5 DEMOLITION AND CONSTRUCTION ENVIRONMENTAL MANAGEMENT

Introduction

5.1 This chapter sets out the demolition and construction works of the proposed development and the key activities that would be undertaken during the works. This chapter also describes the management controls that form part of the development proposals that would be implemented to avoid, minimise and where not possible, mitigate the magnitude of potential environmental impacts.

5.2 Impacts arising during the construction and demolition processes are temporary, generally short-term and intermittent. Nevertheless, they can be sources of potentially significant effects on environmental resources and residential amenity.

5.3 It is not possible to predict in detail the specific environmental impacts and effects that may arise from the proposed development's demolition and construction works as detailed construction method statements and specifications have not yet been prepared and construction contractors not yet appointed. However, it is possible to establish the potential broad environmental impacts associated with the proposed development's demolition and construction works and to determine a framework for the management of these impacts to ensure that significant adverse effects are avoided. The framework would form the basis for a Construction Environmental Management Plan (CEMP), if required, to be implemented during the demolition and construction works. It is anticipated that the CEMP would be secured by means of an appropriately worded planning condition.

5.4 The CEMP would be prepared in accordance with standard best practice and regulatory requirements. The CEMP would include a Construction Traffic Management Plan (CTMP), as well as a Site Waste Management Plan (SWMP).

5.5 More specifically, the CEMP would set out policies, legislative requirements, thresholds/limits, procedures, roles and responsibilities relevant to the implementation of environmental and management controls throughout the duration of the works. The CEMP would be discussed and agreed with RBC in advance of works commencing on-site.

5.6 An outline of the anticipated environmental issues and necessary management controls that would be covered within the CEMP is provided within this chapter.

5.7 It is standard practice to allow the appointed Principal Contractor substantial input into documents such as the CEMP, CTMP and SWMP. However, at this stage of planning, contractors have not yet been appointed and detailed method statements have not yet been prepared. Nevertheless, the likely content of such documents can be reasonably predicted. As such it is considered that the identification and assessment of likely environmental effects is still achievable in the ES.

5.8 It is important to note that while this chapter does not assess the magnitude of potential impacts, nor the significance of likely effects during the demolition and construction works, as this is dealt with in individual technical assessments within ES Volume 1 (Chapters 6 - 10) and ES Volume 2 (Chapters 1 - 2). Controls set out in this chapter have been considered as embedded mitigation within of each technical assessment.

Programme of Works

5.9 Given the outline nature of the application, a detailed development programme has not yet been prepared. To enable assessment of likely environmental effects within this ES, an indicative, but feasible, programme has been developed by the Applicant based on a number of assumptions. These assumptions have been informed by an understanding of current and future projected market conditions, technical considerations and professional experience, all of which are considered to be reliable.

5.10 The indicative development programme is shown in Table 5.1 and is based on the assumption that planning consent is secured, and demolition begins in Q2 2021. For the purposes of the EIA, the development works are anticipated to be delivered in four phases and undertaken over a 51-month period, with completion targeted for Q2 2025.

5.11 The demolition of the existing on-site buildings and construction of the new buildings would take place sequentially in overlapping phases from west to east across the application site. Phase 1 would involve the demolition of the existing TGI Fridays and construction of Plot A. Phases 2 and 3 would involve the demolition of the existing Mothercare, Aldi and Majestic Wine buildings and the construction of Plot B and C. Finally, Phase 4 would involve the demolition of the Range and the construction of Plot D.

Table 5.1: Indicative Development Programme

Phases	Duration (weeks)	Commencement Date	Completion Date
Phase 1			
Demolition of existing TGI Fridays	12	06/04/2021	30/06/2021
Construction of Plot A Substructure	8	01/07/2021	25/08/2021
Construction of Plot A Superstructure	20	09/08/2021	10/01/2022
Construction of Plot A Envelope	30	01/11/2021	16/06/2022
Fitout of Plot A	56	17/01/2022	03/03/2023
Phase 2			
Demolition of existing Mothercare, Aldi and Majestic Wine	12	11/10/2021	14/01/2022
Construction of Plot B Substructure	10	17/01/2022	25/03/2022
Construction of Plot B Superstructure	22	02/03/2022	08/08/2022
Construction of Plot B Envelope	32	27/05/2022	24/01/2023
Fitout of Plot B	66	01/08/2022	27/11/2023
Phase 3			
Construction of Plot C Substructure	10	01/08/2022	10/10/2022
Construction of Plot C Superstructure	22	15/09/2022	01/03/2023

Table 5.1: Indicative Development Programme			
Construction of Plot C Envelope	32	07/12/2022	08/08/2023
Fitout of Plot C	74	22/02/2023	19/08/2024
Phase 4			
Demolition of existing The Range	12	25/04/2023	19/07/2023
Construction of Plot D Substructure	8	20/07/2023	14/09/2023
Construction of Plot D Superstructure	20	29/08/2023	29/01/2024
Construction of Plot D Envelope	30	20/11/2023	04/07/2024
Fitout of Plot D	65	05/02/2024	29/05/2025

Description of Works

Background

5.12 The proposed development would comprise the demolition of the two existing on-site buildings and the construction of four new buildings across Plots A-D.

5.13 The outline sequencing of construction works is identified below:

- Establish site including hoarding installation, welfare and any tree protection;
- Establish vibration and noise monitoring points;
- Enabling works including isolation of existing utilities;
- Asbestos removal following surveys within the existing buildings (where identified)
- Soft strip followed by hard demolition followed by grading to car park existing surface;
- Piling works;
- Utilities and drainage installation;
- Capping beam construction and ground floor slab;
- Superstructure core construction;
- Superstructure concrete frame and slabs;
- Envelope works;
- Roofing works;
- External landscaping and retail shop fronts;
- Internal fit out works commence as soon as areas are weather tight – temporary weathering scheme to be adopted to advance (every 5th floor);
- Internal works ahead of permanent weathering;
- Mechanical, electrical and plumbing (MEP) main plant installation and infrastructure to commence as soon areas are cleared and weatherproofed;
- Testing and commissioning (this would be an on-going process); and
- External works.

Enabling Works

5.14 The aim of the enabling works phases would be to establish the construction site.

5.15 The enabling works would include the following works:

- Undertaking appropriate pre-commencement surveys and investigations;
- Establishment of construction compound;
- Diversions and stopping up of existing utilities; and
- Possession of the existing on-site buildings.

5.16 Prior to commencement of works, the following third parties would be contacted and notified, as appropriate:

- RBC (to make arrangements regarding the commencement of demolition works and provide notification regarding hoarding licences, Section 61 agreement);
- Local resident liaison meetings;
- Highway and byways agencies (meetings to discuss logistics);
- Statutory utility companies (to make notifications regarding the location and termination of supplies into the application site and provision of necessary temporary supplies);
- Police and Fire Brigade (to be notified);
- Health and Safety Executive (HSE) (to be notified); and
- Environmental Health Office (to be notified).

5.17 All necessary awards, boundary agreement and permissions would be arranged and be put in place by the Applicant, before works commence on-site.

Pre-Commencement Surveys, Investigations, Consents and Licences

5.18 Prior to the commencement of the works, it is anticipated that the following investigations and activities would be required and secured by means of an appropriately worded planning condition:

- Asbestos Surveys of the buildings to be demolished;
- Geotechnical Investigations;
- Site Investigations (SI) works;
- CAT Scan of existing services; and
- Preparation of tender documents and method statements.

5.19 There would be a draining down and removal from site of pollutants/contaminants such as refrigeration gases, diesel fuel and engine oils, if any. In the event that asbestos is found within existing buildings, controlled and verified removal of the asbestos and any other hazardous material from such buildings would be undertaken.

5.20 Controlled and verified removal of asbestos or hazardous materials would be taken to an approved reception/disposal facility and in accordance with Control of Asbestos Regulations 2012[1], the Construction (Design and Management) Regulations 2015[2] and under a licence from the Health and Safety Executive (HSE).

5.21 Geotechnical and SI works would be required to inform the detailed structural design and to confirm ground conditions at the application site.

5.22 A Preliminary Risk Assessment has been undertaken of the application site and indicates the potential for contamination to exist (see Volume 3: Technical Appendix 2.3). In the event that contamination is identified following SI works, it would be dealt with by means of an appropriate Remediation Strategy to be secured by means of an appropriately worded planning condition.

[1] HMSO, 2012. Control of Asbestos Regulations 2012. HMSO.

[2] HMSO, 2015. Construction (Design and Management) Regulations 2015. HMSO.

Diversions and Existing Services

5.23 In addition to the above, the locations of existing apparatus, curtailment locations, diversions and de-activation of existing electricity transformers at the application site would be confirmed with service companies. The curtailment of existing domestic services would be arranged, as well as, the cut-off of existing private drainage within the boundary of the application site. Additionally, the protection and maintenance of the existing services would be carried out through liaison with the appropriate service companies to ensure continuity of supply.

Site Offices/Welfare Facilities and General Site Access

5.24 Hoarding would be erected around the application site perimeter or particular phase, as appropriate. The design of the hoarding would be agreed with RBC in advance. However, it is anticipated that the hoarding would comprise a 2.4 m high solid timber fence. The Principal Contractor would be required to maintain the hoarding to provide full security and safety for the general public. The hoarding would provide visual and acoustic screening of the application site from road level, as well as ensure the safety of pedestrians and vehicles.

5.25 The location of site accommodation and welfare facilities, such as drying rooms and toilets, would be agreed with RBC prior to commencement of works.

5.26 Separate access gates would be provided for pedestrian and vehicular access into the application site. Suitable security measures would be installed and operated, including 24 hours security as appropriate.

Temporary Works

5.27 Some temporary works would be necessary during the course of the proposed development demolition and construction stage, in order to protect the public and ensure the structural integrity of the construction works as they progress. These would range from simple propping of hoardings, to scaffold protection fans and crash decks for public protection, and temporary propping of temporary structures such as loading platforms. In all cases, these works would comply with legislation and would be designed and managed by the Principal Contractor who is obliged by law to employ a Temporary Works Co-ordinator.

5.28 Opening up works, where necessary, would be carried out to confirm assumptions made of the structure during the tendering process and to confirm the appropriateness of the demolition methodology. The demolition contractor would also utilise the existing record and archive drawings to produce temporary works solutions for back propping to the demolition floors and crane location requirements.

Demolition Works

5.29 The sequence of demolition allows the retail park to continue partial operations, as opposed to a wholesale decant.

5.30 Prior to the commencement of the hard demolition, a thorough soft strip of the existing buildings would take place. The soft strip would commence with the removal of all potential asbestos identified through the demolition and refurbishment asbestos survey, to be undertaken by licenced contractors.

5.31 The buildings would be demolished by means of a pneumatic scissors and concrete breaker. Materials suitable for crushing would be crushed, graded and stockpiled with some re-use within the application site. The remaining that cannot be recycled on-site is likely to be transferred to suitable tipper or waste haulage vehicles and removed off-site.

Construction Works

5.32 The construction works described in the following sections have been developed by the Client's appointed construction advisor, Mace, and describe the envisaged method of construction for the proposed development based on what is currently known about the application site and the development proposals, as well as standard industry practice.

Piling and Substructure

5.33 Following the removal of the existing car park and structures, the installation of the piling mat at ground floor level would occur before the piling works commence. Tests would be undertaken to confirm the bearing capacity of the mat before the rigs are delivered. Guide walls would be formed prior to the piling in order to correctly align the piles.

5.34 It is envisaged around two piling rigs would install the foundations end bearing piles to support the structure. Continuous Flight Auger (CFA) or Rotary rigs would be utilised depending on the ground investigation survey and interpretive report. CFA piling would be the preferred method as this is less intrusive to receptors.

5.35 The capping beam works would progress in line with the programmed work sequence to maintain suitable spatial separation between the activities. Excavators would remove the pile mat to capping beam formation level, prior to steel being fixed, shutters positioned, and concrete placed.

5.36 On completion of the capping beam, the reduced dig would commence to allow the below ground rain water attenuation tanks to be installed, followed by the ground floor slab. The subsequent vertical structures and slabs would be cast leading to the completion of the new structure.

5.37 During the substructure activities, excavation and installation of utilities provisions would be carried out.

5.38 Once sufficient substructure is in place, the tower crane can be installed which would be used to complete the ground floor slab and ready to start the superstructure.

Building Cores

5.39 Following the completion of the ground floor slab, the construction of the concrete core would commence.

Superstructure

5.40 Once the core is fully complete, or even partially complete, the columns and new floor plates would commence.

5.41 Static concrete pumps (located at ground level) would be used to place the concrete floor slab. The tower cranes would be used to service the superstructure works and cast the vertical concrete encasement elements and load out the decking, shutters and reinforcement.

5.42 The above follows a traditional form of construction. Subject to the detailed design, a prefabricated modular system could be used which would reduce the time on-site and number of deliveries to the application site.

5.43 External hoists would be installed to the new floor levels to facilitate the early vertical distribution of materials and removal of waste. Hoists would be located in strategic locations where materials can be easily offloaded.

5.44 The application site crane strategy would be prepared in accordance with the appropriate Aviation, Highways and Rail obligations. Possible impacts of the crane strategy, should tower cranes be used, might include road closures which would normally be necessary for the erection and dismantling of the

cranes. The timing and requirements would be discussed and agreed with the local authority and highways. The crane strategy would dictate the routing of deliveries to the crane pick points.

5.45 For the purposes of the EIA, it is anticipated that concrete would be delivered via ready mix concrete trucks from surrounding batching plants.

5.46 Modern Methods of Construction (MMC) would be considered in the construction of the proposed development, subject to commercial and technical viability.

Building Envelope

5.47 With the frame complete, the façade installation can commence. This would start immediately once sufficient structure allows clearance above the work zone. The cladding would be installed with the tower crane, working bottom up.

5.48 Scaffolding would not be required if the cladding is prefabricated and installed from the floor slabs.

5.49 After a suitable curing period of the new roof slab to the buildings, roof waterproofing and finishes would commence. This would complete the envelope works and so achieve a water tight structure.

5.50 On completion of the façade works, each level would be inspected and signed off prior to any following trades commencing.

Fit Out

5.51 Fit out would commence following the installation of the external envelope to each floor. (Approximately three floors below the current level of envelope installation). Temporary weatherproofing measures would be installed on every 5th floor. The finishes would be loaded out via the external hoists serving each tower. Due to the floor layout, a 'hoist apartment' on each floor would be created. This apartment would be the last to be fitted out on each floor following the removal of the external hoist and the bringing into (beneficial) use of the permanent lifts.

5.52 The installation sequence to each apartment is currently anticipated to be as follows (although potentially subject to change):

- 1st fix partition walls;
- 1st fix services to walls and ceilings;
- 2nd fix partitioning and ceiling installation;
- Sub floor installation;
- Kitchen and bathroom fit out (possibly pre-fabricated);
- Decoration;
- Final fix of components, white goods, sockets, switches, blinds, signage and floor finishes; and
- Commission and clean.

5.53 Service risers within the common areas on each of the floors would be completed in advance of the individual apartments. Certain lift installations would be prioritised and completed early to allow the external hoist to be disconnected from individual floors and the remaining 'hoist apartment' fitted out. Common area finishes would be left as late as possible, to reduce the risk of damage. Finishes below ground would commence as soon as the structural works are completed.

Open Space, Public Realm and Road Works

Open Space and Public Realm

5.54 In respect of the newly introduced open space network and pedestrian friendly public realm, the following works would be undertaken on-site:

- Site levelling;
- Introduction of appropriate paved materials; and
- Provision of play equipment and street furniture, including litter bins, benches, signage and lighting.

Roads Works and Access Arrangements

5.55 Construction of access roads, internal streets and surface parking would be undertaken. The primary access road would be delivered in advance of this. Works would also include layering of road fill material, levelling, compaction and finishing off with specified material such as bitumen tarmac and paving blocks.

Landscaping Works

5.56 Installation of the proposed soft landscaping would only commence upon completion of associated construction and fit out works to minimise potential plant material loss. Clean topsoil would be imported to fill and shape lawn and landscaped areas, with subsoil used on the strategic areas of open space.

Utilities and Service Installation

Electricity

5.57 The main electrical point of connection (POC) to each plot would be from proposed new SSE (Scottish and Southern Electricity Network) substations located around the application site. These connections would be in addition to the existing supplies which would be retained to provide temporary power during construction.

Gas

5.58 Gas is not proposed for the proposed development.

Water

5.59 The point of connection for the water supply would be located along Vastern Road, taken from the existing Thames Water owned water main.

5.60 The water demand of the proposed development would be calculated according to the size and number of the proposed residential units. Upgrade work may be required for the proposed development to the existing local mains. This would be subject to detailed development.

5.61 It is proposed to discharge foul water flows to the Thames Water foul sewer which currently serves the application site and is located along Trooper Potts Way. Thames Water have confirmed that modelling and potential upgrade works would be required to ensure the receiving sewer would have capacity to accommodate the increased foul flows.

Demolition and Construction and Contracting Strategy

5.62 The Principal Contractor would be responsible for a number of sub-contractors (piling, concrete, cladding etc.) and ultimately for the environmental management during the construction process.

5.63 Stringent contractual procedural and performance obligations would be placed on sub-contractors under a clear management structure.

Demolition and Construction Employment

5.64 The construction of the proposed development would generate employment; a proportion of which is expected to be generated on-site, with the rest being generated elsewhere in the construction supply chain, possibly including modular unit production facilities.

5.65 The construction works would have local benefits through construction training and targeting the local labour force. This would be achieved through employment and training initiatives. Full details of construction employment are provided in ES Chapter 6: Socio-Economics.

Hours of Work

5.66 The hours of work would adhere to the procedures set out in the approved CEMP. The standard hours of working which would include hours of delivery, would be the following, unless otherwise agreed with the RBC in advance.

5.67 Working hours would be agreed with the RBC but are expected to be:

- 08:00 to 18:00 hours Monday to Friday;
- 08:00 to 13:00 hours Saturday; and
- No working on Sundays or Bank Holidays.

5.68 In order to maintain the above working hours, the Principal Contractor may require, at certain times, a period of up to one hour before and after normal working hours, to undertake start and close down activities (this would not include works that are likely to exceed agreed maximum construction works noise levels).

5.69 Although working outside the stated hours would not normally be undertaken, it is possible that some deliveries may take place at night, and that certain works may have to be done during this period for safety or other considerations. If required, such works would be subject to reasonable notice and either securing the required licenses or obtaining prior agreement with RBC, who may impose certain restrictions.

5.70 All work which is intended outside of these hours, excluding emergencies, would be subject to prior agreement, and/or reasonable notice to RBC in terms of Section 61 (S61) of the Control of Pollution Act 1974.

