> <p>Viable populations of species identified in the London BAP and/or regularly occurring populations of species important at the borough scale.</p>
Local (e.g. within 1km of the site)	<p>Sites recognised by local authorities, e.g. Sites of Local Importance for Nature Conservation (SLINC), or considered to meet published ecological selection criteria for such designation.</p> <p>Areas of habitat or populations/assemblages of species that appreciably enrich the local habitat resource (e.g. species-rich hedgerows, ponds).</p> <p>Sites that retain other elements of semi-natural vegetation and due to their size, quality or the wide distribution within the local area are not considered for the above-classifications.</p> <p>Viable populations of species identified in the Borough BAP and/or regularly occurring populations of species important at the local scale.</p>
Within the zone of influence only	<p>Sites that retain habitats and/or species of limited ecological importance due to their size, species composition or other factors.</p>

The next step is to determine which ecological features are of sufficient value to be included in the assessment, with CIEEM guidelines recommending this approach to ensure attention is focussed on those receptors that are susceptible to impact. Therefore, the thresholds for inclusion within the EclA are defined as:

- Any sites, habitats and/or species that are considered to be of at least **Local** biodiversity value;
- Sites, habitats and/or species that receive legal protection or are referenced in policy (e.g. BAPs); and

- Habitats forming corridors and commuting networks for important species.

Once values have been assigned to the ecological features and those of sufficient value for inclusion have been identified, an assessment of the impacts likely to affect the features will be undertaken. The identification of impacts refers to ecological structure and function, and the impacts are assessed in the context of the predicted baseline conditions during the lifetime of the development. They are also assessed in relation to the following criteria:

- Positive or negative impact;
- Direct or indirect impact;
- Magnitude - the size of an impact, in quantitative terms where possible;
- Extent - the area over which an impact may occur;
- Duration - the time period for which an impact is expected to last;
- Reversibility - a permanent impact is one that is irreversible within a reasonable timescale or for which there is no reasonable chance of action being taken to reverse it, a temporary impact is one from which short-term recovery is possible; and
- Timing and frequency - whether impacts are ongoing, separated but recurrent or single events and whether they occur during critical seasons of life-stages of habitats, flora or fauna.

Where the magnitude of change caused by an effect cannot be derived quantitatively, the criteria presented in **Table 12.5** will be used.

Table 12.5 Criteria for Determining the Value of Ecological Features

Impact Magnitude	Description
High	There is a large scale permanent change in the ecological receptor and changes in the overall integrity.
Medium	There is a permanent or long-term temporary change in the ecological receptor but no permanent change in its overall integrity.
Low	There is a small-scale permanent change or mid-term temporary change in the ecological receptor but its overall integrity is not permanently affected.
Neutral	There is no perceptible change in the ecological receptor.

The likelihood that an effect and changes to the ecological feature will occur as predicted, and the degree of confidence in the assessment of the effect on ecological structure and function, will be assessed using the four-point scale identified in CIEEM guidelines:

- *Certain/near certain:* probability estimated at 95% chance or higher.
- *Probable:* probability estimated at above 50% but below 95%.
- *Unlikely:* probability estimated at above 5% but below 50%.

- *Extremely unlikely:* probability estimated at less than 5%.

The ecological significance of an impact is defined by CIEEM as 'an impact (positive or negative) on the 'integrity' of a defined site or ecosystem and/or on the conservation status of habitats and species within a given geographical area'. The value of the feature that will be significantly affected and type of impact will be used to inform the geographical scale at which the impact is significant. A definition of 'integrity' is provided in the Government Circular: Biodiversity and Geological Conservation³⁹: 'The integrity of a site is the coherence of its ecological structure and function, across its whole area that enables it to sustain the habitat, complex of habitats and/or levels of populations of the species for which it was classified'.

To ensure consistency with other sections of the ES, a level of significance for each impact will also be identified following the matrix in **Table 2.1**, which identifies the significance of impact as a function of the magnitude of impact and geographical value of the receptor. It should be noted that this will be provided as a guide, to provide consistency with the significance identified in other sections, and professional judgement will be applied during its application.

12.6 POTENTIAL MITIGATION

There is a wide variety of mitigation and enhancement measures that could be incorporated into the design or form part of the outline CEMP.

The following provides a list of some examples of guiding principles and approaches that it is anticipated will underpin the design of the proposed development and the completion of the enabling, demolition and construction works:

- Demarcation of valued or significant sensitive receptors.
- Ensure timing or phasing of demolition or construction activities are appropriate with regards to the life cycles of local fauna.
- Reduce external artificial lighting of the site where possible and ensure all lighting is compliant with guidance on reducing obtrusive lighting³⁹.
- Comply with best practice methodology, for example erect screening around parts of the site where necessary to prevent dust dispersion and provide noise attenuation.
- Provide toolbox talks to site personnel on the presence of ecological features and the importance of protecting them through the various mitigation measures.

³⁹ Office of the Deputy Prime Minister (2005) Government Circular: Biodiversity and Geological Conservation - Statutory Obligations and their Impact within the Planning System.

³⁹The Institute of Light Engineers (2005) Guidance notes for the reduction of Obtrusive Light.

- Re-instatement of habitat affected by construction through a planting regime that is both appropriate to the site and previous habitat type and utilises native species of local provenance.

In addition to this, the site provides a number of habitat enhancement opportunities that could be incorporated into the design or completion of the development:

- Creation of green/brown roofs on any flat roofed structures, in line with London and LBRuT planning policy (Policy DM SD 5).
- Erection of bird and bat boxes, providing a variety of types with different aspects.
- Implementing an appropriate cutting regime for some grassland areas that aims maintain a botanically diverse habitat with nectar-rich species.

12.7 CONSULTATION

At present no consultation has been undertaken. Natural England and the LBRuT biodiversity officer will be contacted to discuss the scope of the ecological impact assessment and agree on the requirement for further surveys. In the event of the River Crane enhancement opportunities being taken forward, it is recommended that the Crane Valley Partnership is consulted.

13 TOWNSCAPE AND VISUAL AMENITY

13.1 INTRODUCTION AND KEY ISSUES

The Townscape and Visual Impact Assessment (TVIA) will evaluate the environmental consequences of the proposed development in terms of its effects on the character and quality of the townscape, views and visual amenity. It will consider the effects of the proposed development on the physical characteristics of the site and its surroundings, focussing on those features that contribute to the essential townscape character of the area.

The Craneford Way playing fields to the south west of the site are designated as Metropolitan Open Land (MOL), a regional land use designation similar to green belt which seeks to protect the open character of land. The northern part of the site, adjoining A316 Chertsey Road is also occupied by playing fields but is not designated as MOL.

The main issues raised by the proposed development are likely to be:

- Potential change to the townscape character of the site and surrounding areas arising from the demolition and replacement of existing buildings and the proposed development of the site including currently open areas. Key considerations will include the appropriateness of the scale, mass and design of the proposed for its townscape context and the effect on trees that play a notable role in the townscape.
- The potential effect on views obtained by people who may be susceptible to changes to views and visual amenity having regard to the quality of the existing view and the scale and nature of the change. Significant visual effects are more likely to occur where development is introduced on existing undeveloped areas and where the scale of replacement buildings is notably larger than the current situation. The potential for a beneficial change to existing views may also exist where existing views are characterised by poor quality buildings (e.g. from the footpath to the west of the college).

13.2 POLICY REVIEW

In addition to the list of relevant planning policy as set out in Section 4, the following policy and regulatory documents will also be reviewed as part of the EIA process:

- Saved policies T28 and T29 from the London Borough of Richmond upon Thames Unitary Development Plan (2005).
- Design Quality Supplementary Planning Document (SPD) (2006).
- Planning Brief Richmond upon Thames College SPD (2008).

- Crane Valley Planning Guidelines (2005).

13-3 EXISTING ENVIRONMENT

The college comprises a varied collection of buildings dating from the mid to late 20th century which vary in height, the tallest element being a stair tower fronting Egerton Road (approximately 5 storeys). There are no listed or locally listed buildings on the site or in the immediate vicinity of it. The surrounding area is predominantly residential in character comprising mid 20th century suburban streets. The site is adjoined and overlooked by a number of residential properties and is crossed by a pedestrian route. The River Crane corridor, part of the green chain, is a recreational route that runs to the south of the site. The Duke of Northumberland River runs to the west of the Harlequins Stadium. There are mature trees most notably on the perimeter of the northern playing fields, along the footpath to the west of the college site, on the boundary with existing residential properties to the south and to part of the Egerton Road frontage.

The character and quality of the townscape of the site and their surroundings will be recorded and analysed. Broad character areas (those sharing common townscape characteristics) will be defined. Consideration will be given to factors such as land use, urban morphology, building height, mass, form, materials and the role of landscape elements. The susceptibility of each character area to change will be evaluated. Regard will be had to conservation area appraisals and other relevant available information including relevant local and national guidance.

The baseline study will define the extent of visibility of the study site and the parts of the surrounding environment and visual resources that are likely to be sensitive to change. A theoretical ZVI for the proposals will be established by a combination of mapping and fieldwork to establish the area over which views of the proposed development are likely to be seen. It is likely that this will be generally localised in extent with the potential for views from residential properties and streets on the north side of Chertsey Road (Talma Gardens/Tayben Avenue), along residential streets to the east (Heathfield North/Heathfield South/Court Way/Egerton Road), from the River Crane Corridor and the bridge over the railway to the south and from residential properties and associated open space to the west. There would also be the potential for views from areas of high ground to the east (e.g. The Terrace on Richmond Hill and locations within Richmond Park close to Pembroke Lodge).

The existing visual role of the site in the surrounding area will be recorded using photography and the location of receptors confirmed. Day and night time conditions will be considered.

The scale/extent of other committed development proposals will also be set out and

reviewed.

13-4 SENSITIVE RECEPTORS AND POTENTIAL ENVIRONMENTAL EFFECTS

Desk-based research will be undertaken to identify potential sensitive townscape and visual receptors within the ZVI. Sensitive townscape receptors will be likely to include:

- Public open spaces.
- River Crane corridor and green chain.
- Duke of Northumberland's River corridor.
- Rosecroft Gardens Conservation Area.
- Mature trees on the site that play a role in the townscape.
- The townscape character of the residential area immediately to the south and east of the site.
- Elevated views from high ground to the east.

Sensitive visual receptors will also be identified. These are people whose activities and attention are more likely to be focussed on the visual quality of the environment. They are likely to include:

- Residents, particularly where there is likely to be a direct view from habitable rooms that will change noticeably as a result of the proposals (e.g. residential properties on Craneford Way/Egerton Road/Talma Gardens).
- People using public open spaces and green chain.
- Protected views (e.g. from The Terrace on Richmond Hill).
- Pedestrian and cyclists using public footpaths and cycleways in the surrounding area. The more focussed the user is on the amenity of the route the greater the susceptibility of the receptor to change. This will include users of the public footpath to the west of the college, recreational routes associated with the Crane Corridor and routes along surrounding streets.

The potential effects on these receptors has been considered in this initial scoping exercise (see **Table 13.1**).

Table 13.1 Scope of Assessment: Townscape and Visual Effects

Potential Sensitive Receptors	Potential Effect	Potential Effect	
		Scoped In	Scoped Out
Townscape			
Significant groups of trees within the site.	Unknown at this stage.	✓	
Existing areas of open space adjacent to the site.	Changes to the setting and availability.	✓	
Rosecroft Gardens conservation area.	Changes to the setting.	✓	
Character of adjoining residential areas to the east.	Unknown. Compatibility with the existing townscape to be assessed.	✓	
River Crane Corridor/Duke of Northumberland's River.	Change to setting/ subject to details of works to playing fields. Townscape effects likely to minimal due to nature of proposals on Craneford Way playing fields.		✓
Character of the night time environment.	Given the urban nature of the area, this is unlikely to change significantly.		✓
Visual			
Residents adjoining and overlooking the site.	Change to visual amenity arising from new development.	✓	
Views obtained by pedestrians walking through adjoining residential areas.	Change to visual amenity in adjoining streets. Focus assessment on locations where there is likely to be a high magnitude of change.	✓	
Users of the public footpaths to the south and west.	Changes to visual amenity. Change may be beneficial from locations to the west of the college.	✓	
Users of the public open space to the west of the site.	Changes to visual amenity.	✓	
Users of the footpath and cycleway to the north.	Changes to visual amenity.	✓	
Motorists using Chertsey Road.	Motorists are transient receptors, whose focus is not on the visual quality of the townscape. They are travelling at speed past the site and will not be susceptible to changes to views. Unlikely to be significant environmental effects on these receptors.		✓
Passengers on trains passing the site.	Development of scale proposed is unlikely to have a significant effect owing to transient nature of receptors.		✓
People within public spaces with long range views from high ground to the east - The Terrace on Richmond Hill and locations within Richmond Park.	Replacement of an existing building within the wider panorama. Whilst development of scale proposed is unlikely to have a significant effect the change to the view from The Terrace on Richmond Hill will be assessed as a representative view and to test the worst case in terms of long views from the east.	✓	
Motorists, cyclists and pedestrians crossing the railway bridge the on London Road.	Potential for glimpsed views of taller elements on skyline prior to development of the sorting office. Whilst development of scale proposed is unlikely to have a significant effect, the change to the view from this location will be reviewed.	✓	

13.5 ASSESSMENT METHODOLOGY

An assessment will be provided of the effect of the proposals on the character and quality of the surrounding townscape, views and visual amenity. The assessment will be undertaken having regard to the Guidelines for Landscape and Visual Assessment (3rd edition) and other relevant guidance. Where maximum and minimum parameters are defined consideration will be given to the worst case.

The sensitivity of receptors will be established considering their susceptibility to change and the value of the receptor/view. The magnitude of the change during construction and operational stages will be considered taking into account the scale of the effect, its duration and reversibility.

The significance of the effect will be evaluated having regard to the sensitivity of the receptor and magnitude of the effect. A judgement will be made on the significance of the change to the townscape/view based according to the following significance criteria; major adverse, moderate adverse, minor adverse, nil/negligible, minor beneficial, moderate beneficial, major beneficial.

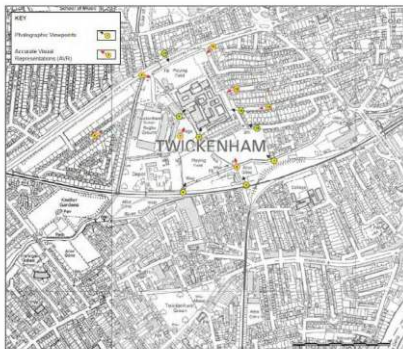
Commentary will be provided to ensure that the basis of the reasoning and judgement is clear and transparent. The assumptions will be clearly set out. It should be recognised that whilst the magnitude of change can be objectively defined, judgements on the nature of the change and significance of the effect are subjective and based on the experience of the assessor. The assessment will be undertaken by a team experienced in undertaking townscape appraisal and visual impact assessment.

Photographs as existing from all of the locations identified on **Figure 13.1** will be provided and commentary on the effects arising from the proposed development provided. Where available, photographs of winter conditions will be provided for comparison.

A limited number of views will be selected for the preparation of accurate visual representations (AVRs). It is envisaged that up to 7 AVRs will be prepared from the locations marked in red on **Figure 13.1** to show the impact of the development from those locations based on a simple massing model. An additional AVR will also be completed for Richmond Hill, as a representative worst case position from the east. These will be based on a wireframe and will seek to test the worst case scenario. The effects on other receptors will be assessed having regard to the application drawings (parameter plans) and photographs.

AVRs will be prepared in accordance with relevant best practice including the Landscape Institute's Advice Note 01/11 'Photography and photomontage in landscape and visual impact assessment', to a level suitable for an OPA.

Figure 13.1 Location of Photo Viewpoints and AVR^s¹³



13.6 POTENTIAL MITIGATION

Should substantial adverse effects be identified, where possible mitigation will be built into the design of the scheme to avoid or reduce these.

A strategy for the reduction of residual moderate adverse impacts will be identified as part of this chapter if required.

13.7 CONSULTATION

Initial consultation was held with LBRuT (Chris Tankard and Marc Wolfe-Cowen) about the proposed photographic viewpoints and AVRs at the end of June/beginning of July 2014. It was agreed that an additional AVR would be included from Richmond Hill as a worst case view. However, there was also a comment about

¹³ Plus one further AVR from Richmond Hill.

having a viewpoint from London Road. It is considered that there would be a limited view of the site from this location once the cumulative schemes are constructed (e.g. the postal sorting office). The need for a viewpoint from this location will be further explored with LBRuT. In addition, agreement with LBRuT will be sought with regards to the combination of photographs and photomontages/wire-frames which will be used to predict the degree of change proposed.

14 CULTURAL HERITAGE

14.1 INTRODUCTION AND KEY ISSUES

The cultural heritage assessment will assess the likely significant effects of the proposed development, and will incorporate a gazetteer of known heritage assets.

Key issues relevant to cultural heritage are outlined below:

- Possible impacts upon archaeological sites located within the Crane Archaeological Priority Area (APA) that includes the recreations grounds in the southern third of the site³⁴.
- Possible impacts upon as yet unrecorded archaeological features that may exist on the Kempton Park gravels upon which the site is located.
- Possible setting impacts upon Rosecroft Gardens Conservation Area and All Hallows Church, a Grade I Listed Building.

14.2 POLICY REVIEW

The relevant planning policies as set out in Section 4 will be reviewed as part of the EIA process.

14.3 EXISTING ENVIRONMENT

A gazetteer of known heritage assets is included in **Figure 14.1** and the designated sites in **Figure 14.2**, with full details of the existing baseline (identified from the desk-based study and initial walkover survey) are provided in **Appendix 14.1**.

14.3.1 Designated Heritage Monuments

There are no designated monuments (Scheduled Monuments, Listed Buildings, Registered Park and Gardens or World Heritage Site) located within the site.

There are 27 Listed Buildings located within the wider study area (OA 8, 9, 12, 14, 15, 17, 18, 21, 22, 24, 25, 32, 33, 35, 36, 38, 40, 41, 45-47, 49, 50 and 53-56). Of these, one; the Church of All Hallows (OA 53) located 525m to the north east of the site, is Grade 1, while the underground passage that runs between St Catherine's School and Radnor Lodge c 723m to the south east of the site (represented by two separate entries; OA 24 and 25) is a Grade II* structure. The remaining 24 Listed Buildings are Grade II. There is one Registered Park and Garden located within the wider study area. This is Pope's Garden, a Grade II garden and which is located 760m to the south east of the site.

³⁴ The Crane APA was established due to the presence of previously recorded industrial activity along the river. This area may also contain archaeological sites sealed below alluvial deposits in an area that was once marshland.

Conservation Areas

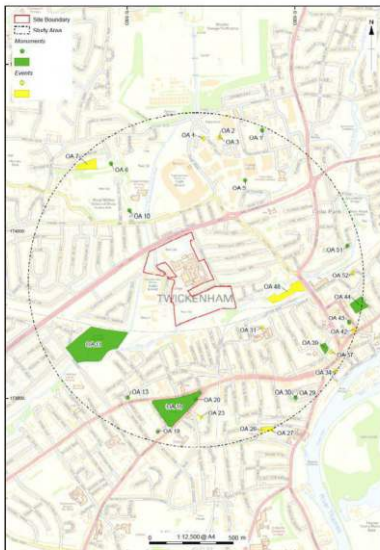
There are seven Conservation Areas (CAs), as defined by the LBRuT, located wholly or partially within the 1km wider study area (**Figure 14.2**). These are; Rosecroft Gardens CA, located immediately to the west of the site; Hamilton Road CA, c 140m to the south; Twickenham Green CA, c 380m to the south; Queen's Road CA, c 260m to the south east; Amyand Park CA, c 600m to the east; Pope's Avenue CA, c 775m to the south and Twickenham Riverside CA, located c 645m to the south east of the site.

Archaeological Priority Areas

The southern third of the site, currently occupied by recreation grounds, is located within the Crane Valley APA as defined by the LBRuT. This APA covers a zone on either side of the River Crane that has included a number of industries. Gunpowder manufacture was the most important of these Crane industries, one which was carried on for at least 400 years up to the 20th century. The River Crane was also used, at one time, for oil and paper mills, and a brewery. This part of the site was formerly marshland. Seasonal flooding could have sealed as yet unrecorded archaeological features below and between successive layers of alluvium. The remainder of the site is located upon Kempton Park Gravels which are known to contain Palaeolithic artefacts. These gravel terraces above the River Thames may have seen later prehistoric and Roman settlement although no evidence has been recorded within the site or the wider study area to this date.

The wider study area also includes parts of the Whitton APA, which covers the medieval core of the village, in the north west and the Twickenham and Marble Hill APA, which covers the early medieval settlement core of the town that dates back to the 8th century, in the south.

Figure 14.1 Heritage Assets



Note: Red line boundary on drawing is larger than proposed OPA boundary. See Appendix 14.1 for details of assets.

Figure 14.2 Designated Heritage Sites



Note: Red line boundary on drawing is larger than proposed OPA boundary. See Appendix 14.1 for details of sites.

14.3.2 Archaeological Baseline

Geology

The site is located on London Clay Formation, made up of clay and silt. This is a Sedimentary Bedrock formed approximately 34 to 56 million years ago in the Palaeogene Period. Above the clay is a superficial deposit of Kempton Park Gravel Formation formed of sand and gravel. These gravels have been deposited over the past 500,000 years (BGS website).

Potential Previous Impacts

Parts of the playing fields to the north of the college buildings may have been impacted by the construction of air raid shelters during the Second World War. There is still some archaeological potential here. The construction of the current college buildings is likely to have had a major impact on any buried archaeological features within the structure's footprint. The archaeological potential within the building footprint is low. The open area immediately to the west of the college contains two large modern earthworks, possibly associated with a block of modern flats. This area appears to have been extensively disturbed although its impact upon the gravels beneath is unclear at this stage.

Site Walkover Survey

A walkover survey of the site was carried out in May 2014, with no new heritage assets identified.

The college buildings all appear to date from the mid- to late-20th century and are mostly constructed of brick and are between one and two storeys in height. The sports field to the north of the college is flat with the buildings of a sports club in the far south west corner.

Immediately to the south west of the site is an area of open ground covered with grass which is taken up with two large circular mounds, each with a flattened summit. A broad rectangular-sectioned depression is located between the two mounds. These earthworks are believed to be modern in origin and possibly associated with the development of the flats located immediately to the west (Challenge Court).

14-4 SENSITIVE RECEPTORS AND POTENTIAL ENVIRONMENTAL EFFECTS

The section of the site located within the Crane Valley APA that has not been heavily impacted by modern development (the playing fields to the south of the college) is considered to be a receptor of high sensitivity. Any groundworks, foundation excavations or piling activity associated with the proposed development would

impact heavily on any as yet unrecorded archaeological features and potentially have a major effect. It is currently understood that no such disturbance is proposed in this area of the site as the playing fields will be retained.

The proposed development will have no impact upon the settings of, or views from, 26 of the 27 Listed Buildings located within the wider study area as these are hidden from the site either by trees or by 20th century housing developments.

The proposed development may have a possible impact upon the views from the Grade I Listed Building of All Hallows Church (OA 53). Although this building is located c500m to the north east of the site, the church tower is an exceptionally tall structure within an area of otherwise low-lying 20th century buildings with clear inter-visibility between the church and the site. Potential impacts to key views from the Listed Building will require further assessment during the preparation of the EIA. The predominant character of the area is one of one to two-storey 20th century houses and offices and open spaces with minor and major roads. The church tower therefore commands expansive views in all directions and these are very likely to include the college site.

The proposed development is likely to impact upon the views from and setting of, the Rosecroft Gardens CA, which is located immediately to the west of the Harlequins Stadium. The far north east corner of Rosecroft Gardens CA and the far north west corner of the site are divided by a thin line of mature and semi-mature trees, offering broken views between the two areas. Any new development could impact upon views from the CA and will also impact upon its immediate setting.

The southern boundary of the proposed development comes within 50m of the Hamilton Road CA. These two areas are divided by a line of mature trees and an area of 20th century housing which obscures the CA from the site, leaving no clear or partial views between the two. Development will have no impact upon this CA.

14.5 ASSESSMENT METHODOLOGY

14.5.1 Data Gathering

A search of the Greater London Historic Environment Record (GLHER) has been carried out for the area of the site and for a wider study area of 1km around it.

The data supplied by the GLHER has been used as the basis for the baseline study presented above, together with the features mapping in **Figures 14.1 and 14.2**.

All available historic map data that shows the site has been collected from the LBRuT Local History Centre and the London Metropolitan Archive. A walkover survey of the site was conducted on 7 May 2014.

It is felt that the data supplied by GLHER will be sufficient to act as the basis for a baseline study in the EIA, noting the following:

- No further historic map evidence needs to be retrieved, although further historic research on the local history of the area will need to be carried out for the EIA.
- A re-visit will need to be carried out following the provision of further design information in order to fully assess the impacts on the settings of and views from All Hallows Church and Rosecroft Gardens Conservation Area.
- Any existing geotechnical or other ground survey reports will be accessed in order to be able to assess the underlying geology of the site and the extent of past disturbances. The data gathered from ground investigations within the site will be utilised to gain insight into the nature and position of the underlying gravel and clay deposits along with the extent of disturbed overburden how these will be directly affected by the proposed development.
- Any aerial photographs of the area that are held by the National Aerial Photographic Library at the NMR in Swindon, will also be studied in case any of these show details of previous buildings as well as soilmarks or cropmarks of archaeological sites or palaeo-channels of the former line of the River Crane.

The assessment will also aim to re-create the later post-medieval land-use in and around the site, utilising maps from the 18th-century (Rocque) and 19th century (Milne 1800, the parish enclosure map of 1819 and Warren, 1846). Ordnance Survey maps from the late 19th century onwards will also be used.

The site will be re-visited once further plans and elevations of the proposed development are available in order to clarify potential setting or construction impacts.

14.5.2 Assessment

The baseline study will be followed by an assessment of the cultural heritage resource within the study area and an analysis of the potential impacts of the proposed development upon this resource.

Setting effects will be defined using two English Heritage guidance documents: The Setting of Heritage Assets, (2012) and Seeing History in the View (2011).

The proposed development will be described with reference to parameter plans and supporting information. The potential impacts of the scheme on the heritage assets set out in the baseline study will then be considered using the definitions laid out in Design Manual for Roads and Bridges, volume 11, Section 3, 5.32-4.

Impact Magnitude and Significance

Determination of the importance of receptors (sites and features) will be based mainly upon existing designations, but allows for professional judgement where features are found that do not have any formal national or local designation. **Table 14.1** contains the criteria used to assess probable importance of receptors.

Table 14.1 Criteria Used to Determine Importance of the Receptor

Importance/sensitivity of receptor	Equivalent to:
Very High	World Heritage Sites (including nominated sites). Sites, buildings or landscapes of acknowledged international importance. Historic landscapes of international value, whether designated or not. Extremely well preserved historic landscapes with exceptional coherence, time depth or other critical factors.
High	Sites or structures of demonstrated national importance, such as: <ul style="list-style-type: none"> • Scheduled Monuments. • Grade I and II* Listed Buildings. • English Heritage Registered Park and Gardens Grade I/II* Undesignated assets of schedulable quality or importance. Undesignated landscapes of high quality and importance and of demonstrable national value. Well preserved historic landscapes exhibiting considerable coherence, time depth and/or other critical factors.
Medium	Important sites on a Regional or district level, such as: <ul style="list-style-type: none"> • Grade II Listed Buildings. • Conservation Areas. • Sites with a regional value or interest for research, education or cultural appreciation. Averagely well preserved historic landscapes with reasonable coherence, time-depth or other critical factors.
Low	Important sites on a local or parish level, such as: <ul style="list-style-type: none"> • Locally Listed Buildings • Sites with a local or parish value or interest for research, education or cultural appreciation. Robust undesignated historic landscapes. Historic landscapes with importance to local interest groups.
Negligible	Sites or features with no significant value or interest or sites that are so badly damaged that too little remains to justify inclusion into a higher grade. Landscapes with little or no significant historical interest
Uncertain	Possible archaeological sites for which there is limited existing information. It has not been possible to determine the importance of the site based on current knowledge. Such sites might comprise isolated findspots or cropmarks visible on air photographs.

Source: adapted from Design Manual for Roads and Bridges (DMRB) (J14 208/07)

Assessment of Magnitude of Change

There are a number of variables in determining magnitude of change and these are laid out in **Table 14.2**. These include the sensitivity or vulnerability of a site to change (for example the presence of made-ground), the nature of past development or management effects, and the differing nature of proposed development processes such as piling and topsoil stripping.

Table 14.2 Criteria Used to Determine Magnitude of Change

Magnitude of Change	Description of Change
High	Complete destruction of the site or feature. Change to the site or feature resulting in a fundamental change in the ability to understand and appreciate the resource and its historical context and setting. This could be either adverse or beneficial.
Medium	Change to the site or feature resulting in an appreciable change in the ability to understand and appreciate the resource and its historical context and setting. This could be either adverse or beneficial.
Low	Change to the site or feature resulting in a small change in the ability to understand and appreciate the resource and its historical context and setting. This could be either adverse or beneficial.
Negligible	Negligible change or no material change to the site or feature. No real change in the ability to understand and appreciate the resource and its historical context and setting.
Uncertain	Extent and exact location of archaeology is uncertain; impact is therefore uncertain or because precise construction methods/impacts are uncertain.

Source: adapted from Design Manual for Roads and Bridges (DMRB) (HA 2018/07)

The importance and/or sensitivity of the receptor and the magnitude of change are combined to indicate the significance of predicted effects, as shown in **Table 2.1**.

It should be noted that **Table 2.1** is a starting point to guide decisions on significance of effect. Decisions will be based on professional judgement and in some circumstances it may be judged necessary to deviate from **Table 2.1**. Any deviations will be clearly recorded and justified.

Assumptions and Limitations

Every effort will be made to assess the likely potential of the area to contain below ground archaeological deposits using the above sources/survey techniques. However no site investigation can ensure complete assessment or prediction of the potential for areas to contain below ground archaeological deposits. Assessment of the likely risk of encountering hitherto unsuspected and significant deposits will be provided as part of the ELA.

14.6 POTENTIAL MITIGATION

Possible mitigation could include changes to the design of the proposed development in order to make the final structure seem more sympathetic to the character of the designated assets and therefore lessen the impact upon them.

Possible mitigation that may be required during demolition and construction is discussed below, and will be included in the outline CEMP as necessary.

14.6.1 Demolition

Once demolition is underway, the removal of wall foundations, basements and services may expose previously undisturbed deposits that may include archaeological features, resulting in impacts to the cultural heritage resource. The potential impacts of such works could be mitigated by the presence of an archaeologist to monitor sensitive demolition works and to identify and record any archaeological features that may be exposed and/or impacted, as necessary.

14.6.2 Construction

Archaeology

As requested, archaeological monitoring of groundworking phases of construction could mitigate the impact that the excavation of foundation trenches, basements, service trenches and the construction of access roads may have on as yet unrecorded archaeological features that may exist within the site. Exposed features would be identified and recorded by the archaeologists present.

Built Heritage

The construction phase may impact upon the setting of and views from, Rosecroft Gardens CA and upon views from the tower of the Church of All Hallows (OA 53), a Grade I Listed Building. This could be mitigated by the screening of the works. Nearby Listed Buildings may also suffer temporary adverse effects through increased noise, traffic movements and vibration. Mitigation measures to remove or reduce any such effects will be defined during the study and may include screening of the proposed development site and relocation of sensitive access routes.

14.6.3 Operation

Built Heritage

Long-term screening of the proposed development from Rosecroft Gardens CA and from the tower of All Hallows Church (OA 53) may be deemed as desirable if the nature of the proposed development is considered to have had an impact on either the settings of or views from these two sites.

14.7 CONSULTATION

As the assessment progresses, consultation will be carried out with the relevant English Heritage officer (Greater London Archaeological Advisory Service Inspector for Richmond-upon-Thames) and the LBRuT Conservation Officer.

15 SOCIO-ECONOMICS

15.1 INTRODUCTION AND KEY ISSUES

The purpose of this assessment will be to consider the key socio-economic impacts associated with the proposed development, during both the construction and operational stages.

It is anticipated that the main socio-economic considerations are likely to be the impacts on the local labour market, housing market, education facilities and community facilities including recreation and open space/playing fields and green chains.

15.2 POLICY REVIEW

National, regional and local planning policies relevant to the socio-economic and community impacts of the proposals will be reviewed and summarised. This review will focus on economic development and employment policies and policies relating to education and sports facility provision. In addition, the relevant planning policies as set out in Section 4 will be reviewed as part of the EIA process.

15.3 EXISTING ENVIRONMENT

In order to assess the likely socio-economic impacts of the proposed development, the economic and labour market characteristics of the study area will be examined including; its demographic profile, trends in the local economy, indices of deprivation, and labour market indicators (including unemployment rates, commuting patterns, income levels and skills levels of the work force). This will establish any strengths and weaknesses of the local economy that the construction or operation of the proposed development may affect.

To establish housing market impacts, current and future planned housing needs in the Borough will be reviewed, including LBRuT's objectively assessed housing need and related evidence base documents.

In terms of social and community impacts, a baseline assessment of the current provision of educational and recreational facilities within the local area will be identified, along with any deficiencies or surplus capacity in such provision and any planned new facilities. This will include consideration of the current provision of sport pitches and playing fields in the local area.

This baseline will be established using a combination of data sources including nationally published statistics from Office of National Statistics (ONS), Department for Communities and Local Government (CLG) and the Department for Business,

Innovation and Skills (BIS), Sport England data sources as well as local data from LBRuT.

15.4 SENSITIVE RECEPTORS AND POTENTIAL ENVIRONMENTAL EFFECTS

The potential sensitive receptors during the construction and operational phases include: the local labour market; housing market and community infrastructure, which have been scoped into the assessment as summarised in **Table 15.1** below. Impacts on the local labour market will arise during both the construction and operational phases, whilst housing market and community infrastructure impacts will arise upon completion.

Each of these receptors will be subject to the potential impacts outlined below, which will be assessed based on the scale of the change over the baseline position, as well as the nature and context of the impact. Impacts will be identified on a matrix basis from major adverse through to major beneficial, representing the scale of impacts above and beyond the baseline position. Where possible, the scale of impact will be quantified in relation to current conditions under each receptor. Where relevant, the location of the impact and its likely duration will be considered.

Table 15.1 Scope of Assessment: Socio-Economics

Potential Sensitive Receptors	Potential Impact	Potential Effect	
		Scoped In	Scoped Out
Local labour market	Job creation during construction and operational phases	✓	
Housing market	Additional housing supply to meet local housing needs during operation	✓	
Community infrastructure (including education and health)	Demands arising from new population.	✓	
Recreation, open space and green chains	Change in provision of sports facilities and playing fields, and additional/improved provision to be provided by operation of the development.	✓	

15.5 ASSESSMENT METHODOLOGY

Employment impacts of the proposals will be assessed by estimating employment generation both from the construction and operational phases of the scheme.

The likely employment impacts of the proposals during the construction phase will be assessed by estimating employment generation from the construction cost of the scheme. Appropriate employment multipliers will be applied to direct employment

to estimate the indirect employment, taking account of expected expenditure by the operation and its employees in the local economy.

For operational employment, this will involve applying typical employment densities to the proposed amount of floorspace for the different components of the scheme and operator estimates. As there are existing jobs on-site, net increases/ decreases will be quantified. Appropriate employment multipliers will be applied to estimate the indirect and induced employment generated by the proposed development. The number, occupation profile and status (full/part-time) of the jobs likely to be created will be identified. The significance of the overall employment effects on the local labour market will then be assessed, taking into account unemployment levels, economic activity rates, commuting patterns, the skills levels of workers available and any training initiatives available.

Any effects of the proposed development on stimulating additional spin-off investment or other economic activity in the local and wider economy will be evaluated, including contribution to relevant economic objectives. The potential of the proposals to attract other proposed development or investment to the wider area will be considered.

Impacts on current commuting flows will be assessed, taking into account the nature of the new jobs proposed on the site, current unemployment levels and skills in the area and likely future changes in employment in the local area.

The assessment will consider changes in population arising from the additional population the development will accommodate by applying forecast average household size to the dwelling mix proposed.

In terms of housing, the assessment will consider impacts upon the provision of housing and how the proposed development will assist the local authority in meeting its objectively assessed need housing target, including affordable housing provision. It will also provide commentary on how increased housing supply will impact on the existing market.

The social and community impacts linked with proposed development of educational and sport and recreational facilities will be considered by assessing their contribution to local, regional and national benchmark standards, where possible, as well as comparing it to the baseline position. This exercise will assist in identifying any deficiencies or surplus capacity in such provision. For education, this will involve assessing the likely pupil yield of the scheme within the context of existing and proposed provision. Wider social and community impacts will also be explored in a qualitative manner.

15.6 POTENTIAL MITIGATION

The need for any mitigation measures to address adverse effects or to maximise positive socio-economic effects will be considered, drawing upon experiences and successful initiatives from elsewhere. This could include maximising use of local firms and resources during construction, and encouraging local recruitment for any new job opportunities created and exploring the potential to allow local communities to access new school places and sports and recreational facilities.

15.7 CONSULTATION

Consultation will be undertaken with relevant statutory consultees, community infrastructure providers and economic development officers within the LBRuT as necessary.

16 SUMMARY OF KEY ISSUES

A summary of the key issues scoped into the EIA, covering the main potential environmental impacts envisaged that could arise from the demolition, construction and operation of the proposed development are given in **Table 16.1**. This includes both negative (adverse) and positive (beneficial) impacts.

Table 16.1 Summary of Key Issues

EIA Topic	Potential Environmental Impacts
Transport	<ul style="list-style-type: none"> Increase in traffic generated during the demolition and construction phase (Heavy Goods Vehicles (HGVs), staff car movements etc), car parking provision during demolition and construction. Potential increase in vehicle movements on the local and wider road networks during operation including capacity issues at junctions. Operational car parking provision requirements for all landuses. Implications on public transport network during all development phases.
Noise and vibration	<ul style="list-style-type: none"> New noise and vibration sources during demolition and construction and impacts on receptors both within and around the site. Changes to the existing noise climate at sensitive receptors located around the site and the access routes associated with operation of the completed development. The effects of existing noise sources on new sensitive receptors within the development.
Air quality	<ul style="list-style-type: none"> Localised changes in levels of road traffic pollutants caused by exhaust emissions from construction traffic, traffic congestion or increased traffic flows on the local road network including diversionary routes during construction. Creation of dust emissions from construction materials, plant and machinery, and associated nuisance. Localised changes in levels of road traffic pollutants resulting from traffic on routes to and from the site(s), during the operational phase.
Ground conditions	<ul style="list-style-type: none"> Potential sources of contamination on site and creation of pathways impacting sensitive receptors. Impacts of potential contamination left in-situ. Management of potentially contaminating materials arising from clearance, demolition and construction.
Waste	<ul style="list-style-type: none"> Appropriate management and disposal of wastes arising during construction and operation of the development. Identifying opportunities for waste minimisation and reuse and recycling of materials and waste during construction and operational phase. Achieving compliance with waste legislation in all phases.
Water and flood risk	<ul style="list-style-type: none"> Changes to water quality and turbidity in surrounding watercourses during construction. Changes to groundwater flow as a result of below ground works and structures. Changes to flood risk within the catchment of the River Crane. Changes to site drainage and runoff patterns from the new operational site and the requirement for Sustainable Drainage Systems (SUDs). Changes in potable water supply and foul water drainage capacity.
Daylight, sunlight and overshadowing	<ul style="list-style-type: none"> Potential reduction in daylight and sunlight levels at existing residential properties and gardens on Egerton Road, Craneford Way and Langhorn Drive. Effects on daylight and sunlight within new residential element.
Ecology	<ul style="list-style-type: none"> Direct habitat loss to adjacent designated sites and ecologically significant habitats. Mortality or harm to protected or ecologically significant species within the footprint of the site. Deterioration or fragmentation of surrounding habitats and disturbance of protected or ecologically significant species within surrounding habitats. Opportunities for biodiversity enhancement and gain.

EIA Topic	Potential Environmental Impacts
Landscape and visual amenity	<ul style="list-style-type: none"> • Potential change to the townscape character of the site and surrounding areas - appropriateness of the scale, mass and design of the proposed for its townscape context and the effect on trees that play a notable role in the townscape. • Change in views and visual amenity.
Cultural heritage	<ul style="list-style-type: none"> • Possible impacts upon archaeological sites located within the Crane Archaeological Priority Area (APA). • Possible impacts upon as yet unrecorded archaeological features that may exist on the Kempton Park gravels upon which the site is located. • Possible setting impacts upon Rosecroft Gardens Conservation Area and All Hallows Church, a Grade I Listed Building.
Socio-economics	<ul style="list-style-type: none"> • Impacts on the local labour market, housing market, education facilities and community facilities. • Changes to provision of recreational facilities and open space/playing fields.

17 PROPOSED STRUCTURE OF THE ES

The proposed structure of the ES is set out below, based on the EIA Regulations and current best practice.

Non-Technical Summary

This will provide an accurate and balanced summary of the key information in the ES and supporting documents, in non-technical language so that it is easily accessible by the general public. The Non-Technical Summary (NTS) will be produced as a standalone document.

Environmental Statement

This will contain the findings of the EIA process and will be reported in accordance with the EIA Regulations. The likely chapter headings are set out below:

- Introduction
- EIA Methodology
- Existing Land Uses and Alternatives
- Alternatives and Design Evolution
- The Proposed Development
- Development Programme and Construction
- Transport
- Noise and Vibration
- Air Quality
- Ground Conditions
- Waste
- Water Resources and Flood Risk
- Daylight, Sunlight and Overshadowing
- Ecology
- Townscape and Visual Amenity
- Cultural Heritage
- Socio-economics
- Cumulative Effects
- Summary of Residual Effects

Technical Appendices

Where necessary, these chapters will be supported by associated technical appendices. These will include:



- Transport Statement.
- Travel Plans.
- Flood Risk Assessment.
- Outline Construction Environmental Management Plan.



Richmond Education and Enterprise Campus Development

Environmental Statement Volume 3 - Appendices

Produced for Richmond upon Thames College

June 2015

In association with:



Nathaniel Lichfield
& Partners
Planning, Design, Economics.



and Anglia Consultants

Client: Richmond upon Thames College

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Environmental Statement

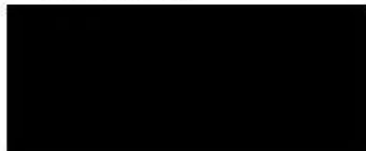
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ENVIRONMENTAL STATEMENT APPENDIX LIST

Chapter 2 – Environmental Impact Assessment Methodology

- Appendix 2.1: REEC Development EIA Scoping Report
- Appendix 2.2: LBRuT Scoping Opinion
- Appendix 2.3: Applicant Response to Scoping Opinion
- Appendix 2.4: Consultation Log

Chapter 3 – Existing Site and Surroundings

- Appendix 3.1: Topography Survey

Chapter 4 – Alternatives and Design Evolution

- Appendix 4.1: The ‘Do Nothing’ Scenario

Chapter 5 – The Proposed Development

- Appendix 5.1: Parameter Plans
- Appendix 5.2: Residential Development Phasing and Comparisons
- Appendix 5.3: Residential Expected Children and External Space Calculations by Phase
- Appendix 5.4: Comparison of Existing and Illustrative External Space Types

Chapter 6 – Demolition and Construction

- Appendix 6.1: Outline Construction Environmental Management Plan
- Appendix 6.2: Outline Construction Management Plan
- Appendix 6.3: Outline Construction Logistics Plan
- Appendix 6.4: Indicative Construction Phasing Plans
- Appendix 6.5: Indicative Demolition and Construction Programme
- Appendix 6.6: 2008 Soiltechnics Ground Investigation Report
- Appendix 6.7: Guidance for Protection of Controlled Waters

Chapter 8 – Transport

- Appendix 8.1: 2019 Baseline Traffic Flow Diagrams
- Appendix 8.2: 2019 Construction Phase 3 Traffic Flow Diagrams
- Appendix 8.3: 2019 Completed Development Traffic Flow Diagrams
- Appendix 8.4: 2034 Traffic Flow Diagrams

Appendix 8.5: Framework Travel Plan

Appendix 8.6: 2019 Completed Development + Cumulative Traffic Flow Diagrams

Appendix 8.7: 2034 Cumulative Traffic Flow Diagrams

Chapter 9 – Noise and Vibration

Appendix 9.1: Detailed Results of Baseline Noise Measurements

Appendix 9.2: Plant Used for Construction Noise Calculations

Appendix 9.3: Noise from Sports Activities

Chapter 10 – Air Quality

Appendix 10.1: Atmospheric Dispersion Modelling System (ADMS) Roads Model Input
Parameters

Appendix 10.2: Model Verification

Chapter 11 – Ground Conditions

Appendix 11.1: Landmark Envirocheck Historical Mapping and Data Report

Appendix 11.2: Soiltechnics Classification of Waste Soils for Off Site Disposal

Chapter 13 – Water Resources and Flood Risk

Appendix 13.1: Flood Risk Assessment

Appendix 13.2: Outline Drainage Assessment

Appendix 13.3: Utilities Statement

Chapter 14 – Daylight Sunlight and Overshadowing

Appendix 14.1: Daylight, Sunlight and Overshadowing Assessment Model

Appendix 14.2: Reference Plans and Window Locations

Appendix 14.3: VSC Results - Neighbouring Properties

Appendix 14.4: Sunlight Results - Neighbouring Properties

Appendix 14.5: Overshadowing Results - Neighbouring Gardens / Open Spaces

Appendix 14.6: ADF Results - Notional Accommodation within Outline Residential Buildings

Appendix 14.7: Sunlight Results - Notional Accommodation within Outline Residential
Buildings

Appendix 14.8: Overshadowing Results – Proposed Gardens / Open Spaces within the
Development

Chapter 15 – Ecology

- Appendix 15.1: Extended Phase 1 Habitat Survey
- Appendix 15.2: Breeding Birds and Bats Species Report
- Appendix 15.3: Terrestrial Invertebrate Report
- Appendix 15.4: Ecological Impact Characterisation
- Appendix 15.5: Arboricultural Impact Assessment

Chapter 16 – Townscape and Visual Amenity

- Appendix 16.1: Townscape and Visual Assessment Impact Assessment Figures, Photographs and Visualisations
- Appendix 16.2: Assessment Criteria
- Appendix 16.3: List of Parameters Plans and Other Documents
- Appendix 16.4: Extracts from Design Quality
- Appendix 16.5: Local Townscape Character Analysis
- Appendix 16.6: Assessment of Construction Effects on Representative Views
- Appendix 16.7: Summary Assessment of Representative Views – Operation

Chapter 17 – Cultural Heritage

- Appendix 17.1: Gazetteer of Cultural Heritage Features
- Appendix 17.2: Archaeological Geophysical Survey

Chapter 18 – Socio – economics

- Appendix 18.1: Community Infrastructure
- Appendix 18.2: Survey of Users of Cranford Playing Field (Provided by FORCE)
- Appendix 18.3: Richmond upon Thames College, Community Sports Centre Usage
- Appendix 18.4: Cranford Way West Rental by Harlequins 2014/2015 Season
- Appendix 18.5: Richmond upon Thames Child Yield Calculator

CHAPTER 2 – APPENDICES

CONTENTS

Appendix 2.1: REEC Development EIA Scoping Report

Appendix 2.2: LBRuT Scoping Opinion

Appendix 2.3: Applicant Response to Scoping Opinion

Appendix 2.4: Consultation Log



Appendix 2.1: REEC Development EIA Scoping Report



Richmond Education and Enterprise Campus Development

EIA Scoping Report

Final

July 2014

In Association with:



and **Anglia Consultants**

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Contents

1	Introduction	1
1.1	Background	1
1.2	Site Context	1
1.3	The Need for EIA.....	3
1.4	Consultation	3
2	The EIA Process	5
2.1	Overview.....	5
2.2	EIA Screening.....	5
2.3	EIA Scoping.....	5
2.4	Approach to EIA.....	6
2.5	Approach to Cumulative Effects Assessment.....	10
3	Scheme Description	12
3.1	Need For the Scheme	12
3.2	The Proposed Development	12
3.3	Demolition and Construction.....	13
3.4	Potential Sensitive Receptors.....	15
3.5	Alternatives Assessment.....	16
4	Policy Review	17
5	Transport.....	20
5.1	Introduction and Key Issues	20
5.2	Policy Review.....	20
5.3	Existing Environment	21
5.4	Sensitive Receptors and Potential Environmental Effects.....	21
5.5	Assessment Methodology.....	23
5.6	Potential Mitigation.....	24
5.7	Consultation	25
6	Noise and Vibration	26
6.1	Introduction and Key Issues	26
6.2	Policy Review.....	26
6.3	Existing Environment	26
6.4	Sensitive Receptors and Potential Environmental Effects.....	28
6.5	Assessment Methodology	29
6.6	Potential Mitigation.....	32
6.7	Consultation	33
7	Air Quality	34
7.1	Introduction and Key Issues	34
7.2	Policy Review.....	34
7.3	Existing Environment	34
7.4	Sensitive Receptors and Potential Environmental Effects.....	36
7.5	Assessment Methodology	38
7.6	Potential Mitigation.....	40
7.7	Consultation	40
8	Ground Conditions	42
8.1	Introduction and Key Issues	42
8.2	Policy Review.....	42
8.3	Existing Environment	42
8.4	Sensitive Receptors and Potential Environmental Effects.....	44
8.5	Assessment Methodology	45
8.6	Potential Mitigation.....	47
8.7	Consultation	48
9	Waste.....	49

9.1	Introduction and Key Issues	49
9.2	Policy Review.....	49
9.3	Existing Environment	50
9.4	Sensitive Receptors and Potential Environmental Effects.....	50
9.5	Assessment Methodology	50
9.6	Potential Mitigation.....	51
9.7	Consultation	52
10	Water Resources and Flood Risk	53
10.1	Introduction and Key Issues	53
10.2	Policy Review.....	53
10.3	Existing Environment	54
10.4	Sensitive Receptors and Potential Environmental Effects.....	59
10.5	Assessment Methodology	61
10.6	Potential Mitigation.....	65
10.7	Consultation	65
11	Daylight, Sunlight and Overshadowing	66
11.1	Introduction and Key Issues	66
11.2	Policy Review.....	66
11.3	Existing Environment	66
11.4	Sensitive Receptors and Potential Environmental Effects.....	67
11.5	Assessment Methodology	68
11.6	Potential Mitigation.....	72
11.7	Consultation	72
12	Ecology	73
12.1	Introduction and Key Issues	73
12.2	Policy Review.....	73
12.3	Existing Environment	73
12.4	Sensitive Receptors and Potential Environmental Effects.....	76
12.5	Assessment Methodology	83
12.6	Potential Mitigation.....	86
12.7	Consultation	87
13	Townscape and Visual Amenity.....	88
13.1	Introduction and Key Issues	88
13.2	Policy Review.....	88
13.3	Existing Environment	89
13.4	Sensitive Receptors and Potential Environmental Effects.....	90
13.5	Assessment Methodology	92
13.6	Potential Mitigation.....	93
13.7	Consultation	93
14	Cultural Heritage	95
14.1	Introduction and Key Issues	95
14.2	Policy Review.....	95
14.3	Existing Environment	95
14.4	Sensitive Receptors and Potential Environmental Effects.....	99
14.5	Assessment Methodology	100
14.6	Potential Mitigation.....	103
14.7	Consultation	104
15	Socio-Economics.....	105
15.1	Introduction and Key Issues	105
15.2	Policy Review.....	105
15.3	Existing Environment	105
15.4	Sensitive Receptors and Potential Environmental Effects.....	106
15.5	Assessment Methodology	106

15.6	Potential Mitigation.....	108
15.7	Consultation	108
16	Summary of Key Issues	109
17	Proposed Structure of the ES	111

List of Figures

Figure 1.1	Site Location
Figure 4.1	Local Plan Proposals Map July 2013
Figure 6.1	Baseline Noise Monitoring Locations
Figure 10.1	Watercourses in Proximity to the Site
Figure 10.2	Fluvial Flood Risk
Figure 10.3	Surface Water Flood Risk
Figure 10.4	Groundwater Flood Risk
Figure 13.1	Locations of Photo Viewpoints and AVRs
Figure 14.1	Heritage Assets
Figure 14.2	Designated Heritage Sites

List of Tables

Table 1.1	The EIA Team
Table 2.1	Significance Criteria
Table 2.2	Provisional List of Cumulative Schemes
Table 5.1	Scope of Assessment: Transport
Table 6.1	Scope of Assessment: Noise and Vibration
Table 6.2	Significance Criteria for Construction Noise
Table 6.3	Significance Criteria for Construction Vibration
Table 6.4	Significance Criteria for Operational Noise
Table 6.5	Significance Criteria for Traffic Noise
Table 7.1	Scope of Assessment: Air Quality
Table 7.2	Air Quality Standards and Objectives
Table 8.1	Scope of Assessment: Ground Conditions Preliminary Conceptual Model
Table 8.2	Significance Criteria for Contaminated Land
Table 10.1	Environment Agency Monitoring Sites in the River Crane and Duke of Northumberland's River Catchment
Table 10.2	Scope of Assessment: Water Resources and Flood Risk
Table 10.3	Criteria for Determining the Nature of the Water Resources Effect
Table 10.4	Criteria for Determining the Value of the Water Resources Receptor
Table 10.5	Significance Evaluation Matrix
Table 11.1	Scope of Assessment: Daylight and Sunlight
Table 12.1	Scope of Assessment: Ecology
Table 12.2	Criteria for Determining the Value of Ecological Features
Table 12.3	Criteria for Determining the Magnitude of Change

Table 13.1	Scope of Assessment: Townscape and Visual Effects
Table 14.1	Scope of Assessment: Cultural Heritage
Table 14.2	Criteria Used to Determine Importance of Receptor
Table 14.3	Criteria Used to Determine Magnitude of Change
Table 14.4	Significance of Effects
Table 15.1	Scope of Assessment: Socio-Economics
Table 16.1	Summary of Key Issues

List of Appendices

Appendix 1.1	Drawings of Proposed Development
Appendix 6.1	Summary of Baseline Noise Survey
Appendix 12.1	Summary of Extended Phase 1 Habitat Survey Results
Appendix 14.1	Summary of Cultural Heritage and Archaeology Desk Study Results

1 INTRODUCTION

1.1 BACKGROUND

Richmond Education and Enterprise Campus (REEC; hereafter referred to as the 'Applicant'), is seeking to submit an Outline Planning Application (OPA) for the mix-used redevelopment of the Richmond upon Thames College (RuTC) site in Twickenham, within the London Borough of Richmond (LBRuT).

The redevelopment of the existing college site offers the opportunity to renew the college and introduce a new secondary school into the LBRuT, re-provide the Clarendon School (special needs secondary school), upgrade the sports fields, and integrate these developments with a shared 'campus', with the development of a new technical media hub on the site, and an element of separate residential development.

There is the potential for a future upgrade of the Harlequins Stadium north stand which is adjacent to the west of the REEC site. The design of the development will therefore consider the interface with the Harlequins site where necessary.

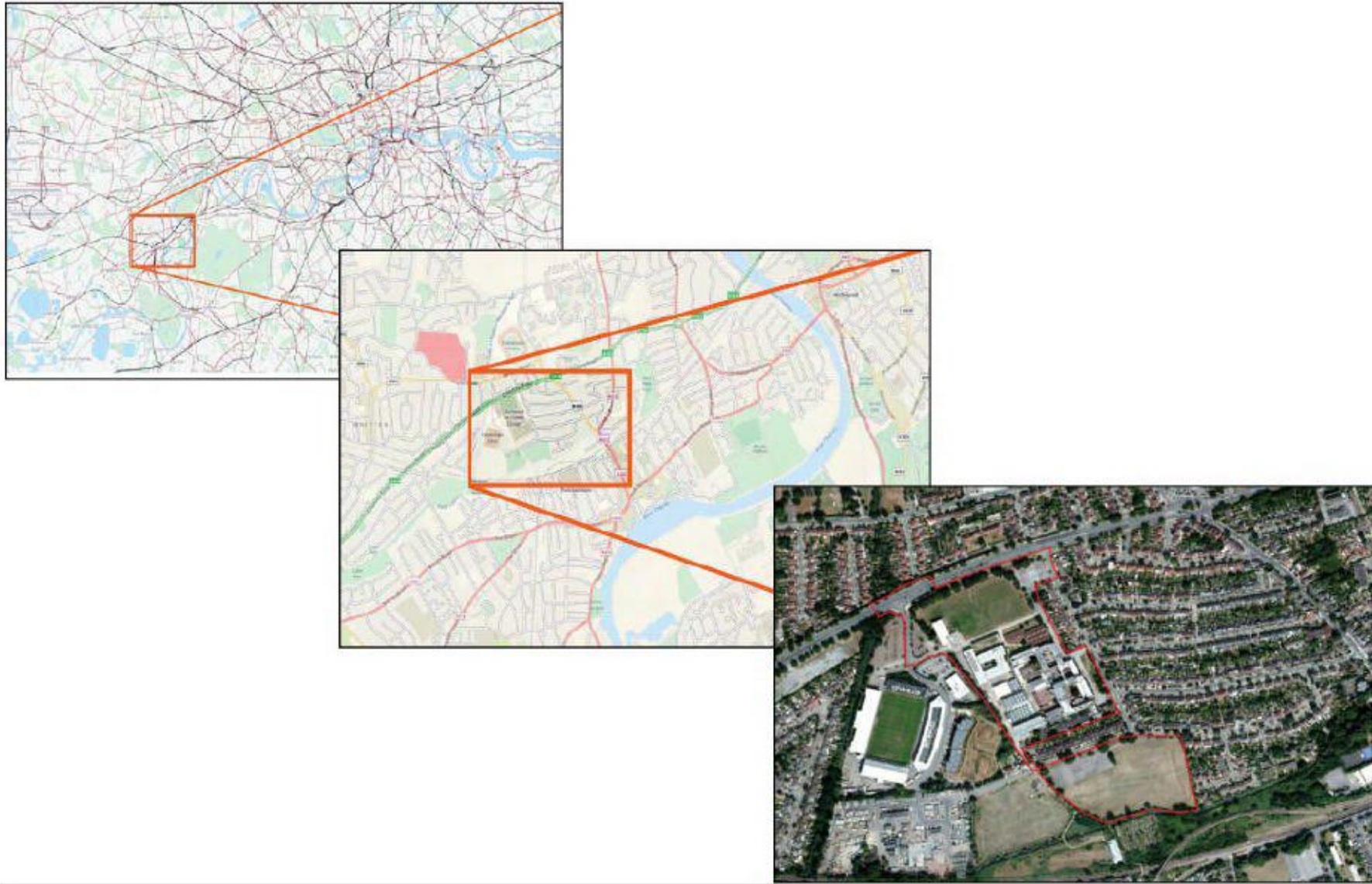
1.2 SITE CONTEXT

The site is located to the north west of Twickenham town centre and occupies approximately 8.6 hectares of land, including the playing fields to the south. **Figure 1.1.** shows the site's location and surrounding context, and drawings A100 E and SK-042C in **Appendix 1.1** show the proposed site with boundary.

The site is bounded to the north by the A316 (Chertsey Road), a dual carriageway which eventually joins the A4 and provides access into central London (eastbound). To the north of the A316 is residential housing, beyond which is Twickenham Rugby Club. The site is bounded by Egerton Road to the east. Residential properties are located on this road (including properties immediately adjacent to the site boundary) and the residential area extends to the east towards Twickenham town centre. The south of college site is bounded by residential properties on Craneford Way.

To the south of Craneford Way are the existing sports fields. These are bounded to the east by residential properties located on Heatham Park Road. The southern boundary is formed by the River Crane whilst the western boundary is formed by a second sports field. The two sports fields are separated by an unnamed tarmac path which runs from north to south providing access from Craneford Way to allotments and buildings located to the south of the River Crane.

Figure 1.1 Site Location



1.3 THE NEED FOR EIA

Given the likely scale of proposed development, the location of the site, and the potential for significant environmental effects, it is recognised that the proposed development will constitute 'EIA development' under the Town and Country Planning (Environmental Impact Assessment) Regulations 2011.

Therefore as it is agreed by the Applicant that an Environmental Impact Assessment (EIA) is required, a formal EIA Screening Opinion was not requested from LBRuT.

Cascade Consulting, and its specialist subconsultants as identified in **Table 1.1**, has been appointed by the Applicant to carry out the 'scoping' stage of the EIA process. This Scoping Report therefore sets out the proposed approach to the EIA, including baseline data collection and assessment methodologies, and key issues and receptors to be considered, for agreement with the Local Planning Authority (LPA), in this case LBRuT.

An Environmental Statement (ES) will be prepared to document the findings of the EIA process and will be submitted in support of the OPA.

Table 1.1 The EIA Team

Environmental Topic	Consultant
EIA Coordination	Cascade Consulting
Transport	TPP/Entran
Noise and Vibration	Anglia Consultants
Air Quality	Entran
Water Resources and Flood Risk	Cascade Consulting ESI (flood risk)
Ground Conditions	RMS Environmental
Waste	RMS Environmental
Daylight and Sunlight	NLP
Ecology	Cascade Consulting (supported by Applied Ecology for surveys)
Townscape and Visual Amenity	NLP
Cultural Heritage	Oxford Archaeology
Socio-economics	NLP

1.4 CONSULTATION

Monthly meetings are scheduled to take place with the LBRuT Planning Case Officer during the production of the applications, and this has included two to date to discuss the proposed approach to the planning applications and high level content of the Scoping Report.

Regular meetings are also being held with the Local Community Forum (LCF) to keep the local residents updated on the assessment work being completed, and ensure they have the mechanism available to raise any concerns during this process.

The groups involved in this forum are:

- Dean Estate Residents Association.
- Friends of the River Crane Environment (FORCE).
- Heatham Alliance.
- Court Way Resident's Association.
- Heatham Residents Association.
- Heathfield South Neighbourhood Watch Coordinator.
- Chudleigh Road Neighbourhood Watch Coordinator.
- Court Way Resident Representative.

Initial contact has been made with a number of statutory consultees to agree surveys, assessment methodologies and obtain baseline data. These discussions will be continued as necessary through the EIA, particularly in relation to any issues that might be raised during the scoping process.

2 THE EIA PROCESS

2.1 OVERVIEW

Environmental Impact Assessment (EIA) is an assessment process applied to both new development proposals and changes or extensions to existing developments that are likely to have significant effects on the environment. The EIA process ensures that potential significant effects on the environment are considered in the decision-making process, including natural resources such as water, air and soil; conservation of species and habitats; and community issues such as visual effects and impacts on the population.

EIA provides a mechanism by which the environmental effects resulting from a development can be predicted, allowing them to be avoided or reduced through the inclusion of mitigation measures. The EIA considers all stages of a development from demolition, construction and operation through to decommissioning of the development at the end of its life.

The output of the EIA process is an Environmental Statement (ES) which is required by the Regulations to be submitted with an application for planning permission for EIA development. This allows the Local Planning Authority (LPA), in this case LBRuT, to take the potential environmental effects of a development fully into account in the decision-making process.