Security

5.71 The perimeter of the construction compound would be secured with the use of hoarding, as shown in Figure 5.1.

Figure 5.1: Example Site Hoarding

5.72 Only authorised persons would be allowed on the application site. A gate marshall would be employed to control access/egress from the key application site entrances, as shown in Figure 5.2 The contact number for out-of-hours security would be visibly marked at application site entrances.

Figure 5.2: Example of Site Control Access Points

Health and Safety

5.73 All works on-site would be undertaken in accordance with the provisions of the Construction (Design and Management) (CDM) Regulations 2015[3]. A CDM Principal Designer would be appointed by the Applicant

[3] Construction (Design and Management) Regulations 2015. Guidance on Regulations. Health and Safety Executive.

and would work with the Project Team and Principal Contractor to ensure compliance with these Regulations.

5.74 All method statements would incorporate regulatory safety matters and a Health and Safety File would be maintained on-site for inspection by the HSE, RBC and others as appropriate.

Emergency Procedures

5.75 Procedures would be set in place to respond to any emergency incidents which may occur on-site. A site Pollution Incident Response Plan would be developed by the Principal Contractor prior to any construction works commencing on-site.

5.76 All appropriate staff would be trained and made aware of the spill contingency plan set in place. In the event of any incident the Applicant would be notified. Additionally, the Environment Agency and any other interested bodies would be notified as required.

5.77 Details on the emergency procedures would be provided in the Construction Phase Plan.

Communication

Community Liaison Manager

5.78 The Principal Contactor's site managers would be responsible for fulfilling the role of community liaison manager. The community liaison manager's responsibilities would comprise the following:

- Recording and responding to enquiries or complaints from the local community or public;
- Communicating to the local community the nature of the construction work that would be carried out;
- Communicating the programme of work to the local community, specifically highlighting any works that may result in complaints (e.g. noisy activities);
- Updating the local community of any changes to the nature of works or programme of works as necessary; and
- Establishing and maintaining good relationships with local stakeholder groups.

5.79 The contact's name and telephone number would be displayed at the entrance to the application site and on the perimeter in prominent locations.

Complaints Procedure

5.80 The Principal Contactor's site managers would make stakeholders aware of the complaints procedure as part of the communication programme. The complaints procedure would comprise the following aspects:

- Publicise the details for relevant application site contacts, including telephone and email contact detail;
- Set up and maintain a complaint register, which records all correspondence/telephone contact from the public or stakeholders;
- Classify the nature of correspondence (e.g. complaint, enquiry, comment);
- In the event of correspondence that requires action, assign to an appropriate member of the management team; and
- Ensure the close-out of actions and update complaints register with a record of all actions and outcomes.

Materials and Resource Use

Selection

5.81 A strategy for minimising carbon emissions would be used when selecting materials. The final CEMP would detail the approach for a range of resource efficiency principles, including locally sourcing materials and services, auditing materials to demonstrate environmental performance (e.g. ISO 140018 or equivalent) and options for reuse of supplies. It would be carried out alongside a carbon foot printing procedure that would minimise carbon demands of the proposed development, identify the use of renewable energy resources, and incorporate efficient energy supply and low carbon technologies.

5.82 The design of the proposed development should maximise the potential to use pre-fabricated elements, and standard profiles and sections which can be easily assembled and disassembled for reuse elsewhere. Materials efficiency would be integrated with the waste hierarchy principles adopted for the scheme, such as identifying opportunities to reuse existing materials and reducing construction waste on site via appropriate benchmarks. Local material selection and procurement would be explored by the Principal Contractor.

5.83 Vulnerable areas of the buildings and wider scheme would be identified to ensure impact protection features are incorporated, and durable materials are specified, to reduce the degradation and use of additional materials over the lifetime of the development.

5.84 The proposed development would seek to create high quality, healthy internal environments for those living and working in and visiting the scheme. Materials selection and procurement would also be informed by the increasing availability of healthy certified materials, where feasible, including but not limited to materials and products that:

- meet testing and emissions standards for low or zero VOC as defined by Building Research Establishment's Environmental Assessment Method (BREEAM), Leadership in Energy and Environmental Design (LEED) and/or WELL[4];
- meet the toxic materials reduction standards set by the WELL standard;
- are Declare[5] label certified; and
- are Cradle to Cradle Certified Products[6].

5.85 Other tools would also be used to ensure that alternative materials with a recycled content and low embodied carbon are specified where possible:

- The Green Guide to Building Specification[7] would be used to ensure that major building elements are specified which have higher Green Guide Ratings (A-C); and
- WRAP's net waste toolkit[8] would be used to ensure that 'quick wins' and opportunities to increase recycled content are identified at early stages of the design.

5.86 Key materials are envisaged to include those indicated in Table 5.2.

Table 5.2: Indicative Key Construction Materials

Materials	Materials Required For
Concrete	Piling, pile caps, superstructure frame, lift cores, stairs, shear walls
Steel Reinforcement	Piling, pile caps, superstructure frame, lift cores, stairs, shear walls
Steel	Long span structures, minor structural elements

[4] International WELL Building Institute. The WELL Standard. https://www.wellcertified.com/
[5] Declare – the nutrition label for buildings. https://living-future.org/declare/
[6] Cradle to Cradle Certified Products Registry. http://www.c2ccertified.org/products/registry
[7] Anderson, J, Shiers, D & Steele, K, 2009. The Green Guide to Building Specification – An Environmental Profiling System for Building Materials and Components, Fourth Edition, BRE Press.
[8] WRAP,2017; [online] NetWasteTool. Available, http://nwtool.wrap.org.uk/ToolHome.aspx

Brick / Blockwork	External envelope, some internal walls
Cross Laminated Timber	Upper levels of BF-F – floors and walls
Glulam Timber Beams	Long spans over openings
Cladding	External envelope
Glazing	External envelope
Partitions (boarding)	Internal walls

Storage and Handling

5.87 Due to the limited amount of space on-site, where practical, contractors would be expected to operate a 'just-in-time' policy for the delivery and supply of construction materials, and packaging would be returned. This means that materials would be brought to the application site just before their incorporation into the work, thereby minimising the need for on-site storage.

5.88 Where possible, prefabricated elements would be lifted directly into position from delivery vehicles. This would assist in reducing on-site storage and labour requirements and construction noise levels, thereby reducing potential nuisances to surrounding receptors.

5.89 Oils and hydrocarbons would be stored in designated locations with specific measures to prevent leakage and release of their contents, include the siting of storage areas away from surface water drains, on an impermeable base with an impermeable bund that has no outflow and is of adequate capacity to contain 110 % of the contents. Valves and trigger guns would be protected from vandalism and kept locked up when not in use. Details of appropriate storage and handling measures would be presented within the CMP.

5.90 All liquids and solids of a potentially hazardous nature (e.g. diesel fuel, oils and solvents) would be stored on surfaced areas, with bunding, and within secure areas, in accordance with the EA's requirements.

Enabling and Demolition Quantities and Waste Management

5.91 Table 5.3 provides an estimate of the quantities of material likely to be generated as a result of the enabling works and demolition of existing on-site buildings, structures, hardstanding, below ground features and foundations on-site.

5.92 Materials arising from the enabling and demolition stage of the proposed development would be recycled where reasonably practical.

Table 5.3: Indicative Estimate of Demolition Material Likely to be Generated on-site

Waste Arising	Approximate Weight (tonnes)
Concrete	7,000
Steel/metal	2,000
Plasterboard	200
Timber	100
Total Enabling Works and Demolition Waste	**9,300**

Excavation and Construction Key Quantities Material

5.93 Estimates of bulk material quantities for key construction components are provided in Table 5.4.

5.94 Waste arising from site clearance, primary infrastructure and earthworks is expected to comprise vegetation (limited), topsoil, rubble, tarmac from former hard standings, gravel and clay material.

5.95 Suitable material excavated during ground-works would be crushed and used as back-fill and piling mat material.

5.96 Any clean excavated material that cannot be reused on-site would be removed by licensed waste carriers and sent for reuse at another development site, or sent for disposal at appropriately licensed facilities (these are expected to be inert waste landfill sites).

5.97 Construction materials would be selected following the BRE 'Green Guide to Specification'. These include the following:

- Minimising embodied energy content (the energy used in manufacture);
- Using recyclable materials where they have high embodied energy; and
- Maximising the recycled content of the material, ease of maintenance, appropriate sourcing of materials and totally excluding deleterious and hazardous materials.

Table 5.4: Bulk Quantities During Construction

Waste Arising	Volume
Bulk Excavation and Pile Arisings	13,000 m^3
Packaging	120 tonnes
Plaster/ Cement	110 tonnes
Miscellaneous	80 tonnes
Timber	180 tonnes
Concrete	55,000 tonnes
Insulation	20 tonnes
Metal	4,500 tonnes
Plastics	55 tonnes
Inert	170 tonnes

Landfill Capacity

5.98 All relevant contractors would be required to investigate opportunities to minimise and reduce waste generation in line with WRAP's 'Halving Waste to Landfill' initiative by undertaking the following:

- Agreements with material suppliers to reduce the amount of packaging or to participate in a packaging take-back scheme;
- Implementation of a 'just-in-time' material delivery system to avoid materials being stockpiled, which increases the risk of their damage and disposal as waste;
- Use of standard size components in design detailing to eliminate risk at source where possible to do so;
- Attention to material quantity requirements to avoid over-ordering and generation of waste materials;
- Re-use of materials wherever feasible, e.g. re-use of excavated soil for landscaping. The Government has set broad targets of the use of reclaimed aggregate, and in keeping with best practice, contractors would be required to maximise the proportion of materials recycled;
- Segregation of waste at source where practical;
- Re-use and recycling of materials off-site where re-use on-site is not practical (e.g. through use of an off-Site waste segregation facility and re-sale for direct re-use or re-processing);
- Skips would be colour coded and signposted to reduce risk of cross contamination and covered to prevent dust and debris blowing around the site, these would be cleared on a regular basis; and

- Burning of wastes or unwanted materials would not be permitted on-site.

5.99 Relevant contractors would be required to carry out works in such a way that, as far as is reasonably practicable, the amount of spoil and waste to be disposed of by landfill is minimised and that any waste arising from the site are transported and disposed of in accordance with relevant legislation.

5.100 Waste generated by the proposed development would be minimised and reused wherever feasible. There is not predicted to be any significant effect upon landfill capacity as a result of the construction waste volumes.

Plant and Equipment

5.101 Consideration has been given to the types of plant and equipment that are likely to be used during the construction works. The typical types of plant and equipment associated with each key element of the works, as well as the estimated percentage on time for the equipment is set out within Table 5.5.

Table 5.5: Estimated Plant and Equipment Types

Plant and Equipment	Enabling Works and Demolition		Substructure		Superstructure		Envelope		Fit-out	
Concrete Crusher	✓	50 %	×		×		×		×	
360 deg Excavators (Large)	✓	100 %	✓	100 %	×		×		×	
360 deg Excavators (mini)	✓	80 %	✓	50 %	×		×		×	
Face Shovel	×		×		×		×		×	
Concrete Breaker	✓	80 %	✓	20 %	×		×		×	
Compactors	✓	50 %	✓	100 %	×		×		×	
Piling Rigs	×		✓	50 %	×		×		×	
Mobile Cranes	✓	20 %	✓	20 %	×		✓	10 %	×	
Tower Cranes	✓	40 %	✓	100 %	✓	100 %	✓	100 %	×	
Concrete Pumps	×		✓	70 %	✓	70 %	×		×	
Cradles	×		×		×		✓	10 %	×	
MEWPS	✓	40 %	×		✓	100 %	✓	100 %	✓	50 %
Goods/ Passenger Hoists	×		×		✓	100 %	✓	100 %	✓	50 %
Cantilever Decks	×		×		✓	100 %	×		×	
Scaffolding	✓	80 %	✓	20 %	✓	20 %	×		×	
Fork Lifts	✓	50 %	✓	50 %	✓	60 %	×		✓	80 %
Small tools (Drills / Cutters)	✓	100 %	✓	100 %	✓	100 %	✓	100 %	✓	50 %

Note: ✓ Usage of plant at the respective demolition and construction phase stage

Trips, Access and Routing Arrangements

Trip Generation

5.102 Table 5.6 provides a breakdown of the anticipated two-way (in and out) vehicle movements for each stage of the demolition and construction works.

Table 5.6: Estimated Daily Vehicle Movements

Activity	Estimated Daily Vehicle Movements
Demolition	24
Excavation	32
Piling	14
Sub-Structure and Superstructure	30
Envelope and Cladding	10
Internal Fit Out	10

5.103 The maximum number of HGV movements would be associated with the demolition, piling and earthworks, with an average of 70 trips (140 movements) per week for approximately 12 months. During the maximum peak construction period, when the substructure and superstructure works would overlap, this could increase to an average of 185 trips (370 movements) per week.

5.104 The most intensely used HGVs on the application site would likely comprise tipper trucks for the removal of excavated material, ready mix concrete trucks for the delivery of concrete, and articulated lorries for the delivery of cladding panels. These figures would be reviewed upon appointment of the Principal Contractor and be would be subject to prior approval of RBC. All contractors would be supplied with a vehicle route card and details of all access routes would be provided

5.105 Deliveries would be required to be booked in at least 24 hours in advance using electronic delivery booking system which would be controlled by the logistics manager. This booking in system would be followed and adhered to any unplanned deliveries would be turned away.

Site Access and Egress

5.106 The site is located within Reading town centre and is bounded by Reading railway station to the south and Vastern Road to the north. Given the constraints, the most suitable vehicle access would be from the west using Caversham Road.

5.107 The site would be accessed via the existing estate road to the west of the complex from Caversham Road. The main arterial route identified is A329 under the railway bridge with a height restriction of approximately 4.75 m, as shown in Figure 5.3.

Figure 5.3: Railway Bridge on A329

5.108 The access point to the application site would change in accordance with the different phases, as shown in Figures 5.4-5.6. This is to allow the existing on-site uses to remain operational while the early phases of the development are under construction, and then as the development progresses, to allow the later phases to be constructed and reduce the impact of demolition and construction traffic on new residential occupants of Plot A.

5.109 During phase 1, construction access to the application site would be from the west from Caversham Road.

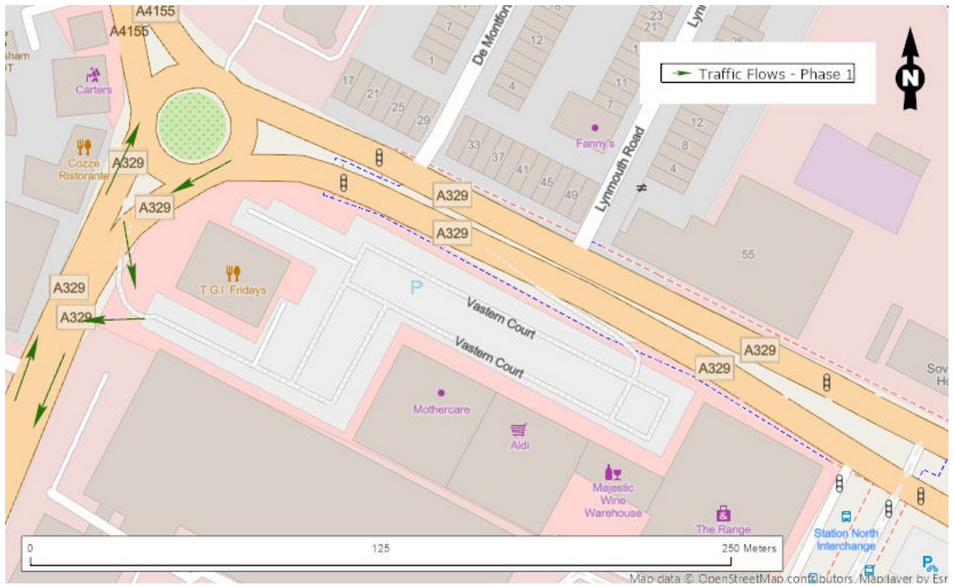

Figure 5.4: Construction Access for Phase 1

5.110 During Phases 2 and 3, access would be moved to the northern boundary of the application site, from Vastern Road, in the middle of the application site.

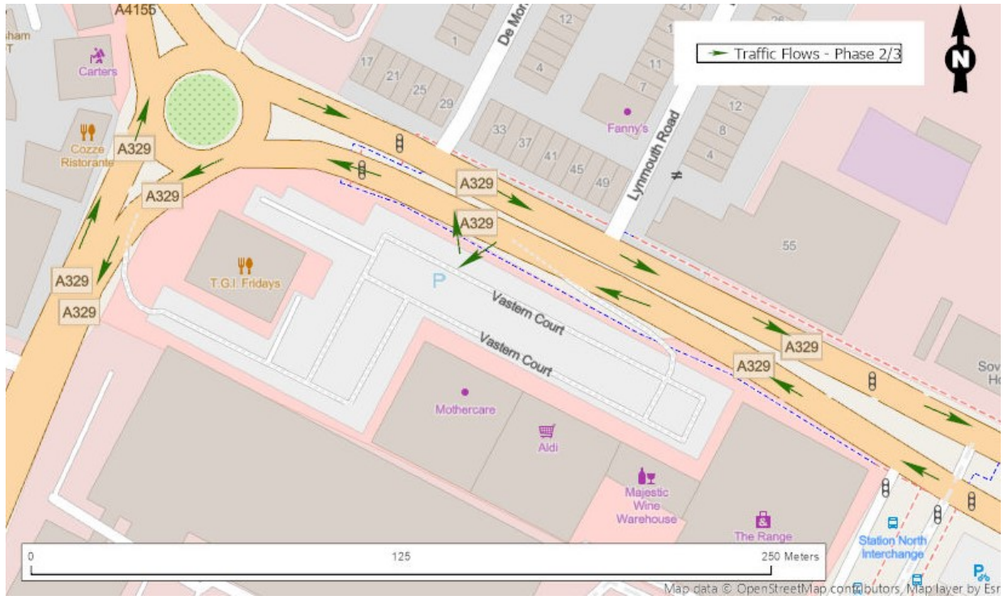

Figure 5.5: Construction Access for Phases 2 and 3

5.111 During Phase 4, access would remain along the northern boundary of the application site on Vastern Road, but would be moved further to the east, at the end of the existing car park.