2.2 EIA SCREENING

As stated in Section 1.3, it is acknowledged that the proposed development is considered to be 'EIA development' given the size and scale, and the location of the site and potential for significant environmental effects. Therefore a formal EIA Screening Opinion request has not been made to LBRuT.

2.3 EIA SCOPING

Scoping is an important initial phase of the EIA process and is principally defined through the EIA Directive. The European Commission defines it as follows:

"Scoping is the process of determining the content and extent of the matters which should be covered in environmental information to be submitted to a competent authority for projects which are subject to EIA"

The purpose of scoping is therefore to establish the scope and methodology to be followed in the EIA process, based on a consideration of the potential environmental

¹ European Commission (EC) (2001) Guidance on Environmental Impact Assessment: Scoping, Office for the Official Publications of the European Communities, Luxembourg.

effects arising from all stages of a scheme. Scoping is not a statutory requirement but it gives the LPA and consultees the opportunity to highlight any areas of concern not already identified, and thereby influence the EIA process and the subsequent ES in the early stages of preparation. The output of scoping informs the ongoing assessment and development of the scheme design.

Various organisations have produced guidance on scoping, including the Institute of Environmental Management and Assessment (IEMA)², the Environment Agency³, the Scottish Government⁴ and the London Borough of Tower Hamlets⁵ while examples of best practice are given in a review by the Department of Communities and Local Governments (CLG)⁶ and the Government's Planning Practice Guidance⁷. Such guidance has been drawn upon in preparing this Scoping Report, and will be used where relevant in the production of the ES.

The overall aims of the scoping stage of EIA are to:

- Provide sufficient information on the proposed scheme to permit the LBRuT Planning Department and other stakeholders and consultees to consider the potential impacts, both adverse and beneficial, of the proposed development.
- Agree the scope of the ES including the geographical and temporal limits of the development, the environmental topics to be assessed, and the most likely significant environmental and social impacts to be considered (this will include scoping out any impacts which are considered unlikely to result in significant effects).
- Agree the extent of baseline surveys and proposed methodologies.
- Agree the methodologies for impact assessment including the criteria to be used for determining significance of impacts.
- Identify other planned or proposed development that may give rise to potential cumulative impacts with the proposed development.
- Agree the material to be provided as part of the EIA process alongside the outline planning application (OPA).

2.4 APPROACH TO EIA

2.4.1 Overview

Each technical chapter of the ES will define the baseline against which the

² IEMA (2011) The State of Environmental Impact Assessment Practice in the UK.

³ Environment Agency (2002) Scoping Guidelines for the Environmental Impact Assessment of Projects (currently being updated (2013)).

⁴ Scottish Government (2013) Planning Advice Note 1/2013: Environmental Impact Assessment.

⁵ London Borough of Tower Hamlets (2012) Tower Hamlets Council EIA Scoping Guidance.

⁶ CLG (2006) Evidence Review of Scoping in Environmental Impact Assessment.

⁷ Planning Practice Guidance (2014) Environmental Impact Assessment. Accessed at

<http://planningguidance.planningportal.gov.uk/blog/guidance/environmental-impact-assessment/preparing-an-environmental-statement/>.

environmental impacts of the proposed development will be assessed. The baseline conditions will be informed by desk-based study and survey work to be completed in 2014.

The environmental impacts will be assessed for the demolition, construction, and operation phases of the proposed development. Although the design life of the buildings will be approximately 30 years, the buildings will be designed so that they can be adapted for future uses or extended to meet future demand. This, combined with an ongoing need for these land uses in LBRuT, means that a decommissioning phase is not envisaged, and is therefore not considered further in this Scoping Report.

2.4.2 Determining the Significance of Impacts

The overall significance of the environmental impacts arising from the proposed development will be judged considering the value or sensitivity of the environmental receptor, and the magnitude of the change. No specific guidance exists for the development of significance criteria for the purposes of EIA and it is generally determined through professional opinion or topic specific guidance (such as that prepared for Ecological Impact Assessment by the Chartered Institute of Ecology and Environmental Management).

Effects occur as a result of changes to receptors on or within a certain distance of a development site. Receptors may be human (such as residents, workers and leisure users), sites with environmental designations (such as protected wildlife or archaeological sites) or individual wildlife sites and species. The nature of the effect perceived by each sensitive receptor will be determined using the following judgements:

- extent;
- magnitude;
- duration;
- frequency;
- reversibility;
- nature (direct or indirect); and
- the effect in addition to other developments (cumulative effect).

In order to provide consistency across the whole of the ES, a general approach will be taken to defining the level of significance of effects as outlined in **Table 2.1**.

Table 2.1 Significance Criteria

		Receptor Value, Scale and Sensitivity		
		High	Medium	Low
Magnitude of effect, including duration, frequency and reversibility	High	Major	Major	Moderate or Minor
	Medium	Major	Moderate	Minor
	Low	Moderate or Minor	Minor	Negligible

The level of significance set out in **Table 2.1** is defined as follows:

- MAJOR – adverse or beneficial effects of considerable duration, magnitude or extent and therefore represent impacts that are of potential concern.
- MODERATE – adverse or beneficial effects considered to have moderate importance to the immediate local area.
- MINOR – adverse or beneficial effects that are likely to be either slight or very short term.
- NEGLIGIBLE – not considered significant.

Where major or moderate effects have been identified, practicable mitigation measures will be proposed to reduce or eliminate the effect. This will be achieved by modifying the design to minimise impacts, but may also be achieved through implementing specific working practices to control potential effects (such as dust suppression measures) or by proposing appropriate replacements for features that will be permanently lost (such as new tree or hedgerow planting). Where mitigation measures are proposed, the assessment will establish their effectiveness and determine whether any residual effects will remain once the measures have been applied.

Residual effects arising from the assessment will be presented in a separate summary chapter.

As part of the OPA, an outline Construction Environmental Management Plan (CEMP) will be produced ensuring a commitment to implement the necessary mitigation measures during the demolition and construction phase.

2.4.3 Use of Parameter Plans in Assessment

The OPA will establish the principles for future development, in terms of the land use across the application area and the scale of development.

To do this, parameter plans for the layout, scale, access, appearance and landscaping of the proposed development will be produced, along with guidelines under which the Reserved Matter applications will be developed and brought forward.

The EIA will therefore be undertaken using the following three control documents:

- **Parameter plans** - anticipated to consist of: existing site plan, development zones and land parcels, land use plans for basement, ground floor and upper floors, development zone dimensions plans (maximum and minimum storey height and alignments), building dimension plans (maximum and minimum height, width and length), open space allocations, access routes.
- **Development specification** - anticipated to include details of the parameter plans and the type and quantity of development that could be brought forward at the Reserved Matters stage for each development zone.
- **Design code** - anticipated to provide guidelines for the appearance for the open spaces and public realm, landscaping including specifications for the planting, furniture and all other components, including streets and pavements. The code is also likely to include environmental and quality standards that each building and open space must comply with. The transport and energy interfaces between the components of the proposed development will also be considered.

The assessments undertaken and reported in the ES, as outlined in this Scoping Report, will be largely based on the information provided in these three documents.

2.4.4 Use of "Timeslices" in Assessment

The construction phases and occupancy phases of a number of elements of the development are likely to overlap (see Section 3.3 for further details), and therefore to ensure the worst-case scenarios are assessed, a number of timeslices will be considered in the assessments where appropriate:

- 2015 - 2017: demolition.
- 2016: start of construction phase.
- 2017: occupation of technical media hub and part of college, continued construction of outstanding education elements.
- 2018: occupation of technical media hub and all education elements and Harlequins, construction of residential.
- 2020: occupation of technical media hub, all education elements, and occupation of some of residential development.
- 2022: fully occupied and operational (TBC).

As the demolition and construction programme is further developed, these timeslices will be refined.

2.5 APPROACH TO CUMULATIVE EFFECTS ASSESSMENT

Cumulative effects can occur in two ways as a result of development activities:

- Intra-project cumulative effects - effect of individual environmental impacts from the proposed development which when combined give a significant effect.
- Inter-project cumulative effects - combination of effects from the scheme and other off site developments. The potential for inter-project cumulative effects depends on the location of the off site developments and the scale, nature and timing of these developments.

To identify those developments which may give rise to inter-project cumulative effects with the proposed development, the following criteria have been used:

Committed developments comprising:

- Developments with planning consent and under construction.
- Developments with planning consent but construction has not commenced.

Planning developments comprising:

- Submitted planning applications awaiting consent.
- Developments which are likely to be submitted where sufficient information is available for an assessment of cumulative effects to be completed.
- Development projects and proposals identified in relevant local plans.

The EIA will consider schemes within a 1km radius of the proposed development. This radius is considered to be a suitable distance over which schemes have the potential to interact cumulatively. A provisional list of the schemes to be considered within the cumulative effects assessment is provided in **Table 2.2**.

Table 2.2 Provisional List of Cumulative Schemes

Address	Application No.	Description	Status
Twickenham Railway Station London Road Twickenham	10/3465/FUL	Demolition of existing station building and access gantries to the platforms and development to provide; a podium across the existing railway lines; a new station concourse with stair and lifts to platform level; three buildings ranging in height between 8 storeys and 3 storeys comprising 165 residential units, 734 sqm of flexible Use Class A1 (shops), A2 (financial and professional services), A3 (restaurant and café) and D2 (leisure) floorspace, plant space including a combined heat and power plant, and green roofs; sustainable transport facilities to include a taxi rank, kiss and ride and car club spaces, 35 commuter car parking spaces (including disabled spaces), residents disabled spaces, delivery and servicing spaces, electric car charging points,	Preliminary works commenced

Address	Application No.	Description	Status
		250 cycle spaces for commuters and 208 cycle spaces for residents; provision of a new station plaza, river walkway including children's playspace, soft and hard landscaping; and off site highway works to include the relocation of the existing bus stop.	
Former Twickenham Postal Sorting Office London Road, Twickenham	12/3650/FUL	Demolition of existing buildings and development of the site to provide a mixed use development comprising of a 3 to 5 storey building accommodating 82 residential units (16 affordable and 66 private sale), 2 restaurants units (A3 Use Class) with basement car, motorcycle and cycle parking, estates office, associated plant equipment and courtyard area; Erection of a 2 to 5 storey community building with associated outdoor space and parking; 28 houses with associated car parking and gardens; New riverside pathway for pedestrians and cyclists, automatic locking gate, public space, internal access road, landscaping and associated infrastructure and utilities.	Under construction
Land Known as Twickenham Rough - Open Land West of Twickenham Sorting Office Site	13/1147/FUL	Proposed change of use to public amenity land and the provision of a 3m wide footpath/cycleway and associated landscaping and fencing.	Approved August 2013

3 SCHEME DESCRIPTION

3.1 NEED FOR THE SCHEME

The REEC development is identified in the Richmond upon Thames Core Strategy as one of the locations where new development is likely to be concentrated over the Plan period (2009-2026).

Policy CP18.B outlines that land in educational use will be 'safeguarded' and the '*potential of existing educational sites will be maximised through redevelopment, refurbishment or re-use to meet educational needs.*'

The vision is to create a new campus for education and enterprise; a college working in partnership with employers on site, which will provide access to resources and work opportunities through work experience, apprenticeships and ultimately, jobs.

The potential to completely redevelop the site provides the college with an opportunity to create a flagship regional centre of excellence, as well as maintaining its strong commitment to its local community.

The college will offer a wide range of courses and subjects including A-Levels and an extensive choice of vocational qualifications from entry level through to level 3 qualifications, including BTECs, NVQs and apprenticeships. It will also offer a number of higher education courses as well as courses for adults, a GCSE pathway and a supported learning offer. The development will enable the college to tailor its offer to ensure it meets the needs of its partners in the enterprise. A post-16 programme that will offer on-site opportunities for pupils graduating from the new secondary school to choose from a very wide range of options. Progression routes for pupils from the Clarendon special school will be provided. The qualifications and skills young people will achieve will make them strong contenders for available employment opportunities with Haymarket, Harlequins, other local employers as well as other major employers operating in the specialist fields.

To fund the above proposed development, part of the college land needs to be sold. The necessary funds will be obtained from an enabling residential development in the southern half of the site. This provides the opportunity to create a new 'education and enterprise' integrated campus.

3.2 THE PROPOSED DEVELOPMENT

The proposed development will comprise: an all new Richmond upon Thames College estate; a new five form entry secondary school; a built for purpose Special Needs School (Clarendon School, relocated from elsewhere in the Borough); and a

new technical media hub to be occupied by Haymarket. Building needs for these users will continue to be considered together to enable the design of an integrated operational and organisational model. Alongside the campus will be a residential development.

Development of the site will replace all of the site's existing buildings. The playing fields on Craneford Way will be retained and enhanced to facilitate improved year-round sport provision.

An indication of the zoning of the education, office, sports and residential elements on site is shown on drawing SK-039F in **Appendix 1.1**. The likely design heights of the buildings across the site will range from up to 10-15m at the south of the site, and up to 20-25m in height to the north and north west adjacent to the A316 Chertsey Road.

Following demolition of the existing college, the development would provide:

- A new campus for education and enterprise – comprising:
 - Replacement college (Use Class D1) of approximately 20,000 square metres (Gross External Area (GEA)) to accommodate up to 3,000 Full-Time Equivalent (FTE) day time students, as well as evening and weekend use.
 - A new five form entry secondary school (Use Class D1) of approximately 6,000 square metres (GEA) for up to 750 students.
 - A secondary school for children with special education needs (Use Class D1) of approximately 3,000 square metres (GEA).
 - New Technical Media Hub for Haymarket (Ancillary Use Class D1) of approximately 2,000 square metres (GEA) including photographic studios, technical testing labs, archive, offices and meeting rooms (up to twenty full time staff), private gallery and creative industries incubator business units).
 - Replacement on-site sports centre (Use Class D2) of up to 4,000 square metres (GEA) to serve both the college and wider community.
 - Possible alterations to existing means of vehicular access to Langhorn Drive together with ancillary on-site parking and landscaping.
- Upgrading of existing Craneford Way Playing Fields for use by the college and local community.
- Enabling residential development of up to 2.5 hectares.
- Energy centre to support the development.

3.3 DEMOLITION AND CONSTRUCTION

A phased programme of enabling works and site set-up, demolition and construction will be required. A brief summary of each of these phases as far as is known at this

time is provided under the relevant headings below.

Whilst specific details of the proposed working methods and approach are not yet available, these will be confirmed prior to undertaking the EIA. This will be to an appropriate level of detail so that a robust assessment can be completed. Proposed working methods and approaches will be provided in the ES.

It is anticipated that enabling works will commence on site in 2015 prior to the start of the main construction and demolition works.

The multi-phased development will initially free-up space for the new education estate and culminate with the vacant possession of the site for residential development. The final form and phasing of the development programme will be subject to a full feasibility study and a detailed logistical and operational review, and will be provided within the planning application. An indication of the likely phasing is as follows:

Enabling Works and Site Set-up

- Enabling works and site set-up (e.g. contractors compound): autumn 2015 (TBC).

Demolition and Construction

- Phase 1 of the college: late 2015/early 2016 - autumn 2017.
- Phase 2 of the college: autumn 2017 - late 2018.
- Schools: late 2015/early 2016 - autumn 2017.
- Technical media hub (Haymarket): autumn 2015 - spring 2017.
- Residential: 2018 onwards.

Operation

- Phase 1 of the college: occupation autumn 2017.
- Phase 2 of the college: occupation autumn 2018.
- Schools: occupation autumn/winter 2017.
- Technical media hub (Haymarket): occupation spring 2017 (TBC).
- Residential: phased occupation from 2018.

Decommissioning

Decommissioning will not be assessed as part of the scope of the EIA because there is currently no intention to decommission the site at any point in the future.

3.4 POTENTIAL SENSITIVE RECEPTORS

A number of receptors have been identified that would potentially be sensitive to effects resulting from the proposed development:

- Existing site users who will remain on site during construction as part of the 'decant' strategy.
- Residents in the immediate vicinity of the site.
- Users of the adjacent road network (e.g. Egerton Road, Craneford Way, Langhorn Drive) and wider strategic network (e.g. A316 Chertsey Road).
- Public transport network (bus, rail) and pedestrians and cyclists.
- LBRuT Air Quality Management Area.
- Water resources and underlying aquifers - Kempton Park Gravel shallow principal aquifer, River Crane, Duke of Northumberland's River, River Thames.
- On site drainage systems and capacity of potable water and sewerage networks to meet demand of new development.
- Residential receptors for daylight and sunlight, both on and offsite.
- Statutory and non-statutory designated conservation sites with 2km - Ham Lands Local Nature Reserve and Isleworth Ait Local Nature Reserve, Sites of Metropolitan Importance for Nature Conservation including the Crane Corridor, Borough Sites of Importance Nature Conservation (Grade 1 and Grade 2) including the Duke of Northumberland's River north and south of Kneller Road, and Local Sites of Importance for Nature Conservation.
- Habitats e.g. River Crane, broadleaved semi-natural woodland, protected and/or valued species.
- Conservation areas, namely the Rosecroft Gardens Conservation Area. Others in the wider study area include Hamilton Road, Twickenham Green, Queen's Road, Amyand Park, Pope's Avenue and Twickenham Riverside within 775m of the site.
- Local and long distance townscape views e.g. from The Terrace on Richmond Hill, Richmond Park.
- Listed buildings within the wider study area specifically the Grade I Listed Building of All Hallows Church, Registered Park and Garden - Pope's Garden.
- Crane Valley Archaeological Priority Area (APA) on site, and Whitton APA and Twickenham and Marble Hill APA in the wider study area.
- Sub-surface archaeological resource - although limited by previous development on the site.
- Open space, green chains and recreational facilities.
- Local community workforce.

3-5 ALTERNATIVES ASSESSMENT

In accordance with the EIA Regulations, the ES will present the main reasonable alternatives considered by the Applicant and an indication of the main reasons for the choice made, taking into account the environmental effects.

The ES will include consideration of the following where applicable:

- 'Do nothing' scenario - the consequences of no development taking place;
- 'Alternative sites' scenario - the potential for the same development to take place on other sites within the borough;
- 'Alternative uses' scenario - the potential for alternative land uses of the site; and
- 'Alternative designs' scenario - documentation of how the design put forward in the OPA has evolved, including selection of massing, alignment, floor heights, materials and landscaping.

The proposed development of the existing site has been the subject of discussions between LBRuT and REEC, to evaluate the concept for the development of the site and produce a masterplan, and is in accordance with local planning policy documents (see Section 4).

4 POLICY REVIEW

The planning policy context for the site is set out in the following documents:

- National Planning Policy Guidance:
 - National Planning Policy Framework (NPPF) (2012).
 - Planning Practice Guidance (2014).
- Strategic Planning Policy:
 - The London Plan - Spatial Development Strategy for Greater London (2011).
 - The London Plan - Revised Early Minor Amendments (2013).
 - Housing Supplementary Planning Document (SPD) (2012).
- Local Planning Policy:
 - London Borough of Richmond upon Thames Core Strategy (2009).
 - London Borough of Richmond upon Thames Development Management Plan (2011).
 - London Borough of Richmond upon Thames Local Plan Proposals Map (2013).
 - Saved Policies of the LBRuT Unitary Development Plan (UDP) (2005).

The site is currently the subject of a series of designations as shown in **Figure 4.1**.

The designations and supporting policies as defined in the LBRuT Local Plan Proposals Map 2013 are briefly summarised below:

1. Redevelopment Site (T29):

Redevelopment Site T29 carries forward saved policy of the UDP of March 2005; this envisages “the redevelopment to provide college and enabling residential development. Retention and upgrading of Craneford Way East Playing Field”.

2. River Crane Area of Opportunity CP12:

The application site is within the “River Crane Area of Opportunity”, which is supported by Core Strategy Policy CP12 which states:

“the Council will improve the strategic corridor to provide an attractive open space with improvements to the biodiversity. Developments in and adjacent to the River Crane Corridor will be expected to contribute to improving the environment and access, in line with planning guidance.”

3. Metropolitan Open Land DM OS 2:

The playing fields at the south west of the site are designated as Metropolitan Open Land (MOL) and subject to Policy DM OS 2 as well as The London Plan (2011) Policy 7.17.

The site also adjoins the following policy designations:

- Twickenham Area Action Plan (Policies TWP1, TWP2, TWP3, TWP4).
- Public Open Space DM OS5 and OS6.
- Other sites of nature importance CP 4.
- Other Open land of townscape importance DM OS 3.

Any development would also be subject to the advice contained in LBRuT's local adopted Supplementary Guidance on the following matters:

- Affordable Housing.
- Car Club Strategy.
- Design Quality.
- Off Street Parking Standards.
- Sustainable Construction checklist.
- Telecommunications Equipment.
- Design for Maximum Access.
- Nature Conservation and Development.
- Planning Obligations Strategy.
- Security by Design.

The following emerging Local Planning documents may also be relevant dependant on the stage they have reached when the application may be determined:

- Draft LB Richmond Local Plan Site Allocations Development Plan Document (DPD)⁸ designates:
 - the college site as Site TW10 for “Redevelopment to provide a new college, offices, secondary school and special school, residential including affordable and open space”; and
- LB Richmond Community Infrastructure Levy SPD⁹.

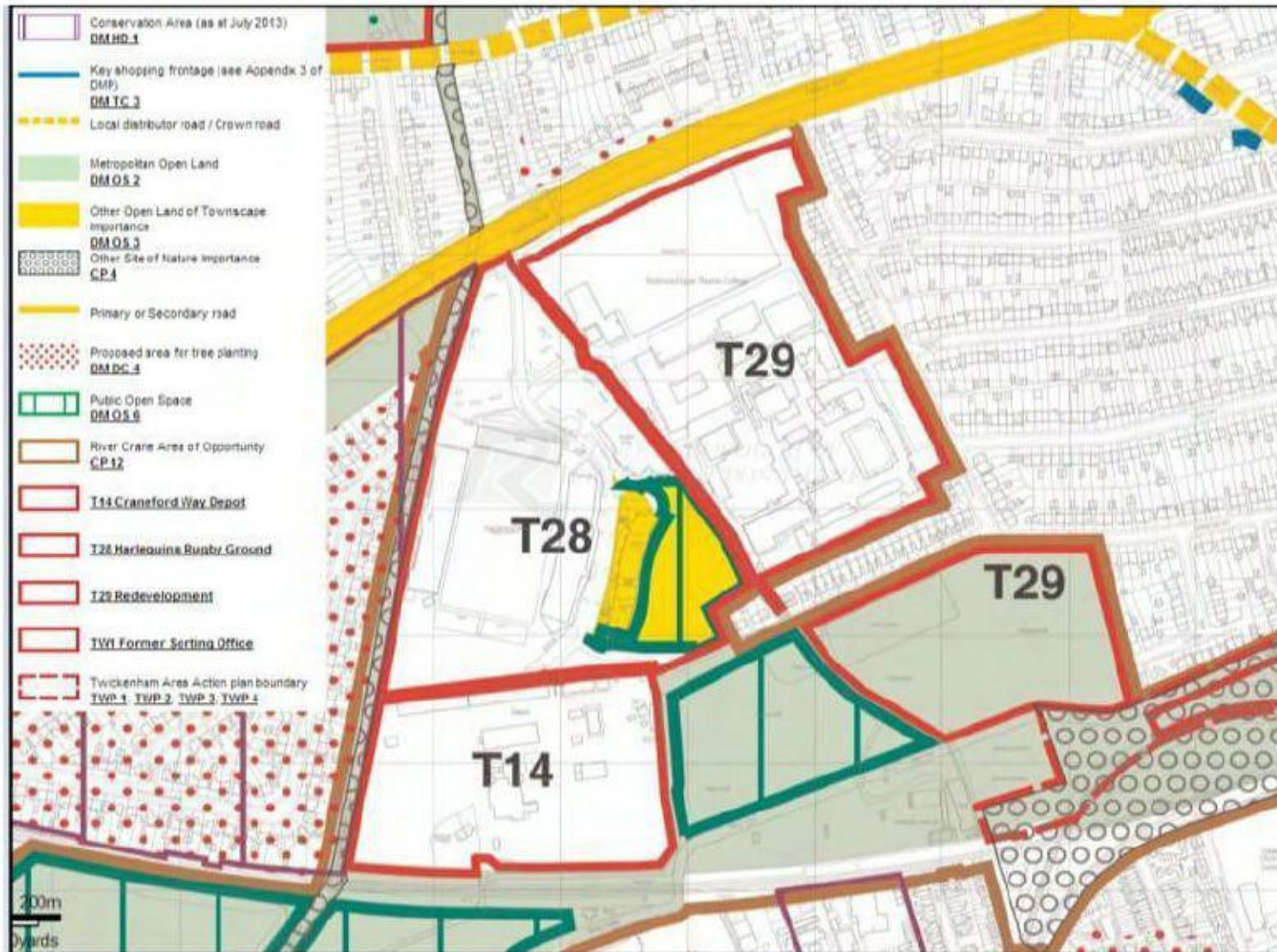
Additionally the site has also been the subject of a number of historic Site Development Briefs – including:

- Richmond Upon Thames College Planning Brief – December 2008.
- Crane Valley Planning Guidelines – April 2005.

⁸ The Pre publication draft version was issued Nov 2013 and a revised consultation commenced on additional sites on 9 June 2014. The Publication Draft is due to be issued for consultation in late 2014 with adoption expected in 2015.

⁹ Due for adoption in September 2014 following submission and review by Secretary of State (SoS).

Figure 4.1 Local Plan Proposals Map July 2013



5 TRANSPORT

5.1 INTRODUCTION AND KEY ISSUES

The site has good road access off the A316 Chertsey Road, providing links with the adjacent highway network. Due to the existing multiple access points into the site and complex access arrangements off the A316, surveys may be required to understand the existing local traffic conditions. This will form the baseline against which the proposed development will be assessed.

The OPA will be accompanied by a separate Transport Statement (TS), informed by the transport assessment (TA), and Travel Plans for relevant parts of the proposed development.

Traffic analysis and modelling will be required to look at both the impact of construction and operational traffic on the local highway network and to identify whether any mitigation will be required.

Key issues relevant to the transport assessment (TA) are:

- Traffic generated during the demolition and construction phase (Heavy Goods Vehicles (HGVs), staff car movements etc), car parking provision during demolition and construction.
- Vehicle movements on the local and wider road networks during operation including capacity issues at junctions.
- Operational car parking provision.
- Implications on public transport network during all development phases.

5.2 POLICY REVIEW

In addition to the list of relevant planning policy as set out in Section 4, the following policy and regulatory documents will also be reviewed in preparing the TS:

- Department for Transport, Delivering a Sustainable Transport System (2008).
- Department for Transport, Creating Growth, Cutting Carbon – Making Sustainable Transport Happen (2011).
- Department for Transport Guidance on Transport Assessments (2007).
- Transport for London, London Freight Plan (2008).
- Transport for London's Transport Assessment Best Practice Guidance (2010).
- Transport for London's Guidance for Workplace Travel Planning for Development (2008).
- Greater London Authority, The Walking Plan for London – Mayor of London (2004).

- Greater London Authority, Cycling Revolution: London (2010).

5.3 EXISTING ENVIRONMENT

The site is positioned on the southern side of the A316 Chertsey Road, which forms part of the Transport for London (TfL) Strategic Road Network 'North and West' area. Access to the site is via a 'left in' and 'left out' only priority junction off the A316 via Langhorn Drive. Vehicles approaching from the west must therefore go around the A316 Chertsey Road/B361 Whitton Road signal controlled roundabout to access Langhorn Drive. Vehicles wanting to exit the site, and travel east, must go around the A316 Chertsey Road/B358 Hospital Bridge Road signal controlled roundabout, which is approximately 1 mile west from the Langhorn Drive junction.

The surrounding road network carries significant traffic volumes, focused on the A316, and during periods of peak traffic activity it is clear that the adjacent junctions on the A316 (junctions with the B355, B361 and A310) experience congestion.

The college is well located to take advantage of local public transport facilities, including bus and rail services. There is an extensive network of bus routes which stop on London Road approximately 400-500m from the campus, with further stops on King Street and York Street approximately 600-700m from the campus.

There is no London Underground station providing direct access to the college. Underground users must change at Richmond or Hounslow (East or Central to connect to Hounslow bus station) for connecting bus services 33 and 281 respectively. Access to the overground rail network is available approximately 600m to the east at Twickenham Rail Station.

There is currently a high level footbridge over the A316 Chertsey Road next to the Langhorn Drive junction. The structure appears to have been a temporary construction, although looks to have been in place for a number of years.

5.4 SENSITIVE RECEPTORS AND POTENTIAL ENVIRONMENTAL EFFECTS

The proposed development of the site has the potential to generate more traffic than it does at present, given the additional residential components. The potential transport effects of any increase in travel as a result of the proposed development could include the following:

- Disruption and disturbance caused by construction traffic including HGVs during the construction phase.
- Increase in operational traffic causing detrimental impact on residential amenity and the highway network.

Langhorn Drive will continue to be the main access for all components of the proposed development. Access to the college student car park will continue to be from Egerton Road, whilst the residential element of the development will likely be from Court Way or Heathfield North and Heathfield South. Access from Egerton Road is restricted by a fire access near its junction with the A316 Chertsey Road.

As part of the proposed development, the Langhorn Drive junction with the A316 Chertsey Road (a 'left in' and 'left out' only priority junction) will remain unchanged. It is considered reasonable that vehicles travelling to the site from the west will continue to go around the A316 Chertsey Road/B361 Whitton Road signal controlled roundabout, as the implementation of an all-movements junction would require significant carriageway realignment and has the potential to increase delays to traffic on the A316 Chertsey Road.

Proposed operational parking on the site will be assessed for all land uses. Parking standards set out in The London Plan and LBRuT's Draft Development Plan will be reviewed as part of this assessment.

The overall quantum and breakdown of car and cycle parking provision will be assessed against the two parking standards and agreed with both LBRuT and TfL prior to the submission of the OPA.

The schools and college provision requirements will also be determined with regard to drop-off and access for mini-buses, coaches and taxis.

Table 6.1 provides a summary of the scope of the transport assessment.

Table 6.1 Scope of Assessment: Transport

Potential Sensitive Receptors	Potential Impact	Potential Effect	
		Scoped In	Scoped Out
A316 Chertsey Road and associated junctions and roundabouts	Increased traffic short-term during construction phase and long-term during operational phase causing capacity issues.	✓	
Local road network	Increased traffic during construction phase and inappropriate routing. Long-term increase in traffic during operational phase.	✓	
Parking - on site and off site	Ability to meet parking provision on site for land uses during construction and operation. Implications on off site parking in wider area during operation.	✓	
Pedestrian access	Increased use of high level footbridge over A316.	✓	

5.5 ASSESSMENT METHODOLOGY

5.5.1 Transport Review

An initial transport review will be completed consisting of:

- Site visit during peak hours to assess the existing transport and traffic conditions in the local area, and understand the access arrangements to the site.
- Review accessibility of the site by all modes of transport and review quality of provisions in terms of walking and cycling routes.
- Complete a full multi-modal trip generation assessment for the proposed development and compare to the existing use to assess the potential impact of the proposals on each mode.
- Review the development proposals against local, regional and national policy.

5.5.2 Baseline Surveys

No baseline surveys have been undertaken to date, with the proposed scope to be discussed with TfL and LBRuT.

Due to the multiple access points into the site and the complex situation with regard to access from the A316, including pedestrians crossing the A316, a number of surveys may be required to understand the existing local traffic conditions and level of use.

The following surveys may be required:

- Highways and existing site use surveys:
 - Turning count survey of college student car park and main college accesses on Egerton Road
 - Automatic traffic counter surveys (ATC) for one week to include local road network.
- Parking beat survey for roads close to the college site access .
- Pedestrian survey of use of high level footbridge and informal crossing of A316 Chertsey Road.

The need for surveys of the main junctions on the wider road network will be considered after completion of the initial transport review.

The need for, and scope of these baseline surveys, will be discussed and agreed with TfL and LBRuT.

5.5.3 Transport Assessment

The proposed development will be supported by a TS, informed by the TA, and Travel Plans for the residential and educational elements of the proposed development.

The TA will be prepared in accordance with guidance set out in Section 5.2 and specific TfL and LBRuT requirements.

The TA will consider the impact of trip generation on the road network, which in the first instance would be expressed as a percentage increase against existing traffic flows. The TA will also assess the current capacity of the local public transport network and provide an assessment of how the proposed development is predicted to impact upon its capacity.

The full scope of modelling requirements will need to be agreed with TfL and LBRuT, but will potentially include analysis of highway capacity issues using ARCADY, PICADY and LINSIG.

It terms of construction traffic there are no significant highway safety issues and subject to internal layouts all delivery vehicles should be able to enter and exit the site in a forward gear.

Traffic analysis will also consider the impact of construction traffic on the local highway network and identify whether any mitigation will be required. This analysis will also identify whether certain routes/times should be avoided to reduce the potential for congestion with resultant delays. Swept path analysis will be completed using AutoTrack to assess vehicle movements for car parking and servicing to develop preferred site layout.

5.5.4 Significance Criteria

The transport chapter of the ES will report the findings, data and analysis undertaken within the TA, and identify the significance of the impacts in accordance with **Table 2.1**.

5.6 POTENTIAL MITIGATION

Impacts will not be known until the appropriate transport modelling has been done. At this point, appropriate mitigation measures will be identified. However, potential mitigation measures include:

- Specified haulage and access routes during construction to avoid residential areas.
- Agreement of days of the week and times of the day when construction vehicles would be permitted to access the site specified in agreement with the local

planning authority and highways authorities and set out in the Environmental Management Plan.

- An outline Construction Workforce Travel Plan Framework would be developed to minimise car use, especially sole occupancy car use.
- Operational travel plans for the residential and educational elements of the scheme to maximise use of public transport etc.

The outline Construction Work Force Travel Plan Framework would be agreed with relevant stakeholders. Travel plans are defined as a package of measures aimed at promoting sustainable travel with an emphasis on reducing reliance on single occupancy car use. They must be tailored to the specific circumstances of the site to be effective.

5.7 CONSULTATION

No consultation has been undertaken with respect to traffic impacts to date. Comprehensive discussions will be required with TfL and LBRuT. It is proposed that formal consultation meetings be held to discuss the proposals and scope of the overall content, surveys and methodologies for the TA and any supporting documents. It is proposed that technical notes are produced and presented at these meetings to formalise agreement of the various scope items.

6 NOISE AND VIBRATION

6.1 INTRODUCTION AND KEY ISSUES

Noise and vibration effects associated with the proposed development are likely to occur predominantly during the demolition and construction phase. The ambient noise climate at the site is currently influenced by traffic noise from the A316 Chertsey Road to the north and by noise from aircraft, as the Heathrow flight path crosses the Borough. Impacts are likely to be confined to sensitive receptors located within (during decant phase and as the development is occupied) and close to the site boundaries.

Key issues relevant to noise and vibration are outlined below:

- Noise and vibration sources associated with all activities during demolition and construction of the development and the effects on sensitive receptors both within and around the site.
- Changes to the existing noise climate at sensitive receptors located around the site and the access routes associated with operation of the completed development.
- The effects of existing noise sources on sensitive receptors within the development.

6.2 POLICY REVIEW

In addition to the list of relevant planning policy as set out in Section 4, the following policy and regulatory documents will also be reviewed as part of the EIA process:

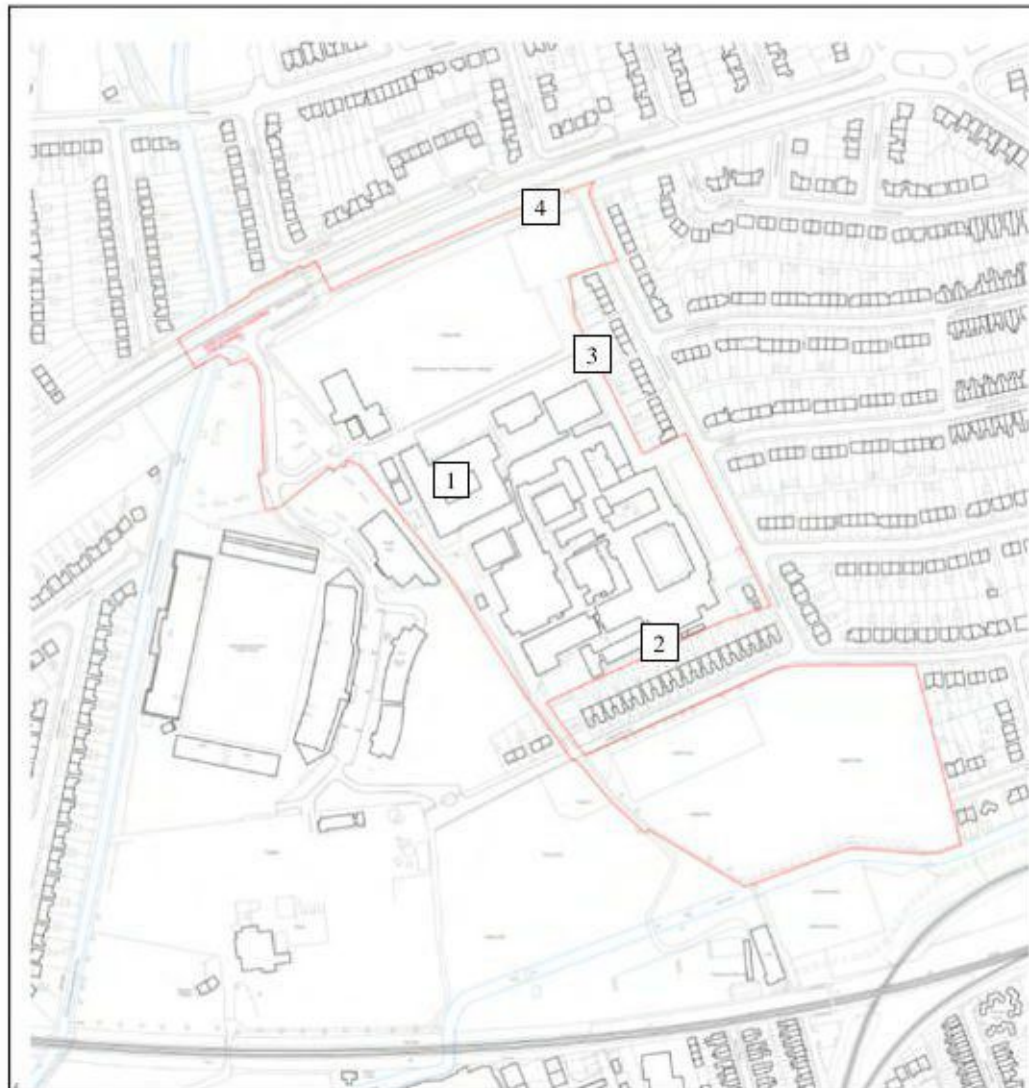
- Noise Policy Statement for England (2010) (part of the NPPF).
- British Standard (BS)8233:1999 Sound insulation and noise reduction for buildings - a code of practice.
- World Health Organisation (WHO) (2000) Guidelines for Community Noise.
- BS4142:1997 Method for rating industrial noise affecting mixed residential and industrial areas.

6.3 EXISTING ENVIRONMENT

As no existing baseline noise information was available, ambient noise levels against which any introduced noise propagating to surrounding sensitive receptors can be compared was obtained in April/May 2014. Survey locations were selected to represent noise sensitive locations closest to the various scheme components. This included positions on the site itself and at nearby residential receptors. The distribution of the survey locations 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. The locations and methodology were agreed with the Environmental Health Officer from LBRuT on 17 April 2014 and are shown in **Figure 6.1**.

Figure 6.1 Baseline Noise Monitoring Locations



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 at the boundary with the A316. Details of the baseline monitoring completed and the results are provided in **Appendix 6.1**.

Baseline vibration measurements were not carried out for two reasons. Firstly, because there were no significant existing sources of vibration in the vicinity of the sensitive receptors closest to the site (Positions 2 and 3) and secondly, because the effects of vibration are normally assessed in terms of absolute levels and not by

difference from a baseline level.

6.4 SENSITIVE RECEPTORS AND POTENTIAL ENVIRONMENTAL EFFECTS

The sensitive receptors that will need to be considered in the EIA have been identified during the baseline survey. These are mainly residential receptors located close to the site boundaries, on the A316 to the north, on Egerton Road to the east and on Craneford Road to the south. The Harlequins Stadium is located to the west of the site, but is not considered a receptor because it is not a sensitive use.

Sensitive receptors will also be located within the development site at the new college and school, and at the proposed residential area.

Construction of the proposed development is likely to affect the noise climate of the area. Construction activities which will be considered as part of the noise assessment would include:

- Enabling works, such as road and drainage diversions, services diversions.
- Phased demolition of parts of the site.
- Infrastructure works including preparation of the construction compound.
- Construction traffic movements within the site and on surrounding roads, associated with the import and export of materials (information required from Transport Assessment).
- Excavation and earthworks.
- General construction of buildings across the whole of the site.

The main construction works would take place within the existing site boundary and noise could therefore affect those sensitive receptors already identified, closest to the boundaries. Vibration from demolition and construction activities such as piling and earthworks, could also affect those properties near the boundaries and will therefore be assessed.

Although operational noise will be considered as part of the assessment, it is not envisaged that there will be any significant effects, as any external plant or machinery noise would be controlled at source by appropriate mitigation measures and operational vehicle movements are expected to be insignificant relative to existing traffic. As there are no anticipated sources of operational vibration this will be scoped out of the assessment.

Table 6.1 Scope of Assessment: Noise and Vibration

Potential Sensitive Receptors	Potential Impact	Potential Effect	
		Scoped In	Scoped Out
Residential, close to the development boundaries. Residential, within the proposed development. Educational, college and school buildings.	Noise and vibration generated during demolition of existing buildings, excavation works and construction of the new buildings, including construction traffic.	✓	
Residential, close to the development boundaries. Residential, within the development. Educational, college and school buildings.	Operational noise from external plant such as air conditioning systems and from traffic generated by the development.	✓	
Residential, within the development. Educational, college and school buildings.	Operational noise from existing ambient sources, aircraft and traffic.	✓	
Residential, close to the development boundaries. Residential, within the development Educational, college and school buildings.	Operational vibration.		✓

6.5 ASSESSMENT METHODOLOGY

6.5.1 Construction Noise

Noise levels from the construction of the proposed development will be predicted at noise sensitive receptors at the site boundaries and at areas of the development which are completed while other construction works continue. Noise levels will be estimated using BS5228¹⁰. The prediction method contained in the standard calculates noise levels at selected receptors based on source noise levels, propagation distance, details of the intervening ground cover, topography and screening. This information will be used to determine construction noise levels at the selected receptors.

The various elements of the construction works will be grouped into phases for the purpose of the noise assessment, with each phase reflecting the different noise exposures that would occur over time at each sensitive receptor location. The calculated noise levels will represent the noisiest periods when the maximum number of activities would be operating simultaneously during any given phase of the work. The predicted noise level will therefore represent the worst-case noise level during each phase and may be lower at other times when not all of the activities are operating at the same time.

¹⁰ British Standards Institution, BS 5228 Noise and Vibration Control on Construction and Open Sites.

The baseline survey data will be used to evaluate whether the predicted construction noise levels would be prominent over the baseline levels, from which the likely significance of potential effects can be assessed.

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 its temporary nature means that it cannot be assessed using the same criteria as an operational noise source which could result in a permanent effect. When assessing construction noise the guidance in BS5228 identifies a number of key factors in relation to the acceptability of noise (and vibration) to people living and working around the site. Many of these reflect the considerations of the Institute of Acoustics (IOA)/Institute of Environmental Management and Assessment (IEMA)¹¹ draft guidance for the assessment of significance.

The factors cited in BS5228 include the duration of the construction works, hours of working, attitude to the site operator, impulsive or tonal characteristics of the noise and the influence of existing ambient noise levels. To assess the likely significant effect of construction noise on sensitive receptors, the 'ABC Method' provided in BS5228-1:2009 will be employed. This method defines category threshold values which are determined by 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. The criteria also take account of the duration of the construction works. The proposed significance criteria to be used in the assessment are provided in **Table 6.2**.

Table 6.2 Significance Criteria for Construction Noise

Significance 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

6.5.2 Construction Vibration

The potential for vibration effects will be considered where construction works are likely to be close enough to residential properties for there to be perceptible vibration. This is particularly relevant for dwellings on the site boundaries. The

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.

methodology of BS5228, based on historic vibration data, will be used to estimate vibration from demolition, piling and compaction at relevant stages of construction.

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 will be determined using BS5228, BS7385¹², measured data from similar activities elsewhere and professional judgement. The proposed significance criteria to be used in the assessment are provided in **Table 6.3**.

Table 6.3 Significance Criteria for Construction Vibration

Significance 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

6.5.3 Operational Noise

It is considered that the design of the new buildings would ensure that operational effects associated with the proposed development are likely to be negligible. However, any relevant potential noise sources (such as traffic generation, plant machinery and any other miscellaneous activities) will be identified and assessed as the scheme design develops. The residual effects of noise from buildings or structures housing plant and machinery would normally be assessed using particular criteria of the assessment framework described in BS4142¹³. This method describes the likelihood of complaints in terms of the difference between the background noise level and the rating level of the noise source. The significance of the change in noise level is rated as part of this process as shown in **Table 6.4**.

Table 6.4 Significance Criteria for Operational Noise

Significance Criteria for Operational Noise	
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

Traffic noise, particularly from freely flowing traffic (which is regarded as the worst

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

¹³ British Standards Institution (1997) BS 4142 Method for rating industrial noise affecting mixed residential and industrial areas, British Standards Institution.

case), is a relatively uniform noise source without strong tonal or impulsive characteristics. The significance of traffic noise effects is commonly assessed simply on the degree of change anticipated. A 3dB(A) change in traffic noise is associated with a halving or doubling of traffic flow. Many of the guidance documents (past and present) relating to traffic noise assessment note 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. Based on the relevant guidance⁴⁴, the threshold at which traffic noise change becomes noticeable, and therefore significant, is generally accepted as being a noise change of approximately 3dB. Thus the following significance criteria are proposed in **Table 6.5**.

Table 6.5 Significance Criteria for Traffic Noise

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

6.6 POTENTIAL MITIGATION

6.6.1 Construction

The guidance given in BS5228 Parts 1 and 2 – Noise and Vibration Control on Construction and Open Sites⁴⁵, will be followed to control construction noise. This requires that noise control measures would be adopted according to ‘best practicable means’ which includes measures such as specification of plant equipment, hours of operation and HGV access routes. These principles will be set out in the outline CEMP.

Noise emissions from plant machinery would be controlled through the use of modern and therefore quieter models, with regular servicing and maintenance to maintain machinery to original specifications. Static machinery such as generators would be positioned as far away from noise sensitive receptors as possible, and acoustically screened.

Permanent noise barriers or site hoardings would be constructed as early as possible in the construction programme where these would benefit noise sensitive receptors.

General working hours would be agreed with LBRuT, and as stated in their Considerate Contractor advice note are likely to be 08:00 – 18:00 Mondays to Fridays and 08:00 to 13:00 Saturdays. Any necessary noise limits would also be

⁴⁴ Department for Transport (2007) Tag Appraisal Guidance (TAG) Unit 3.3.2 – The Noise Sub-objective, Department for Transport.

⁴⁵ British Standards Institute BS 5228-1:2009 – Noise and Vibration Control on Construction and Open Sites.

agreed.

6.6.2 Operation

Plant and machinery, such as ventilation and air conditioning plant, would be screened or housed in buildings which incorporate appropriate noise and vibration attenuation measures designed to minimise the possibility of disturbance to nearby sensitive uses. Regard would be paid to the provisions of BS4142:1997¹⁶, by ensuring that operational noise emissions as determined at the nearest residential premises are at least 10dB below the prevailing LA90 levels.

6.7 CONSULTATION

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 schools and BS4142 for operational noise.

¹⁶ British Standards Institute, BS4142:1997 'Method of Rating Industrial Noise affecting Mixed Residential and Industrial Areas'.

7 AIR QUALITY

7.1 INTRODUCTION AND KEY ISSUES

The site enabling, demolition, construction and operation of the proposed development have the potential to result in air quality impacts in the area surrounding the site.

The LBRuT has declared a Borough-wide Air Quality Management Area (AQMA), due to exceedances of the nitrogen dioxide (NO₂) and particulate matter (PM₁₀) objectives. Consequently, the redevelopment site falls within the designated AQMA.

The key issues to be considered as part of this section are listed below:

- Localised changes in levels of road traffic pollutants caused by exhaust emissions from construction traffic, traffic congestion or increased traffic flows on the local road network including diversionary routes during construction.
- Creation of dust emissions from construction materials, plant and machinery, and associated nuisance.
- Localised changes in levels of road traffic pollutants resulting from traffic on routes to and from the site, during the operational phase.

7.2 POLICY REVIEW

In addition to the list of relevant planning policy as set out in Section 4, the following policy and regulatory documents will also be reviewed as part of the EIA process:

- The European Directive on Ambient Air and Cleaner Air for Europe (2008).
- Air Quality Strategy for England, Scotland, Wales and Northern Ireland (2007).
- Local Air Quality Management (LAQM) - Part IV of the Environment Act 1995 requires local authorities to periodically Review and Assess.
- National Planning Policy Framework (2012)- replaces Planning Policy Statement 23: Planning and Pollution Control.
- The Mayor of London's Draft Supplementary Planning Guidance on the Control of Dust and Emissions during Construction and Demolition (2013).
- Mayor of London's Air Quality Strategy - Cleaning the Air (2010).
- London Borough of Richmond upon Thames Air Quality Action Plan (2002).
- London Borough of Richmond upon Thames Review and Assessment of Air Quality and Air Quality Progress Report (2013).

7.3 EXISTING ENVIRONMENT

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), 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 NO₂ and PM₁₀, with the exception of the AURN site (NO₂ only). An extensive network of passive diffusion tubes also monitors ambient NO₂ concentrations, largely at kerbside or roadside locations.

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

Annual mean NO₂ concentrations are measured at a number of urban background locations and indicate that concentrations away from main roads are well within the air quality objective (<30µg/m³).

Data presented in LBRuT 2013 Progress Report for the AQMA indicate that there have been no recorded exceedances of the long or short-term air quality objectives for PM₁₀ in the Borough in recent years. Annual mean roadside PM₁₀ concentrations measured at 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.

The nearest particulate monitoring site to the proposed development is the Teddington AURN (2.4km south), 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 PM₁₀ measured at the London Wetlands Centre in Barnes (a suburban site, approximately 7.5km east-northeast of the proposed development) are around 50% of the annual mean air quality objective.

With regards to air quality at the site, the highest pollutant concentrations are expected to occur at the site boundary with the A316, where it is possible that there will be exceedances of the annual mean air quality objective for NO₂.

Research has concluded¹⁷ that exceedances of the 1-hour mean air quality objective may occur where annual mean concentrations are over 60µg/m³. Annual mean concentrations at the A316 Chertsey Road monitoring site between 2010 and 2012 were below this level, therefore assuming that there are no significant increases in

¹⁷ 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.

traffic flows, compliance with the short-term air quality objective is likely to be achieved at the façade of the proposed development.

The proposed residential development would adjoin Craneford Way, which is a comparatively minor road. Existing annual mean NO₂ concentrations at this location are likely to be well within the air quality objective.

7.4 SENSITIVE RECEPTORS AND POTENTIAL ENVIRONMENTAL EFFECTS

7.4.1 Construction Phase

In accordance with the Institute of Air Quality Management (IAQM) guidance¹⁸, an assessment of demolition and construction dust impacts will be undertaken for dust sensitive receptors:

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

The impact of demolition and construction activities on dust-sensitive ecological receptors will also be considered where applicable:

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

The construction traffic assessment will consider the impacts of construction vehicle movements on the AQMA and existing residential receptors.

7.4.2 Operational Phase

The current design for the development indicates that the buildings adjacent to the A316 Chertsey Road will comprise office and education facilities and therefore short-term impacts will be of primary concern.

LAQM.TG(09) describes in detail typical locations where consideration should be given to pollutants defined in the legislation. 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.

For instance, on a footpath, where exposure will be transient (for the duration of

¹⁸ Institute of Air Quality Management (February 2014) Guidance on the assessment of dust from demolition and construction.

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. In general terms, concentrations associated with long-term standards are lower than short-term standards owing to the chronic health effects associated with exposure to low level pollution for longer periods of time.

The Environmental Protection UK (EPUK) Planning Guidance¹⁹ provides a set of criteria to help determine whether changes in traffic have the potential to adversely impact on local air quality.

For a development, air quality impacts associated with traffic are only likely to be significant where there is a change in the:

- annual average daily traffic (AADT) flow or peak hour flow of 10% (5% in an AQMA);
- annual average daily heavy goods vehicle (HGV) flow of 200 or more; or
- average speed of 10 km/hr or more on roads with an AADT of 10,000 (or 5,000 on narrow congested roads).

Only properties and designated sites within 200m of roads affected by a project need be considered since beyond this distance the impact of traffic emissions is negligible.

The impact of operational traffic associated with the proposed development will therefore be assessed for sensitive receptors closest to roads links where a significant impact is likely to occur based on the above criteria and professional judgement.

Consideration will also be given to the impacts of emissions from the energy centre required as part of the development.

A summary of the scope of the air quality assessment is presented in **Table 7.1**.

¹⁹ EPUK (April 2010), Development Control: Planning for Air Quality (2010 Update).

Table 7.1 Scope of Assessment: Air Quality

Potential Sensitive Receptors	Potential Impact	Potential Effect	
		Scoped In	Scoped Out
Existing residential properties/ businesses/ schools etc. within 350m of the site boundary.	Health and dust soiling impacts from demolition, earthworks and construction activities.	✓	
Dust sensitive ecological sites within 50m of the site boundary.	Dust soiling impacts from demolition, earthworks and construction activities.	✓	
Existing residential properties/ businesses/ schools etc. and dust sensitive ecological areas within 50m of roads used by construction traffic, up to 500m from the site entrance.	Health and dust soiling impacts from trackout.	✓	
Existing residential properties/ businesses/ schools /ecological sites etc. within 200m of road links affected by construction and operational traffic.	Health impacts due to increased airborne NO ₂ , PM ₁₀ and PM _{2.5} concentrations from construction and operational traffic emissions.	✓	
Existing residential properties/ businesses/ schools etc. within 200m of the site boundary.	Health impacts due to emissions from on-site plant and machinery.	✓	
Existing residential properties/ businesses/ schools and ecological sites within 10km .	Impact of stack emissions from energy centre on residential areas and designated ecological sites.	✓	

7.5 ASSESSMENT METHODOLOGY

A qualitative assessment will be carried out to assess the potential impacts associated with dust and PM₁₀ releases during the construction and operational phases of the proposed development and to determine any necessary mitigation measures that will be required.

The assessment will be based on the latest guidance from the IAQM²⁰ which divides construction activities into the following four categories:

- Demolition – demolition of existing structures and other materials not required on-site;
- Earthworks – excavation of material, haulage, tipping and stockpiling;
- Construction – buildings and infrastructure associated with the development; and

²⁰ IAQM (February 2014) Guidance on the assessment of dust from demolition and construction, Institute of Air Quality Management.

- Trackout – re-suspended dust from vehicles travelling over un-made dusty haul roads and onto the public highway.

The risk of dust effects (low, medium or high) is determined by the scale and nature of the works and the proximity of sensitive human and ecological receptors. The significance of the dust effects is based on professional judgement, taking into account the sensitivity of the local area. Appropriate mitigation measures will be recommended and these will be detailed in the outline CEMP.

The impact of emissions from on-site plant and machinery during the construction phase is not expected to be significant; however a detailed dispersion modelling assessment of impacts would be undertaken using Breeze AERMOD 7 for any significant sources that are identified.

A detailed dispersion modelling assessment of construction and operational traffic impact will be undertaken using ADMS-Roads (Version 3.2). The assessment will take account of all relevant national and local policies and DEFRA technical guidance relating to air quality. The assessment will focus on emissions of nitrogen dioxide (NO₂) and fine particulate matter (PM₁₀ and PM_{2.5}), taking into account all relevant national and local policies and DEFRA technical guidance. Where possible, verification of the modelled concentrations will be undertaken using data from nearby air quality monitoring sites.

Of the pollutants included in the AQS, NO₂, PM₁₀ and PM_{2.5} will be particularly relevant as these are the primary pollutants associated with road traffic. The air quality standards and objectives for these pollutants are presented in **Table 7.2**.

Table 7.2 Air Quality Standards and Objectives

Pollutant	Standard (µg/m ³)	Averaging Period	No. of Permitted Exceedances
NO ₂	200 (a)	1-Hour	18 per annum (99.8th percentile)
	40 (a)	Annual	-
PM ₁₀	200 (a)	24-Hour	35 per annum (90.4th percentile)
	50 (a)	Annual	-
PM _{2.5}	25 (a)	Annual	-
(a) Air Quality Standards Regulations (2010)			
(b) EU Directive Limit Value			

The impact of existing road traffic on occupants of the proposed development will be assessed in addition to the impact of any construction and operational traffic associated with the site on existing sensitive receptor locations (e.g. nearby residential properties). Air quality impacts will also be identified at sensitive ecological sites where relevant.

The Breeze AERMOD 7 dispersion model (a new generation dispersion model that incorporates the latest understanding of the atmospheric boundary layer) will be used to predict pollutant concentrations at sensitive human health and ecological receptor locations due to emissions from the proposed on-site energy centre. This will be used to determine likely impacts alone and in-combination with traffic emissions, and determine potential changes to the stack heights, locations etc if mitigation is necessary. The modelling will be undertaken using five years of hourly sequential meteorological data from Heathrow Airport to allow the worst-case impacts to be identified. The cumulative impact of traffic and stack emissions will also be determined.

The significance of the predicted traffic and stack impacts will be determined in accordance with the EPUK planning guidance.

7.6 POTENTIAL MITIGATION

For construction dust, mitigation measures are likely to include enclosure of site with solid hoardings, use of water spraying for particularly dusty construction sites/compounds during dry periods, careful consideration of construction plant, and speed controls for vehicles on unpaved roads and over construction sites. The contractor would be required to work to a strict code of practice to ensure that good site practices are followed to minimise the generation of dust in particular, and reference will be made to relevant guidance including the Mayor's Guidance on the Control of Dust and Emissions during Construction and Demolition.

Mitigation measures could also include access restrictions (particularly restrictions on HGVs), speed restrictions, traffic calming and the use of vegetative screens. These will be detailed in the CEMP.

Construction traffic impacts will also be minimised by good practice, using well maintained vehicles and plant, and by traffic management measures which may include controls over HGV routing and peak hour movements. These principles will be set out in the outline CEMP.

Mitigation of operational air quality impacts will also focus on traffic management to avoid congestion.

All of the above mitigation is anticipated to be 'built-in' to the scheme design and approach to construction management.

7.7 CONSULTATION

Consultation was undertaken with the Air Quality Officer at LBRuT on 8 May 2014 regarding monitoring data availability for the area surrounding the proposed

development. It was confirmed that there was adequate existing LBRuT air quality monitoring in place to determine appropriate baseline concentrations for the assessment and facilitate model verification. Consequently, it was agreed that additional baseline monitoring would not be required to support the EIA.

8 GROUND CONDITIONS

8.1 INTRODUCTION AND KEY ISSUES

The potential impacts of contaminated land, both within the proposed site and on adjacent and nearby sites from where contaminant migration could impact the proposed development, will be considered.

Land contamination in the context of this assessment is defined as the presence of substances in, on or under the land, that have the potential to cause harm, whether this is to the environment (i.e. groundwater or controlled waters) or to human health. Potential geoenvironmental impacts with respect to proposed development construction, operation and waste management are also considered. Impacts to surface water quality are considered in Section 10: Water Resources and Flood Risk.

The key issues to be considered are listed below:

- Location and nature of any potentially contaminated land within the site, construction area and other areas in close proximity.
- Identification of potential sources of contaminant migration into the site, including migration of ground gases.
- Impacts of potential contamination arising during demolition and site clearance, excavation and construction.
- Impacts of potential contamination left in-situ.
- Management of potentially contaminating materials arising from clearance, demolition and construction.

8.2 POLICY REVIEW

In addition to the list of relevant planning policy set out in Section 4, the following policy and regulatory documents will also be reviewed as part of the EIA process:

- Part IIA of the Environmental Protection Act (EPA) 1990 (the Contaminated Land Regime).
- Contaminated Land (England) Regulations 2006.
- Contaminated Land (England) (Amendment) Regulations 2012.
- The Water Resources Act 1991 (as amended).
- The Environmental Damage (Prevention and Remediation) Regulations 2009.

8.3 EXISTING ENVIRONMENT

A Phase 1 Contaminated Land study, including site walkover and Landmark Information Group Envirocheck data request (including historical Ordnance Survey

mapping) has been completed for the proposed development and wider area. Reference has also been made to site investigations (including trial pits and boreholes) completed in 2008 by Soiltechnics, to determine data on contaminant levels.

The site is occupied by the buildings of existing college and its associated open spaces, including car parks and sports fields. Ground level across the site varies typically between about 9.5mAOD and 12.0mAOD.

A review of historical mapping indicates that the site was covered mainly by open fields in 1869. Buildings identified as "Marsh Farm" stood in the southern part of the site near to the course of the River Crane. The north eastern part of the site was occupied by orchards which appear to be connected to a building beyond the northern site boundary on Whitton Road identified as "Orchard Cottage".

The situation within the main site was largely unchanged by 1896. However, an area adjacent to but outside the south western corner of the site is shown as being developed as a sewage works. The 1896 map appears to show some unidentified features of the works on both sides of the River Crane, whose original course ran through the site at that time. The sewage works appeared to be connected to Whitton Road by a tramline which ran across the site.

The 1896 map shows a gravel pit beyond the southern site boundary immediately south of the railway line.

The 1920 map shows that there were a number of filter beds at the sewage works, mostly lying outside the site. However, the edges of some of the filter beds were close to the river as it ran through the main site at that time. By 1920, the tramway across the site was no longer shown and the gravel pit to the south had been infilled and partly redeveloped.

By 1935 the sewage works had expanded, partly into the areas currently occupied by the Harlequins Stadium but also partly into the eastern area of the site. On the later 1938 map, the extended areas are labelled as allotment gardens. Also, by 1938 the first of the current college buildings which presently occupy the main site had been built.

The 1960 - 1966 mapping shows the sewage works to have been replaced by a depot on the site of the current council depot. The River Crane had been realigned to its present course along the southern boundary of the site. Allotment gardens are still shown to the west and south west of the college buildings. However, the area to the south of the buildings is shown as a playing field.

The 1975 map shows further extensions to the college buildings. This situation appeared largely unchanged in 1992. By 2006, the full development of the college is shown. The most recent map, dated 2014, also shows the new housing areas to the east of the Harlequins Stadium.

The superficial geology of the sites and surrounding area consists of the sands and gravels of the Kempton Park Gravel formation which overlies the London Clay. The gravel is classified as a principal aquifer, but the bedrock is unproductive. The nearest licensed groundwater abstraction is over 1.5 km from the sites.