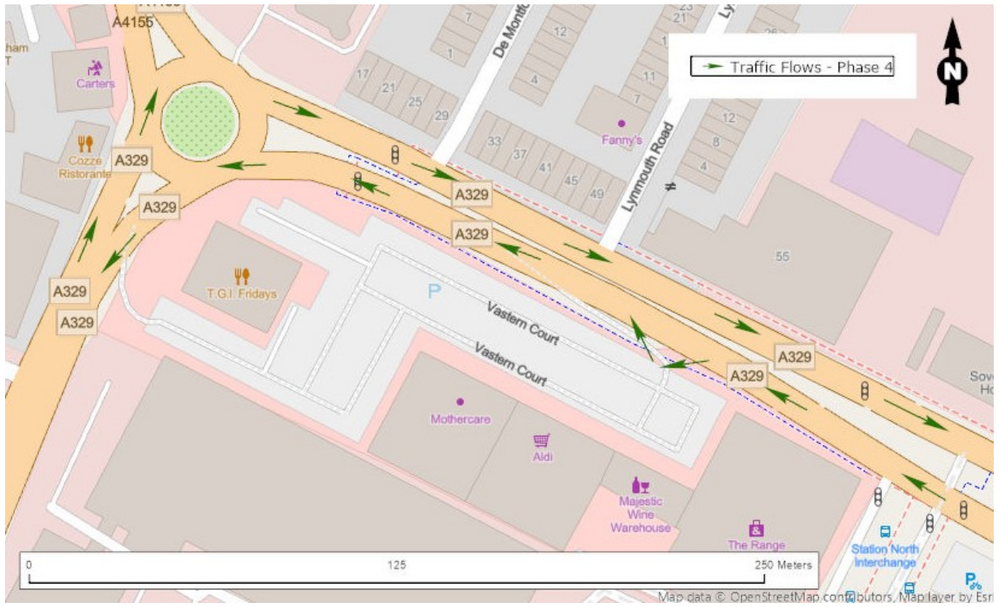

Figure 5.6: Construction Access for Phase 4

5.112 Access through the existing roads would be closely managed by traffic marshals and security with particular attention to cyclist using the cycle lane.

5.113 The application site would be able to accept all vehicle categories including a 10 m rigid truck and a 16 m articulated vehicle. Swept path analysis would be carried out at the detailed design stage.

5.114 Segregated traffic routes would be implemented on the site. Where the existing access to operational retail units is required for the public, it would require highway alterations in advance, but these can be positioned to eventually become the new permanent crossovers.

Construction Traffic Route

5.115 Construction traffic route is displayed in Figure 5.7.

Figure 5.7: Construction Traffic Route to Site

Closures and Diversion

5.116 Site activities with the potential to affect the public highways outside of the boundaries of the application site are as follows:

- Temporary footpath diversions/ closures may be required, and licences would be applied for in order to erect, adapt and dismantle this hoarding. Wherever possible the width of any retained footpath would be maintained at minimum 1.5 m wide;
- A mobile crane is required for erecting/dismantling the tower cranes. The tower crane contractor would develop a site-specific plan for this and seeking all relevant statutory approvals etc.;
- Delivery and installation of MEP capital plant. Whilst it is anticipated that the cranes on-site would be sized to carry out these lifting operations, the use of supplementary mobile cranes may be required from within the site boundary;
- Erection, adaption and striking of hoardings and scaffolding would be necessary in order to ensure the safety of operatives and the general public that would encroach into the public realm;
- Scaffolds would incorporate protection fans at an acceptable height and monarflex style sheeting; and
- Façade and external works at ground level where the works abut directly adjacent to the public realm. Wherever possible working access would be limited to ensure a minimum clear pedestrian footpath width of 1.5 m is maintained. A Method Statement would be agreed with RBC's Highways department for each eventuality and appropriate licences would be obtained where necessary.

Loading/Unloading Areas

5.117 The storage area for the proposed development would be within the application site boundary, utilising existing landscaping and parking areas. This would be constantly reviewed as works progress and the application site conditions change. Lighting, signage, fire points and pedestrian protection would need to be constantly updated and communicated to all as these works develop.

5.118 Unloading / loading and storage areas would be clearly defined and carefully considered to:

- Be established and maintained on-site, rather than off-site, as far as possible;
- Be segregated from pedestrian routes using barriers;
- Have sufficient room for all vehicle movements including turning space;
- Have adequate lighting and appropriate signage; and
- Have Fire Points and Spill Kits located in the immediate vicinity pertinent to the unloading / loading operations and / or materials being stored.

Pedestrian Access/Egress Routes and Parking Management

5.119 Pedestrian access routes for members of the public would be clearly displayed using appropriate and approved signage. Where necessary, such as through tunnels under scaffolding, additional lighting (including emergency power fittings) would be provided from the application site temporary electrical installation.

5.120 All pedestrian routes that are in close proximity to moving vehicles would be protected using appropriate physical barriers.

5.121 All operatives would access and egress to the application site via designated site control access points, which would be manned by site security. All contractors would book into the relevant security area for their area of works and having done so they would then proceed to their working areas using designated routes.

5.122 Once operatives have entered the application site they would only use designated pedestrian routes which would be clearly defined with relevant signage prominently displayed and updated as works progress and site dynamics change. Physical barriers would be installed to segregate vehicle and pedestrian movements and crossover points would be gated.

5.123 Safe 'green routes' would be established to ensure safe segregation between all vehicles and pedestrians/ construction operatives.

Environmental Controls and Mitigation

5.124 A review of the potential environmental impacts associated with the construction works has been undertaken to proactively inform the development proposals and agree appropriate mitigation measures.

Potential impacts can arise from day to day works or from individual instances of accidents, poor operation or management. They are, however, largely dependent on the implementation of effective controls e.g. the employment of dust suppression methods, use of a well trained workforce and properly maintained plant.

5.125 A summary of the potentially significant environmental impacts that could arise during the demolition and construction works and mitigation measures integral to the development proposals are provided in Table 5.6. Further detail and assessment of these likely impacts are provided in ES Chapters 6-10 and ES Volume 2.

5.126 Construction plant specifications have been defined allowing noise and other implications to be assessed. Potential impacts in many areas are largely dependent on attention to management control (e.g. watering to control dust, use of noise attenuated plant), which would be under the control of the Principal Contractors required, by tender requirements, to adhere to management controls and method statements.

Table 5.6: Summary of Potential Environmental Impacts during Demolition and Construction

Receptor	Potential Impacts	Mitigation
Below ground Heritage Assets (Archaeology)	• Damage to potential in-situ archaeological remains (if present).	• Archaeological site evaluation following demolition works and prior to substructure works, with further evaluation e.g. including any watching briefs required during earthworks as necessary).
Transport and Pedestrian Infrastructure	• Temporary traffic disruption caused by site traffic and an increase in HGV movements	• Implementation of a CTMP. • Use of RBC approved access points and routes to the application site, with deliveries outside peak hours where possible (and abnormal loads at quiet times, subject to agreement with RBC and TfL).
	• Transfer of mud and materials from vehicles onto public highways causing the potential for pollution hazards	• On-site wheel washing facilities or regular road sweeping to prevent water transfer to the road.
	• Temporary disruption to pedestrian access and routes within the locality of the application site.	• Implementation of a CTMP • Maintenance of footpaths around the application site, where possible, ensuring access is maintained for all.
Noise and Vibration	• Temporary increased noise levels at surrounding residential and commercial properties, from HGV vehicle movements and demolition / construction activities e.g. breaking out, crushing, piling, cutting etc.	• Installation of 2.4 m site hoarding. • Agreement of working hours with RBC, careful selection of quiet plant. • Appropriate siting and regular maintenance of plant. • Use of silenced and well-maintained plant conforming with the relevant EU directives relating to noise and vibration.
	• Vibration impacts on local buildings, due to increased vibration from demolition works, piling, use of heavy vehicles within the application site etc.	• The construction techniques proposed are considered unlikely to result in significant vibration impacts but the need for vibration monitoring / setting of vibration action levels would be discussed and agreed with RBC.
Air Quality	• Windblown dust generated from demolition works, earthworks, stockpiles, construction vehicle movements on unpaved surfaces, crushing etc.	• Dust suppression techniques, such as damping down, use of temporary screens, covering of stockpiles etc. • Preparation and Implementation of a Site Waste Management Plan (SWMP). • Appropriate sourcing of materials.
Soil and Groundwater	• Pollution incident through spill of fuels or chemicals, or discharge of sediment laden water / runoff.	• Appropriate storage of fuels and potentially hazardous construction materials within a secure site compound. • Provision of on-site pollution control kits. • Use of settlement system prior to discharge.
	• Siltation and contamination of surface water runoff and ground water.	• Use of settlement tanks, bunding and street sweeping to prevent contamination of the stormwater system.
	• Potential for soil contamination.	• Geotechnical Site Investigations that are being undertaken would be used to characterise current soil and groundwater conditions at the application site. In the event that contamination is found, soil would be removed and an appropriate Remedial Strategy developed in conjunction with RBC and the EA.
Ecology	• Accidental spills and discharges from the storage of fuels and construction materials which may create pollution hazards. • Accidental release of surface water runoff containing elevated levels of suspended sediments or other contaminants	• Appropriate storage of fuels and potentially hazardous construction materials within a secure site compound. • Provision of on-site pollution control kits. • Use of settlement system prior to discharge.
	• Permanent damage and loss of habitats. • Injury or death of protected birds and animals.	Works to remove trees to be undertaken outside of the bird breeding season of March to August in the event that nesting birds are encountered.
Natural Resource Use	• Waste generation and disposal of materials to landfill.	• Preparation and Implementation of an SWMP. • Waste minimisation at source, with segregation and recycling of waste generated.
	• Use of natural resources	• Preparation and Implementation of an SWMP. • Appropriate sourcing of materials.

Table 5.6: Summary of Potential Environmental Impacts during Demolition and Construction

Receptor	Potential Impacts	Mitigation
Site Workers	• Release of asbestos during demolition	• Completion of Asbestos Surveys and removal of all identified asbestos materials by a specialist contractor as part of the demolition works.
	• Exposure of construction staff to contamination, if confirmed during planned site investigations works.	• Use of Personal Protective Equipment (PPE).
Residential Amenity	• Temporary visual intrusion for nearby residents, occupiers of other land uses, pedestrians and passers-by. • Temporary visual intrusion of construction works on views into and out of the application site. • Temporary increases in road noise and vibration generated from construction vehicles. • Temporary increases in noise and vibration levels generated from the use of site plant and machinery. • Temporary generation of wind-blown dust nuisance from ground surfaces, stockpiles, vehicles, work faces and cutting and grinding of materials. • Temporary generation of exhaust emissions from lorries and plant delivering and removing materials including dust and particulates which may impact upon local air quality.	• Installation of 2.4 m site hoarding. • Standard, good site housekeeping. • Appropriate construction site layout. • On-site wheel washing facilities. • Dust management. • Demolition and construction traffic management. • Agreement of working hours with RBC careful selection of quiet plant, appropriate siting and regular maintenance, use of temporary acoustic barriers around specific activities etc. Setting of noise and vibration limits with associated monitoring during the works.

Mitigation and Scope of Environmental Management Controls

5.127 The following mitigation controls are typical for this type of development and would be committed to and delivered pursuant to either planning conditions, obligations contained in a legal agreement (under Section 106 of the Town and Country Planning Act, 1990) and supported as necessary by contractual obligations between the Applicant and the Principal Contractors or regulatory provisions in force from time-to-time.

Proposed Site Management Controls

Construction Environmental Management Plan

5.128 A CEMP would be prepared by the Principal Contractor and would include a Traffic and Logistics Plan (TLP).

5.129 The use of CEMPs is standard practice across the construction industry to reduce the risk of adverse effects during construction on sensitive environmental resources and to minimise disturbance to local residents. The CEMP can be expected to include matters such as:

- Commitments to follow Environment Agency Pollution Prevention Guidelines;
- Details of site waste management;
- Details of construction traffic management, including routes and signage;
- Details of working methods and their attendant mitigation measures;
- Measures to minimise / mitigate dust generation and dispersal;
- Measures to minimise / mitigate noise and vibration – using plant that conforms to the relevant standards on noise emissions; construction works would only be carried out during agreed hours of operation, except in emergency situations; the use of acoustic screening where appropriate; and
- Pollution incident response measures, including preparation of a spill management plan to prevent environmental effects in the event of a spill occurring.

Considerate Constructors

5.130 The Site would be registered with the 'Considerate Constructors Scheme'. This scheme ensures that contractors carry out their operations in a safe and considerate manner with due regard to passing pedestrians and road users.

Principal Contractor and Management of Sub Contractors

5.131 All contractors would be required to demonstrate how they would adhere to procedures set out within the CMP and EMP satisfying regulations and best practices regarding environmental control.

Environmental and Communication/Liaison Strategy

5.132 Roles and responsibilities would be clearly defined along with details on control measures and activities to be undertaken to minimise environmental effect and monitoring and record-keeping requirements. A commitment would be made to periodically review the documentation and undertake regular environmental audits implemented during the demolition and construction phase. Access would be given as required for Local Authority Environmental Officers to verify audits.

Emergencies and Environmental Incidences

5.133 Protocols to be implemented on-site in instances of emergencies and environmental incidents would be set out within the CEMP for approval by RBC.

Housekeeping and General Site Management

5.134 Hoardings would be erected around the application site to provide a clear and secure demarcation between operational activities and other areas and to provide information regarding the proposed development and its progress. Particular attention would be paid to locations supporting high volumes of pedestrian movement (for example on Vastern and Caversham Road), demolition and construction routes, access gates and security arrangements.

5.135 A 'clean site' policy would be maintained and contractors and their subcontractors would be expected to maintain a tidy application site. A street sweeper would be employed as required during the demolition, piling and excavation periods of the construction programme to make sure that the streets around the application site would be kept clean during the works.

Adjacent Residential Properties and Other Neighbours

5.136 The following mitigation and environmental controls would collectively limit potential visual, noise, vibration, traffic and dust impacts associated with the proposed development's construction works:

- Maintaining aesthetically appropriate site hoardings;
- Agreeing working hours with the RBC;
- Undertaking regular road sweeping;

- Arranging and locating potentially high impact site activities and plant away from neighbouring residential receptors;
- Selecting quiet plant and regularly maintaining plant;
- Implementing good site housekeeping measures;
- Directing site lighting away from sensitive receptors;
- Turning site lighting off outside of normal working hours;
- Screening scaffolding and active construction activities above hoarding levels, where practical;
- Implementing construction traffic management measures as agreed with RBC;
- Implementing and monitoring dust management measures;
- Implementing and monitoring noise and vibration measures; and
- Using temporary acoustic barriers around potentially noisy activities.

Archaeology

5.137 During demolition and substructure works, there is the potential for impacts on archaeological remains beneath the application site. The archaeological potential of the application site is likely to be limited to remains of no more than low significance and therefore further survey work (i.e. archaeological evaluation trial trenches or pits) is not considered to be necessary. It is recommended that an archaeological watching brief during preliminary ground preparation and subsequent foundation construction, would mitigate the impacts of the proposals and ensure that any archaeological assets were not removed without record.

Contaminated Soil

5.138 According to a Preliminary Risk Assessment undertaken of the application site (Technical Appendix 2.5, ES Volume 3) RBC currently classifies the application site as 'low risk' in terms of the potential for significant soil or groundwater contamination to be present at the application site. As is standard for redevelopment of sites of this nature, potential risks would need to be assessed through a site investigation and risk assessment.

5.139 During construction works, it is anticipated that a number of potentially contaminative liquids and chemicals including diesel required for emergency generators for site operations could be stored on-site. The following management and control measures would be included in the CEMP:

- Storing all liquids and solids of a potentially hazardous nature on surfaced areas, with bunding, in accordance with the EA's Pollution and Prevention Guidelines 2 (PPG2)[9] preventing pollution from above ground storage tanks. Whilst the EA's PPGs are no longer valid, these represent good practice and would therefore be followed;
- Ensuring that Contractors control and bund any hazardous substances used on-site (although at this stage none are anticipated), including oil drums or containers on-site, in accordance with Control of Substances Hazardous to Health (COSHH) Regulations (as amended) and ensure that oil or other contaminants are not allowed to reach water courses or ground water sources including aquifers;
- Storing all oils and chemicals in bunded areas in order to contain any spillages, should these occur. Bunding would be specified to ensure secondary containment of at least 110 % of the volume of the largest tank within the bund;
- Siting all filling points, gauges and vents within the bund;
- Placing tanks on impermeable bases to reduce the risk of spillage to groundwater. Integral or self-bunded tanks would be favoured; and
- Sealing the drainage system of the bund with no discharge to any watercourse, land or underground strata. Associated pipe work would be located above ground and protected from accidental damage.

5.140 Furthermore, all site works would be undertaken in accordance with the EA's Pollution Prevention Guidance Note 6 (PPG6)[10] and Pollution Prevention Guidance Note (PPG3)[11].

5.141 Construction vehicles would be properly maintained to reduce the risk of hydrocarbon contamination and would only be active when required. Construction materials would be stored, handled and managed with due regard to underlying soil and thus the risk of accidental spillage or release would be minimised.

5.142 As standard practice in brownfield development, the design of the construction would provide remediation. The construction of the proposed development would provide a clean cover layer in landscaped areas and give a concrete foundation slab to the correct design and thickness.

Water Resources

5.143 To ensure that no contaminant-pathway-receptors pathways are created and to reduce the potential for contamination to occur during construction, all site activities would be undertaken in accordance with the requirements of the Water Resources Act 1991[12], Water Act 2014[13], Control of Pollution (Oil Storage) Regulations 2001[14], and the Pollution prevention guidance[15]. The Applicant would also be responsible for obtaining all necessary consents and ensuring compliance with the conditions of the consents.

5.144 As a minimum the CEMP would cover the following provisions:

- all storage facilities should be located above ground and on suitably designed and managed hard-standing, bunded where necessary, to prevent any accidental spillages from being released to ground;
- management and handling of construction materials is undertaken with due care and consideration to minimise the risk of accidental spills; and
- material stockpiles should be adequately protected to avoid being washed or blown away from the immediate area.

5.145 Potential pathways for contamination would be minimised as follows:

- groundwater would be prevented from entering excavations by dewatering, if required;
- surface water would be prevented from entering excavations by using cutoff ditches, covering the excavation, or captured within the groundwater pumping system;
- potentially contaminating activities such as concrete preparation, vehicle washing and fuelling etc. are constrained to dedicated protected areas where contaminated water can be collected; and
- contaminated water from excavations would be collected within a settlement tank or lagoon to enable treatment prior to release.

5.146 In addition, the construction drainage system for the proposed development would be designed and managed to comply with BS 6031:2009[16], which details methods that should be considered for the general control of drainage on construction sites. Further advice is also contained within BS 8004:2015[17].

[9] Environment Agency, 2011. Pollution Prevention Guidelines 2 Above Ground Oil Storage Tanks. Environment Agency.
[10] Environment Agency, 2012. Pollution Prevention Guidelines 6 Working at Construction and Demolition Sites. Environment Agency.
[11] Environment Agency, 2006. Pollution Prevention Guidelines 3 Use and Design of Oil Separators Environment Agency.
[12] Secretary of State, 2009. Water Resources Act 1991 (Amendment) (England and Wales) Regulations 2009. London. HMSO
[13] Secretary of State, 2014. Water Act 2014. London. HMSO
[14] Secretary of State, 2001. Control of Pollution (Oil Storage) Regulations 2001. London. HMSO.
[15] Department of the Environment, Food and Rural Affairs (Defra), 2019. Pollution Prevention for Businesses. London. HMSO.
[16] British Standard Institution, 2009. BS6031:2009 British Standard Code of Practice for Earthworks. London. BSi.
[17] British Standard Institution, 2015. BS8004:2015 Code of Practise for Foundations. London. BSi.

5.147 Wherever possible, the Applicant would minimise the amounts of wastewater discharged from the application site. Surface drainage and wastewater would pass through settlement tanks and oil interception facilities before discharge to sewer. The Applicant would ensure that all potentially contaminated water, e.g. dewatering effluent, is disposed of in accordance with the Water Resources Act 1991[18] and Water Industry Act 1999[19], to the satisfaction of the EA and Thames Water.

5.148 An Emergency Incident Plan would be in place for the application site to deal with potential spillages and/or pollution incidents. This would include the provision of on-site equipment for containing spillages, such as emergency booms and chemicals to soak up spillages.

5.149 Any pollution incidents would be reported immediately to RBC and the regulatory bodies such as the EA.

Ecology

5.150 Dust generated from construction works would be managed by means of 2.4 m high site hoarding and dust suppression measures, such as the use of water sprays, dampening down of roads and covering of storage areas, such that the potential for adverse dust generation is reduced.

5.151 Construction drainage, air quality and noise management controls would be actively implemented at the application site to minimise potential construction impacts.

5.152 All lighting would appropriately be aimed, controlled and switched off when the application site is not operational (where practicable).

Transport

5.153 A CTMP would be developed and agreed in accordance with RBC to take into account legislative requirements (e.g. Highways Act 1980, the New Roads and Street Works Act 1991, Town and Country Planning Act 1990, Traffic Management Act 2004) Police, Fire Authority and HSE Guidance, Local Authority Transport Schemes and Neighbourhood Lorry Restrictions. The Traffic Management Plan would be reviewed and updated in line with the construction programme and would typically include details of the following:

- preferred hours of deliveries and removals (out of peak hours);
- agreed demolition and construction traffic routing and application site access points;
- road cleaning facility provisioning;
- temporary traffic control measures;
- temporary and permanent access to the works - for personnel/vehicles;
- off-loading and storage areas;
- traffic management procedures for waste disposal vehicles;
- personnel and vehicle segregation;
- equipment e.g. temporary fencing, signage etc.;
- temporary and permanent closures and diversions of footpaths;
- street furniture removal, if required; and
- site inductions.

5.154 Wheel cleaning facilities with adjoining hard standings would be located, when appropriate, at the access and egress points of the application site. These wheel cleaning facilities would be supplemented by regular road cleaning during the excavation and basement works and would have appropriate catchment areas.

Vehicle Routing

5.155 Vehicles making deliveries to the application site or removing spoil material would travel via designated routes which would be agreed with RBC as required. The Principal Contractor would liaise with RBC to provide directional signage on the principal routes on the highway network surrounding the application site, if required, in order to improve navigation.

5.156 In line with RBC's standard approved working hours, construction traffic movements are likely to take place on the local and wider highway network between 08:00 and 18:00 hours from Monday to Friday and 08:00 to 13:00 hours on Saturdays unless the times are constrained by planning conditions. Where possible vehicle movements would be scheduled out of peak hours (i.e. 08:00 – 09:00 and 17:00 – 18:00 during the weekdays.). Deliveries of the modular blocks would be made outside of peak hours, between 19.00 and 21.00.

5.157 Vehicles coming to the application site would have specific timeslots booked. It would be the responsibility of the driver and company to ensure they arrive on site at the designated time.

5.158 The construction sequence for the application site would be programmed to minimise the need for road closures. However, there may be instances when they are unavoidable. Where this is the case, road closures would be requested 6 - 12 weeks in advance and authorised by RBC.

5.159 The Principal Contractor would co-ordinate all deliveries and collections to/from the application site, and ensure that as far as possible that:

- all delivery and collection vehicles are aware of the proposed routing;
- prior to a delivery or collection, haulers would notify the relevant authorities in accordance with the Road Vehicles (Authorisation of Special Types) (General) Order 2003[20] if required;
- liaison would be undertaken with occupants of adjacent buildings to avoid delays to service deliveries due to construction vehicles; and
- deliveries would be made on a 'just in time' basis.

5.160 Larger vehicle movements would be scheduled to avoid peak hours on the local road network if at all possible. If an alternative construction traffic route is required, this would first be agreed with RBC.

5.161 Suppliers would be encouraged to consolidate deliveries where feasible. Where possible all deliveries would be made to designated areas within the application site. If for any reason it is necessary to load and unload outside site boundaries, the details and procedure for this would be agreed in advance with RBC.

5.162 There would be no waiting areas for site vehicles in the roads around the application site.

HGV Management

5.163 The most intensely used HGVs on the application site would be ready mix concrete trucks for the delivery of concrete and articulated lorries for the delivery of fabricated steelwork.

5.164 It is assumed that HGV construction traffic would be spread evenly over an 8 hour long working day (to avoid peak periods), although there may be slight peaks.

5.165 Loading and unloading of vehicles, dismantling of equipment such as scaffolding or moving equipment or materials around the application site would be conducted in such a manner as to minimise noise impacts to existing surrounding residential properties.

[18] Secretary of State, 1991. The Water Act 1991. HMSO.
[19] Secretary of State, 1999. Water Industry Act. London. HMSO.
[20] Secretary of State, 2003. Road Vehicles (Authorisation of Special Types) (General) Order. HMSO.

Parking Management and Staff Travel

5.166 A key aspect of the demolition and construction process would be the management of demolition and construction worker travel to and from the application site. Construction workers would be encouraged to access the application site by public transport, walking and cycling in order to reduce the potential impact of vehicle traffic during this temporary period. A series of measures would be implemented to encourage workers to travel using sustainable modes, which would form part of the CTMP, These may include:

- Cycle parking would be provided and this would be covered and secure;
- Facilities for changing and storing cycling clothes would be provided;
- The developer would investigate the provision of public transport vouchers to encourage workers to travel to the application site by bus or rail;
- The contractor would encourage workers to car share where possible and would set up a car sharing database to identify where matches could be made; and
- Travel information packs would be provided to all workers. These would be provided in either paper form or electronically and would include public transport timetables and information on cycling routes.

5.167 Parking provision would be provided on site, if possible, however this would be limited and spaces would be managed.

5.168 Vehicle movements would be managed to avoid queuing outside the application site access points.

Noise and Vibration

5.169 Effective co-ordination and time management of demolition and construction activities would be used to avoid adverse effects from noise and vibration to surrounding areas. Early and helpful communications with the surrounding and on-site receptors would assist in managing any complaints arising during the demolition and construction works of the proposed development.

5.170 Contractors would be required to ensure that works are carried out in accordance with best practicable means as stipulated in the Control of Pollution Act 1974. A full explanation of measures to control construction noise would be detailed in all construction method statements.

Noise Emissions

5.171 The precise needs and intentions in regards to noise control cannot, however, be specified until detailed construction planning and phasing programmes are complete.

5.172 As set out in Chapter 8: Noise and Vibration, noise levels from the demolition and construction of the proposed development have been predicted at noise-sensitive properties on-site and in close proximity to the application site and the impact of the noise assessed. Noise levels likely to be generated by the demolition and construction works have been predicted based on the type and number of plant likely to be in operation.

5.173 Noise control measures would include:

- Planning deliveries and removals out of peak hours where possible;
- Plan working hours to take account of the effects of noise upon persons in areas surrounding site operations and upon persons working on-site;
- Parking construction traffic off the public highway;
- Controlling the discharge of trucks from site to avoid congestion;
- Implementing traffic management systems at the entrances to the application site to control the traffic into the application site;
- Maintaining the 2.4 m site hoarding around the application site boundary to screen noise from low level sources and/or street level receptors;
- Agreeing working hours with RBC;
- Using 'silenced' plant and equipment wherever possible and maintaining plant on a regular basis in accordance with the relevant EU directives relating to noise;
- Selecting electrically driven equipment where possible in preference to internal combustion powered; hydraulic power in preference to pneumatic; and wheeled in lieu of tracked plant;
- Operating plant at low speeds where possible and incorporating automatic low speed idling;
- Siting noisy activities away from sensitive receptors, where possible;
- Certifying plant to meet relevant standards;
- Minimising disturbance from reversing bleepers through measures such as site layout, provision of screening or use of broadband sound emitting reversing alarms;
- Keep internal haul routes well maintained;
- Use rubber linings for chutes and dumpers to reduce impact noise;
- Switching off vehicle engines where vehicles are standing for extended periods and avoid unnecessary revving of vehicle engines;
- Start-up plant and vehicles sequentially rather than all together;
- Lowering materials whenever practicable rather than dropping; and
- Making all contractors familiar with the guidance in BS 5228[21] which would form a pre-requisite of their appointment.

Vibration

5.174 There are sensitive receptors located immediately along the eastern and southern boundaries of the application site. Noise and vibration surveys were carried out between 22 and 25 March 2019. An additional vibration survey was carried out on 26 June 2019.

5.175 BS 5228 Part 2[21] contains historic vibration measurement data for piling works, including the CFA method proposed for the proposed development.

5.176 Historic data presented in Table D.64 of BS 5228 suggest that vibration levels would fall to below 1 mm/s within 10 m of the piling works. The resulting PPV from CFA piling would likely be between 0.14 mm/s – 0.3mm/s. Vibration of less than 1 mm/s is unlikely to generate complaints from those living within nearby off-site sensitive properties. Historic data suggests that this method of piling is unlikely to lead to vibration that would cause damage to buildings, even cosmetic damage.

5.177 The following measures would be employed:

- Sequencing the piling programme so that numerous piles within 10 m of an affected property or buried utilities are not carried out successively. A maximum of three piles would be installed within 10 m of an affected property or buried utilities with a break before continuing in that area;
- Carrying out vibration monitoring during early piling works, away from any affected property or buried utilities, to quantify the levels of vibration likely to be attained; and
- Compiling an appropriate action plan for incorporation into the CEMP to ensure that the adverse effects of subsequent piling work, if identified, are minimised at all works.

[21] British Standards Institution, 2009 and 2014. British Standard 5228: 2009+A: 2014 Code of practice for noise and vibration control on construction and open sites. BSI

Air Quality

5.178 Dust and emission control and mitigation at the application site would be particularly important during earthworks and dry weather periods. To minimise adverse effects due to dust, the site-specific best practice measures described in Table 5.7 would be implemented by the Principal Contractor.

Table 5.7: Proposed Development Demolition and Construction Mitigation Measures for High Risk Sites

Works	Mitigation Measure
Communications	• Implement a stakeholder communication plan that includes community engagement before work commences on-site. • Display name and contact details of responsible person for dust issues on the application site boundary in addition to head/regional office contact information.
Dust Management Plan	• Develop and implement a Dust Management Plan (DMP), to be approved by the RBC.
Site Management	• Record all complaints and incidents in a site log. • Make the complaints log available to the RBC if requested. • Take appropriate measures to reduce emissions in a timely manner, and record the measures taken within the log. • Record any exceptional dust incidents on or off site in the log book, and the action taken to resolve the situation. • Hold regular liaison meetings with other high-risk construction sites within 500 m to limit the potential from cumulative impacts and to co-ordinate DMPs.
Monitoring	• Undertake regular on and off-site visual inspections where there are nearby receptors. • Carry out regular inspections to ensure compliance with the DMP and record results in the site log book. • Make the inspection log available to the RBC if requested. • Increase the frequency of inspections during activities with a high potential to create dust or in prolonged dry weather.
Preparing and Maintaining Site	• Plan application site layout during construction to locate dust generating activities as far as possible from receptors. • Use solid screens around dusty activities or site boundary that are at least as high as any stockpiles. • Avoid application site runoff of water and mud. • Fully enclose the application site or specific operations where there is a high potential for dust production and the application site is active for an extensive period. • Keep site fencing barriers and scaffolding clean using wet methods. • Remove dusty materials from the application site as soon as possible. • Prevent wind whipping from stockpiles by covering, seeding, fencing or damping down. • Carry out regular dust soiling checks of buildings within 100 m and provide cleaning if necessary. • Agree monitoring locations with RBC. • Install screens to minimise dust and pollution. • Provide showers and ensure a change of shoes and clothes are required before going off-site to reduce transport of dust.
Operating Vehicle/Machinery and Sustainable Travel	• Enforce an on-site speed limit of 10 mph. If long haul routes are required then speeds may be increased with suitable additional control measures, subject to approval of the nominated undertaker and with the agreement of the RBC. • Ensure vehicles switch off engines when stationary – no idling. • Avoid use of generators where possible. • Produce a CEMP to manage the sustainable delivery of materials. • Implement a sustainable travel plan for site workers.
Operations	• Cutting, grinding or sawing equipment only to be used with suitable dust suppression equipment or techniques. • Ensure adequate water supply for effective dust and particulate matter suppression (use recycled water where possible). • Use enclosed chutes, conveyors and covered skips. • Minimise drop heights of materials from loading and handling equipment and use fine water sprays on such equipment wherever appropriate. • Ensure suitable cleaning material is available at all times to clean up dry spills and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.
Waste Management	• Re-use and recycle waste to reduce dust from waste materials. • No bonfires.
Measures Specific to Demolition	• Soft strip inside buildings before demolition of external walls and windows. Ensure effective water suppression is used, preferably through the use of hand held sprays. • Ensure water suppression is used during demolition operations. • Avoid explosive blasting, use appropriate mechanical or manual alternatives. • Bag and remove biological debris or damp down material prior to demolition.
Measures Specific to Earthworks	• Re-vegetate earthworks and exposed areas/soil stockpiles as soon as practicable. • Use hessian, mulch or tackifiers* where it is not possible to re-vegetate or cover with topsoil. • Only expose small areas of ground or stockpile when working.
Measures Specific to Construction	• Ensure aggregates are stored in bunded areas and are not allowed to dry out. If required dry for a particular process appropriate additional control measures are required. • Avoid concrete scabbling** where possible. • Ensure bulk cement and other fine powder is delivered in tankers and stored in silos with suitable emission control during operation and delivery. • Smaller supplies of fine powder material to be in sealed containers and stored appropriately.
Measures Specific to Trackout	• Regular use of water-assisted dust sweepers to clean access and local roads. • Avoid dry sweeping of large areas. • Ensure vehicles entering and leaving the application site are appropriately covered to prevent emission during transport. • Inspect on-site haul roads for integrity and repair as necessary. • Inspections of haul roads to be recorded in site log, including any remedial action taken. • Implement a wheel washing system, with rumble grids where reasonably practical. • Ensure there is an adequate area of hard surfaced road between wheel wash facility and the application site exit, site size and layout permitting. • Access gate to be located at least 10 m from receptors, where possible. • Apply dust suppressants to locations where a large volume of vehicles enter and exit the application site.

Notes:*Tackifier is a sticky substance used to temporary bind the surface of stockpiled material at risk of generating dust emissions.
** Scabbling is the process of removing the surface layer of a concrete structure.

5.179 The Applicant would give detailed dust control protocols as part of their contracts for the application site.

Waste Management

5.180 Waste produced during all construction activities on site would be subject to the 'Duty of Care' under The Waste (England and Wales) Regulations 2011. It is the joint responsibility between the Principal Contractor and the Client to ensure that waste produced onsite is disposed of in accordance with legislation. The Waste Duty of Care Practice (November 2018) sets out practical guidance on how to meet waste duty of care requirements. It is issued under section 34(7) of the Environmental Protection Act 1990 (the EPA) in relation to the duty of care set out in Section 34(1) of that Act.

5.181 The Principal Contractor would audit waste carriers and disposal facilities and maintain documentary evidence that these requirements are being met. A register of waste carriers, disposal sites (including transfer stations) and relevant licensing details would be produced and maintained on site.

5.182 An area for waste collection and materials delivery and storage is expected to be provided within the site boundary. Materials that can be beneficially used in the future development of the site would be segregated directly on site.

Recycling

5.183 All generated waste would be sorted for reuse, recycling or disposal, and placed into their respective lorries. All non-hazardous waste that is not suitable for reuse on site would be loaded out onto waste trucks from the registered waste contractor, and once full, transported to a licensed recycling centre or nominated landfill site.

Disposal

5.184 All construction materials that cannot be re-used or recycled or would be disposed of at appropriately licensed disposal facilities. The destination of all waste or other materials from the application site would be notified to the relevant authority for approval. Deposition would be in accordance with the requirements of the:

- EA;
- Environmental Protection Act 1990[22];
- Controlled Waste Regulations 2012[23];
- Waste Regulations 2011[24];
- Hazardous Waste (England and Wales) Regulations 2005[25];
- Waste Duty of Care Code of Practice 2018[26]; and
- Environmental Permitting (Amended) Regulations 2016[27].

5.185 No burning of construction waste would take place on-site.

Cumulative Demolition and Construction Impacts

5.186 Site preparation, demolition and construction activities, when undertaken at the same time, have the potential to give rise to combined (cumulative) impacts and effects. Although temporary, these combined impacts, if not managed can give rise to potentially adverse effects on sensitive receptors in proximity to the application site, i.e. existing residential, community and open space receptors.

5.187 Such impacts are typically restricted to short periods of time. Even then, not all receptors would experience impact interactions during this time depending on phasing and proximity to the sensitive receptor. The majority of interactions are likely to arise from activities such as demolition works, noise and vibration from construction plant and vehicles, dust from plant and vehicles, the visual impacts of the work and passing HGVs.

5.188 In terms of residential amenity, demolition and construction works would typically be carried out outside of those hours when residents could reasonably expect quiet enjoyment of their properties. Demolition and construction works would typically be carried out between the hours of 08:00 to 18:00 hours, so residents would not be subjected to unreasonable impacts during daytime demolition and construction works periods.

5.189 Impact interactions that are likely to occur would generally be of a temporary and short term nature and would be carefully co-ordinated to ensure minimal disruption to sensitive receptors.

5.190 It is anticipated that the stringent management controls set out in this chapter would ensure that the potential construction and demolition of the proposed development would be kept to a minimum and as such, would limit the potential for further predicted impacts when considered in conjunction with the development proposals in the surrounding area. It is expected that other schemes in the area would also adopt similar stringent management controls.

5.191 The CEMP, to be secured by an appropriately worded planning condition, would be implemented during the demolition and construction works and would provide a framework within which activities on-site would be managed 'at source' to minimise impacts on all sensitive receptors.

Deconstruction of Proposed Development

5.192 The deconstruction of the proposed development would follow a demolition method and sequence. Safe working practices would be devised and implemented and would be undertaken according to typical dismantling techniques prevalent at the time.

5.193 The application site would be hoarded. Soft stripping works would then commence, removing all fixtures and fittings bringing the structure back to its shell.

5.194 When the development is at an appropriate level, long arm track mounted shear cutters would be used. The application site would then be taken down to ground level and temporary works installed to make the application site safe.