Site investigations completed in 2008²¹ encountered between 0.3-1.0m of topsoil or made ground, grading into orange brown clays becoming sand and gravel (considered to be Kempton Park Gravel) to depths of between 4.2m and 5.3m, and locally 9.3m. Stiff grey dark grey clay considered to be London Clay was encountered underlying the Kempton Park Gravel. Groundwater was encountered at between 1.1-3.5m in exploratory excavations and water levels of between 1.33-2.54m were observed in standpipes installed across the site.

During the site walkover survey, no obvious features of the main site or its current or former uses suggested that there may be a risk of soil contamination. All boilers for heating and hot water purposes are gas fired, although one location was identified where solid or liquid fuel may have been used previously.

Although there were no obvious areas of infill on the sites, it is understood that there were bunkers in use during the second World War and that these have since been backfilled.

During the 2008 site investigations, elevated concentrations of benzo(a)pyrene were measured in one location (in existing playfield to north of site) and was presumed to be associated with ash and clinker contained in the soil. Some hydrocarbon contamination also measured in two locations in the near surface soils (along western boundary of site, south of Langhorn Drive entrance). Based on gas monitoring undertaken, the site is classified as characteristic gas situation two, based on the definitions in CIRIA guidance document C665, which could require mitigation depending on the final location of the buildings.

8.4 SENSITIVE RECEPTORS AND POTENTIAL ENVIRONMENTAL EFFECTS

The potential impacts of contaminated land will be assessed based on a conceptual model of both sites. This is based on the source - pathway - receptor concept.

²¹ Soiltechnic (2008) Proposed Redevelopment of Richmond upon Thames College - Ground Investigation Report and Classification of Waste Soils for Offsite Disposal Report.

The following sources of contamination, potential receptors of this contamination and the potential pathways linking the two have been identified based on work undertaken to date and have assisted in developing a preliminary conceptual model relating to the site, as provided in **Table 8.1**.

Table 8.1 Scope of Assessment: Preliminary Conceptual Model

Sources	Pathway	Receptors
<p><i>On-Site</i></p> <p>Historical or liquid fuel storage</p> <p>Made ground and/or infill.</p> <p>Possible encroachment of sewage treatment filter beds/sludge lagoons into south west corner of site.</p> <p>Asbestos.</p> <p><i>Off-Site</i></p> <p>Former sewage works (now Council depot and waste transfer station).</p> <p>Electrical sub-station.</p>	<p>Surface water run-off into surface water features, including River Crane and the Duke of Northumberland's River.</p> <p>Migration of leachable contaminants from made ground into shallow aquifer.</p> <p>Migration of contaminants within groundwater in shallow aquifer into surface water features.</p> <p>Dermal contact/ingestion/inhalation of dust, soil or liquids.</p> <p>Inhalation of ground gases, vapours and dust.</p> <p>Migration of ground gases and vapours.</p> <p>Direct contact of aggressive contaminants with concrete or pipes.</p>	<p>Controlled waters; groundwater including the shallow principal aquifer (Kempton Park Gravel), River Crane to south of site, Duke of Northumberland's River to west of site.</p> <p>Human health; construction workers, future site users; and adjacent site users.</p> <p>Construction materials and structures: concrete and pipes.</p>

8.5 ASSESSMENT METHODOLOGY

The principal guidance document on managing contaminated land is Contaminated Land Report 11 (CLR11), published by the Environment Agency. This provides a technical framework for identifying and remediating contaminated land through the application of a risk management process. CLR11 also sets out the approach to remediation of contaminated land.

The question of whether risk is unacceptable in any particular case involves not only scientific and technical assessments, but also appropriate criteria to judge the risk and conclude on exactly what risk would be unacceptable.

The process of risk assessment is summarised as follows:

- Develop a Conceptual Site Model – carry out a desk study review of available documentary information and identify the potential sources, pathways and receptors relevant to the site, and the potential pollutant linkages.
- Gather site-specific information on the Conceptual Site Model – through available site investigation.
- Gather information on the nature and extent of contamination, details of pathways for migration of contamination and specific information on the receptors to update the model.
- Risk assessment – apply criteria that will enable a judgement as to whether the

concentrations of contaminants in soil represent an unacceptable risk. These criteria must be relevant to each pollutant linkage, and can be generic (conservative) criteria, or can be site-specific (less conservative). Generic assessment criteria are concentrations of a contaminant in soil below which the risk is acceptable. Site specific assessment criteria are concentrations of a contaminant in soil above which there is likely to be an unacceptable risk.

The need for further intrusive site investigation will be assessed in relation to the Conceptual Model.

If a site passes based on the application of generic assessment criteria, then it is likely that no remedial action is required. If a site fails, then there may be a benefit in gathering further information and deriving site specific assessment criteria. If a site then also fails on the application of site specific criteria, then remedial action will be required.

The Environment Agency has published extensive guidance on the technical aspects of risk assessment, which forms the recognised basis of the UK approach to identifying whether land affected by contamination presents an unacceptable risk. Derivation of relevant assessment criteria is done using the Contaminated Land Exposure Assessment (CLEA) model. The Environment Agency has published a number of generic assessment criteria in the form of Soil Guideline Values (SGVs) for a number of contaminants, while a wide range of generic values have been published independently by various agencies using CLEA.

Risks arising from gas in the ground would be assessed and managed in accordance with the guidance in CIRIA report C665.

For the purposes of the EIA, the assessment of likely significant effects and likely residual effects will be based on significance criteria derived in line with the good practice provided in the CIRIA Report C552. The criteria consider controlled waters, human health, ecological and property receptors listed in the contaminated land statutory guidance and Environment Agency Model Procedures (CLR11). They are set out in **Table 8.2**.

Table 8.2 Significance Criteria for Contaminated Land

Effect	Description
Major adverse	Severe or irreversible detrimental effect to human health. Severe temporary or irreversible reduction in the quality of a potable groundwater or surface water resource of local, regional or national importance. Irreversible or severe temporary detrimental effect on animal or plant populations. Irreversible detrimental effect to nationally important geological feature. Irreversible detrimental effect to building structure resulting in collapse or demolition.
Moderate adverse	Long-term minor or short-term moderate detrimental effect to human health. A minor or moderate, local-scale reduction in the quality of potable groundwater or surface water resources of local, regional or national importance, reversible with time. Reversible widespread reduction in the quality of groundwater or surface water resources used for commercial or industrial abstractions. Medium-term, reversible detrimental effect on animal or plant populations. Medium-term, reversible detrimental effect to nationally important geological feature. Detrimental effect to building structure requiring remedial engineering works.
Minor adverse	Short-term minor detrimental effect to human health. A minor or moderate temporary detrimental effect in the quality of groundwater or surface water resources that are used for, or have the potential to be used for, commercial or industrial abstractions. Short-term reversible detrimental effect on animal or plant populations. Short-term reversible detrimental effect to nationally important geological feature. Detrimental effect to building structures not requiring remedial engineering works.
Negligible	No appreciable effect on human, animal or plant health, potable groundwater or surface water resources or geological features of importance.
Minor beneficial	Minor reduction in risk to human, animal or plant health. Minor local-scale improvement to the quality of potable groundwater or surface water resources. Moderate local-scale improvement to groundwater or surface water resources that are used for, or have potential to be used for industrial or commercial abstractions.
Moderate beneficial	Moderate reduction in risk to human, animal or plant health. Moderate local scale improvement to the quality of potable groundwater or surface water resources. Major local scale, or moderate wide scale, improvement to the quality of groundwater or surface water resources used for commercial or industrial abstraction only.
Major beneficial	Major reduction in risk to human, animal or plant health. Major local-scale/moderate to major improvement in the quality of a potable groundwater or surface water resource of local, regional or national importance.

8.6 POTENTIAL MITIGATION

Preliminary assessment indicates that the risk of contamination being present on the site is low with contamination being confined to small areas of the site. Depending on the form of the proposed development, remediation may not be considered necessary.

The most likely mitigation for excavated contaminated material is disposal at a landfill after treatment and processing. It is classified as waste by virtue of its contamination. It therefore cannot be re-deposited on site, nor used in construction on site or elsewhere (except under a Pollution Prevention and Control (PPC) permit). The suitability of landfills to accept such material will be based on its classification according to the Landfill Regulations²² and the Environment Agency Waste Acceptance Criteria²³. Preliminary analysis indicates that while some contaminated excavated material could be disposed of at landfill permitted to accept inert waste,

²² Landfill (England and Wales) Regulations 2002.

²³ Environment Agency (2010) Waste acceptance at landfills: Guidance on waste acceptance procedures and criteria.

some would require disposal at non-hazardous and hazardous waste sites.

Where contaminated material is to remain undisturbed on site potential health impacts will be mitigated where required by containment beneath a capping layer. Where there is a risk to construction material such as pipes and cable runs, these will be laid in clean fill.

Other opportunities for remediation on site will be explored, but at present it is considered unlikely that on-site remediation of excavated material, if needed, would be possible because there will be a lack of space and the potential quantities of contaminated soil will be very small.

The impacts of ground gases can be mitigated by providing sensitive structures with gas barriers (e.g. gas proof membranes within a flood slab structure) or by ventilation of enclosed spaces.

Potential impacts on groundwaters and surface waters during construction could be mitigated by use of containment and prevention of run-off and during operation of the site through the use of containment and cover systems.

8.7 CONSULTATION

Contaminated land is the statutory responsibility of LBRuT, and they will be consulted on the proposed remedial strategy in the case of any significant contaminated land risks requiring mitigation.

9 WASTE

9.1 INTRODUCTION AND KEY ISSUES

The waste assessment will consider the impacts of solid waste arisings, mitigation of those arisings and management of waste streams.

The principal waste streams to be assessed in the EIA are demolition, excavation and construction waste arisings. Waste arisings during the operational phase of the proposed development may change from the present. Therefore, it will be necessary to estimate future operational waste arisings in order to define the waste servicing requirements for the new development.

The key issues to be considered are listed below:

- Management and disposal of wastes arising during construction of the proposed development.
- Identifying opportunities for waste minimisation and reuse and recycling of materials and waste during construction and during operational phase.
- Identifying opportunities for use of recycled materials in construction (e.g. the use of recycled aggregates).
- Achieving compliance with waste legislation in all phases.
- Waste servicing requirements during operation.

9.2 POLICY REVIEW

In addition to the list of relevant planning policy set out in Section 4, the following planning policy and guidance documents will also be reviewed as part of the EIA process:

- UK Government “Waste not, Want not” strategy which put forward the Waste Hierarchy.
- Waste (England and Wales) Regulations, 2011.
- Planning Policy Statement 10: Planning for Sustainable Waste Management.
- National Waste Strategy, 2007.
- UK Government Waste Review of June 2011 and Action Plan.
- The Site Waste Management Plan Regulations, 2008 (repealed in 2013).

Department for Communities and Local Government and Defra are currently finalising the Updated National Waste Planning Policy and Waste Management Plan for England respectively, drafts of which were consulted on in 2013. These documents will supersede the Planning Policy Statement when published in final form.

9.3 EXISTING ENVIRONMENT

There is currently no significant demolition, excavation or construction waste generation at the site. The current major operational waste stream of significance is commercial and catering waste from the college and associated uses.

It is proposed that the commercial contracts currently in place for collection and disposal/recycling of waste be used in the assessment, or waste arisings will be estimated for different uses based on likely head counts.

It is considered unlikely that LBRuT collect any waste from the site through its domestic waste collection rounds, so the impacts on the Borough's waste collection, recycling and disposal facilities from the college development should not be an issue.

For the new housing provision the existing baseline would be zero.

9.4 SENSITIVE RECEPTORS AND POTENTIAL ENVIRONMENTAL EFFECTS

Potential environmental effects of waste during the construction phase include:

- Noise, vibration and dust associated with waste handling plant.
- Air quality impacts from waste handling and storage (odour, dust).
- Surface water quality impacts from stormwater runoff and waste soil stockpiles and other waste storage areas.
- Soil and groundwater impacts from waste storage.

Potential environmental effects during the operational phase include impacts associated with the management and disposal of domestic and commercial waste from offices, workshops, canteens and ancillary facilities. The quantities and types of these wastes will be estimated for the purposes of defining waste servicing the environmental impacts of these wastes post-collection will not be assessed as these are not under the control of the owners and operators of the development.

9.5 ASSESSMENT METHODOLOGY

Compliance with relevant waste management legislation will serve to minimise many potential environmental impacts and the application of good practice will reduce any residual impacts. Key legislation includes the following:

- Duty of Care imposed by Section 34 of the Environmental Protection Act 1990.
- Site Waste Management Plans Regulations 2008 (repealed in 2013).
- Environmental Permitting Regulations 2007, particularly provisions relating to registered exemptions from permitting.
- Hazardous Waste Regulations 2005.

Current Environment Agency guidance relating to waste management on development sites will also be followed.

Although there is no longer a statutory requirement to prepare Site Waste Management Plans (SWMP), the Applicant proposes to provide an outline SWMP for the development. It is the intention that the outline plan will be prepared broadly in accordance with the former regulations and the non-statutory guidance which supports them.

When the measures to achieve legislative compliance have been established, many of the potential impacts arising from the management of wastes will be considered in other sections of the ES. For example the transport and air quality assessments will consider the impact of vehicle movements associated with waste haulage.

As such, the waste management assessment section of the ES will be limited to the consideration of how the opportunities for sustainable waste management have been incorporated into the proposed development and the identification of additional mitigation measures necessary to minimise residual impacts associated with waste management. This assessment will be undertaken using professional judgment and experience.

9.6 POTENTIAL MITIGATION

Waste management planning within the context of the EIA relates primarily to the adoption of good working practices to encourage the reduction, reuse and recycling of materials and wastes. The Applicant is committed to a strategy to ensure that waste minimisation and sustainable waste management practices are considered from an early stage and throughout the design, demolition, construction and operational phases of the proposed development. In addition, the cost-effective use of recycled and secondary materials, such as aggregates from construction and demolition wastes, would be used in the design. This will be confirmed during the detailed design stage.

The clearance, demolition and construction work will be the subject of a SWMP which informs, takes forward and develops the mitigation measures set out in the ES. The outline SWMP will provide a framework for compliant management of all waste streams, consider opportunities for minimisation, reuse and recycling and compliance with waste policies that apply to contractors, including objectives in relation to minimising waste to landfill.

At detailed design, the design and specifications of the proposed development will include consideration of opportunities for the reuse and recycling of materials, and the cost-effective use of imported recycled/secondary materials in the works.

Therefore, mitigation measures to minimise environmental impacts from the storage and transportation of wastes are likely to include at outline:

- careful location of stockpiles and other storage areas;
- segregation of waste streams to maximise opportunities for reuse and recycling (using on-site recycling plant where appropriate);
- use of good practice in the design of waste storage areas and the use of suitable waste containers;
- use of sheeting, screening, damping and seeding where appropriate and practicable;
- control and treatment of runoff from soil and waste soil stockpiles;
- minimising storage periods;
- minimising haulage distances and consideration of the use of alternatives to road transport; and
- sheeting of vehicles.

9.7 CONSULTATION

Consultation on waste management issues will be undertaken with LBRuT as appropriate during the production of the ES.

10 WATER RESOURCES AND FLOOD RISK

10.1 INTRODUCTION AND KEY ISSUES

The following chapter sets out the proposed approach to the assessment of significant effects in relation to water quality, surface water drainage and run-off, flood risk, and network capacity requirements. An assessment of potential environmental effects in relation to groundwater quality is included in Section 8: Ground Conditions.

The key issues to be considered are listed below:

- Changes to water quality and turbidity in surrounding watercourses during construction.
- Changes to groundwater flow as a result of below ground works and structures.
- Changes to flood risk within the catchment of the River Crane.
- Changes to site drainage and runoff patterns from the new operational site and the requirement for Sustainable Drainage Systems (SUDs).
- Changes in potable water supply and foul water drainage capacity.

According to the NPPF, a Flood Risk Assessment (FRA) will be required to support the OPA as the development covers a site greater than 1 hectare and part of the site is located in Flood Zone 2. As such, an outline FRA will be prepared and will identify and assess all forms of flooding to and from the proposed development and demonstrate how these flood risks will be managed so that the proposed development remains safe throughout its lifetime, taking into account the potential impact of climate change.

10.2 POLICY REVIEW

In addition to the list of relevant planning policy set out in Section 4, the following legislation and policy documents will also be reviewed as part of the EIA process:

- Water Framework Directive (WFD).
- Urban Waste Water Treatment Directive (UWWTD).
- Nitrates Directive.
- Water Resources Act 1991.
- Environment Agency Catchment Abstraction Management Strategies (CAMS).
- The London Regional Flood Risk Appraisal (2009).
- The London Borough of Richmond upon Thames Strategic Flood Risk Assessment (SFRA) (2008).
- Thames Catchment Flood Management Plan (2009).
- Local Flood Risk Management Strategy for Richmond upon Thames (2014, under

development).

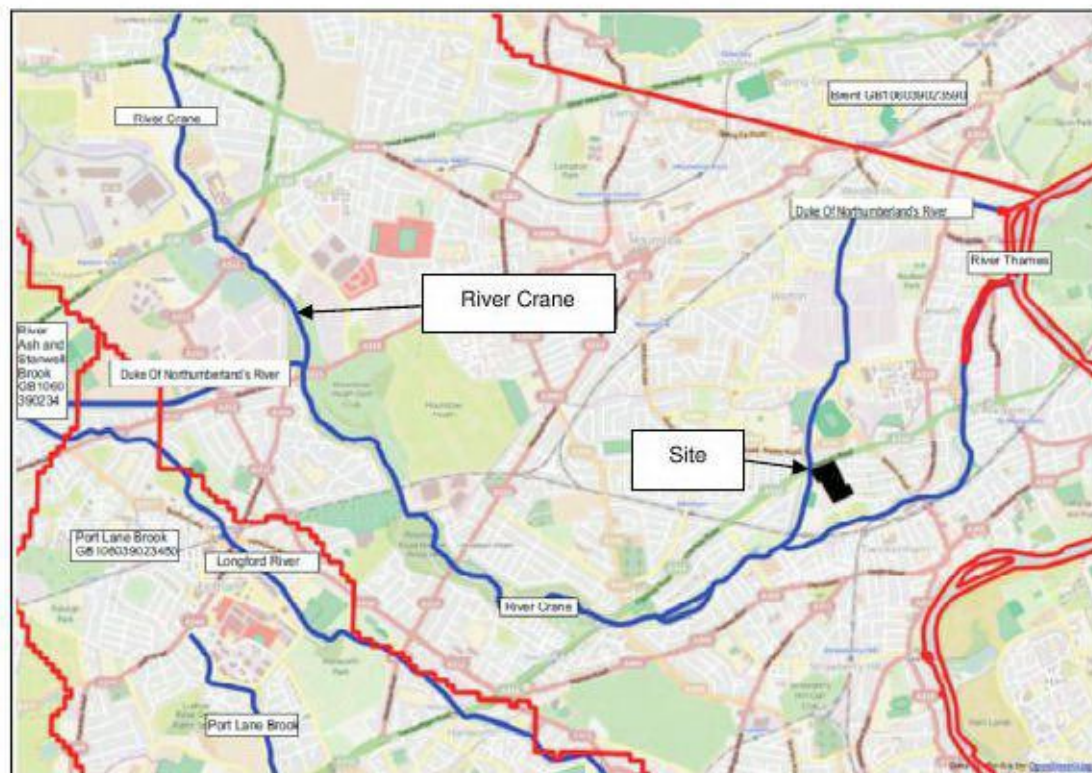
- The London Borough of Richmond upon Thames Preliminary Flood Risk Assessment (PRFA) (2011).
- Surface Water Management Plan for the London Borough of Richmond upon Thames (2011).

10.3 EXISTING ENVIRONMENT

10.3.1 Water Resources

Figure 10.1 provides an overview map of the watercourses that flow through or near to the proposed development site.

Figure 10.1 Watercourses in Proximity to the Site



The River Crane is a moderate sized watercourse and tributary of the tidal River Thames. It flows adjacent to the southern boundary of the site, eventually joining the River Thames approximately 2km downstream of the site at Isleworth. The Duke of Northumberland's River is a tributary and distributary of the River Crane. It joins the River Crane upstream of the site (at Hounslow Heath) and the two rivers combine as the River Crane for approximately 2 miles. Just upstream of the site, the Duke of Northumberland's River takes the form of a distributary of the River Crane and is diverted to flow through Mogden Sewage Works (noting that the Sewage Treatment Works treated effluent is piped to the River Thames).

The River Crane and Duke of Northumberland's River are typical urban watercourses and both have been designated as heavily modified under the WFD. The WFD waterbody containing the site (River Crane including part of the Yeading Brook, GB106039023030), the River Crane and part of the Duke of Northumberland's River is located between the M4 motorway to the north and Isleworth to the east and has been classified as poor ecological potential. The River Crane alongside the site is within an artificial culvert which is uniform. The Duke of Northumberland River, although artificial in nature, resembles a more natural river albeit consisting of a straightened channel with reinforced banks. Upstream of the River Crane WFD waterbody, the Duke of Northumberland's River flows across three more WFD waterbodies, which have all been designated as heavily modified and have all been classified as moderate ecological potential. From upstream to downstream, these are: GB106039023090 (Colne and Grand Union Canal from confluence with Chess to Ash), GB106039023480 (Ash and Stanwell Brook) and GB106039023450 (Port Lane Brook). The WFD potential of these waterbodies is moderate.

The River Thames downstream of the River Crane and Duke of Northumberland's River falls within transitional and coastal (TraC) WFD Waterbody GB530603911403 (Thames Tideway Upper), which is designated as heavily modified with moderate ecological potential.

Table 10.1 provides an overview of hydrology (flow), surface water quality, ecology and fish data that have been requested from the Environment Agency and will be used to inform the existing baseline.

Environment Agency hydrological (flow) data is available for on the River Crane at Cranford Park (upstream of the confluence with the Duke of Northumberland's River) and immediately adjacent to the site at Marsh Farm Road. Hydrology data is available for the Duke of Northumberland's River downstream and north of the site at Mogden Sewage Works. No hydrology data is available for the Duke of Northumberland's River between the River Colne and the River Crane. Downstream of the site, hydrology data is available at Mogden Sewage Works.

Environment Agency routine water quality baseline sites on the River Crane are located immediately upstream from the site at Mereway Road and further upstream at A315 Staines Road, Hounslow. Water chemistry data is also available downstream of the site for the River Crane at Northcote Road, Isleworth. No water quality sites are located on the Duke of Northumberland's River upstream of the site and River Crane. Downstream of the site, water quality data is available for the Duke of Northumberland's River at Kidd's Mill, Isleworth.

With regard to aquatic ecology, three Environment Agency monitoring sites are located upstream of the site at Watersplash Lane, immediately upstream of the Duke

of Northumberland's River and at Crane Park with no aquatic ecology monitoring sites located downstream of the site. The only aquatic ecology monitoring site on the Duke of Northumberland's River is located immediately upstream of the River Crane at (Upper) River Gardens.

Finally, Environment Agency fish monitoring sites are located upstream of the site on the River Crane at Cranford Park, Hounslow Heath and at Crane park with no sites located downstream of the site. On the Duke of Northumberland's River, two sites are located upstream of the site and the River Crane at Moor Lane and Hatton Road, with two sites downstream of the site on Riverside Walk and Mill Platt.

No other surface water features are present on or immediately adjacent to the site.

Table 10.1 Environment Agency Monitoring Sites in the River Crane and Duke of Northumberland's River Catchment

Data type	River Crane		Duke of Northumberland's River	
	Upstream site	Downstream site	Upstream site	Downstream site
Hydrology	Cranford Park (ID3660TH)	Twickenham, Marsh Farm (ID3680TH)	None	Hounslow, at Mogden Sewage Works (ID3695TH)
Water Quality	North Hyde Road (PCRR0084) Mereway Road (REF tbc)	Northcote Road, Isleworth (PCRR0006)	None	Kidd's Mill, Isleworth (PCRR0025)
Aquatic Ecology	At Watersplash Lane (34253) Above Duke of Northumberland's River (34254) Crane Park, Hanworth (33880)	None	(Upper) River Gardens (34257)	None
Fish	Cranford Park (14618) Hounslow Heath (14617) Crane Park (17310)	None	Moor Lane (14620) Hatton Road (16390)	Riverside Walk (14615) Mill Platt (16391)

Geological mapping (www.bgs.co.uk) of this site indicates that the bedrock geology underlying the site is the London Clay Formation which is not associated with groundwater flooding and has no aquifer designation. However, there are superficial deposits of Kempton Park Gravel Formation (sand and gravels) beneath the site and these are classified as a principal aquifer.

As part of a previous study for the development, a survey of the existing services feeding the site was undertaken which included site drainage. The main drainage, both foul and surface water, connects to the Thames Water sewer located in Cranford Way. The information source suggests there to be both pumped and gravity outlets, but it is uncertain if these are combined at the sewer. It is understood

Figure 10.3 Surface Water Flood Risk

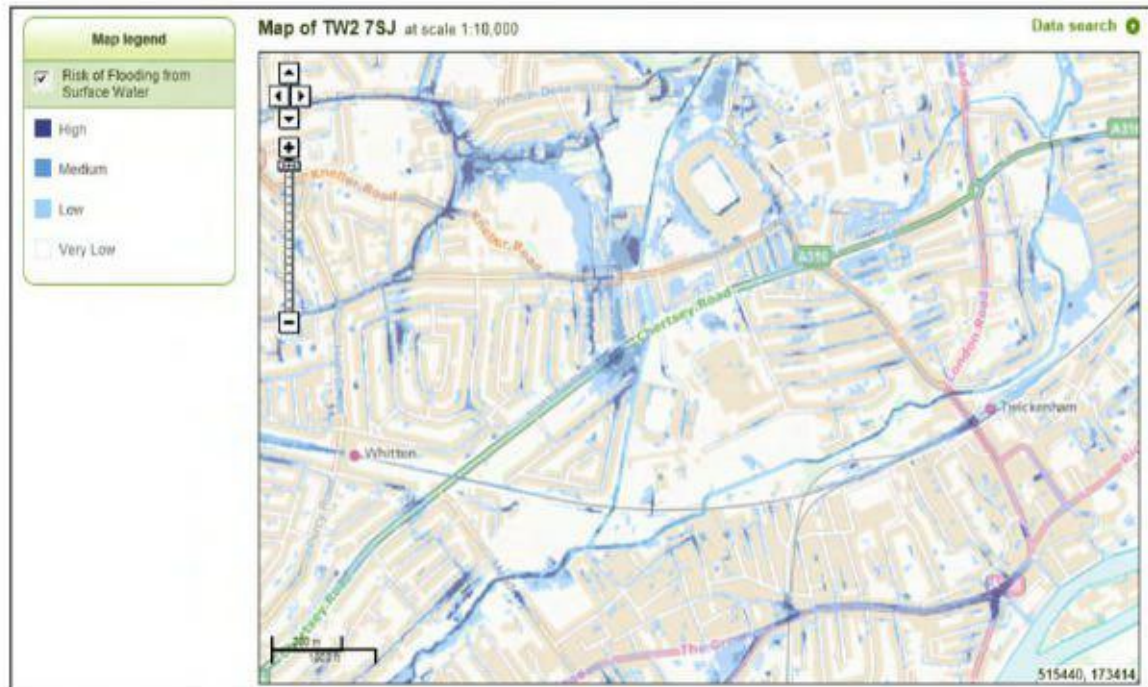
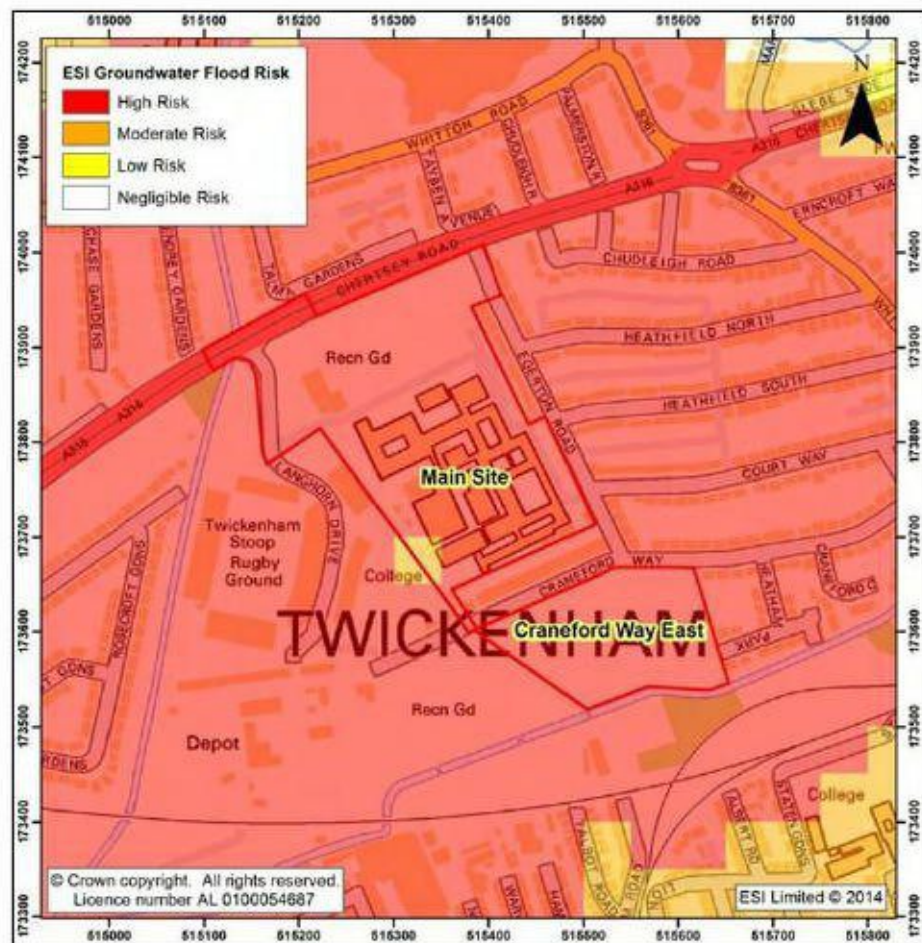


Figure 10.4 Groundwater Flood Risk



An assessment of historical flooding will be undertaken to set the context for the assessment of current and future baseline conditions. The assessment of historical flooding will be based on available information from the Environment Agency and LBRuT and on previous reviews of historic flooding in the Borough reported in the Strategic Flood Risk Assessment (SFRA) and Preliminary Flood Risk Assessment (PFRA) and other flood risk plans and assessments referred to in Section 10.2.

10.4 SENSITIVE RECEPTORS AND POTENTIAL ENVIRONMENTAL EFFECTS

10.4.1 Construction

Water Resources

During enabling works, demolition and construction associated with the development, materials such as fuel, dirt, cement, concrete and other debris could enter the River Crane or the Duke of Northumberland's River.

Demolition and construction have the potential to disturb contaminants in the soil and cause them to be released into the local watercourses. The watercourses could experience increases in turbidity and decreases in water quality as a result. As a result of the large flows and high sediment load of the tidal River Thames compared to the River Crane and Duke of Northumberland's River, the confluence of the River Crane with the tidal River Thames immediately downstream of the A3004 in Isleworth (TQ 16579 75377) and the confluence of the Duke of Northumberland's River with the tidal River Thames downstream of Church Street in Isleworth (TQ 16628 75963) is considered the limit of extent of any potential effects.

Flood Risk

The site, and therefore construction workers, are at risk of fluvial flooding from two sources:

- a large-scale catchment wide flooding event of the River Crane which may cause riverine flooding; and
- more localised heavy rainfall events falling on the heavily urbanised catchments that drain into the River Crane.

Information to enable an assessment of other (non-fluvial) sources of flooding, such as groundwater flooding, will be gathered from a variety of sources referred to above, notably the LBRuT SFRA and PFRA.

During the construction phase, and in operation, there is the potential for flow routes for surface water runoff generated on site and flowing through the site (from upstream sources) to be modified. The works may also impact the volume of surface

water runoff generated on site due to changes in impermeable areas. Any green space or landscaping has the potential to reduce surface water runoff leaving the site.

These impacts are not expected to be significant but cannot be scoped out of the assessment at this stage. The ES and FRA will include a full surface water assessment including runoff calculations pre- and post-development works.

10.4.2 Operation

Water Resources

Sediment and runoff dynamics from the site have the potential to be affected by changes in operational layout on the site such as a reduction or increase in the percentage of hard-standing area. These changes have the potential to change the flow and flow patterns in the River Crane and Duke of Northumberland's River, but are unlikely to influence water chemistry. The confluence of the River Crane and the Duke of Northumberland's River with the tidal River Thames is considered the limit of extent of any potential effects.

The increase in land uses on the site, especially residential, could impact the existing drainage infrastructure and result in capacity issues to provide potable water and deal with foul drainage. Surveys for all the mains utilities have been undertaken for the site, and the results are awaited to understand the need for diversions and new supplies. Additional consultation will be undertaken with Thames Water as required to understand any capacity issues. Water recycling, rainwater collection and the use of water efficient fixtures and fittings in the buildings will be considered.

Flood Risk

The majority of the development is located outside the flood zones, with only changes to the playing fields potentially resulting in an increase in flood risk. The change in impermeable surfaces and potential increase in surface water runoff from the site will need to be considered and a surface water drainage strategy produced to ensure baseline runoff rates are not exceeded. Consideration will also be given to other (non-fluvial) sources of flooding.

A summary of the scope of the water resources and flood risk assessment is provided in **Table 10.2**.

Table 10.2 Scope of Assessment: Water Resources and Flood Risk

Potential Sensitive Receptors	Potential Impact	Potential Effect	
		Scoped In	Scoped Out
River Crane and Duke of Northumberland's River	Pollution incidents and sediment runoff during construction. Changes in runoff from site during operation resulting in water quality issues.	✓	
Principal aquifer (Kempton Park Gravel)	Changes to flow because of below ground works and structures.	✓	
Infrastructure Site Users	Increased demand on existing foul water drainage capacity and potable water supply during operation. Changes to surface water drainage regime as a result of changes to impermeable land surface during operation.	✓	
Infrastructure Site Users	Increased risk of flooding during construction and operation.	✓	

10.5 ASSESSMENT METHODOLOGY

10.5.1 Water Resources

Overview

A description of the baseline conditions for the assessment will be developed from existing Environment Agency and Thames Water monitoring data and will be used to illustrate the variations and trends in flow, water levels, sediment characteristics and water quality over time and spatially downstream of the site where possible.

The heavily modified nature of the River Crane and Duke of Northumberland's River combined with large areas of hard standing within the catchment mean that the watercourses are susceptible to low flows during periods of drought and to high flows during periods of heavy rainfall. In addition, the watercourses are subject to a number of upstream diffuse pollution sources in the catchment, carrying elevated sediment loads, nutrients and pollutants, particularly during periods of heavy rainfall. In turn, the in-stream aquatic ecology is likely to be heavily influenced by habitat availability, flows and water quality.

The impact assessment will evaluate the future projected baseline with and without the proposed development against relevant standards. These will include the WFD ecological and water quality standards. The impact assessment will focus on any changes in hydrology, flows and water quality (including sediment dynamics) as part of the proposed development construction activities, such as (temporary) increases in the area of hard standing resulting in run-off, stockpiling on-site and pollution

control measures to prevent spills.

Significance Criteria

The assessments outlined above will allow judgements to be made on the likely impacts as a result of the proposed development and their significance. The potential significance of effects will be assessed based on the criteria set out in **Tables 10.3-10.4**.

The significance criteria are based on the nature of the effect (in terms of magnitude, probability, reversibility, duration and direction) and the receptor (in terms of sensitivity and value/ importance). The closer the proximity of the receptor to the site, greater the likelihood of direct and indirect effects on hydrology, water quality and geomorphology, which is captured by the “probability” criterion in **Table 10.3**.

It should be noted that these criteria form a starting point to guide decisions on significance of effects. Decisions will be based on professional judgement and in some circumstances it may be judged necessary to deviate from the criteria. Any deviations will be clearly recorded and justified.

Table 10.3 Criteria for Determining the Nature of the Water Resources Effect

	Magnitude	Probability	Reversibility	Duration
High	<p>Large-scale (regional to waterbody) effects on flows, water levels and/or wetted areas, significantly influenced outside their normal operating envelope.</p> <p>Large-scale (regional to waterbody) effects on the river channel, banks or sediment dynamics, which are likely to have a consequent effect on watercourse hydrodynamics.</p> <p>Large-scale (regional to waterbody) effects on water quality, which affects suitability of the water quality to support Good or High WFD status for river ecology.</p>	High likelihood of direct effects on hydrology, water quality and geomorphology	Effects on hydrology, water quality and geomorphology are irreversible	Long term effects on hydrology, water quality and geomorphology
Medium	<p>Medium-scale (local to waterbody) changes to flows, water levels and/or wetted areas.</p> <p>Medium-scale (local to waterbody) effects on the river channel, banks or sediment dynamics, such as changes to erosional and depositional character that have a limited influence on channel function.</p> <p>Medium-scale (local to waterbody) effects on water quality, but not predicted to lead to deterioration in WFD status for river ecology.</p>	Medium likelihood of direct effects OR high likelihood of indirect effects on hydrology, water quality and geomorphology	Effects on hydrology, water quality and geomorphology are partially reversible	Medium term effects on hydrology, water quality and geomorphology
Low	<p>Small-scale (up to local) changes to flows, water levels and/or wetted areas, within their normal operating envelope.</p> <p>Small-scale (up to local) effects on the river channel, banks or sediment dynamics, with little or no consequent effects on watercourse hydrodynamics.</p> <p>Small-scale (up to local) effects on water quality, within the usual variability for the site.</p>	Low likelihood of direct effects OR medium likelihood of indirect effects on hydrology, water quality and geomorphology	Effects on hydrology, water quality and geomorphology are mostly reversible	Short term effects on hydrology, water quality and geomorphology
Negligible	<p>Little or no changes to flows, water levels and/or wetted areas.</p> <p>Little or no effects on the river channel, banks or sediment dynamics.</p> <p>Little or no effects on water quality.</p>	Low likelihood of direct or indirect effects on hydrology, water quality and geomorphology	Effects on hydrology, water quality and geomorphology are fully reversible	At most temporary effects on hydrology, water quality and geomorphology
Direction of Effect				
Adverse	Negative effects on the quantity and quality of water resources and sediments available for use by people and wildlife			
Beneficial	Positive effects on the quantity and quality of water resources and sediments available for use by people and wildlife			

Table 10.4 Criteria for Determining the Value of the Water Resources Receptor

	Sensitivity	Value/ Importance
High	Hydrology, water quality and geomorphology support Good or High WFD status. High vulnerability to temporary or permanent changes in hydrology, water quality and geomorphology	Designated for relevant environmental features at national (SSSI, NNR or equivalent) or international level (SPA, SAC or Ramsar). This includes WFD protected areas (e.g. Drinking Water Protected Area DrWPA). Frequently used by people e.g. for recreation, abstraction
Medium	Hydrology, water quality or geomorphology supports Good or High WFD status or potential. Medium vulnerability to temporary or permanent changes in hydrology, water quality and geomorphology	Designated for relevant environmental features at regional (e.g. Sites of Metropolitan Importance) or district level (e.g. Local Nature Reserves) Occasionally used by people e.g. for recreation, abstraction
Low	Hydrology, water quality or geomorphology supports Less than Good WFD status or potential. Low vulnerability to temporary or permanent changes in hydrology, water quality and geomorphology	Not designated for relevant features, but may contain habitats or populations/assemblages of species that appreciably enrich the local habitat resource (e.g. species rich hedgerows, ponds). Infrequently used by people e.g. for recreation, abstraction
Negligible	Hydrology, water quality and geomorphology support Less than Good WFD status or potential Not vulnerable to temporary or permanent changes in hydrology, water quality and geomorphology	Not designated for relevant features Not used by people e.g. for recreation, abstraction

For context, based on the criteria in **Table 10.4** and baseline information available to date as outlined in Section 10.3, the River Crane has low sensitivity (based on less than Good WFD status, high degree of modification and subsequent low vulnerability to changes in water quality, hydrology and hydromorphology) and medium importance (based on the relative proximity of non-statutory designated sites and recreational use of the watercourse); whereas the Duke of Northumberland's River has low sensitivity and less than and low to negligible importance (based on the absence of designations and infrequent or less than infrequent use of the watercourse for recreation or abstraction).

Table 2.1 in Section 2 will be used for determining the significance of the impact.

10.5.2 Flood Risk Assessment and Preliminary Surface Water Drainage Strategy

As stated previously, a separate outline FRA will be produced to support the OPA, ensuring that all potential flood risk sources to the site have been considered and that appropriate mitigation measures will be put in place where potential impacts are identified. A desktop study will focus on the flooding mechanisms at the site from rivers, groundwater and surface water run-off.

In addition a drainage assessment will be undertaken to assess the potential of the proposed development to increase flood risk to the surrounding areas due to the surface water run-off generated as a result of the proposed development. Available discharge routes for surface water will be assessed including discharge to ground, watercourse and sewer. Design calculations will be undertaken to support the design of a preliminary surface water drainage strategy for the OPA. An assessment of the foul sewer and surface water drainage requirements and existing capacity will also be undertaken.

10.6 POTENTIAL MITIGATION

There is potential for adverse impacts on surface waters during construction, however most of these risks can be addressed through normal good practice construction techniques. For example, all construction activities should follow the Pollution Prevention Guidelines (PPG) issued by the Environment Agency. These principles will be detailed in the outline CEMP.

There is potential for adverse and beneficial impacts on flood risk during construction and operation of the proposed development. Most of the adverse impact risk (e.g. change in surface water runoff) are considered capable of mitigation with normal good practice construction techniques. For example, detailed design (including of construction activities) will need to consider the height of floor levels where sensitive uses are required, the use of SuDS and guidance on flood resistant and resilient construction techniques where the level of risk is high. If appropriate, these measures will be incorporated into the outline design, to minimise the need for the ES to identify further mitigation.

10.7 CONSULTATION

At present no consultation has been undertaken, with exception of collating baseline data from the Environment Agency. During the assessment process, consultation will be undertaken with LBRuT and the Environment Agency around the flood risk issues, and Thames Water regarding network capacity.

11 DAYLIGHT, SUNLIGHT AND OVERSHADOWING

11.1 INTRODUCTION AND KEY ISSUES

Key daylight, sunlight and shadow effects associated with the proposed development will be considered quantitatively during the operational stage. This will include analysis of the development's effects on existing neighbouring residential properties and gardens/open spaces. It will also consider the levels of natural light that are likely to be experienced by proposed residential units and open spaces within the proposed development.

The assessment will be undertaken in accordance with the guidelines set out in the revised Building Research Establishment (BRE) report "Site Layout Planning for Daylight and Sunlight: A Guide to Good Practice" (2011).

It is anticipated that the key issues to be considered are as follows:

- Effects on daylight and sunlight levels on existing residential properties and gardens on Egerton Road, Craneford Way and Langhorn Drive.
- Effects on daylight and sunlight within the new residential element.

Under the BRE guidance there is a requirement to assess the effects of development on the natural light levels received by residential (and quasi-residential) accommodation. The analysis of commercial floorspace and other non-residential uses is therefore not required.

11.2 POLICY REVIEW

National, strategic and local planning policy and guidance of relevance to the assessment of daylight and sunlight effects will be reviewed and summarised in the chapter. This includes the following:

- Twickenham Area Action Plan (2013).
- Saved Richmond Unitary Development Plan Policy (2005).
- Building Research Establishment (BRE) Site Layout Planning for Daylight and Sunlight: A Guide to Good Practice (2011).

11.3 EXISTING ENVIRONMENT

In order to assess the likely daylight, sunlight and shadow effects arising from the proposed development, the baseline natural light conditions experienced by neighbouring residential properties, gardens and open spaces in the immediate vicinity of the site will be modelled and assessed.

The baseline daylight conditions will be considered in terms of the following methods of assessment:

- Daylight: Vertical Sky Component (VSC) and Daylight Distribution (DD).
- Sunlight: Annual and Winter Probable Sunlight Hours (A/WPSH).
- Shadow: Two hour sunlight contour analysis.

These methods of assessment are discussed in more detail in Section 11.5 below.

11.4 SENSITIVE RECEPTORS AND POTENTIAL ENVIRONMENTAL EFFECTS

On the basis of an initial site walkover, the following neighbouring properties will need to be considered in the daylight and sunlight assessment:

- Nos. 1-33 (odd), 16-20 (even) and 28-36 (even) Egerton Road.
- Nos. 94 and 97 Heathfield South.
- No. 96 Court Way.
- Nos. 70-148 and 150-156 (even) Craneford Way.
- Nos. 1-43 Challenge Court.
- No. 29 Kendry Gardens.
- Nos. 23-75 (odd) and 28 Talma Gardens.
- Nos. 7-11 (odd) and 16 Tayben Avenue.

Other neighbouring properties are situated at sufficient distance from the site to be unaffected by the scheme in terms of daylight and sunlight, and/or are non-residential.

The following neighbouring gardens, public open spaces and landscape features will need to be considered in the shadow assessment:

- Rear gardens serving Nos. 1-33 (odd) Egerton Road.
- Gardens serving Nos. 94 and 97 Heathfield South.
- Garden serving No. 96 Court Way.
- Garden serving Nos. 8 Gladstone Avenue.
- Gardens serving No. 29 Kendry Gardens.
- Gardens/ open spaces serving Nos. 23-75 (odd) and 28 Talma Gardens.
- Gardens serving Nos. 7-11 (odd) and 16 Tayben Avenue.
- Public open space adjacent to Challenge Court.

In addition to these neighbouring receptors, the ES chapter will consider the levels of natural light (daylight and sunlight) received by the residential units proposed within the proposed development. It will also assess the levels of sunlight and shadow that will be experienced within the gardens, communal amenity spaces and public spaces

within the development.

As the technical media hub, education and sports buildings will rely on artificial lighting, these are outside the scope of assessment (in accordance with BRE guidance).

Table 11.1 provides a summary of the scope of the assessment.

Table 11.1 Scope of Assessment: Daylight and Sunlight

Potential Sensitive Receptors	Potential Impact	Potential Effect	
		Scoped In	Scoped Out
Neighbouring residential properties and open spaces.	Material reduction in daylight and sunlight due to scale/massing/orientation of development and potential increased shadowing in the context of the BRE guide levels.	✓	
Residential elements of development.	Insufficient natural light experienced by new residential accommodation in the context of the BRE guide levels.	✓	
Technical media hub, education and sports buildings.	Rely on artificial lighting therefore outside scope of assessment (in accordance with BRE guidance).		✓
Construction effects.	None (only the completed scheme will be assessed).		✓

11.5 ASSESSMENT METHODOLOGY

11.5.1 Daylight Methodology

The daylight analysis for neighbouring properties and new residential properties will be based on the calculation of VSC and DD. The internal daylight analysis for the proposed accommodation may also consider Average Daylight Factor (ADF). The ADF values will be calculated where there are failures of the other standards, to demonstrate if the rooms have sufficient daylight, where the parameters to undertake these calculations are known. These methods of assessment are summarised below. Where maximum and minimum parameters are defined, consideration will be given to the worst case.

Vertical Sky Component

The level of ambient daylight received by a window is quantified in terms of its VSC, which represents the amount of vertical skylight falling on a vertical window. The

daylight assessment will be based on three dimensional AutoCAD models constructed for the site and surroundings as existing and with the proposed development in place. The heights and locations of the surrounding buildings and the proposed development will be taken from measured site survey information, OS digital plan data, site observations, aerial photography of the site and surroundings and drawings produced by the project architects.

The VSC level at each of the windows requiring assessment will be quantified using Waldram Tools daylight and sunlight software (MBS Software Ltd).

The BRE good practice guide outlines numerical guidelines that represent flexible targets for new developments in relation to the vertical sky component at nearby reference points. The document states that:

- “If the vertical sky component, with the new development in place, is **both** less than 27% **and** less than 0.8 times its former value, then the loss of light is likely to be noticeable.”
- The guidelines therefore require that **either** the VSC target **or** the degree of change in daylighting are met (i.e. if the 27% target is adhered to, there is no requirement under the BRE guidelines for the resultant VSC level to remain at 0.8 times the former VSC level).

Daylight Distribution

The analysis of DD considers the area of a room which can receive an unobstructed view of the sky. It is quantified at working plane height (+0.85m) using the Waldram Tools software.

The BRE (2011) guide states:

- “If, following construction of a new development, a no-sky line moves so that the area of the existing room which does not receive direct skylight is reduced to less than 0.8 times its former value, this will be noticeable to the occupants.”
- The analysis of daylight distribution provides a more sophisticated method of assessing daylight than VSC as it takes into account the size of a room and the size and number of its windows.

Average Daylight Factor

The BRE guide advises that the calculation of ADF provides an alternative means of assessing the level of daylight received by the interior of the room served by a window. It is an appropriate means of assessment for proposed accommodation where the parameters required for the ADF calculations are known.

The calculation of ADF again provides a more sophisticated method of calculating the daylight level experienced within a room than VSC as it takes into account the size and reflectance of room's surfaces and the number, size and transmittance of its window(s), as well as the ambient daylight level (VSC) received at the window(s).

The ADF is defined as the average internal illuminance as a percentage of the unobstructed external illuminance under standard overcast conditions.

ADF can be calculated using the following formula (amended in the updated BRE guide, 2011):

$$df = \frac{TA_w \theta}{A(1-R^2)} \%$$

Where:

- T is the diffuse visible transmittance of the glazing (a value of 0.65 is typical for double glazed clear glass; a value of 0.18 is used for obscured glazing).
- A_w is the net glazed area of the window (m^2).
- θ is the angle of visible sky in degrees.
- A is the total area of the room surfaces: ceiling, floor, walls and windows (m^2).
- R is the average reflectance (a value of 0.7 is applicable for new/proposed accommodation with light internal surface treatments).

The updated BRE guide (2011) introduces a separate procedure for floor to ceiling windows and glazed doors. It states that areas of glazing below the working plane should be treated as a separate window and an extra factor is applied to it to take account of the reduced effectiveness of low level glazing in lighting the room. The BRE states that a value equivalent to the floor reflectance can be taken for this factor. An adjustment factor of 0.3 is appropriate for medium timber floors and has been used in this case.

The approach to assessing internal daylighting using the ADF method is set out at Appendix C of the BRE guide. The BRE guide and British Standard BS8206 set the following minimum recommended ADF levels for different room types:

- Kitchens: 2%.
- Living rooms: 1.5%.
- Bedrooms: 1%.

11.5.2 Sunlight Methodology

Of the neighbouring windows considered in the daylight assessment, the window reference points that are orientated within 90 degrees of due south will also require

assessment in terms of annual and winter sunlight availability.

The levels of sunlight availability at the window reference points assessed have been calculated based on the three dimensional AutoCAD models of the site and surroundings as existing and with the development in place, using the Waldram Tools daylight and sunlight software. The calculations provide the percentage year round sunlight availability and the percentage of sunlight availability received during the winter months.

The BRE good practice guide states that the sunlighting of an existing dwelling may be adversely affected by a development “...if the centre of the window:

- receives less than 25% of annual probable sunlight hours, or less than 5% of annual probable sunlight hours between 21 September and 21 March and receives less than 0.8 times its former sunlight hours during either period and has a reduction in sunlight received over the whole year greater than 4% of annual probable sunlight hours”
- As with daylight, the guidelines require that **either** the sunlight availability targets **or** the degree of change in sunlighting **or** a reduction less than 4% of APSH are achieved (i.e. if the 25%/5% targets are adhered to, there is no requirement under the BRE guidelines for the resultant sunlight levels to remain at 0.8 times the former levels etc.).

11.5.3 Overshadowing Methodology

The BRE ‘test’ for a development’s overshadowing impacts relates to the area of an amenity space that receives more than two hours of sunlight on 21 March (the Spring Equinox). The guide states:

“...for it to appear adequately sunlit throughout the year, at least half of a garden or amenity area should receive at least two hours of sunlight on 21 March. If, as a result of new development, an existing garden or amenity area does not meet the above, and the area which can receive two hours of sun on 21 March is less than 0.8 times its former value, then the loss of sunlight is likely to be noticeable”.

The assessment would therefore consider the areas of existing and proposed gardens, amenity spaces, public spaces and landscape features that would receive more than two hours of direct sunlight on this date with the development in place. This analysis will be applied to both existing and proposed areas of amenity space.

11.5.4 Significance Criteria

The significance criteria used in the daylight, sunlight and overshadowing analyses

will be based on the BRE guidance.

The adverse effects of the proposed development on neighbouring properties can be classified based on the following categories of impact:

- **Beneficial:** Enhancement of natural light conditions.
- **Negligible:** Compliant with BRE daylight distribution/VSC or annual/winter sunlight availability guide levels.
- **Minor adverse:** Retained daylight distribution/VSC or annual/winter sunlight availability level within 20% of BRE guide levels.
- **Moderate adverse:** Retained daylight distribution/VSC or annual/winter sunlight availability level within 50% of BRE guide levels.
- **Significant adverse:** Retained daylight distribution/VSC or annual/winter sunlight availability level more than 50% below BRE guide levels.

11.6 POTENTIAL MITIGATION

A daylight and sunlight audit of the development will be undertaken during the ongoing design process and any measures necessary to mitigate against potentially adverse environmental effects will be incorporated, where possible, prior to finalising the design. As such it is anticipated that limited additional mitigation will be required in the ES.

11.7 CONSULTATION

The scope of the assessment and the assessment methodology will be agreed with the LBRuT through this scoping process.

12 ECOLOGY

12.1 INTRODUCTION AND KEY ISSUES

The site enabling, demolition, construction and operation of the proposed development have the potential to give rise to impacts upon designated sites, habitats and species within and surrounding the development site. The Ecological Impact Assessment (EcIA) will consider these impacts upon features of nature conservation importance and identify any mitigation measures that may be required to avoid or minimise impacts.

The key issues to be considered are listed below:

- Direct habitat loss to adjacent designated sites and ecologically significant habitats.
- Mortality or harm to protected or ecologically significant species within the footprint of the site.
- Deterioration or fragmentation of surrounding habitats and disturbance of protected or ecologically significant species within surrounding habitats.
- Opportunities for biodiversity enhancement and gain.

12.2 POLICY REVIEW

In addition to the list of relevant planning policy set out in Section 4, the following topic specific planning policy, guidance documents and legislation will also be reviewed and considered as part of the EIA process:

- Biodiversity Action Plans - national (UK), regional (London) and local (LBRuT) and the Post-2010 Biodiversity Framework²⁴.
- Conservation of Habitats and Species Regulations 2010 (as amended).
- Wildlife and Countryside Act 1981 (as amended).
- Natural Environment and Rural Communities Act 2006.
- Countryside and Rights of Way Act 2000.
- Environmental Damage (Protection and Remediation) Regulations 2009.

12.3 EXISTING ENVIRONMENT

Baseline information on nature conservation is available for the site through publically available resources, such as the National Biodiversity Network (NBN), a biodiversity records request to Greenspace Information for Greater London (GIGL) and an Extended Phase 1 Habitat survey of the site, carried out in April 2014. The

²⁴ Joint Nature Conservation Committee and Defra (on behalf of the Four Countries Biodiversity Group) (2012) UK Post-2010 Biodiversity Framework. July 2012. Available from <http://jncc/defra.gov.uk/page-6189>.

desk based information has been gathered for a study area of 2km surrounding the site²⁵ with walkover information including the site and adjacent habitats.

Further details of the baseline data collected is provided in **Appendix 12.1**, with the following providing an overview.

Within the 2km study area, there are no European (Special Areas of Conservation, Special Protection Areas or Ramsar sites), or nationally designated sites (Sites of Special Scientific Interest or National Nature Reserves). The study area did contain two Local Nature Reserves (LNRs), three Sites of Metropolitan Importance for Nature Conservation (SMINCs), one Borough (Grade 1) Site of Nature Conservation Importance (SINC), four Borough (Grade 2) SINC and six Local SINC.

UK Biodiversity Action Plan (BAP) habitats were not identified on the site, however the grassland habitats outside the college's grounds are considered to comprise part of the local and regional Urban Greenspace BAP. The scope of the London Parks and Green Spaces Habitat Action Plan is limited to land managed for public access. With the recreational fields falling under the ownership of RuTC, they are therefore not considered to fall within this definition. The closest UK BAP habitat was identified as deciduous woodland, approximately 120m east of the site, with additional areas of mudflat and undetermined grassland BAP habitats about 2km from the site.

The site is dominated by a variety of buildings and hardstanding that comprise the college with landscaped areas interspersed between the buildings. To the north and the south of the college are recreational fields with scattered mature trees surrounding them. The site also includes part of the hardstanding car park and access road to the north-west of the site.

The Extended Phase 1 Habitat survey recorded few semi-natural habitats present on or in the adjacent habitats: broadleaved semi-natural woodland; scrub/shrub; poor semi-improved grassland; scattered trees; amenity grassland; tall ruderals; running water and intact species-poor hedge. Many of these habitats on the site originate from amenity planting, and therefore are considered of intrinsic biodiversity value within the immediate survey area only or at the local scale. As such, the requirement to consider impacts to habitats of these values is unlikely (see Section 12.5), unless they contribute to planning policy requirements.

Upon completion of the Extended Phase 1 Habitat Survey, the following detailed surveys were recommended; breeding birds, bats, hedgehog and terrestrial invertebrates. These surveys are being carried out in summer 2014.

²⁵ For the collation of desk-based records, only those recorded in the last 10 years have been considered as species distributions often change over time, for example otter *Lutra lutra* underwent a dramatic loss of distribution in the mid-1950s to the late-1970s and is only recovering that distribution now.

Desk-based information identifies the importance of the River Crane corridor, including the Duke of Northumberland's River, adjacent to the site, for bird habitat in the area and identifies a number of species listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended) and/or as species of conservation concern. The breeding bird survey will follow the Common Bird Census methodology, over three separate survey visits. These visits will be undertaken in summer 2014, and consist of the surveyor walking the development site and adjacent habitats slowly, within 30m of all cover habitats, and plotting registrations of individual singing birds to allow the number of territories of each species to be identified. The value of the site for breeding birds will be established following the methodology proposed by Fuller (1980)²⁶.

The semi-natural habitats, including the river corridors, and some features on the buildings provide a variety of habitat opportunities for bats. A walkover survey of the site will be completed by an experienced bat ecologist to confirm any potential roosting opportunities within the site. If any roosts are discovered, this will be followed by dusk surveys following appropriate survey guidance, with the number of visits depending upon the value of the roosts identified. Activity surveys of the site will also be completed using a walked transect, which will be completed over two evening visits following the Bat Survey Guideline²⁷ recommendations.

The scrub, tall ruderal and areas of longer grassland adjacent to the site have some potential to support common reptiles. However, the area is relatively isolated from the railway corridor and is of very limited extent and therefore is unlikely to support anything greater than a very low population of common reptiles. No further survey is considered necessary.

The semi-natural habitats present have some potential to support invertebrate species, particularly where these provide nectar rich sources of food. A walkover survey will be completed by an experienced entomologist to identify key habitats on the site for invertebrates and consider the potential invertebrates that are likely to be present on site. During the walkover, invertebrates will be collected as encountered and identified to provide a general list of species commonly present on the site.

The habitats on site have potential to support hedgehogs, particularly the woodland and amenity grassland habitats to the south and north of the college, and alongside Challenge Court, where these are connected to residential gardens. Although not legally protected, the species is considered to be ecologically significant due to declines in populations, as highlighted by its inclusion as a UK BAP and London BAP

²⁶ Fuller, R. J. (1980) A Method for Assessing the Ornithological Interest of Sites for Conservation. *Biological Conservation* 17: pp 229 - 239.

²⁷ Bat Conservation Trust (2012) *Bat Surveys - Good Practice Guidelines - 2nd Edition*. Bat Conservation Trust, London.

priority species. A targeted survey is not proposed, however a watching brief will be undertaken during the completion of the evening bat activity surveys and any sightings of the species noted.

The riparian habitats of the River Crane and the Duke of Northumberland's River are not considered to be suitable for the presence of water vole *Arvicola amphibious*, as the banks are reinforced and provide very little shelter in the form of vegetation cover. Furthermore, the absence of marginal macrophytes and shallow depth are unsuitable for the species. No records of otter *Lutra lutra* have been identified in the desk study and the habitats are not considered to hold great value for the species.

No other legally protected or ecologically significant species are considered likely to be present on the site.

12.4 SENSITIVE RECEPTORS AND POTENTIAL ENVIRONMENTAL EFFECTS

12.4.1 Value of Sensitive Receptors

In order to provide a focussed assessment of impacts on ecology and nature conservation, Chartered Institute of Ecology and Environmental Management (CIEEM) guidelines recommend establishing which receptors are considered to be of sufficient value to warrant inclusion within the Ecological Impact Assessment (EcIA; which will form a chapter of the ES). This approach ensures the assessment focuses on those receptors likely to be susceptible to significant effects. As a result, the following thresholds are proposed for identification of receptors that will be included within the EcIA:

- any sites, habitats and/or species that are considered to be of at least Local biodiversity value;
- sites, habitats and/or species that receive legal protection or are referenced in policy (e.g. BAPs); and
- habitats forming corridors and commuting networks for important species.

12.4.2 Potential Environmental Effects

The following potential environmental effects will be considered through the assessment, although are dependent upon the outcomes of baseline surveys being completed in summer 2014:

Habitat loss - restricted to semi-natural habitats present within the footprint of the development which are generally of low ecological value. This in turn may effect bird and bat populations through loss of nesting/roosting opportunities and foraging or commuting opportunities.

Whilst some areas of habitat loss will occur, the loss will only be considered where the baseline habitat meets the threshold for inclusion. For example, there will be a loss of amenity grassland due to the inclusion of astro turf pitches, however as amenity grassland is considered to be of ecological value within the immediate survey area only, does not receive legal protection or form part of a BAP habitat or contribute to the River Crane corridor or form a commuting network for species, the loss is not considered through the EcIA.

Habitat fragmentation - restricted movement of species and potential reduction in population viability because habitat corridors have been broken and smaller areas of habitat support few species.

Habitat deterioration - construction and demolition activities could cause deterioration of onsite and adjacent habitats including broadleaved semi-natural woodland, Urban Greenspace BAP habitat, scattered trees and the River Crane and the Duke of Northumberland's River (falls within the Borough SINC). This could include encroachment, changes to air quality (e.g. dust) and effluent runoff. These activities could result in direct harm/mortality and disturbance of species.

The area over which dust impacts are considered will follow the IAQM guidance²⁸, which identifies that appropriate screening criteria for detailed assessment of impacts associated with dust are 50m surrounding the site and 50m from haulage roads for up to 500m from the site (as discussed further in Section 10: Water Resources and Flood Risk).

Changes to water quality have the potential to influence the River Crane and Duke of Northumberland's River, along with the designated sites that fall downstream of the site. Any discharges to the river, in the form of run-off or accidental spillages, could result in a deterioration in habitat and influence the downstream floral and faunal habitats.

Direct harm/mortality - harm or mortality of species during vegetation clearance or building demolition (breeding birds, bats, invertebrates, hedgehog).

Disturbance - disturbance of bird species and bats both during construction and operation through noise and inappropriate lighting.