Summary

5.195 The development programme comprises the demolition of existing buildings, and construction of the proposed development as described in Chapter 4: Proposed Development Description. Assuming planning permission is secured, on-site works are projected to start Q2 2021 and the construction works to be completed in Q2 2025.

5.196 Demolition and construction works have the potential to cause environmental impacts, from subsurface works, noise, wastes, surface water runoff, and emissions to air. Measures to control potential environmental impacts would be set out within the CEMP (including a CTMP and SWMP) to be secured by appropriately worded planning conditions or obligations by means of a Section 106 legal agreement.

[22] Security of State, 1990. Environmental Protection Act 1990. London. HMSO
[23] Department of the Environment, Food and Rural Affairs (DEFRA), 2012. Controlled Waste (England and Wales) Regulations 2012. London. HMSO.
[24] Security of State, 2011. The Waste (England and Wales) Regulations. London. HMSO.
[25] Department of the Environment, Food and Rural Affairs (DEFRA), 2005. Hazardous Waste (England and Wales) Regulations, 2005. London. HMSO.
[26] Department of the Environment, Food and Rural Affairs (DEFRA), 2018. Waste Duty of Care Code of Practice 2018, HMSO.
[27] Security of State, 2016. Environmental Permitting (England and Wales) (Amended) Regulations, London. HMSO.

6 SOCIO-ECONOMICS

Introduction

6.1 This chapter of the ES presents an assessment of the potential impacts and associated likely significant effects with respect to socio-economics arising from the demolition and construction stage and completed development/operational stage of the proposed development.

6.2 The chapter describes the methods used to assess the potential impacts and likely effects; the baseline conditions at and surrounding the application site; the likely direct, indirect and wider socio-economic effects taking into consideration embedded mitigation; the need for additional mitigation; and the significance of residual effects.

Methodology

6.3 There is no published guidance for socio-economic assessment in EIA. Accordingly, the assessment has been informed by, but not limited to, the following legislation and policies:

- NPPF; [1]
- PPG;[2] and
- Reading Borough Local Plan 2019[3].

6.4 In addition, professional judgment has been applied.

Consultation

6.5 At the time of undertaking the assessment, the EIA Scoping Opinion remains outstanding.

6.6 In addition to the formal EIA Scoping Process, consultation was also undertaken with the RBC Acting Planning Manager and Michael Steen at Bright Futures for Children regarding the pupil yield multipliers for the education element of the assessment. Table 6.1 summarises the consultation with respect to socio-economics.

Table 6.1: Summary of Consultation

Consultee and Form/Date of Consultation	Summary of Comments	Action Taken
RBC Acting Planning Manager – Julie Williams. Email issued 30 October 2019.	A response was received regarding the use of CIL payments since 2015, but no detail on the pupil yields.	Calculations have been based on the yield multipliers from the RBC November 2013 Supplementary Planning Document.
Brighter Futures for Children – Michael Steen. Email issued 5 December 2019.	No response received.	Calculations have been based on the yield multipliers from the RBC November 2013 Supplementary Planning Document.

Assessment Scope

6.7 The assessment has been based on a series of development parameters, assumptions and commitments, as described in Chapter 2: EIA Process and Methodology, in Chapter 4: Proposed Development Description and in Chapter 5: Demolition and Construction Environmental Management. Due to the flexibility being sought in respect of land use classes, the socio-economics assessment has been undertaken based on a worst-case interpretation of the minimum and maximum land use schedule presented in Chapter 4: Proposed Development Description.

6.8 Table 6.3 summarises the use classes which have informed the various assessments presented within the ES Chapter and which are considered to represent the worst case for that particular assessment.

Technical Scope

6.9 The assessment considers the following:

- Review of on-site operations and any resulting employment loss;
- Development works and the resulting generation of direct and indirect employment and economic output, measured in Gross Value Added (GVA);
- Generation of direct and indirect employment and GVA resulting from the delivery of non-residential floorspace, taking account of existing on-site economic uses;
- Delivery of new housing including affordable housing;
- Introduction of a new residential population accommodated by the residential units and the resulting demand for local community services and infrastructure including:
  - Primary healthcare (GP and dental provision);
  - Early years, primary and secondary education;
  - Local expenditure generated by new households;
  - Open/play space;
- Impact on existing levels of deprivation in the study area; and
- Impact on perceptions of crime.

Spatial Scope

6.10 The application site is situated within the electoral ward of Abbey within the local authority of Reading, as shown in Figure 6.1.

[1] Secretary of State for Ministry of Housing, Communities and Local Government, 2019. National Planning Policy Framework.
[2] https://www.gov.uk/government/collections/planning-practice-guidance
[3] Reading Borough Council, 2019. Reading Borough Local Plan. RBC.

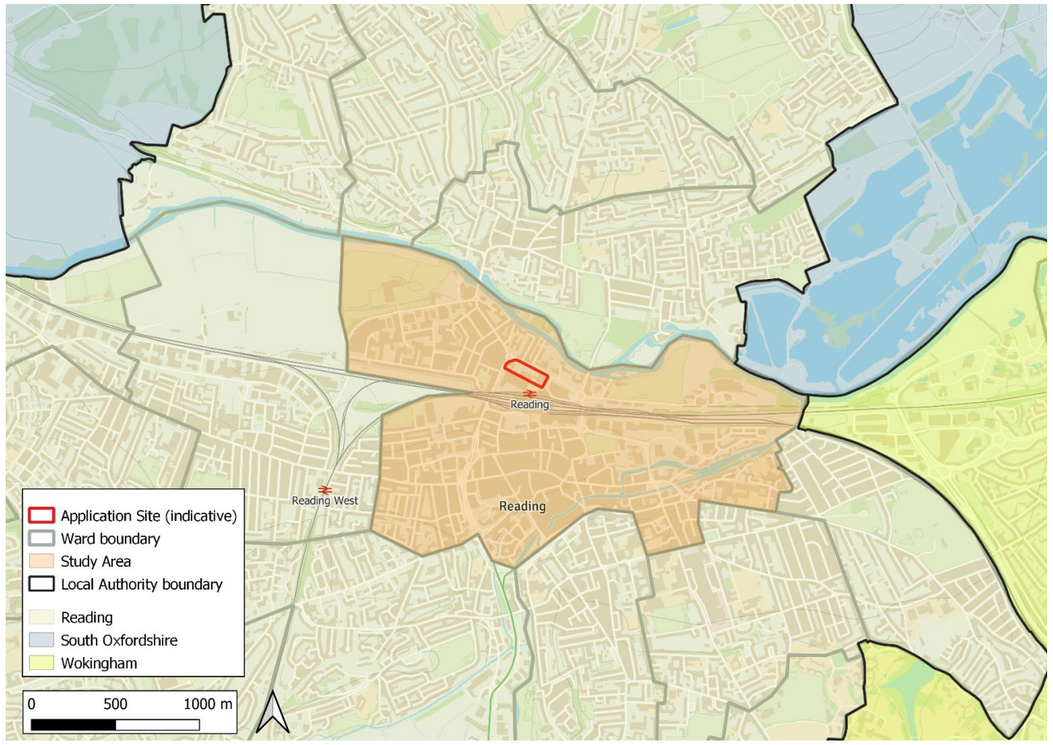

Figure 6.1 Socio-Economic Assessment Study Area

6.11 It is important when undertaking an assessment of the proposed development's potential impacts and likely social and economic effects that the geographical scope of the assessment is clearly understood and that the effects are assessed at the appropriate level.

6.12 The electoral ward of Abbey has been used to represent the study area for the socio-economic assessment as the application site sits entirely within this ward. Baseline conditions for the study area (local level) were compared to the RBC's area (borough level) and England (national level) wherever possible. Distance measures, as opposed to the study area, have been used for the assessment of primary healthcare because people travel beyond the study area for this service. Table 6.2 summarises the receptor selection criteria used within this assessment.

Table 6.2: Receptor Selection Criteria

Receptor	Measure	Justification
Housing	Study area and RBC area	The additional housing created by the proposed development is considered to impact predominantly on the study area and RBC.
Employment/Economic output	Application site, study area and RBC area	Both construction and operational employment is considered to impact predominantly on the study area and RBC.

Table 6.2: Receptor Selection Criteria

Receptor	Measure	Justification
Early years education	study area	RBC Childcare Sufficiency Assessment (CSA) 2017[4] provides data at ward level.
Primary education	2.6 km from the application site boundary	Based on the average distance travelled to a primary school according to the National Travel Survey 2017[5].
Secondary education	5.6 km from the application site boundary	Based on the average distance travelled to a secondary school according to the National Travel Survey 2017.
Primary healthcare (General Practitioner (GP) and dental provision)	study area	Since 2015, people can register with any GP of their choice. However, to limit assessment, provision within the study area has been considered as the area most likely to be impacted upon by the proposed development.
Open/play space	0.4 km and 0.8 km	Based on the radial catchments set out in RBC's Open Spaces Strategy Update Note 2018[6].
Deprivation	study area and RBC area	The proposed development is considered to impact predominantly on the study area and RBC area in respect of deprivation.
Crime	study area and RBC area	Crime Statistics available at ward level and the proposed development is considered to impact predominantly on the study area and RBC area in respect of crime.

Temporal Scope

6.13 The socio-economic assessment has given consideration to baseline conditions for the most recent year for which information is available and a future baseline has been considered for the anticipated year of completion and operation of the proposed development (June 2025) in respect of population and education.

6.14 Demolition phase effects have been considered over an 11-month period (assessing Plots A to D) and construction phase effects have been considered over the period July 2021 to June 2025, in accordance with the development programme set out in ES Chapter 5: Demolition and Construction Environmental Management.

Baseline Characterisation Method

Desk Study

6.15 Baseline characteristics have been established through interpretation of nationally recognised research, data and survey information sourced from official statistics, including:

- Office for National Statistics (ONS), 2018 Mid-Year Population Estimates (MYPE).[7],[8];
- ONS, 2016-based Sub National Population Projections (SNPP)[9];
- ONS, Census 2011[10];
- RBC, Annual Monitoring Report 2017-18[11];
- Experian, Retail Planner Data[12];
- ONS, Annual Population Survey[13] (APS);

4 RBC, October 2017, Childcare Sufficiency Assessment 2017: Final Report
5 DfT, 26 July 2018, National Travel Survey 2017
6 RBC, January 2018, Reading Open Spaces Strategy Update Note 2018
7 ONS, 25 October 2019, Population estimates by output areas, electoral, health and other geographies, England and Wales: mid-2018
8 ONS, 29 June 2019, Population estimates for the UK, England and Wales, Scotland and Northern Ireland: mid-2018
9 ONS, 24 May 2018, Subnational population projections for England: 2016-based
10 ONS, 2011 Census KS401EW and KS402EW
11 RBC, December 2018, Annual Monitoring Report 2017-18
12 Experian Retail Planner Data, 2017
13 Annual Population Survey, 2018 [downloaded via NOMIS 12 December 2019]

- ONS, Claimant Count[14];
- ONS, Job Seeker Allowance (JSA) claimants[15];
- ONS, Business Register and Employment Survey[16] (BRES) 2018;
- Oxford Economics, 2016-2019 Global Forecasting and Quantitative Analysis[17];
- National Health Service (NHS), GP Workforce Statistics as at 31 June 2019[18];
- NHS Digital database of General Dental practices as at 30th November 2018;
- RBC, Childcare Sufficient Assessment (CSA) 2017[19];
- Department for Education (DfE) Annual School Census January 2019[20];
- DfE, School Place Planning Data[21];
- Ordnance Survey (OS) Open Greenspaces[22];
- RBC, Parks, Outdoor Facilities & Open Spaces register[23];
- RBC, Reading Open Spaces Strategy Update Note 2018[24];
- Indices of Deprivation 2019[25]; and
- Police.uk[26]

Field Study

6.16 A field study was not undertaken as this was not considered necessary in order to characterise the baseline.

Assessment Method

Methodology

6.17 The assessment of socio-economic effects is based on a worst-case scenario. However, due to the flexible Development Parameters, the worst-case scenario differs with each of the receptors. Table 6.3 sets out the scenario which is considered worst-case for each of the receptors.

Table 6.3: Worst-case Scenario for Receptors

Receptor	Description
Housing	The worst-case scenario for housing assumed that no residential uses would be delivered.
Local Expenditure	Any new population generated by the proposed development (whether that be residential or employees) has the potential to generate local expenditure. Spending potential is greater for a residential population as spending would be on convenience, comparison and leisure goods and services. Spending from employees is assumed to be limited to convenience goods. The worst-case assessment for local expenditure assumed no residential development and 100 % employment uses. Again, to assess worst-case, it has been assumed that the employment floorspace would be occupied by the use classes which generate the least employment. This is 100,000 m^2 of office floorspace (B1a); 8,000 m^2 of hotel floorspace (C1) and 7,000 m^2 of leisure floorspace (D1-D2).

Table 6.3: Worst-case Scenario for Receptors

Receptor	Description
Employment/Economic output	The worst-case would be the scenario that generates the least employment/economic output. As such, the assessment of effects on employment/economic output assumed 100,000 m^2 residential floorspace (C3); 8,000 m^2 of hotel floorspace (C1); and 7,000 m^2 of leisure floorspace (D1-D2).
Education (early years, primary and secondary)	The worst-case scenario for education would be the scenario which generates the greatest extent of residential population and therefore demand for education services. As such, the assessment of effects on education assumed that the proposed development would deliver 1,000 residential units. It is also assumed that all residents would be new to the area and not already attending a local school/early year service. The development parameters state that all of the residential units would be apartments. To assess a worst-case scenario it has been assumed that the maximum of 60 % would be 2+ bedrooms and 40 % 1-bedroom apartments.
Primary healthcare (General Practitioner (GP) and dental provision)	The worst-case scenario for primary healthcare would be the scenario which generates the greatest extent of residential population and therefore demand for primary healthcare services. As such, the assessment of effects on primary healthcare assumed that the proposed development would deliver 1,000 residential units. It is also assumed that all residents would be new to the area and not already registered with a local health practitioner.
Open/play space	Worst-case scenario for open/play space would be the scenario which generates the greatest extent of residential population and therefore demand for open/play space. As such, the assessment of effects on open/play space assumes that the proposed development would deliver 1,000 residential units. The development parameters state that at least 10 % of the overall application site area would be provided as publicly accessible open space. Worst-case assessment assumes that the proposed development would deliver the minimum 10%.

Population

6.18 The size of the population generated by the proposed development has been determined by multiplying the number of residential units to be delivered by the proposed development by the average household size for the proposed development's anticipated year of completion (2025) as projected by the ONS, 2016-based household projections[27] for the RBC area.

Housing

6.19 The impact on the local housing stock has been assessed qualitatively based on the contribution that the proposed development would make to the identified housing needs established by planning policy or any potential shortfall in net housing completions identified in the RBC, Authority Monitoring Report 2017-18[28].

[14] ONS, Claimant Count October 2019 [downloaded via NOMIS 12 December 2019]
[15] ONS, Jobseeker's Allowance by occupation October 2019 [downloaded via NOMIS 12 December 2019]
[16] ONS, Business Register and Employment Survey 2018 [downloaded via NOMIS 12 December 2019]
[17] Oxford Economics, 2016-2019, GVA per Worker
[18] NHS, GP workforce Statistics March 2019 and location data of GP practices and branches and dental surgeries, May 2019
[19] RBC, October 2017, Childcare Sufficiency Assessment 2017: Final Report
[20] DfE, Annual School Census January 2019
[21] DfE, 28 March 2019, School planning tables: school capacity academic year 2017 to 2018
[22] https://www.ordnancesurvey.co.uk/business-government/products/open-map-greenspace
[23] https://www.reading.gov.uk/parks [accessed 12 December 2019]
[24] RBC, January 2018, Reading Open Spaces Strategy Update Note 2018
[25] MHCLG, 26 September 2019, English Indices of Deprivation 2019
[26] https://www.police.uk/ [accessed 12 December 2019]
[27] ONS, 2016-based subnational household projections
[28] RBC, December 2018, Annual Monitoring Report 2017-18

Local Expenditure

6.20 A quantitative assessment has been made on the potential for new residents living and employees working in the proposed development to increase spending on goods and services in the local area. This has been assessed by multiplying the proposed development's number of residential units/number of employees by average annual household/per person expenditure on convenience, comparison and leisure goods and services sourced from Experian (2017).

Employment

6.21 Current on-site employment operations have been informed by research undertaken by Jones Lang LaSalle (JLL) Real Estate Advisors.

6.22 The likely number of jobs generated during the demolition and construction stage has been assessed based on the Construction Industry Training Board (CITB), Labour Forecasting Tool (LFT). The LFT is able to produce labour forecasts based on historic data. The tool focuses on forecasting labour demand on a month-by-month basis by each occupational group throughout the demolition and construction phase of the proposed development. The LFT calculations have been based actual costs developed by Cast. Demolition and construction stage employment has been calculated separately. The demolition phase has assumed an 11-month demolition programme in accordance with the development programme set out in ES Chapter 5: Demolition and Construction Environmental Management. The construction phase has assumed a 48-month construction programme commencing in July 2021 and finishing in June 2025. The level of indirect employment generated during the demolition and construction period has been assessed quantitively by applying the ONS, Type 1 employment multiplier, 2015[29].

6.23 The completed and operational stage employment has been calculated using employment densities[30] applied to the proposed development's floorspace schedules by Use Class

6.24 Floorspace schedules for the proposed development have been provided by Gross External Area (GEA). GEA has been converted to Gross Internal Area (GIA) by assuming 95 % of the GEA following conversion guidance provided in the HCA, Employment Densities Guide, 3rd Edition, November 2015. However, the Employment Densities Guide requires some use class floorspaces by Net Internal Area (NIA). NIA figures have been calculated by assuming 90 % of the GIA area, again following conversion guidance provided in the HCA, Employment Densities Guide.

6.25 Guidance from the HCA, Additionality Guide, 4th Edition, 2014[31] has been used to understand the potential multiplier effects of the proposed development. The Additionality Guide establishes that gross additional employment levels would most likely be subject to a degree of 'leakage' (referring to the number of jobs likely to be taken up by people outside the RBC area); 'displacement' (the level of employment likely to be lost, moved or adversely affected by the employment created as a result of the proposed development) and 'composite multiplier effects' (the additional economic benefit that would be derived as a direct result of the income earned by the new employment as an indirect result of the supply chain linkages). These factors are collectively known as the additionality factors.

6.26 In this instance, it is considered that the degree of leakage would be high (50 %) on the basis that the employment opportunities created by the proposed development would serve not only the new population that would inhabit the proposed new dwellings but also residents of the wider RBC area and beyond; displacement levels would be low at 25 % as the proposed development is expected to take only limited trade from other parts of the RBC Area; and the composite multiplier effect would be local/sub-regional level and therefore 1.29 for the office use (B1a) and 1.38 for the recreational uses (C1 and D1-D2).

Economic Output

6.27 The level of economic output on the existing on-site operations has been measured through the generation of GVA per annum. GVA is a measure of economic impact, distributed through retained profit and wages. GVA resulting from existing on-site uses has been calculated by applying the average GVA per worker by Industry for the South East (SE) sourced from Oxford Economics, 2016-2019 Global Forecasting and Quantitative Analysis[32].

6.28 GVA resulting from the direct construction jobs has been calculated by applying the average GVA per construction worker per annum for the SE region sourced from Oxford Economics, 2016-2019 Global Forecasting and Quantitative Analysis. Further to this, a total indirect GVA per annum has been calculated using a national average GVA per worker figure.

6.29 GVA during the completed and operational stage has been assessed using the same Use Class floorspace assumptions used to calculate operational employment. This assumes a worst-case. The contribution that future residents and workers would make to the GVA output is assessed using the number of economically active residents and residents in employment from the ONS, APS for the 12 months to June 2019, applied to the total population anticipated to arise from the proposed development. The average GVA output per worker by Industry for the RBC area provided by Oxford Economics, 2016-2019 Global Forecasting and Quantitative Analysis[33] is applied to the anticipated number of employed residents of the proposed development and estimated on-site future workers to estimate the GVA contribution per annum.

Primary Healthcare

6.30 The number of future residents anticipated to live on the proposed development (as described within the assessment approach for population) has been compared to the levels of capacity within the primary healthcare system to determine whether or not the existing provision assessed within the baseline, would be able to accommodate the needs of the proposed development population.

6.31 To determine whether existing GP provision is under or over-capacity, GP to patient ratios of local practices were compared to the average for England of 1 GP for every 2,043 people. The ratio of 1 GP per 2,043 people was derived from GP workforce numbers published by NHS Digital as at June 2018 and 2018 MYPE (also as at June 2018). Reference was also made to NHS Services Finder in respect of whether the service is currently (as at 11 December 2019) accepting new patients.

6.32 It is not possible to determine the precise number of patient places available as no central census of dentists is conducted and no definitive ratio of patients per dentist exists. However, a telephone survey was undertaken with each of the identified practices on 16 December 2019 to identify whether they are accepting new patients.

Education

6.33 Pupil yields for flats/apartments provided by RBC (summarised in Table 6.4) have been applied to the proposed development's accommodation mix (by type and size) to calculate the number of early years, primary and secondary school aged children generated by the proposed development. The number of pupils generated by the proposed development has been compared to the level of surplus or deficit school places identified in the baseline assessment to determine whether the existing education provision would be able to accommodate the needs of the proposed development population.

[29] ONS (March 2019) Type 1 UK employment multipliers and effects, reference year 2015
[30] HCA (2015) Employment Densities Guide 3rd Edition
[31] HCA (2014) Additionality Guide 4th edition

[32] Oxford Economics, 2016-2019 Global Forecasting and Quantitative Analysis
[33] Oxford Economics, 2016-2019, GVA per worker

Table 6.4: RBC Pupil Yield Multipliers (number of children per new dwelling)

Age Group	Flats/Apartments	
	2 Bedroom	3+ Bedroom
Rising Fives (Age 4)	0.12	0.18
Primary (Ages 5 to 10)	0.17	0.22
Secondary (Ages 11 to 16)	0.05	0.17

Source: RBC, S106 Planning Obligations SPD, November 2013[34]

Open Space/Play Space

6.34 A qualitative assessment has been undertaken based on the proximity of the application site to existing open space and the quantum and accessibility of open space that would be delivered by the proposed development.

6.35 Open space requirements have been based on proximity standards set out RBC's 'Reading Open Spaces Strategy Update Note 2018[35]' and which are summarised in Table 6.5.

Table 6.5: RBC Open Space Provision Standards

Name	Description	Size	Radial Catchment
Borough Park	Varied character and facilities; open parkland, natural, formal, sport, play and relaxation; catering	60 hectare (ha)	Not specified
District Park	Varied character and facilities (but fewer than above); natural, formal, sport, play and relaxation	20 ha	1.2 km
Local Park	Relaxation, play and ball games	2 ha or 1 to 2 ha equipped	0.8km
Neighbourhood Park	LEAP (local equipped area for play) + informal space	0.1 to 0.2 ha equipped	0.4 to 0.8 km
Small recreational Open Spaces	'low-grade' recreation	0.1 to 0.2 ha	0.4 to 0.8 km
Linear Open Spaces	Relaxation; green link	Not specified	Not specified
Semi-Natural Sites	Comparatively undisturbed sites, managed for wild flora and fauna	Not specified	1.5 to 2.0km

Source: RBC, Reading Open Spaces Strategy Update Note, 2018

6.36 RBC does not provide public open/play space requirements per head of population. The Reading Open Spaces Strategy Update Note 2018 states that money collected through the Community Infrastructure Levy (CIL) will be used to fund open space infrastructure. However, RBC emphasise the importance of on-site delivery of open space where that can be achieved.

6.37 In the absence of open/play space requirements from RBC, reference has been made to guidance published by the Fields in Trust[36]. The 2015 guidance for open/play space provision in England is summarised in Table 6.6.

Table 6.6: Open/Play Space Quantity Guidance

Open Space Typology	Type	Quantity Guidance (hectares per 1,000 population)
Playing pitches	Formal	1.20
All outdoor sports	Formal	1.60
Equipped/designated play areas	Formal	0.25
Other outdoor provision (MUGAs and skateboard parks)	Formal	0.30
Parks and gardens	Informal	0.80
Amenity open space	Informal	0.60
Natural and semi-natural	Informal	1.80

Source: Fields in Trust, Guidance for Outdoor Sport and Play, 2015

6.38 The Fields in Trust guidance has been applied to the future residential population of the proposed development to provide the quantum of open/play space provision that would be required to be delivered as part of the proposed development.

Deprivation

6.39 The assessment has been undertaken on a qualitatively basis in respect of the proposed development and how this is likely to affect future deprivation levels within the area based on professional judgement.

Crime

6.40 Assessment has been qualitatively based on the extent to which increased population and modern housing design techniques are expected to impact upon perceptions of crime within the study area and have been based on professional judgement and experience.

Assessment Criteria

6.41 The criteria used to assess if an effect is significant or not, is set out in subsequent sub-sections. This has been determined by consideration of the sensitivity of the receptor, magnitude of impact, duration of the effect, geographical extent of the effect and application of professional judgement.

6.42 There are no technical significance criteria relating to assessment of socio-economic effects on human populations other than those that relate specifically to other technical areas such as pollution, noise etc. and these are dealt with in detail, in separate ES chapters, if necessary and, where appropriate, summarised within the socio-economics chapter. The significance of socio-economic effects has therefore been assessed using professional judgement in accordance with the outline methodology for determining sensitivity of receptors and magnitude of impacts and significance of effects.

6.43 Quantitative calculations have been undertaken where possible e.g. surplus or deficit of pupil places and comparative GP to patient ratios, and the level of significance determined by the effect at either local, district or national level. Where it is has not been possible to measure effects on a quantitative basis, a qualitative assessment has been provided.

[34] RBC, November 2013, S106 Planning Obligations Supplementary Planning Guidance
[35] RBC, January 2018, Reading Open Spaces Strategy Update Note 2018
[36] Fields in Trust, 2015, Guidance for Outdoor Sport and Play: Beyond the Six Acre Standard: England

Receptor Sensitivity Criteria

6.44 The sensitivity of receptors has been classified as low, medium or high, in accordance with the criteria set out in Table 6.7.

Table 6.7: Receptor Sensitivity Criteria

Sensitivity	Criteria
Low	The receptor/resource is tolerant of change without detriment to its character, is of low or local importance.
Medium	The receptor/resource has moderate capacity to absorb change without significantly altering its present character or is of high importance.
High	The receptor/resource has little ability to absorb change without fundamentally altering its present character or is of international or national importance.

Impact Magnitude Criteria

6.45 The magnitude of impact has been classified as low, medium or high, in accordance with the criteria set out in Table 6.8.

Table 6.8: Impact Magnitude Criteria

Magnitude of Impact	Criteria
Low	A minor shift away from baseline conditions. Change arising from the loss/alteration will be discernible/detectable but not material. The underlying character/composition/attributes of the baseline condition will be similar to the pre-development circumstances/situation.
Medium	Loss or alteration to one or more key elements/features of the baseline conditions such that post development character/composition/attributes of the baseline will be materially changed.
High	Total loss or major/substantial alteration to key elements/features of the baseline (pre-development) conditions such that the post development character/composition/attributes will be fundamentally changed.

Significance Criteria

6.46 Significant effects have been determined based on the standard terminology and matrix approach defined in ES Chapter 2: EIA Process and Methodology and set out in Table 6.9, with moderate and major effects considered significant in EIA terms.

Table 6.9: Significance Criteria

Magnitude of Impact	Sensitivity of Receptors		
	Low	Medium	High
Low	None	Negligible	Minor
Medium	None – Negligible	Minor	Moderate
High	Minor	Moderate	Major

6.47 Duration of effect has been described as short, medium or long-term, in accordance with the criteria set out in Table 6.10.

Table 6.10: Duration of Effects Criteria

Duration	Criteria
Short	Up to 5 years
Medium	5 to 10 years
Long-term	10 years and over

Assumptions and Limitations

6.48 There are no further limitations or assumptions made other than those detailed in the assessment method above.

Baseline Conditions

Existing Baseline

Population

6.49 The ONS, 2018 MYPE estimate that the study area has a population of 14,700 people, accounting for 9 % of the RBC area's total population (163,200 people). The study area has a younger population profile than the both the RBC area and England. Only 6 % of the study area's population is aged 65+ years and over compared to 12% in the RBC area and 18 % in England. In contrast, the study area has a higher proportion of its population of working age (77 %) compared to just 67 % in the RBC area and 63 % in England. Whilst the study area has a younger population profile, the proportion of the population aged 0 to 15 years in the study area (17 %) is lower than the RBC area (21 %) and England (19%). Table 6.11 summarises the age profile of the study area, the RBC area and England by broad age group and Figure 6.2 compares the age profile of the study area, the RBC area and England by 5-year age group. All figures have been individually rounded and may not sum.

Table 6.11: Age Profile by Broad Age Group

2018 MYPE	Study Area	RBC Area	England
All people	14,700 (100 %)	163,200 (100 %)	55,977,200 (100 %)
Aged 0 to 15	2,500 (17 %)	33,900 (21 %)	10,748,500 (19 %)
Aged 16 to 64	11,300 (77 %)	109,300 (67 %)	35,049,500 (63 %)
Aged 65+	900 (6 %)	20,000 (12 %)	10,179,300 (18 %)

Source: ONS, 2018 MYPE

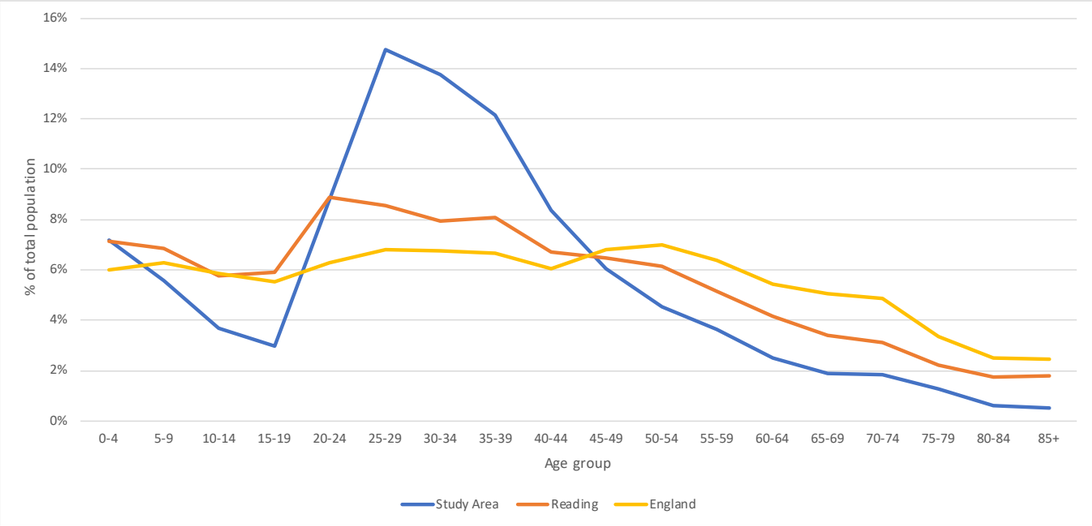

Figure 6.2 Age Profile by 5-year Age Group

Housing

6.50 The 2011 Census recorded approximately 65,551 households in the RBC area, 10 % of which (6,783) are within the study area. Table 6.12 highlights that accommodation within the study area predominantly takes the form of flats (72 %). The study area has a higher proportion of flats than the RBC area (32 %) and England (22 %). In contrast, the study area has a lower proportion of terraced (22 %); semi-detached (4 %) and detached properties (2 %) than the RBC area and England.

6.51 Accommodation within the study area is mainly private rented (51 %), which is in contrast to the RBC area and England where the majority of accommodation is owner occupied (55 % and 63 % respectively). Only 28 % of accommodation in the study area is owner occupied.

6.52 Caravans and other temporary structures are not included. All figures have been rounded and may not sum.

Table 6.12: Household Accommodation Type and Tenure

Type	Study Area	RBC Area	England
Detached	2%	12%	22%
Semi-detached	4%	25%	31%
Terraced	22%	30%	24%
Flats	72%	32%	22%
Tenure			
Owned	28%	55%	63%
Shared ownership	3%	2%	1%
Social rent	16%	16%	18%
Private rent	51%	26%	17%

Source: ONS, 2011 Census, Tables KS401EW and KS402EW [downloaded from NOMIS 12 December 2019].

6.53 The RBC Authority Monitoring Report 2017-2018 establishes that in 2017/18 there was a total of 700 net housing completions in the RBC area. This is above RBC's current annual housing target of 689 net homes per annum (2013-2036) as set out in the Reading Borough Local Plan (adopted November 2019)[37]. However, over the last five-years (2013/14 to 2017/18) net housing completions have totalled 3,164 which is equivalent to 633 per annum, falling short of the Local Plan requirement. Nonetheless, the RBC Authority Monitoring report 2017-18 projects completions over the years 2018/19 to 2025/26 to be in excess of the Local Plan requirement in each individual year.

Local Expenditure

6.54 Retail expenditure data from Experian (2017) reports the average annual household expenditure in the RBC area on convenience (food), comparison (non-food) and leisure goods and services as follows:

- Convenience = £4,966 per household per annum;
- Comparison = £8,442 per household per annum; and
- Leisure = £7,414 per household per annum.

Employment/Economic Output

6.55 The application site is currently occupied by four retail units (A1) and one restaurant (A3) as detailed in Table 6.13 along with the existing number of employees. In total, the application site is currently providing employment for 225 people.

Table 6.13: Existing Tenancy of Application Site

Occupant	Use Class	Employee Numbers	Floorspace (m^2)
The Range	A1	80	3,326
Mothercare	A1	30	1,440
Majestic Wine	A1	8	294
Aldi	A1	85	1,480
TGI Friday	A3	22	845

Source: JLL

6.56 Applying the average GVA per worker by Industry for the South East region to the application site's existing employment potential, it is estimated that the existing application site has the potential to generate a GVA of approximately £10.2 million per annum.

6.57 In the year ending June 2019 there were 90,800 residents in the RBC area aged between 16 and 64 years who were classified as economically active (ONS, APS, 2019). This is equivalent to 82 % of 16 to 64 year olds and 56 % of all people. This is above the average for England (79 % of 16 to 64 year olds). Economically active includes people in employment, the unemployed and full-time students.

6.58 In total 78 % of working age residents aged 16 to 64 years in the RBC area are in employment (ONS, APS, 2019), which is higher than the average for England (76 %). In the RBC area this is equivalent to 53 % of all people.

6.59 The unemployment rate in the RBC area (for those aged 16 to 64 years) in the year ending June 2019 was 4.6 % which is higher than the national average (4.1 %). Whilst not a measure of total unemployment, Claimant Count data provides a count of the number of people claiming unemployment

[37] RBC, Reading Borough Local Plan, Adopted November 2019, Policy H1

related benefits including JSA and UC within the study area. As at October 2019 there were 345 claimants of unemployment related benefits in the study area which is equivalent to 3.1 % of all residents aged 16 to 64 years. This is higher than the Claimant Count for the RBC area (2.7 %) and England (2.8 %).

6.60 In October 2019, there were 395 residents in the RBC area claiming JSA, of which 50 (i.e. 13 %) resided in the study area. Of those claiming JSA in the RBC area, the majority of people (190, equivalent to 48 %) are seeking employment in Sales Occupations, with the remaining looking for work in: elementary trades, plant and storage related occupations, administration occupations, corporate managers and skilled agricultural trades.

6.61 The RBC area is a net importer of labour. According to the 2018 BRES, there are 105,000 employees working in the RBC area, of which 43,000 (41 %) work within the study area. The study area has a comparatively high proportion of employees working in: the Retail sector (14 %); the Professional, Scientific and Technical sector (14 %); the Financial and Insurance sector (9 %); the Accommodation & Food Services sector (8 %) and Public Administration and Defence sector (7 %) in comparison to the RBC area average as is shown in Table 6.14.

Table 6.14: Percentage of Employees by Industrial Sector (Workplace Based)

Sector	Study Area	RBC Area	England
Retail	14%	11%	9%
Professional, scientific and technical	14%	11%	9%
Information and communication	10%	14%	4%
Business administration and support services	10%	10%	9%
Financial and insurance	9%	4%	3%
Accommodation and food services	8%	6%	7%
Public administration and defence	7%	4%	4%
Mining, quarrying and utilities	6%	3%	1%
Transport and storage (inc/. postal)	5%	4%	5%
Health	3%	12%	13%
Education	3%	6%	9%
Arts, entertainment, recreation and other services	3%	4%	4%
Wholesale	1%	3%	4%
Property	1%	1%	2%
Manufacturing	1%	2%	8%
Construction	1%	2%	5%
Motor trades	1%	2%	2%
Agriculture, forestry and fishing	0%	0%	1%
Total	100%	100%	100%

Source: ONS, BRES 2018

6.62 The data also identifies that there is a construction workforce, significant in size, already working within the study area. Whilst only 1% of employment within the study area is within the Construction sector, this is equivalent to 350 employees. In total, 2,250 people work in the Construction sector within the RBC area.

Primary Healthcare

6.63 There are six GP practices operating within the study area as shown in Figure 6.3. One of the GP Practices – Russell Street Surgery (Map No. 4) has a further two GP branches associated with the Practice: Coley Park Surgery (Map No. 4a) located in Reading but outside of the study area; and Burghfield Health Centre, Burghfield Common located in the local authority of West Berkshire. This Health Centre is not shown on Figure 6.2 due to the distance from the application site.