Considering the urbanised setting of the site, impacts arising from noise generation during construction or operation are unlikely to be significant to ecological receptors beyond 500m from the proposed development. Consideration of noise impacts will therefore only be given to designated sites and bird populations within this zone of

²⁸ Institute of Air Quality Management (2014) *Guidance on the assessment of dust from demolition and construction*. IAQM, London.

influence. As no works are proposed to take place over night, consideration of impacts associated with noise upon bats is not considered necessary.

Inappropriate lighting has the potential to impact upon habitat usage (including foraging and commuting) onsite and offsite by nocturnal species, in particular bat populations and their activity on site, and those utilising the habitats for rest/shelter, for example nesting birds. Although parts of the site are currently lit overnight as a result of their urban context, the construction or operation of the proposed development may result in a change to current levels.

Recreational pressure - increases in the residential population will increase recreational pressures on semi-natural habitats in the area during operation, notably open greenspace such as the footpath along the River Crane.

This has the potential to result in deterioration in habitat quality, for example as a result of inappropriate use that causes damage to the habitat or littering. Whilst the increase in residential properties has potential to impact upon the urban greenspace, broadleaved woodland and watercourse habitats immediately adjacent to the proposed development, these are already subject to significant recreational use and, in the case of the greenspace and woodland, are managed for such use.

The designated sites are either managed with public access in mind or are inaccessible to the public, for example the Twickenham Junction Rough Local SINC, and therefore are unlikely to change significantly as a result of the proposed development with visits resulting from the proposed development likely to be infrequent and recreational use is likely to be concentrated closer to the proposed development. Therefore, the impacts associated with increases in recreational pressure are not considered to be significant and thus will be scoped out of the ES.

Table 12.3 Scope of Assessment: Ecology

Potential Sensitive Receptors	Potential Impact	Potential Effect	
		Scoped In	Scoped Out
<i>Designated Sites</i>			
Ham Lands LNR (940m south-east of the site)	No significant effects expected because of distance.		✓
Isleworth Ait LNR (2km north-east of the site)	No significant effects expected because of distance.		✓
Crane Corridor SMINC (450m south-west of the site)	<u>Construction</u> Noise	✓	
Ham Lands SMINC (940m south-east of the site)	No significant effects expected because of distance.		✓
River Thames and Tidal Tributaries SMINC (1.3km south-east of the site)	No significant effects expected because of distance.		✓
Duke of Northumberland's River north of Kneller Road Borough I SINC (160m north of the site)	<u>Construction</u> Dust deposition Noise Water quality and run-off	✓ ✓ ✓	
	<u>Operation</u> Water quality and run-off	✓	
Mogden Sewage Works Borough I SINC (730m north of the site)	No significant effects expected because of distance.		✓
Duke of Northumberland's River south of Kneller Road Borough II SINC (alongside the western boundary of the site)	<u>Construction</u> Dust deposition Noise Lighting Water quality and run-off	✓ ✓ ✓ ✓	
	<u>Operation</u> Increased recreational pressure Water quality and run-off	✓	✓
River Crane at St. Margarets (including Richmond Site) Borough II SINC (200m north-east of the site)	<u>Construction</u> Noise Water quality and run-off	✓ ✓	
	<u>Operation</u> Increased recreational pressure Water quality and run-off	✓	✓
Strawberry Hill Golf Course Borough II SINC (1.2km north-east of the site)	No significant effects expected because of distance.		✓
Petersham Lodge Wood & Ham House Meadows Borough II SINC (1.4km north-east of the site)	No significant effects expected because of distance.		✓
Duke of Northumberland's River at Woodlands Borough II SINC (1.5km north of the site)	No significant effects expected because of distance.		✓

Potential Sensitive Receptors	Potential Impact	Potential Effect	
		Scoped In	Scoped Out
Hounslow, Feltham and Whitton Junctions Borough II SINC (1.5km west of the site)	No significant effects expected because of distance.		✓
Hounslow Loop Railsides Borough II SINC (1.6km north-west of the site)	No significant effects expected because of distance.		✓
Fulwell & Twickenham Golf Courses Borough II SINC (1.7km south-west of the site)	No significant effects expected because of distance.		✓
The Copse, Holly Hedge Field & Ham Avenues Borough II SINC (1.9km south-east of the site)	No significant effects expected because of distance.		✓
Petersham Meadows Borough II SINC (2km east of the site)	No significant effects expected because of distance.		✓
Twickenham Junction Rough Local SINC (alongside the southern boundary of the site)	<u>Construction</u> Dust deposition	✓	
	Noise Lighting	✓ ✓	
	<u>Operation</u> Lighting	✓	
Moor Mead Local SINC (800m east of the site)	No significant effects expected because of distance.		✓
Marble Hill Park and Orleans House Gardens Local SINC (1.2km east of the site)	No significant effects expected because of distance.		✓
Twickenham Cemetery Local SINC (1.3km west of the site)	No significant effects expected because of distance.		✓
Teddington Cemetery Local SINC (1.5km south of the site)	No significant effects expected because of distance.		✓
Inwood Park Local SINC (1.8km north-west of the site)	No significant effects expected because of distance.		✓
Twickenham Road Meadow Local SINC (2km east of the site)	No significant effects expected because of distance.		✓
<i>Habitats</i>			
River Crane	<u>Construction</u> Dust deposition Air quality Lighting Water quality and run-off	✓ ✓ ✓ ✓	
	<u>Operation</u> Increased recreational pressure Lighting Water quality and run-off	✓ ✓ ✓	
Duke of Northumberland's River	<u>Construction</u> Dust deposition Air quality Lighting Water quality and run-off	✓ ✓ ✓ ✓	

Potential Sensitive Receptors	Potential Impact	Potential Effect	
		Scoped In	Scoped Out
	<u>Operation</u> Increased recreational pressure Lighting Water quality and run-off	✓ ✓ ✓	
Urban Greenspace BAP habitat	<u>Construction</u> Habitat deterioration as a result of encroachment of works Dust deposition	✓ ✓	
	<u>Operation</u> Increased recreational pressure		✓
Broadleaved semi-natural woodland	<u>Construction</u> Habitat loss or deterioration as a result of encroachment of works Dust deposition	✓ ✓	
	<u>Operation</u> Increased recreational pressure		✓
Poor semi-natural grassland	<u>Construction</u> Dust deposition	✓	
	<u>Operation</u> Increased recreational pressure		✓
Scattered trees	<u>Construction</u> Habitat loss Habitat loss or deterioration as a result of encroachment of works Dust deposition	✓ ✓ ✓	
	<u>Operation</u> No significant effects expected.		✓
<i>Species</i>			
Schedule 9 invasive species Wall cotoneaster	<u>Construction</u> Potential spread of the species through removal or inappropriate landscaping.	✓	
Breeding birds	<u>Construction</u> Potential loss or fragmentation of habitats Direct harm, mortality or disturbance Deterioration of habitats as a result of dust deposition. Noise Lighting	✓ ✓ ✓ ✓	
	<u>Operation</u> Lighting Noise	✓	✓



Potential Sensitive Receptors	Potential Impact	Potential Effect	
		Scoped In	Scoped Out
Bats	<u>Construction</u> Potential loss or fragmentation of habitats Direct harm, mortality or disturbance Deterioration of habitats as a result of dust deposition. Noise Lighting	✓ ✓ ✓ ✓	✓
	<u>Operation</u> Lighting Noise	✓	✓
Common reptiles	<u>Construction</u> Potential loss or fragmentation of habitats Direct harm, mortality or disturbance Deterioration of habitats as a result of dust deposition.	✓ ✓ ✓	
Hedgehogs	<u>Construction</u> Potential loss or fragmentation of habitats Direct harm, mortality or disturbance Deterioration of habitats as a result of dust deposition. Lighting	✓ ✓ ✓ ✓	
	<u>Operation</u> Lighting Noise	✓	✓
Invertebrates	<u>Construction</u> Potential loss or fragmentation of habitats Direct harm, mortality or disturbance Deterioration of habitats as a result of dust deposition.	✓ ✓ ✓	

12.5 ASSESSMENT METHODOLOGY

The ecological assessment will be undertaken with reference to recognised guidance given in the Institute of Environmental Management and Assessment (IEMA) and CIEEM study guidelines^{29,30}. It is noted that the CIEEM EcIA guidelines are currently under review, if possible these will be incorporated within the ES should the revised guidelines be issued early enough during the completion of the assessment.

The assessment methodology itself is semi-quantitative, based on empirical data and professional judgement.

The aims and objectives of the assessment are to:

- determine the value of ecological features (or receptors) to be affected by the scheme (to be finalised based on the baseline information above and comments received during the scoping consultation period);
- assess the significance of the impacts on both the ecology of the site and surrounding features by magnitude or severity of the effect against the value of the features;
- identify mitigation measures to avoid, minimise and/or reduce the likely significant effects and identify additional enhancement measures; and
- establish residual effects likely after mitigation has been implemented.

Ecological features will be attributed a value according to the criteria set out in **Table 12.4**, which has been created following CIEEM guidelines. Consideration will also be given to distinguishing both *biodiversity value* and *legal status*.

²⁹ Institute of Environmental Management and Assessment (IEMA) (1995). *Guidelines for Baseline Ecological Assessment*.

³⁰ Chartered Institute of Ecology and Environmental Management (CIEEM) (2006) *Guidelines for Ecological Impact Assessment in the United Kingdom* (version 7 July 2006).

Table 12.4 Criteria for Determining the Value of Ecological Features

Value	Criteria
International	An internationally designated site or candidate site, i.e. a Special Protection Area (SPA), provisional SPA, Special Area of Conservation (SAC), candidate SAC, Ramsar site, or area which would meet the published selection criteria for designation. [<i>Note: none in study area</i>]. A viable area of a habitat type listed in Annex I of the Habitats Directive, or smaller areas of such habitat that is essential to maintain the viability of a larger whole. Sites supporting populations of internationally or European important species.
National (England)	A nationally designated site, i.e. Site of Special Scientific Interest SSSI, National Nature Reserve (NNR) or discrete area which would meet the published selection criteria for national designation (e.g. SSSI selection guidelines). [<i>Note: none in study area</i>]. A viable area of a priority habitat identified in the UK BAP, or smaller areas of such habitat essential to maintain wider viability. Viable populations of nationally important species that are of threatened or rare conservation status, including those identified as priority species in the UK BAP.
Regional (South East)	Sites that exceed the Metropolitan-level designation but fall short of SSSI selection criteria. Smaller areas of key habitat identified in the UK BAP that is essential to maintain wider viability. Viable populations of nationally scarce species identified in the UK and London BAP and/or regularly occurring populations of a regionally important species.
Metropolitan/County (Greater London)	Sites recognised by local authorities, e.g. Sites of Metropolitan Importance for Nature Conservation (SMINC), or considered to meet published ecological selection criteria for such designation. A viable area of key habitat identified in the London BAP or significant resource or ancient semi-natural woodland. Viable populations of regionally scarce species identified in the UK and London BAP and/or regularly occurring populations of a species important at the metropolitan scale.
Borough/ District (Richmond upon Thames)	Sites recognised by local authorities, e.g. Sites of Borough Importance for Nature Conservation or Local Nature Reserves (LNRs), or considered to meet published ecological selection criteria for such designation. A diverse and/or ecologically valuable hedgerow network and smaller areas of ancient semi-natural woodland. A viable area of habitat identified in the Borough BAP. Viable populations of species identified in the London BAP and/or regularly occurring populations of species important at the borough scale.
Local (e.g. within 5km of the site)	Sites recognised by local authorities, e.g. Sites of Local Importance for Nature Conservation (SLINC), or considered to meet published ecological selection criteria for such designation. Areas of habitat or populations/assemblages of species that appreciably enrich the local habitat resource (e.g. species-rich hedgerows, ponds). Sites that retain other elements of semi-natural vegetation and due to their size, quality or the wide distribution within the local area are not considered for the above classifications. Viable populations of species identified in the Borough BAP and/or regularly occurring populations of species important at the local scale.
Within the zone of influence only	Sites that retain habitats and/or species of limited ecological importance due to their size, species composition or other factors.

The next step is to determine which ecological features are of sufficient value to be included in the assessment, with CIEEM guidelines recommending this approach to ensure attention is focussed on those receptors that are susceptible to impact. Therefore, the thresholds for inclusion within the EcIA are defined as:

- Any sites, habitats and/or species that are considered to be of at least **Local** biodiversity value;
- Sites, habitats and/or species that receive legal protection or are referenced in policy (e.g. BAPs); and

- Habitats forming corridors and commuting networks for important species.

Once values have been assigned to the ecological features and those of sufficient value for inclusion have been identified, an assessment of the impacts likely to affect the features will be undertaken. The identification of impacts refers to ecological structure and function, and the impacts are assessed in the context of the predicted baseline conditions during the lifetime of the development. They are also assessed in relation to the following criteria:

- Positive or negative impact;
- Direct or indirect impact;
- Magnitude - the size of an impact, in quantitative terms where possible;
- Extent - the area over which an impact may occur;
- Duration - the time period for which an impact is expected to last;
- Reversibility - a permanent impact is one that is irreversible within a reasonable timescale or for which there is no reasonable chance of action being taken to reverse it, a temporary impact is one from which short-term recovery is possible; and
- Timing and frequency - whether impacts are ongoing, separated but recurrent or single events and whether they occur during critical seasons of life-stages of habitats, flora or fauna.

Where the magnitude of change caused by an effect cannot be derived quantitatively, the criteria presented in **Table 12.5** will be used.

Table 12.5 Criteria for Determining the Value of Ecological Features

Impact Magnitude	Description
High	There is a large scale permanent change in the ecological receptor and changes in the overall integrity.
Medium	There is a permanent or long-term temporary change in the ecological receptor but no permanent change in its overall integrity.
Low	There is a small-scale permanent change or mid-term temporary change in the ecological receptor but its overall integrity is not permanently affected.
Neutral	There is no perceptible change in the ecological receptor.

The likelihood that an effect and changes to the ecological feature will occur as predicted, and the degree of confidence in the assessment of the effect on ecological structure and function, will be assessed using the four-point scale identified in CIEEM guidelines:

- *Certain/near certain:* probability estimated at 95% chance or higher.
- *Probable:* probability estimated at above 50% but below 95%.
- *Unlikely:* probability estimated at above 5% but below 50%.

- *Extremely unlikely:* probability estimated at less than 5%.

The ecological significance of an impact is defined by CIEEM as 'an impact (positive or negative) on the 'integrity' of a defined site or ecosystem and/or on the conservation status of habitats and species within a given geographical area'. The value of the feature that will be significantly affected and type of impact will be used to inform the geographical scale at which the impact is significant. A definition of 'integrity' is provided in the Government Circular: Biodiversity and Geological Conservation³¹: 'The integrity of a site is the coherence of its ecological structure and function, across its whole area that enables it to sustain the habitat, complex of habitats and/or levels of populations of the species for which it was classified'.

To ensure consistency with other sections of the ES, a level of significance for each impact will also be identified following the matrix in **Table 2.1**, which identifies the significance of impact as a function of the magnitude of impact and geographical value of the receptor. It should be noted that this will be provided as a guide, to provide consistency with the significance identified in other sections, and professional judgement will be applied during its application.

12.6 POTENTIAL MITIGATION

There is a wide variety of mitigation and enhancement measures that could be incorporated into the design or form part of the outline CEMP.

The following provides a list of some examples of guiding principles and approaches that it is anticipated will underpin the design of the proposed development and the completion of the enabling, demolition and construction works:

- Demarcation of valued or significant sensitive receptors.
- Ensure timing or phasing of demolition or construction activities are appropriate with regards to the life cycles of local fauna.
- Reduce external artificial lighting of the site where possible and ensure all lighting is compliant with guidance on reducing obtrusive lighting³².
- Comply with best practice methodology, for example erect screening around parts of the site where necessary to prevent dust dispersion and provide noise attenuation.
- Provide toolbox talks to site personnel on the presence of ecological features and the importance of protecting them through the various mitigation measures.

³¹ Office of the Deputy Prime Minister (2005) Government Circular: Biodiversity and Geological Conservation - Statutory Obligations and their Impact within the Planning System.

³² The Institute of Light Engineers (2005) Guidance notes for the reduction of Obtrusive Light.

- Re-instatement of habitat affected by construction through a planting regime that is both appropriate to the site and previous habitat type and utilises native species of local provenance.

In addition to this, the site provides a number of habitat enhancement opportunities that could be incorporated into the design or completion of the development:

- Creation of green/brown roofs on any flat roofed structures, in line with London and LBRuT planning policy (Policy DM SD 5).
- Erection of bird and bat boxes, providing a variety of types with different aspects.
- Implementing an appropriate cutting regime for some grassland areas that aims maintain a botanically diverse habitat with nectar-rich species.

12.7 CONSULTATION

At present no consultation has been undertaken. Natural England and the LBRuT biodiversity officer will be contacted to discuss the scope of the ecological impact assessment and agree on the requirement for further surveys. In the event of the River Crane enhancement opportunities being taken forward, it is recommended that the Crane Valley Partnership is consulted.

13 TOWNSCAPE AND VISUAL AMENITY

13.1 INTRODUCTION AND KEY ISSUES

The Townscape and Visual Impact Assessment (TVIA) will evaluate the environmental consequences of the proposed development in terms of its effects on the character and quality of the townscape, views and visual amenity. It will consider the effects of the proposed development on the physical characteristics of the site and its surroundings, focussing on those features that contribute to the essential townscape character of the area.

The Craneford Way playing fields to the south west of the site are designated as Metropolitan Open Land (MOL), a regional land use designation similar to green belt which seeks to protect the open character of land. The northern part of the site, adjoining A316 Chertsey Road is also occupied by playing fields but is not designated as MOL.

The main issues raised by the proposed development are likely to be:

- Potential change to the townscape character of the site and surrounding areas arising from the demolition and replacement of existing buildings and the proposed development of the site including currently open areas. Key considerations will include the appropriateness of the scale, mass and design of the proposed for its townscape context and the effect on trees that play a notable role in the townscape.
- The potential effect on views obtained by people who may be susceptible to changes to views and visual amenity having regard to the quality of the existing view and the scale and nature of the change. Significant visual effects are more likely to occur where development is introduced on existing undeveloped areas and where the scale of replacement buildings is notably larger than the current situation. The potential for a beneficial change to existing views may also exist where existing views are characterised by poor quality buildings (e.g. from the footpath to the west of the college).

13.2 POLICY REVIEW

In addition to the list of relevant planning policy as set out in Section 4, the following policy and regulatory documents will also be reviewed as part of the EIA process:

- Saved policies T28 and T29 from the London Borough of Richmond upon Thames Unitary Development Plan (2005).
- Design Quality Supplementary Planning Document (SPD) (2006).
- Planning Brief Richmond upon Thames College SPD (2008).

- Crane Valley Planning Guidelines (2005).

13.3 EXISTING ENVIRONMENT

The college comprises a varied collection of buildings dating from the mid to late 20th century which vary in height, the tallest element being a stair tower fronting Egerton Road (approximately 5 storeys). There are no listed or locally listed buildings on the site or in the immediate vicinity of it. The surrounding area is predominantly residential in character comprising mid 20th century suburban streets. The site is adjoined and overlooked by a number of residential properties and is crossed by a pedestrian route. The River Crane corridor, part of the green chain, is a recreational route that runs to the south of the site. The Duke of Northumberland River runs to the west of the Harlequins Stadium. There are mature trees most notably on the perimeter of the northern playing fields, along the footpath to the west of the college site, on the boundary with existing residential properties to the south and to part of the Egerton Road frontage.

The character and quality of the townscape of the site and their surroundings will be recorded and analysed. Broad character areas (those sharing common townscape characteristics) will be defined. Consideration will be given to factors such as land use, urban morphology, building height, mass, form, materials and the role of landscape elements. The susceptibility of each character area to change will be evaluated. Regard will be had to conservation area appraisals and other relevant available information including relevant local and national guidance.

The baseline study will define the extent of visibility of the study site and the parts of the surrounding environment and visual resources that are likely to be sensitive to change. A theoretical ZVI for the proposals will be established by a combination of mapping and fieldwork to establish the area over which views of the proposed development are likely to be seen. It is likely that this will be generally localised in extent with the potential for views from residential properties and streets on the north side of Chertsey Road (Talma Gardens/Tayben Avenue), along residential streets to the east (Heathfield North/Heathfield South/Court Way/Egerton Road), from the River Crane Corridor and the bridge over the railway to the south and from residential properties and associated open space to the west. There would also be the potential for views from areas of high ground to the east (e.g. The Terrace on Richmond Hill and locations within Richmond Park close to Pembroke Lodge).

The existing visual role of the site in the surrounding area will be recorded using photography and the location of receptors confirmed. Day and night time conditions will be considered.

The scale/extent of other committed development proposals will also be set out and

reviewed.

13.4 SENSITIVE RECEPTORS AND POTENTIAL ENVIRONMENTAL EFFECTS

Desk-based research will be undertaken to identify potential sensitive townscape and visual receptors within the ZVI. Sensitive townscape receptors will be likely to include:

- Public open spaces.
- River Crane corridor and green chain.
- Duke of Northumberland's River corridor.
- Rosecroft Gardens Conservation Area.
- Mature trees on the site that play a role in the townscape.
- The townscape character of the residential area immediately to the south and east of the site.
- Elevated views from high ground to the east.

Sensitive visual receptors will also be identified. These are people whose activities and attention are more likely to be focussed on the visual quality of the environment. They are likely to include:

- Residents, particularly where there is likely to be a direct view from habitable rooms that will change noticeably as a result of the proposals (e.g. residential properties on Craneford Way/Egerton Road/Talma Gardens).
- People using public open spaces and green chain.
- Protected views (e.g. from The Terrace on Richmond Hill).
- Pedestrian and cyclists using public footpaths and cycleways in the surrounding area. The more focussed the user is on the amenity of the route the greater the susceptibility of the receptor to change. This will include users of the public footpath to the west of the college, recreational routes associated with the Crane Corridor and routes along surrounding streets.

The potential effects on these receptors has been considered in this initial scoping exercise (see **Table 13.1**).

Table 13.1 Scope of Assessment: Townscape and Visual Effects

Potential Sensitive Receptors	Potential Effect	Potential Effect	
		Scoped In	Scoped Out
Townscape			
Significant groups of trees within the site.	Unknown at this stage.	✓	
Existing areas of open space adjacent to the site.	Changes to the setting and availability.	✓	
Rosecroft Gardens conservation area.	Changes to the setting.	✓	
Character of adjoining residential areas to the east.	Unknown. Compatibility with the existing townscape to be assessed.	✓	
River Crane Corridor/Duke of Northumberland's River.	Change to setting/ subject to details of works to playing fields. Townscape effects likely to minimal due to nature of proposals on Craneford Way playing fields.		✓
Character of the night time environment.	Given the urban nature of the area, this is unlikely to change significantly.		✓
Visual			
Residents adjoining and overlooking the site.	Change to visual amenity arising from new development.	✓	
Views obtained by pedestrians walking through adjoining residential areas.	Change to visual amenity in adjoining streets. Focus assessment on locations where there is likely to be a high magnitude of change.	✓	
Users of the public footpaths to the south and west.	Changes to visual amenity. Change may be beneficial from locations to the west of the college.	✓	
Users of the public open space to the west of the site.	Changes to visual amenity.	✓	
Users of the footpath and cycleway to the north.	Changes to visual amenity.	✓	
Motorists using Chertsey Road.	Motorists are transient receptors, whose focus is not on the visual quality of the townscape. They are travelling at speed past the site and will not be susceptible to changes to views. Unlikely to be significant environmental effects on these receptors.		✓
Passengers on trains passing the site.	Development of scale proposed is unlikely to have a significant effect owing to transient nature of receptors.		✓
People within public spaces with long range views from high ground to the east - The Terrace on Richmond Hill and locations within Richmond Park.	Replacement of an existing building within the wider panorama. Whilst development of scale proposed is unlikely to have a significant effect the change to the view from The Terrace on Richmond Hill will be assessed as a representative view and to test the worst case in terms of long views from the east.	✓	
Motorists, cyclists and pedestrians crossing the railway bridge on the London Road.	Potential for glimpsed views of taller elements on skyline prior to development of the sorting office. Whilst development of scale proposed is unlikely to have a significant effect, the change to the view from this location will be reviewed.	✓	

13.5 ASSESSMENT METHODOLOGY

An assessment will be provided of the effect of the proposals on the character and quality of the surrounding townscape, views and visual amenity. The assessment will be undertaken having regard to the Guidelines for Landscape and Visual Assessment (3rd edition) and other relevant guidance. Where maximum and minimum parameters are defined consideration will be given to the worst case.

The sensitivity of receptors will be established considering their susceptibility to change and the value of the receptor/view. The magnitude of the change during construction and operational stages will be considered taking into account the scale of the effect, its duration and reversibility.

The significance of the effect will be evaluated having regard to the sensitivity of the receptor and magnitude of the effect. A judgement will be made on the significance of the change to the townscape/view based according to the following significance criteria; major adverse, moderate adverse, minor adverse, nil/negligible, minor beneficial, moderate beneficial, major beneficial.

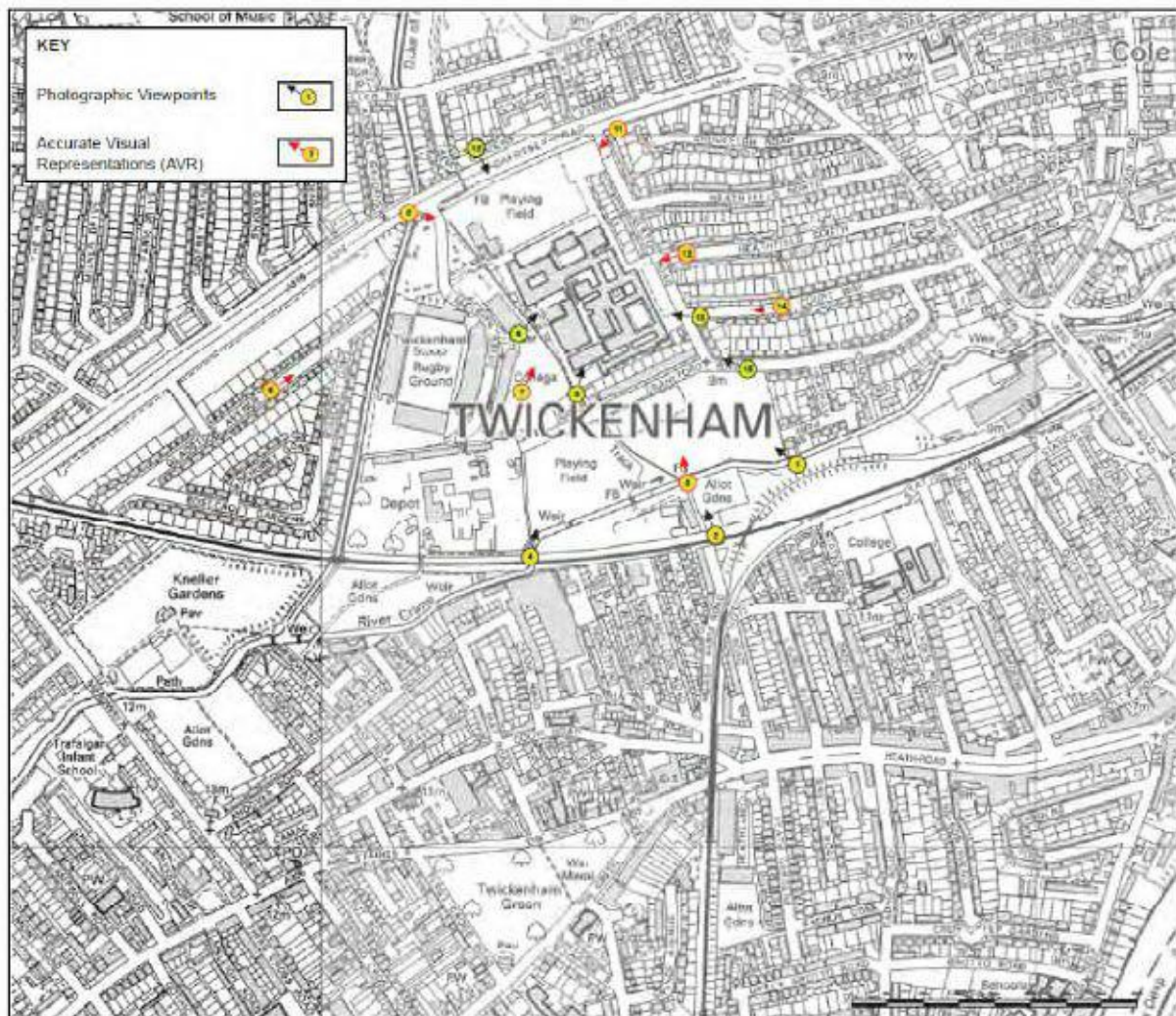
Commentary will be provided to ensure that the basis of the reasoning and judgement is clear and transparent. The assumptions will be clearly set out. It should be recognised that whilst the magnitude of change can be objectively defined, judgements on the nature of the change and significance of the effect are subjective and based on the experience of the assessor. The assessment will be undertaken by a team experienced in undertaking townscape appraisal and visual impact assessment.

Photographs as existing from all of the locations identified on **Figure 13.1** will be provided and commentary on the effects arising from the proposed development provided. Where available, photographs of winter conditions will be provided for comparison.

A limited number of views will be selected for the preparation of accurate visual representations (AVRs). It is envisaged that up to 7 AVRs will be prepared from the locations marked in red on **Figure 13.1** to show the impact of the development from those locations based on a simple massing model. An additional AVR will also be completed for Richmond Hill, as a representative worst case position from the east. These will be based on a wireframe and will seek to test the worst case scenario. The effects on other receptors will be assessed having regard to the application drawings (parameter plans) and photographs.

AVRs will be prepared in accordance with relevant best practice including the Landscape Institute's Advice Note 01/11 'Photography and photomontage in landscape and visual impact assessment', to a level suitable for an OPA.

Figure 13.1 Location of Photo Viewpoints and AVRs³³



13.6 POTENTIAL MITIGATION

Should substantial adverse effects be identified, where possible mitigation will be built into the design of the scheme to avoid or reduce these.

A strategy for the reduction of residual moderate adverse impacts will be identified as part of this chapter if required.

13.7 CONSULTATION

Initial consultation was held with LBRuT (Chris Tankard and Marc Wolfe-Cowen) about the proposed photographic viewpoints and AVRs at the end of June/beginning of July 2014. It was agreed that an additional AVR would be included from Richmond Hill as a worst case view. However, there was also a comment about

³³ Plus one further AVR from Richmond Hill.

having a viewpoint from London Road. It is considered that there would be a limited view of the site from this location once the cumulative schemes are constructed (e.g. the postal sorting office). The need for a viewpoint from this location will be further explored with LBRuT. In addition, agreement with LBRuT will be sought with regards to the combination of photographs and photomontages/wire-frames which will be used to predict the degree of change proposed.

14 CULTURAL HERITAGE

14.1 INTRODUCTION AND KEY ISSUES

The cultural heritage assessment will assess the likely significant effects of the proposed development, and will incorporate a gazetteer of known heritage assets.

Key issues relevant to cultural heritage are outlined below:

- Possible impacts upon archaeological sites located within the Crane Archaeological Priority Area (APA) that includes the recreations grounds in the southern third of the site³⁴.
- Possible impacts upon as yet unrecorded archaeological features that may exist on the Kempton Park gravels upon which the site is located.
- Possible setting impacts upon Rosecroft Gardens Conservation Area and All Hallows Church, a Grade I Listed Building.

14.2 POLICY REVIEW

The relevant planning policies as set out in Section 4 will be reviewed as part of the EIA process.