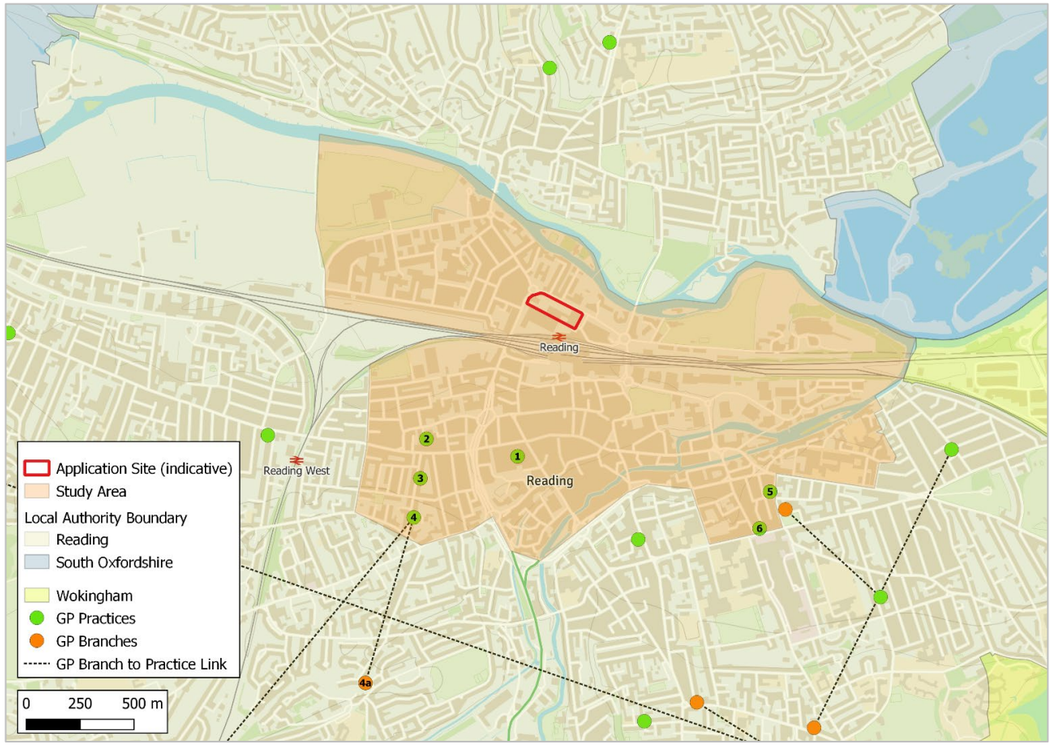

Figure 6.3: Existing General Practitioner Provision

Source: NHS Digital[38]

6.64 Table 6.15 presents the number of registered patients along with the number of Full Time Equivalent (FTE) GPs in the six identified GP Practices. As noted in the assessment methodology section, data is only published for GP Practices and therefore the data presented in Table 6.14 for the Russell Street Surgery, also includes data for the associated GP branches of Coley Park Surgery and Burghfield Health Centre.

[38] NHS Digital as at 31 May 2019

Table 6.15: Existing GP Provision and Capacities (June 2019)

Map No.	Surgery Name	GPs (FTE)	Registered Patients	GP to Patient Ratio	Surplus Capacity*
1	Reading Walk-In Health Centre	4.3	9,872	1:2,296	0
2	Chatham Street Surgery	1.1	6,836	1:6,215	0
3	Abbey Medical Centre	0.8	2,421	1:3,026	0
4	Russell Street Surgery	3.1	8,356	1:2,695	0
5	Eldon Road Surgery	0.7	3,235	1:4,621	0
6	Melrose Surgery	2.4	10,537	1:4,390	0
	Total	12.4	41,257	1:3,327	0

Source: NHS (June 2019)

*Assessed against the average for the South East region of 1 GP for every 2,245 people. Capacity is calculated by subtracting the existing GP to patient ratio from the average for the South East region and multiplying this by the number of FTE GPs at the surgery

6.65 All six GP practices are currently operating above capacity (assessed against the average for the South East region of 1 GP for every 2,245 people). Therefore, there is no surplus capacity within the existing GP provision in the study area.

6.66 There are four dental surgeries located within the study area as illustrated in Figure 6.4.

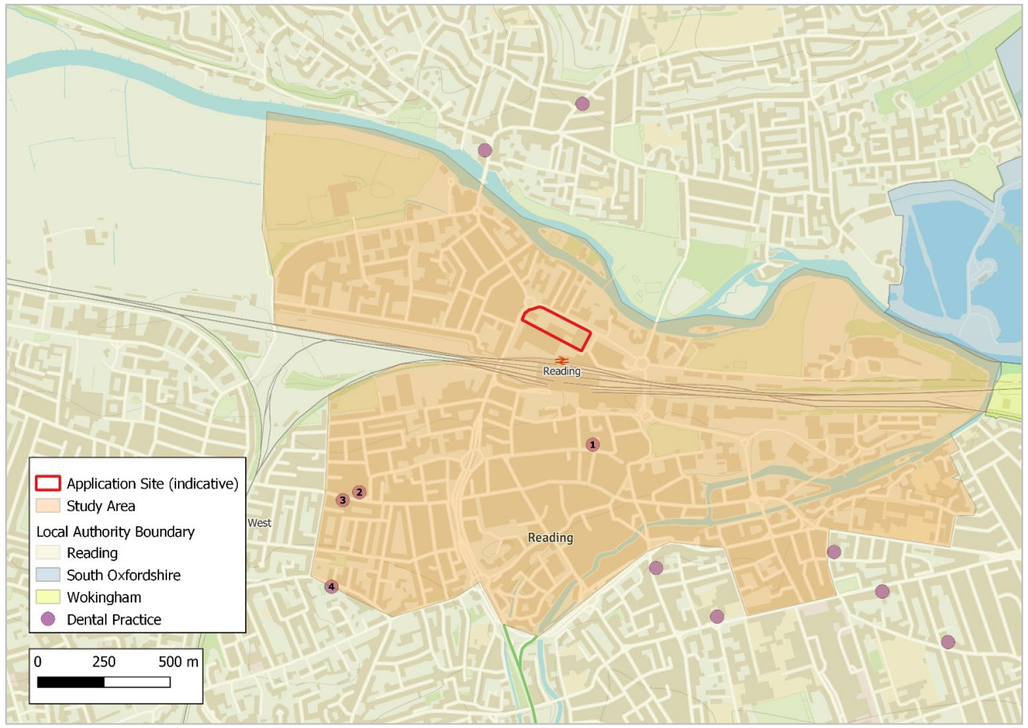

Figure 6.4: Existing Dental Provision

Source: NHS Digital

6.67 Table 6.16 provides details of the four dental practices along with an assessment of whether the practices are currently accepting new NHS/private patients.

Table 6.16: Existing Dental Provision (December 2019)

Map No.	Practice Name	Address	Accepting New Patients?	
			NHS	Private
1	Friar Street Dental Surgery	15 Friar Street, Reading, RG1 1DB	Yes	Yes
2	Inspire Dental Reading	124 Oxford Road, Reading, RG1 7NL	Yes	Yes
3	Reading Dental Sedation Clinic	165 Oxford Road, Reading, RG1 7UZ	Referral only	
4	Castle Hill Clinic	1c Tilehurst Road, Reading, RG1 7TW	Yes	Yes

Source: Telephone Survey dated 16 December 2019

6.68 One of the four dental practices (Reading Dental Sedation Clinic) offers treatment by referral only and of the remaining three dental practices, all three are accepting both new NHS and private patients. This indicates available dental provision within proximity of the application site currently.

Education

6.69 Early years education and care is provided in a number of ways including at local authority-maintained nursery schools, children's centres or primary schools with nursery classes, or privately through independent nursery schools, playgroups, child-minders or creches.

6.70 Reference to RBC's CSA 2017[39] identifies a total of 14 providers of formal early years/childcare provision within the study area providing a total of 629 registered places. The CSA identified 77 vacancies within the study area as at March 2017 (the latest available). Vacancies as a proportion of total places is equivalent to 12 % in the study area, marginally lower than the average for RBC (13 %).

6.71 A total of 21 primary schools have been identified within a 2.6 km radius of the application site as shown on Figure 6.5.

[39] RBC, October 2017, Childcare Sufficiency Assessment 2017: Final Report

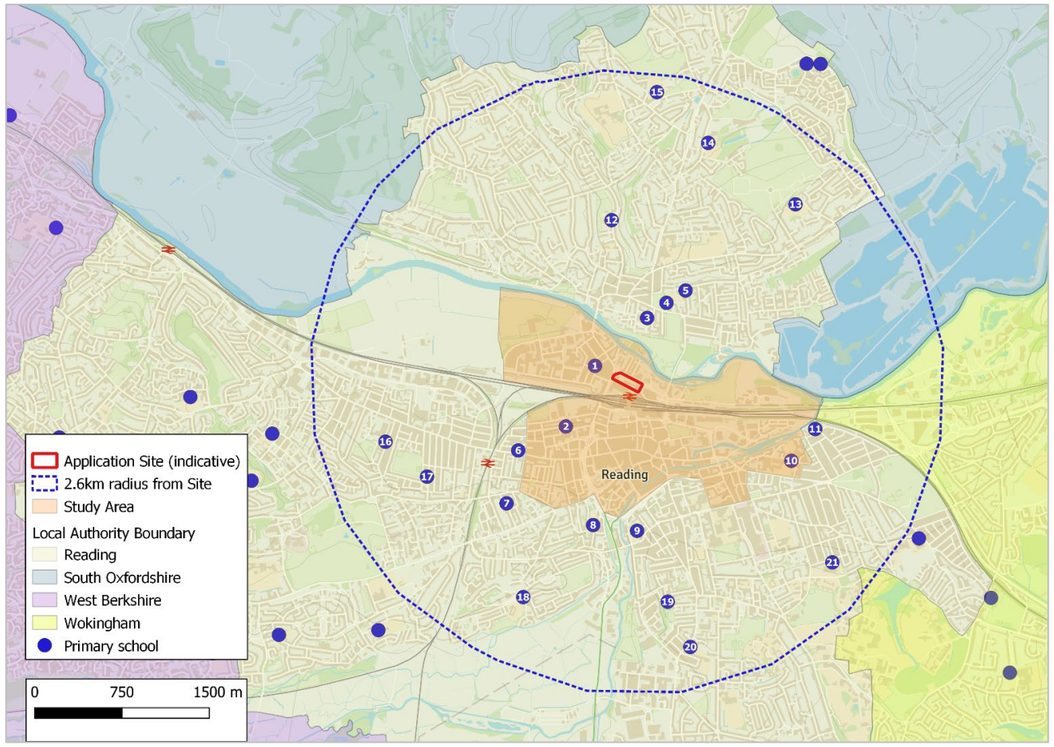

Figure 6.5: Existing Primary School Provision

6.72 Table 6.17 details the number of pupils on roll according to the January 2019 School Census and current capacity figures for each of the identified primary schools.

Table 6.17: Existing Primary School Provision within Study Area

Map No.	Name	Pupils on roll	Capacity	Surplus/Deficit Places
1	E P Collier Primary School	350	472	122
2	Civitas Academy	209	420	211
3	Thameside Primary School	408	420	12
4	The Heights Primary School	276	350	74
5	St Anne's Catholic Primary School	220	240	20
6	Oxford Road Community School	286	292	6
7	All Saints Junior School	95	100	5
7	All Saints Church of England Aided Infant School	60	60	0
8	Coley Primary School	273	300	27
9	Katesgrove Primary School	681	708	27
10	St John's Church of England Primary School	468	420	-48
11	New Town Primary School	290	472	182
12	Caversham Primary School	447	450	3
13	Micklands Primary School	400	420	20
14	The Hill Primary School	450	420	-30
15	Emmer Green Primary School	450	420	-30
16	Wilson Primary School	469	477	8
17	Battle Primary Academy	424	472	48
18	St Mary and All Saints Church of England Primary School	360	460	100
19	New Christ Church Church of England Primary School	184	210	26
20	The Palmer Primary Academy	441	498	57
21	Redlands Primary School	269	210	-59
	Total	7,510	8,291	781

Source: DfE, Annual School Census, January 2019

6.73 The primary school nearest to the application site, E P Collier Primary School, is currently operating under-capacity with a surplus of 122 places. In combination, all of the primary schools within 2.6 km of the application site are currently operating under-capacity with a surplus of 781 places.

6.74 A total of 11 secondary schools have been identified within a 5.6 km radius of the application site, as shown in Figure 6.6. However, one of the 11 secondary schools (Reading Girls' School, Map No. 8) is an all-girls school and therefore has been excluded from the assessment. Ten secondary schools have therefore been selected for assessment, with two of these schools (The Bulmershe School and Maiden Erlegh School) being located within the Local Education Authority (LEA) of Wokingham. The remaining eight secondary schools are located within the LEA of Reading. Table 6.18 details the number of pupils on roll according to the January 2019 School Census and current capacity figures for each of the 10 identified secondary schools.

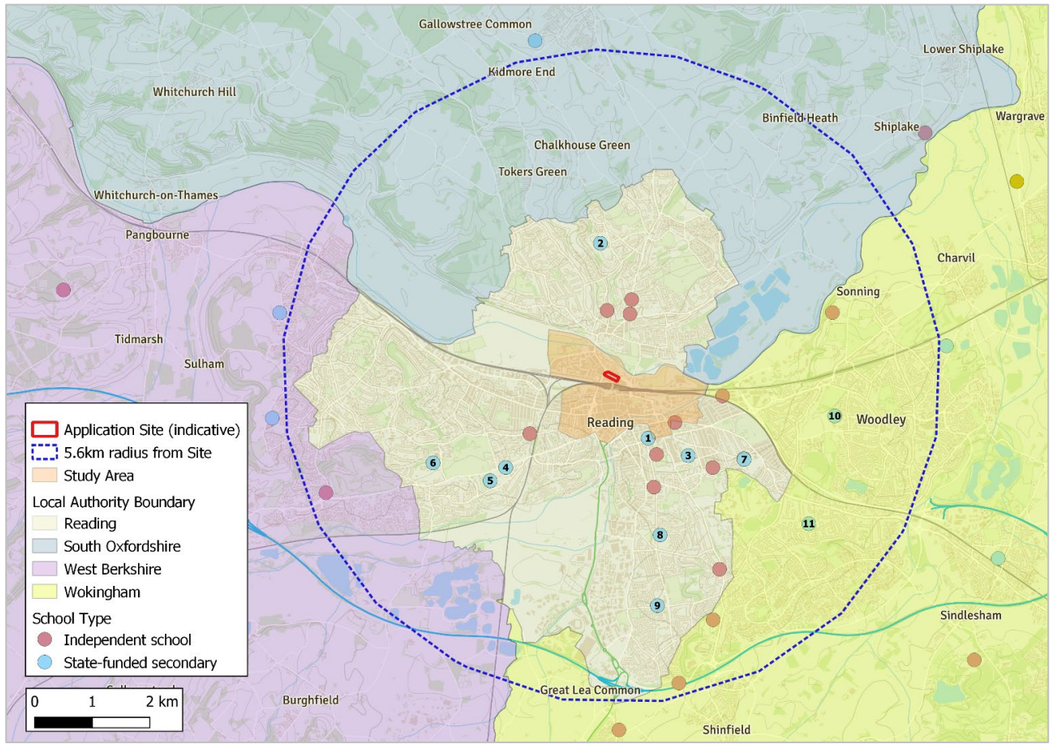

Figure 6.6: Existing Secondary School Provision

Table 6.18: Existing Secondary School Provision

Map No.	Name	LEA	Pupils on roll	Capacity	Surplus/deficit places
1	Kendrick School	Reading	739	760	21
2	Highdown School and Sixth Form Centre	Reading	1,357	1,440	83
3	Reading School	Reading	1,027	887	-140
4	The WREN School	Reading	589	1,176	587
5	Blessed Hugh Faringdon Catholic School	Reading	815	849	34
6	Prospect School	Reading	1,044	1,700	656
7	UTC Reading	Reading	453	600	147
8	Reading Girls' School	Reading	Not assessed		
9	John Madejski Academy	Reading	612	950	338
10	The Bulmershe School	Wokingham	1,145	1,383	238
11	Maiden Erlegh School	Wokingham	1,824	1,788	-36
Total			9,605	11,533	1,928

Source: DfE, Annual School Census, January 2019

6.75 The secondary school nearest to the application site, Kendrick School, is currently operating slightly under-capacity with 21 surplus places. In combination, all of the secondary schools within 5.6 km of the application site are currently operating under-capacity with a surplus of 1,928 places.

Open/Play Space

6.76 RBC's 'Reading Open Spaces Strategy Update Note 2018[40] acknowledges that the amount of public open space in the RBC area is broadly in line with the national guidelines and that the total provision of open space across the RBC area is adequate. However, there are parts of the RBC area which are deficient in open space provision with residents in and around the town centre being further away from public open space than the recommended standards. RBC's Open Space Strategy[41] adopts a 0.4 km to 0.8 km radius catchment for neighbourhood/local parks and play space and a 1.2 km radius catchment for larger parks and sports facilities as detailed earlier in this Chapter (see Table 6.5).

6.77 Reference to OS Open Greenspace identifies the provision of public open space within the required radial catchment of the application site according to RBC's open space standards. See Figure 6.7 and Table 6.19.