14.3 EXISTING ENVIRONMENT

A gazetteer of known heritage assets is included in **Figure 14.1** and the designated sites in **Figure 14.2**, with full details of the existing baseline (identified from the desk-based study and initial walkover survey) are provided in **Appendix 14.1**.

14.3.1 Designated Heritage Monuments

There are no designated monuments (Scheduled Monuments, Listed Buildings, Registered Park and Gardens or World Heritage Site) located within the site.

There are 27 Listed Buildings located within the wider study area (OA 8, 9, 12, 14, 15, 17, 18, 21, 22, 24, 25, 32, 33, 35, 36, 38, 40, 41, 45-47, 49, 50 and 53-56). Of these, one; the Church of All Hallows (OA 53) located 525m to the north east of the site, is Grade 1, while the underground passage that runs between St Catherine's School and Radnor Lodge c 723m to the south east of the site (represented by two separate entries; OA 24 and 25) is a Grade II* structure. The remaining 24 Listed Buildings are Grade II. There is one Registered Park and Garden located within the wider study area. This is Pope's Garden, a Grade II garden and which is located 760m to the south east of the site.

³⁴ The Crane APA was established due to the presence of previously recorded industrial activity along the river. This area may also contain archaeological sites sealed below alluvial deposits in an area that was once marshland.

Conservation Areas

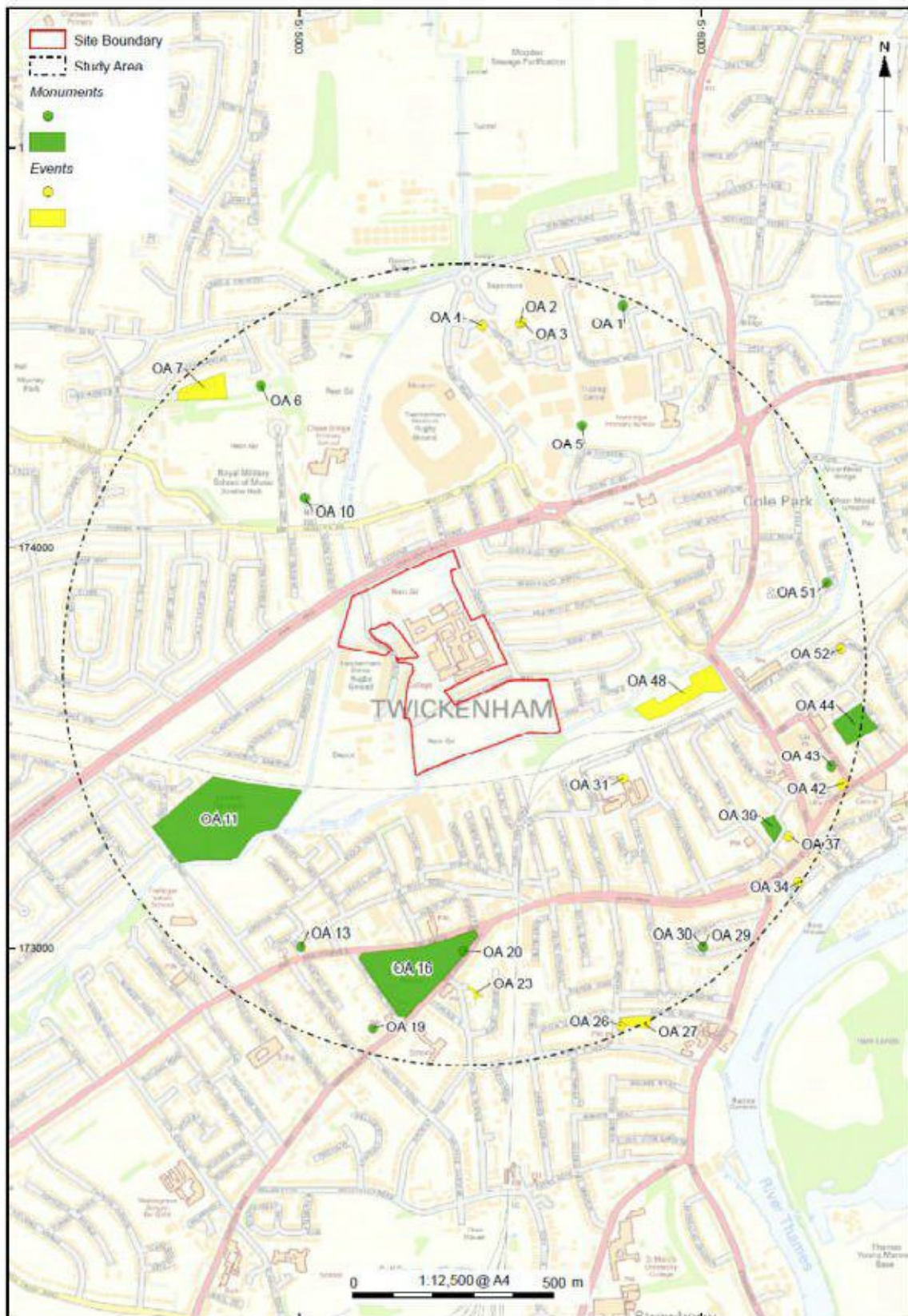
There are seven Conservation Areas (CAs), as defined by the LBRuT, located wholly or partially within the 1km wider study area (**Figure 14.2**). These are; Rosecroft Gardens CA, located immediately to the west of the site; Hamilton Road CA, c 140m to the south; Twickenham Green CA, c 380m to the south; Queen's Road CA, c 260m to the south east; Amyand Park CA, c 600m to the east; Pope's Avenue CA, c 775m to the south and Twickenham Riverside CA, located c 645m to the south east of the site.

Archaeological Priority Areas

The southern third of the site, currently occupied by recreation grounds, is located within the Crane Valley APA as defined by the LBRuT. This APA covers a zone on either side of the River Crane that has included a number of industries. Gunpowder manufacture was the most important of these Crane industries, one which was carried on for at least 400 years up to the 20th century. The River Crane was also used, at one time, for oil and paper mills, and a brewery. This part of the site was formerly marshland. Seasonal flooding could have sealed as yet unrecorded archaeological features below and between successive layers of alluvium. The remainder of the site is located upon Kempton Park Gravels which are known to contain Palaeolithic artefacts. These gravel terraces above the River Thames may have seen later prehistoric and Roman settlement although no evidence has been recorded within the site or the wider study area to this date.

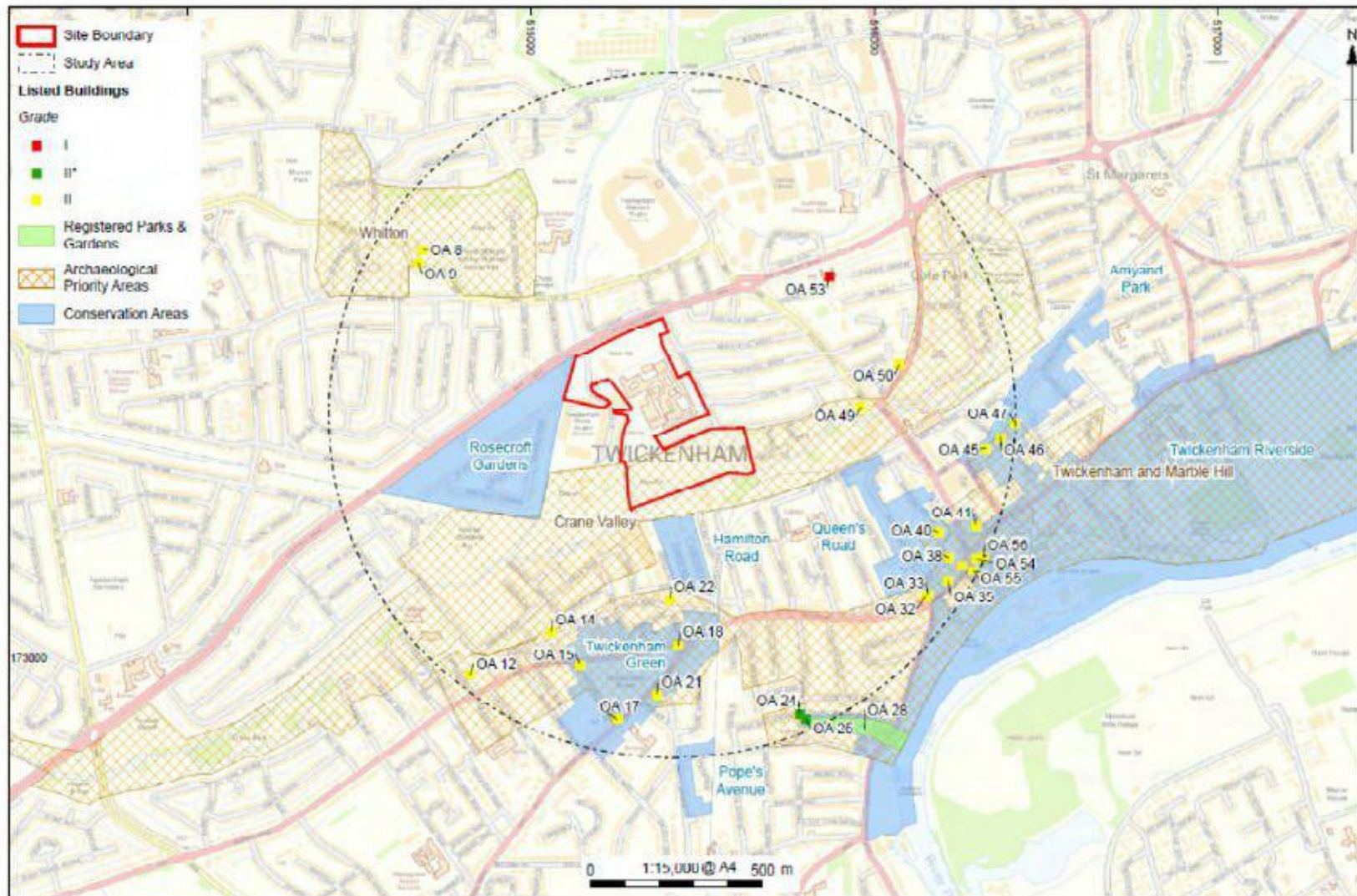
The wider study area also includes parts of the Whitton APA, which covers the medieval core of the village, in the north west and the Twickenham and Marble Hill APA, which covers the early medieval settlement core of the town that dates back to the 8th century, in the south.

Figure 14.1 Heritage Assets



Note: Red line boundary on drawing is larger than proposed OPA boundary. See Appendix 14.1 for details of assets.

Figure 14.2 Designated Heritage Sites



Note: Red line boundary on drawing is larger than proposed OPA boundary. See Appendix 14.1 for details of sites.

14.3.2 Archaeological Baseline

Geology

The site is located on London Clay Formation, made up of clay and silt. This is a Sedimentary Bedrock formed approximately 34 to 56 million years ago in the Palaeogene Period. Above the clay is a superficial deposit of Kempton Park Gravel Formation formed of sand and gravel. These gravels have been deposited over the past 500,000 years (BGS website).

Potential Previous Impacts

Parts of the playing fields to the north of the college buildings may have been impacted by the construction of air raid shelters during the Second World War. There is still some archaeological potential here. The construction of the current college buildings is likely to have had a major impact on any buried archaeological features within the structure's footprint. The archaeological potential within the building footprint is low. The open area immediately to the west of the college contains two large modern earthworks, possibly associated with a block of modern flats. This area appears to have been extensively disturbed although its impact upon the gravels beneath is unclear at this stage.

Site Walkover Survey

A walkover survey of the site was carried out in May 2014, with no new heritage assets identified.

The college buildings all appear to date from the mid- to late-20th century and are mostly constructed of brick and are between one and two storeys in height. The sports field to the north of the college is flat with the buildings of a sports club in the far south west corner.

Immediately to the south west of the site is an area of open ground covered with grass which is taken up with two large circular mounds, each with a flattened summit. A broad rectangular-sectioned depression is located between the two mounds. These earthworks are believed to be modern in origin and possibly associated with the development of the flats located immediately to the west (Challenge Court).

14.4 SENSITIVE RECEPTORS AND POTENTIAL ENVIRONMENTAL EFFECTS

The section of the site located within the Crane Valley APA that has not been heavily impacted by modern development (the playing fields to the south of the college) is considered to be a receptor of high sensitivity. Any groundworks, foundation excavations or piling activity associated with the proposed development would

impact heavily on any as yet unrecorded archaeological features and potentially have a major effect. It is currently understood that no such disturbance is proposed in this area of the site as the playing fields will be retained.

The proposed development will have no impact upon the settings of, or views from, 26 of the 27 Listed Buildings located within the wider study area as these are hidden from the site either by trees or by 20th century housing developments.

The proposed development may have a possible impact upon the views from the Grade I Listed Building of All Hallows Church (OA 53). Although this building is located c500m to the north east of the site, the church tower is an exceptionally tall structure within an area of otherwise low-lying 20th century buildings with clear inter-visibility between the church and the site. Potential impacts to key views from the Listed Building will require further assessment during the preparation of the EIA. The predominant character of the area is one of one to two-storey 20th century houses and offices and open spaces with minor and major roads. The church tower therefore commands expansive views in all directions and these are very likely to include the college site.

The proposed development is likely to impact upon the views from and setting of, the Rosecroft Gardens CA, which is located immediately to the west of the Harlequins Stadium. The far north east corner of Rosecroft Gardens CA and the far north west corner of the site are divided by a thin line of mature and semi-mature trees, offering broken views between the two areas. Any new development could impact upon views from the CA and will also impact upon its immediate setting.

The southern boundary of the proposed development comes within 50m of the Hamilton Road CA. These two areas are divided by a line of mature trees and an area of 20th century housing which obscures the CA from the site, leaving no clear or partial views between the two. Development will have no impact upon this CA.

14.5 ASSESSMENT METHODOLOGY

14.5.1 Data Gathering

A search of the Greater London Historic Environment Record (GLHER) has been carried out for the area of the site and for a wider study area of 1km around it.

The data supplied by the GLHER has been used as the basis for the baseline study presented above, together with the features mapping in **Figures 14.1** and **14.2**.

All available historic map data that shows the site has been collected from the LBRuT Local History Centre and the London Metropolitan Archive. A walkover survey of the site was conducted on 7 May 2014.

It is felt that the data supplied by GLHER will be sufficient to act as the basis for a baseline study in the EIA, noting the following:

- No further historic map evidence needs to be retrieved, although further historic research on the local history of the area will need to be carried out for the EIA.
- A re-visit will need to be carried out following the provision of further design information in order to fully assess the impacts on the settings of and views from All Hallows Church and Rosecroft Gardens Conservation Area.
- Any existing geotechnical or other ground survey reports will be accessed in order to be able to assess the underlying geology of the site and the extent of past disturbances. The data gathered from ground investigations within the site will be utilised to gain insight into the nature and position of the underlying gravel and clay deposits along with the extent of disturbed overburden how these will be directly affected by the proposed development.
- Any aerial photographs of the area that are held by the National Aerial Photographic Library at the NMR in Swindon, will also be studied in case any of these show details of previous buildings as well as soilmarks or cropmarks of archaeological sites or palaeo-channels of the former line of the River Crane.

The assessment will also aim to re-create the later post-medieval land-use in and around the site, utilising maps from the 18th-century (Rocque) and 19th century (Milne 1800, the parish enclosure map of 1819 and Warren, 1846). Ordnance Survey maps from the late 19th century onwards will also be used.

The site will be re-visited once further plans and elevations of the proposed development are available in order to clarify potential setting or construction impacts.

14.5.2 Assessment

The baseline study will be followed by an assessment of the cultural heritage resource within the study area and an analysis of the potential impacts of the proposed development upon this resource.

Setting effects will be defined using two English Heritage guidance documents; The Setting of Heritage Assets, (2012) and Seeing History in the View (2011).

The proposed development will be described with reference to parameter plans and supporting information. The potential impacts of the scheme on the heritage assets set out in the baseline study will then be considered using the definitions laid out in Design Manual for Roads and Bridges, volume 11, Section 3, 5.32-4.

Impact Magnitude and Significance

Determination of the importance of receptors (sites and features) will be based mainly upon existing designations, but allows for professional judgement where features are found that do not have any formal national or local designation. **Table 14.1** contains the criteria used to assess probable importance of receptors.

Table 14.1 Criteria Used to Determine Importance of the Receptor

Importance/ sensitivity of receptor	Equivalent to:
Very High	World Heritage Sites (including nominated sites). Sites, buildings or landscapes of acknowledged international importance. Historic landscapes of international value, whether designated or not. Extremely well preserved historic landscapes with exceptional coherence, time depth or other critical factors.
High	Sites or structures of demonstrated national importance, such as: <ul style="list-style-type: none"> • Scheduled Monuments. • Grade I and II* Listed Buildings. • English Heritage Registered Park and Gardens Grade I/II* Undesignated assets of schedulable quality or importance. Undesignated landscapes of high quality and importance and of demonstrable national value. Well preserved historic landscapes exhibiting considerable coherence, time depth and/or other critical factors.
Medium	Important sites on a Regional or district level, such as: <ul style="list-style-type: none"> • Grade II Listed Buildings. • Conservation Areas. • Sites with a regional value or interest for research, education or cultural appreciation. Averagely well preserved historic landscapes with reasonable coherence, time-depth or other critical factors.
Low	Important sites on a local or parish level, such as: <ul style="list-style-type: none"> • Locally Listed Buildings • Sites with a local or parish value or interest for research, education or cultural appreciation. Robust undesignated historic landscapes. Historic landscapes with importance to local interest groups.
Negligible	Sites or features with no significant value or interest or sites that are so badly damaged that too little remains to justify inclusion into a higher grade. Landscapes with little or no significant historical interest
Uncertain	Possible archaeological sites for which there is limited existing information. It has not been possible to determine the importance of the site based on current knowledge. Such sites might comprise isolated findspots or cropmarks visible on air photographs.

Source: adapted from Design Manual for Roads and Bridges (DMRB) (HA 208/07)

Assessment of Magnitude of Change

There are a number of variables in determining magnitude of change and these are laid out in **Table 14.2**. These include the sensitivity or vulnerability of a site to change (for example the presence of made-ground), the nature of past development or management effects, and the differing nature of proposed development processes such as piling and topsoil stripping.

Table 14.2 Criteria Used to Determine Magnitude of Change

Magnitude of Change	Description of Change
High	Complete destruction of the site or feature. Change to the site or feature resulting in a fundamental change in the ability to understand and appreciate the resource and its historical context and setting. This could be either adverse or beneficial.
Medium	Change to the site or feature resulting in an appreciable change in the ability to understand and appreciate the resource and its historical context and setting. This could be either adverse or beneficial.
Low	Change to the site or feature resulting in a small change in the ability to understand and appreciate the resource and its historical context and setting. This could be either adverse or beneficial.
Negligible	Negligible change or no material change to the site or feature. No real change in the ability to understand and appreciate the resource and its historical context and setting.
Uncertain	Extent and exact location of archaeology is uncertain; impact is therefore uncertain or because precise construction methods/impacts are uncertain.

Source: adapted from Design Manual for Roads and Bridges (DMRB) (HA 208/07)

The importance and/or sensitivity of the receptor and the magnitude of change are combined to indicate the significance of predicted effects, as shown in **Table 2.1**.

It should be noted that **Table 2.1** is a starting point to guide decisions on significance of effect. Decisions will be based on professional judgement and in some circumstances it may be judged necessary to deviate from **Table 2.1**. Any deviations will be clearly recorded and justified.

Assumptions and Limitations

Every effort will be made to assess the likely potential of the area to contain below ground archaeological deposits using the above sources/survey techniques. However no site investigation can ensure complete assessment or prediction of the potential for areas to contain below ground archaeological deposits. Assessment of the likely risk of encountering hitherto unsuspected and significant deposits will be provided as part of the EIA.

14.6 POTENTIAL MITIGATION

Possible mitigation could include changes to the design of the proposed development in order to make the final structure seem more sympathetic to the character of the designated assets and therefore lessen the impact upon them.

Possible mitigation that may be required during demolition and construction is discussed below, and will be included in the outline CEMP as necessary.

14.6.1 Demolition

Once demolition is underway, the removal of wall foundations, basements and services may expose previously undisturbed deposits that may include archaeological features, resulting in impacts to the cultural heritage resource. The potential impacts of such works could be mitigated by the presence of an archaeologist to monitor sensitive demolition works and to identify and record any archaeological features that may be exposed and/or impacted, as necessary.

14.6.2 Construction

Archaeology

As requested, archaeological monitoring of groundworking phases of construction could mitigate the impact that the excavation of foundation trenches, basements, service trenches and the construction of access roads may have on as yet unrecorded archaeological features that may exist within the site. Exposed features would be identified and recorded by the archaeologists present.

Built Heritage

The construction phase may impact upon the setting of and views from, Rosecroft Gardens CA and upon views from the tower of the Church of All Hallows (OA 53), a Grade I Listed Building. This could be mitigated by the screening of the works. Nearby Listed Buildings may also suffer temporary adverse effects through increased noise, traffic movements and vibration. Mitigation measures to remove or reduce any such effects will be defined during the study and may include screening of the proposed development site and relocation of sensitive access routes.

14.6.3 Operation

Built Heritage

Long-term screening of the proposed development from Rosecroft Gardens CA and from the tower of All Hallows Church (OA 53) may be deemed as desirable if the nature of the proposed development is considered to have had an impact on either the settings of or views from these two sites.

14.7 CONSULTATION

As the assessment progresses, consultation will be carried out with the relevant English Heritage officer (Greater London Archaeological Advisory Service Inspector for Richmond-upon-Thames) and the LBRuT Conservation Officer.

15 SOCIO-ECONOMICS

15.1 INTRODUCTION AND KEY ISSUES

The purpose of this assessment will be to consider the key socio-economic impacts associated with the proposed development, during both the construction and operational stages.

It is anticipated that the main socio-economic considerations are likely to be the impacts on the local labour market, housing market, education facilities and community facilities including recreation and open space/playing fields and green chains.

15.2 POLICY REVIEW

National, regional and local planning policies relevant to the socio-economic and community impacts of the proposals will be reviewed and summarised. This review will focus on economic development and employment policies and policies relating to education and sports facility provision. In addition, the relevant planning policies as set out in Section 4 will be reviewed as part of the EIA process.

15.3 EXISTING ENVIRONMENT

In order to assess the likely socio-economic impacts of the proposed development, the economic and labour market characteristics of the study area will be examined including; its demographic profile, trends in the local economy, indices of deprivation, and labour market indicators (including unemployment rates, commuting patterns, income levels and skills levels of the work force). This will establish any strengths and weaknesses of the local economy that the construction or operation of the proposed development may affect.

To establish housing market impacts, current and future planned housing needs in the Borough will be reviewed, including LBRuT's objectively assessed housing need and related evidence base documents.

In terms of social and community impacts, a baseline assessment of the current provision of educational and recreational facilities within the local area will be identified, along with any deficiencies or surplus capacity in such provision and any planned new facilities. This will include consideration of the current provision of sport pitches and playing fields in the local area.

This baseline will be established using a combination of data sources including nationally published statistics from Office of National Statistics (ONS), Department for Communities and Local Government (CLG) and the Department for Business,

Innovation and Skills (BIS), Sport England data sources as well as local data from LBRuT.

15.4 SENSITIVE RECEPTORS AND POTENTIAL ENVIRONMENTAL EFFECTS

The potential sensitive receptors during the construction and operational phases include: the local labour market; housing market and community infrastructure, which have been scoped into the assessment as summarised in **Table 15.1** below. Impacts on the local labour market will arise during both the construction and operational phases, whilst housing market and community infrastructure impacts will arise upon completion.

Each of these receptors will be subject to the potential impacts outlined below, which will be assessed based on the scale of the change over the baseline position, as well as the nature and context of the impact. Impacts will be identified on a matrix basis from major adverse through to major beneficial, representing the scale of impacts above and beyond the baseline position. Where possible, the scale of impact will be quantified in relation to current conditions under each receptor. Where relevant, the location of the impact and its likely duration will be considered.

Table 15.1 Scope of Assessment: Socio-Economics

Potential Sensitive Receptors	Potential Impact	Potential Effect	
		Scoped In	Scoped Out
Local labour market	Job creation during construction and operational phases	✓	
Housing market	Additional housing supply to meet local housing needs during operation	✓	
Community infrastructure (including education and health)	Demands arising from new population.	✓	
Recreation, open space and green chains	Change in provision of sports facilities and playing fields, and additional/improved provision to be provided by operation of the development.	✓	

15.5 ASSESSMENT METHODOLOGY

Employment impacts of the proposals will be assessed by estimating employment generation both from the construction and operational phases of the scheme.

The likely employment impacts of the proposals during the construction phase will be assessed by estimating employment generation from the construction cost of the scheme. Appropriate employment multipliers will be applied to direct employment

to estimate the indirect employment, taking account of expected expenditure by the operation and its employees in the local economy.

For operational employment, this will involve applying typical employment densities to the proposed amount of floorspace for the different components of the scheme and operator estimates. As there are existing jobs on-site, net increases/ decreases will be quantified. Appropriate employment multipliers will be applied to estimate the indirect and induced employment generated by the proposed development. The number, occupation profile and status (full/part-time) of the jobs likely to be created will be identified. The significance of the overall employment effects on the local labour market will then be assessed, taking into account unemployment levels, economic activity rates, commuting patterns, the skills levels of workers available and any training initiatives available.

Any effects of the proposed development on stimulating additional spin-off investment or other economic activity in the local and wider economy will be evaluated, including contribution to relevant economic objectives. The potential of the proposals to attract other proposed development or investment to the wider area will be considered.

Impacts on current commuting flows will be assessed, taking into account the nature of the new jobs proposed on the site, current unemployment levels and skills in the area and likely future changes in employment in the local area.

The assessment will consider changes in population arising from the additional population the development will accommodate by applying forecast average household size to the dwelling mix proposed.

In terms of housing, the assessment will consider impacts upon the provision of housing and how the proposed development will assist the local authority in meeting its objectively assessed need housing target, including affordable housing provision. It will also provide commentary on how increased housing supply will impact on the existing market.

The social and community impacts linked with proposed development of educational and sport and recreational facilities will be considered by assessing their contribution to local, regional and national benchmark standards, where possible, as well as comparing it to the baseline position. This exercise will assist in identifying any deficiencies or surplus capacity in such provision. For education, this will involve assessing the likely pupil yield of the scheme within the context of existing and proposed provision. Wider social and community impacts will also be explored in a qualitative manner.

15.6 POTENTIAL MITIGATION

The need for any mitigation measures to address adverse effects or to maximise positive socio-economic effects will be considered, drawing upon experiences and successful initiatives from elsewhere. This could include maximising use of local firms and resources during construction, and encouraging local recruitment for any new job opportunities created and exploring the potential to allow local communities to access new school places and sports and recreational facilities.

15.7 CONSULTATION

Consultation will be undertaken with relevant statutory consultees, community infrastructure providers and economic development officers within the LBRuT as necessary.

16 SUMMARY OF KEY ISSUES

A summary of the key issues scoped into the EIA, covering the main potential environmental impacts envisaged that could arise from the demolition, construction and operation of the proposed development are given in **Table 16.1**. This includes both negative (adverse) and positive (beneficial) impacts.

Table 16.1 Summary of Key Issues

EIA Topic	Potential Environmental Impacts
Transport	<ul style="list-style-type: none"> • Increase in traffic generated during the demolition and construction phase (Heavy Goods Vehicles (HGVs), staff car movements etc), car parking provision during demolition and construction. • Potential increase in vehicle movements on the local and wider road networks during operation including capacity issues at junctions. • Operational car parking provision requirements for all landuses. • Implications on public transport network during all development phases.
Noise and vibration	<ul style="list-style-type: none"> • New noise and vibration sources during demolition and construction and impacts on receptors both within and around the site. • Changes to the existing noise climate at sensitive receptors located around the site and the access routes associated with operation of the completed development. • The effects of existing noise sources on new sensitive receptors within the development.
Air quality	<ul style="list-style-type: none"> • Localised changes in levels of road traffic pollutants caused by exhaust emissions from construction traffic, traffic congestion or increased traffic flows on the local road network including diversionary routes during construction. • Creation of dust emissions from construction materials, plant and machinery, and associated nuisance. • Localised changes in levels of road traffic pollutants resulting from traffic on routes to and from the site(s) , during the operational phase.
Ground conditions	<ul style="list-style-type: none"> • Potential sources of contamination on site and creation of pathways impacting sensitive receptors. • Impacts of potential contamination left in-situ. • Management of potentially contaminating materials arising from clearance, demolition and construction.
Waste	<ul style="list-style-type: none"> • Appropriate management and disposal of wastes arising during construction and operation of the development. • Identifying opportunities for waste minimisation and reuse and recycling of materials and waste during construction and operational phase. • Achieving compliance with waste legislation in all phases.
Water and flood risk	<ul style="list-style-type: none"> • Changes to water quality and turbidity in surrounding watercourses during construction. • Changes to groundwater flow as a result of below ground works and structures. • Changes to flood risk within the catchment of the River Crane. • Changes to site drainage and runoff patterns from the new operational site and the requirement for Sustainable Drainage Systems (SUDs). • Changes in potable water supply and foul water drainage capacity.
Daylight, sunlight and overshadowing	<ul style="list-style-type: none"> • Potential reduction in daylight and sunlight levels at existing residential properties and gardens on Egerton Road, Craneford Way and Langhorn Drive. • Effects on daylight and sunlight within new residential element.
Ecology	<ul style="list-style-type: none"> • Direct habitat loss to adjacent designated sites and ecologically significant habitats. • Mortality or harm to protected or ecologically significant species within the footprint of the site. • Deterioration or fragmentation of surrounding habitats and disturbance of protected or ecologically significant species within surrounding habitats. • Opportunities for biodiversity enhancement and gain.

EIA Topic	Potential Environmental Impacts
Landscape and visual amenity	<ul style="list-style-type: none"> • Potential change to the townscape character of the site and surrounding areas - appropriateness of the scale, mass and design of the proposed for its townscape context and the effect on trees that play a notable role in the townscape. • Change in views and visual amenity.
Cultural heritage	<ul style="list-style-type: none"> • Possible impacts upon archaeological sites located within the Crane Archaeological Priority Area (APA). • Possible impacts upon as yet unrecorded archaeological features that may exist on the Kempton Park gravels upon which the site is located. • Possible setting impacts upon Rosecroft Gardens Conservation Area and All Hallows Church, a Grade I Listed Building.
Socio-economics	<ul style="list-style-type: none"> • Impacts on the local labour market, housing market, education facilities and community facilities. • Changes to provision of recreational facilities and open space/playing fields.

17 PROPOSED STRUCTURE OF THE ES

The proposed structure of the ES is set out below, based on the EIA Regulations and current best practice.

Non-Technical Summary

This will provide an accurate and balanced summary of the key information in the ES and supporting documents, in non-technical language so that it is easily accessible by the general public. The Non-Technical Summary (NTS) will be produced as a standalone document.

Environmental Statement

This will contain the findings of the EIA process and will be reported in accordance with the EIA Regulations. The likely chapter headings are set out below:

- Introduction
- EIA Methodology
- Existing Land Uses and Alternatives
- Alternatives and Design Evolution
- The Proposed Development
- Development Programme and Construction
- Transport
- Noise and Vibration
- Air Quality
- Ground Conditions
- Waste
- Water Resources and Flood Risk
- Daylight, Sunlight and Overshadowing
- Ecology
- Townscape and Visual Amenity
- Cultural Heritage
- Socio-economics
- Cumulative Effects
- Summary of Residual Effects

Technical Appendices

Where necessary, these chapters will be supported by associated technical appendices. These will include:

- Transport Statement.
- Travel Plans.
- Flood Risk Assessment.
- Outline Construction Environmental Management Plan.