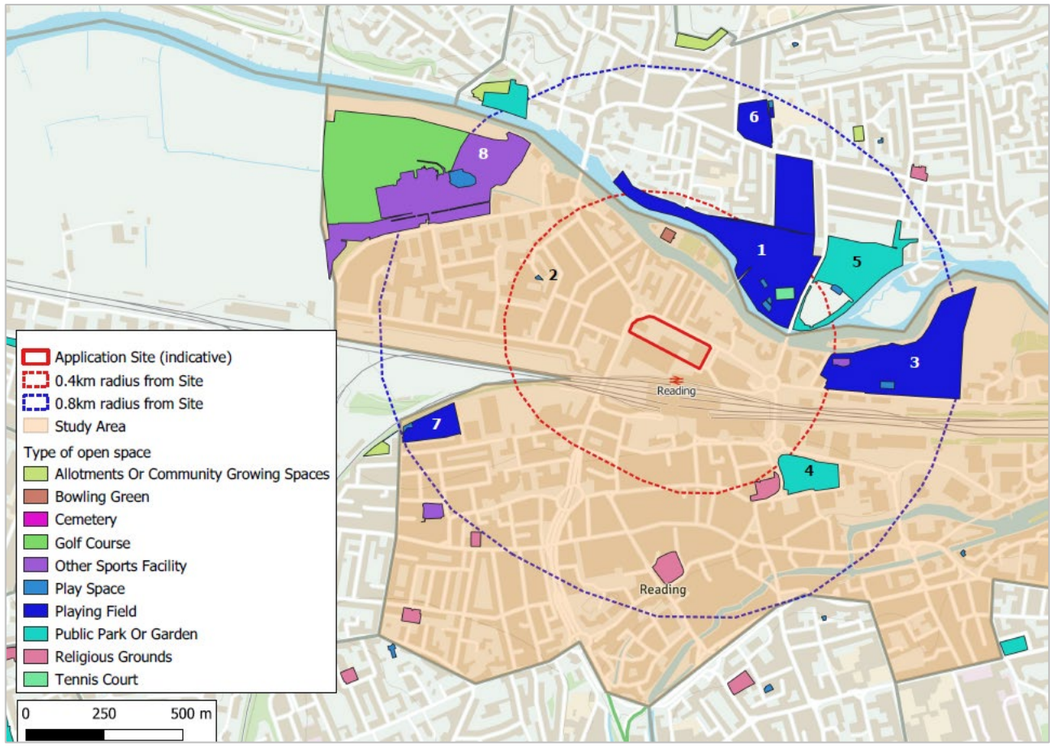

Figure 6.7: Existing Open/Play Space Provision

Source: OS Open Greenspace

[40] RBC, January 2018, Reading Open Spaces Strategy Update Note 2018

[41] RBC, January 2018, Reading Open Spaces Strategy Update Note 2018

Table 6.19: Existing Open/Play Space Provision

Map No.	Name	Radial Catchment	Description of Facility Surplus/Deficit Places
1	Christchurch Meadows	0.4 km	Playing field, children's play area, football, fishing and tennis
2	Denbeigh Place	0.4 km	Play space
3	King's Meadow	0.8 km	Playing field, children's play area, football, fishing and rugby
4	Forbury Gardens	0.8 km	Recreation ground
5	Hill's Meadow	0.8 km	Public park, skateboarding and BMX track
6	Westfield Road	0.8 km	Recreation ground and children's play area
7	Victoria Park	0.8 km	Recreation ground and children's play area

Source: RBC, Open Spaces Strategy Update Note, 2018

6.78 Figure 6.7 and Table 6.19 demonstrate that within a 0.4 km to 0.8 km radial catchment of the application site there are numerous sites providing a range of public open/play space provision, thereby meeting RBC's open space requirements.

Deprivation

6.79 According to the Indices of Deprivation 2019, the RBC area is ranked the 141st most deprived local authority in England (out of 326). However, within the RBC area there are pockets of considerable deprivation as illustrated in Figure 6.8. Of the 97 Lower Super Output Areas (LSOAs) in the RBC area, five LSOAs are within the most 10% deprived nationally.

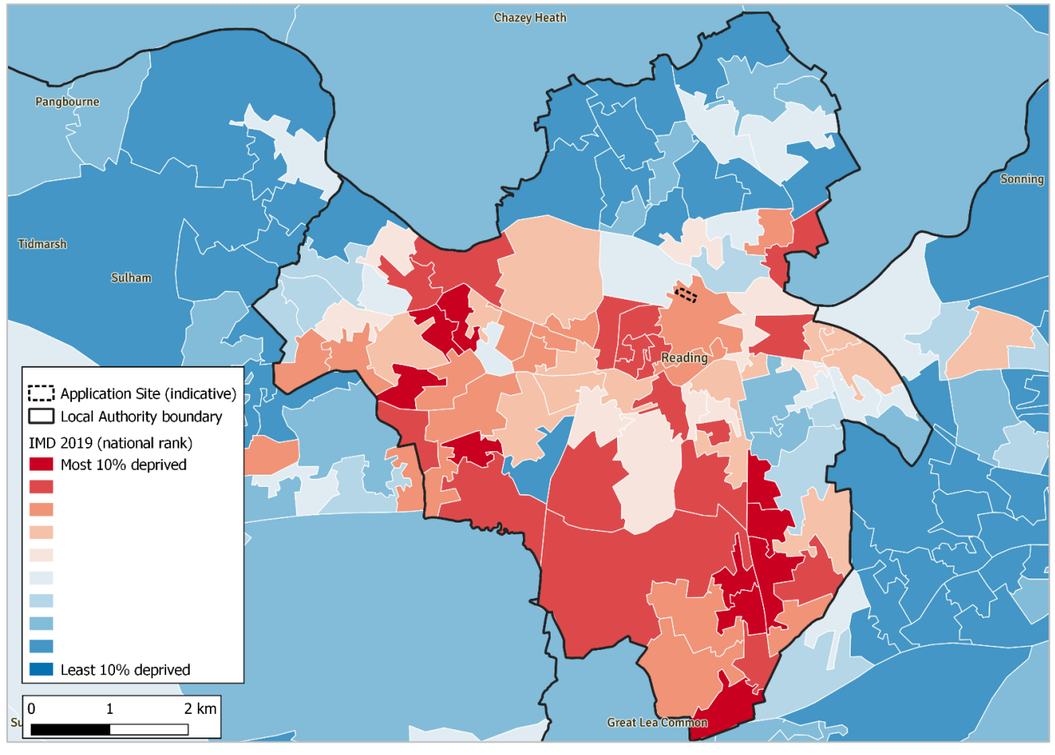

Figure 6.8: Deprivation Levels in RBC

Source: MHCLG, Indices of Deprivation 2019

6.80 The application site is located within the LSOA of Reading 011F. This LSOA is the 32nd most deprived LSOA in the RBC area (out of 97) and is within the 4th decile nationally, meaning it is within England's most 40% deprived. Table 6.20 details the decile for each of the seven domains (types) of deprivation. The domains comprise: Income Domain; Employment Domain; Education, Skills and Training Domain; Health Domain; Crime Domain; Barriers to Housing and Services Domain; and Living Environment Domain). Decile 1 represents that the LSOA is in the most 10% deprived of LSOAs nationally and decile 10 represents the least 10% deprived LSOAs in England.

Table 6.20: Index of Multiple Deprivation 2019 National Decile for LSOAs in which Application Site is located

Deprivation Domain	LSOA Reading 011F (National Decile)
Overall IMD	4
Income	5
Employment	7
Health Deprivation and Disability	3
Education, Skills and Training	6
Barriers to Housing and Services	1
Crime and Disorder	2
Living Environment	4

Source: MHCLG, Indices of Deprivation 2019

6.81 Table 6.21 demonstrates that on the Barriers to Housing Services domain, Reading 011F is within the top 10 % deprived nationally (1st decile). The Barriers to Housing Services domain measures the physical and financial accessibility of housing and local services, including household overcrowding and homelessness. Furthermore, LSOA Reading 011F is within the 2nd decile on the Crime and Disorder domain which measures the risk of personal and material victimisation. LSOA Reading 011F is relatively less deprived in respect of Employment (7th decile) and Education, Skills and Training (6th decile).

Crime

6.82 In October 2019 there were 398 incidents of crime reported within the study area. This is equivalent to 27 incidents per 1,000 population (assessed against the study area's baseline population of 14,670). The rate of crime in the study area is higher than the average for the RBC area of 10 incidents per 1,000 population.

6.83 Figure 6.9 demonstrates the physical location of the 398 incidents of crime in the study area and Table 6.21 details the incidents by type of crime alongside the average for the RBC area.

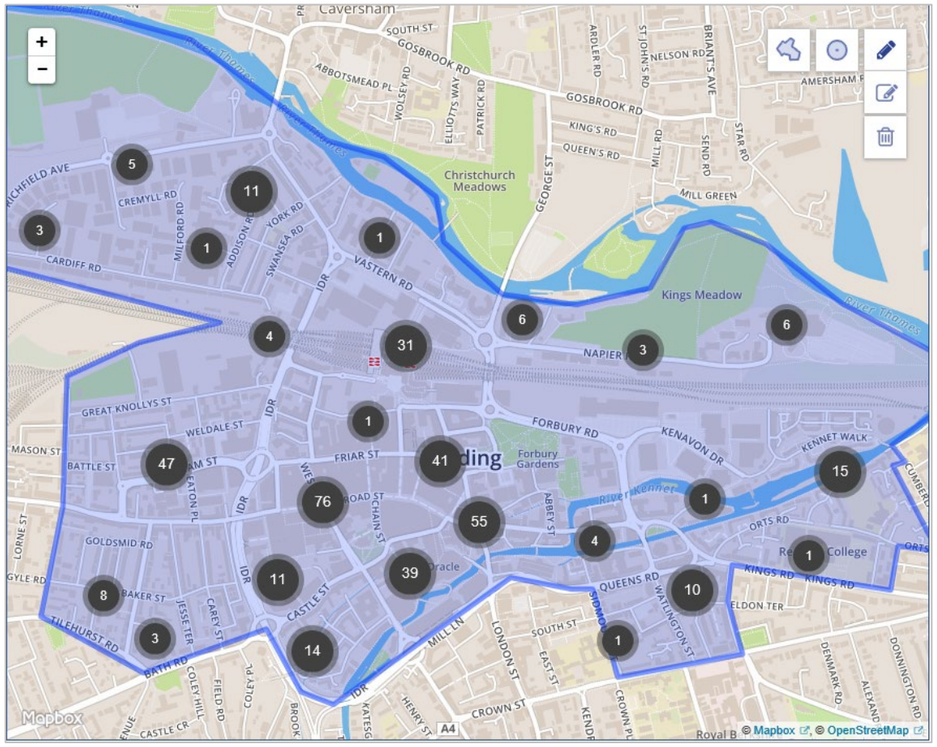

Figure 6.9: Reported Crime Incidents in Study Area (October 2019)

Source: Police.uk

Table 6.21: Incidents of Crime with Study Area and RBC Area(October 2019)

Incidents	Study Area	RBC Area
Anti-social behaviour	9 %	14 %
Bicycle Theft	11 %	5 %
Burglary	5 %	6 %
Criminal damage and arson	5 %	10 %
Drugs	5 %	4 %
Other crime	1 %	1 %
Other theft	10 %	7 %
Possession of weapons	0 %	0 %
Public order	6 %	5 %
Robbery	2 %	2 %
Shoplifting	12 %	5 %
Theft from the person	4%	2%

Table 6.21: Incidents of Crime with Study Area and RBC Area(October 2019)

Incidents	Study Area	RBC Area
Vehicle crime	3 %	6 %
Violence and sexual offences	29 %	33 %
Total	**100 %**	**100 %**
Number of Crimes	**398**	**1,587**

Source: Police.uk

6.84 The majority of incidents within the study area are acts of violence and sexual offences (29 %), although the proportion is slightly lower than the average for the RBC area. Incidents of shoplifting are higher in the study area than in comparison to the RBC area (1 2% compared to 5 %). Similarly, bicycle theft is also higher in the study area (11 %) compared to the RBC area (5 %). The higher incidents of shoplifting and bicycle theft in the study area is considered to be as a result of the Reading Railway Station and retail units located within the study area.

Future Baseline

Population

6.85 It is anticipated that development works would commence in April 2021 and would be complete by June 2025. The ONS 2016-based SNPP project that by 2025 the RBC area would have a population of 171,200. This represents an increase of 4.9 % from the existing baseline characteristics (year 2018) which is marginally higher than the growth projected for England over the same period (4.0 %). Table 6.22 summarises the RBC area's population by broad age group in 2025. As explained in the assessment methodology section, SNPPs are only published for local authority district areas and higher geographies and are therefore not available for the study area. All figures have been rounded and may not sum.

Table 6.22: Projected Age Profile (2025)

Age Profile	Study Area	RBC Area	England
All people	N/A	171,200 (100 %)	58,224,900 (100 %)
Aged 0 to 15	N/A	34,600 (20 %)	11,068,800 (19 %)
Aged 16 to 64	N/A	113,700 (66 %)	35,605,700 (61 %)
Aged 65+	N/A	22,900 (13 %)	11,550,400 (20 %)

Source: ONS, 2016-based SNPP[42]

6.86 By 2025 the working age population of the RBC area is projected to be 113,700 providing an increase of 4.0 % from the existing baseline. In comparison, England's working age population is projected to increase by just 1.6 %.

6.87 The ONS, 2016-based household projections project that by 2025 the average household size in the RBC area will be 2.43 persons per household.

Education

6.88 Future baseline characteristics in relation to primary and secondary school capacities are available for school planning areas (not individual schools). In 2018/19 there were 553 surplus primary places

[42] ONS, 24 May 2018, Subnational population projections for England: 2016-based

within the Central West Primary Planning Area. DfE forecasts indicate that by 2022/23 the number of surplus primary places will have reduced to 264.

6.89 Within the Reading Secondary Planning Area there were 1,779 surplus secondary places in 2018/19. DfE forecasts indicate that by 2024/25 the number of surplus places will have decreased to 133.

Sensitive Receptors

6.90 The receptors identified as being sensitive to the proposed development and which have been 'scoped-in' to the assessment are summarised in Table 6.23. The sensitive receptors are based on the potential for effects based on the development parameters rather than the sensitivity in EIA terms.

Table 6.23: Summary of Sensitive Receptors

Receptor	Sensitivity
Population	Low
Housing	Low
Local expenditure	Low
Employment	High
Economic output	High
Early years education	Low
Primary education	Low
Secondary education	Low
Primary healthcare – GP provision	Low
Primary healthcare – Dental provision	Low
Open/play space	Low
Deprivation	Low
Crime	Low

Assessment of Effects

Demolition and Construction Effects

6.91 Demolition effects are focused on employment. Similarly, construction effects are also focused on economic impacts including construction jobs and spending. Construction phase effects on education and primary healthcare have not been included in the assessment, as it is assumed that the construction workforce would use facilities near their place of residence and therefore not place any additional demand on local provision.

Employment/Economic Output

6.92 Employment would be created throughout the demolition phase. Based on calculations produced through use of the CITB LFT and the estimated demolition cost, it is anticipated that the demolition phase would support 39 jobs over the demolition period.

6.93 The construction phase of the proposed development is expected to generate a number of jobs across all construction disciplines from ground workers to construction management. Based on calculations produced through use of the CITB LFT, which are in turn based on an indicative construction cost, it is anticipated that the proposed development would support 531 direct FTE construction jobs on-site per month over the construction period. This average is considered to provide a conservative estimate as it would be further enhanced by workers who would construct open space and other landscaped areas not included within the LFT calculations.

6.94 In addition to jobs created as a direct effect of the construction and management of the proposed development, further indirect employment and economic benefit would be experienced as a result of the spin-off and multiplier effects. The level of indirect employment generated during the construction period has been assessed quantitively by applying the ONS Type 1 employment multiplier, 2015 to the direct construction employment (=0.97 x 531) resulting in 515 indirect jobs.

6.95 Construction phase employment would generate economic output, measured through the generation of GVA. Based on an average GVA per construction worker of £50,400 per annum for the SE region, the direct employment from the proposed development could generate a GVA of approximately £26.8 million per annum (=531 x £50,400). Over the 48-month construction period this is equivalent to £107.1 million. The indirect 515 jobs are expected to generate £26.7 million per annum based on applying the UK average GVA across all employment (=515 x £51,781). Over the 48-month construction period this is equivalent to £106.7 million. This would provide a combined GVA of £213.8 million over the construction period.

6.96 The creation of 12 demolition jobs and a further 531 direct and 515 indirect jobs over the construction period is considered to have a temporary, **Major Beneficial** effect (significant) at the Borough level on employment.

6.97 Generating a combined GVA of £213.8 million over the construction period the proposed development is considered to have a temporary, **Major Beneficial** effect (significant) at the Borough level on economic output during the construction phase for which no mitigation measures are required.

Completed Development Effects

6.98 Completed development effects on each socio-economic receptor have been assessed on the basis of the worst-case scenario outlined earlier in the Chapter in Table 6.3.

Demand for Housing

6.99 On the basis that no residential dwellings are delivered, it is considered that the proposed development would not contribute to RBC's future overall or affordable housing requirement and therefore the proposed development is considered to have a **Negligible** effect on housing (not significant) at the local level for which no mitigation measures are required.

Local Expenditure

6.100 Convenience goods expenditure from employees is based on convenience goods expenditure per person from Experian. Experian estimate that the national average expenditure per person per annum on convenience goods is £2,202. Based on professional judgement and in light of an equivocal evidence base, it is assumed that approximately 10 % of this annual spend per person could be spent by employees in the local area (i.e. buying lunch etc) which equates to some £220 per worker per annum. On the basis of an operational workforce of 3,522, this equates to annual growth in convenience goods expenditure of £775,795.

6.101 Baseline characteristics identified that there are currently 225 direct jobs on the application site. Applying the average convenience spend per person (£220) to these workers would suggest that the current on-site employees are spending £49,500 per annum in the local area.

6.102 On the basis that the proposed development's employee population has the potential to generate spend of £775,795 per annum, which is higher than the £49,500 spend by employees currently, it is considered that the proposed development would have a **Major Beneficial** effect (significant) on local expenditure at the local level for which mitigation measures are not required.

Employment/Economic Output

6.103 Table 6.24 illustrates the worst-case operational employment generation on the basis of the assumed floorspace set out earlier in this Chapter in Table 6.3. Zero employment is generated by the residential floorspace.

Table 6.24: Potential Operational Employment Generation

Use Class	m^2 per FTE Worker	Floorspace Provision (m^2)			Jobs (FTE)
		GEA	GIA	NIA	
Residential (C3)	N/A	N/A	N/A	N/A	N/A
Leisure (D1-D2)	65*	7,000	6,650	5,985	92
Hotel (C1)	67**	N/A	N/A	N/A	67
Total					**159**

* The Employment Densities Guide provides a range for Use Class D2 of between 65 and 300 m^2 per FTE worker depending on use. 65 m^2 has been assumed for this analysis as this reflects a mid-market/family fitness centre.

** Based on a maximum floorspace of 8,000 m^2, the hotel is assumed to have 200 bedrooms and the HCA Employment Densities Guide refers to an employment density of 1 job per 3-bedrooms.

Source: HCA[43]

6.104 Assuming the worst-case scenario for employment generation, 159 jobs could be generated by the proposed development.

6.105 As detailed in the assessment methodology section of this chapter, the proposed development's non-residential uses are considered to have a high level of leakage (50 %) and a low level of displacement (25 %). The composite multiplier effects applied are 1.38 for the leisure use and ; 1.29 for the office use. The additionality factors applied to the proposed development (worst-case) therefore result in the following calculations:

- 159 jobs minus 50 % leakage = 79 jobs;
- 79 jobs minus 25 % displacement = 60 jobs; and
- 60 jobs multiplied by between 1.29 and 1.38 = 76 jobs.

6.106 GVA generated by the proposed development (worst-case) would equate to £2.7 million per annum.

6.107 The residential floorspace (assumed to be 100,000 m^2 to represent worst case) would provide 1,000 residential units that would accommodate up to 2,430 residents (=1,000 dwellings x average household size of 2.43 for the RBC area in 2025). Based on the existing proportion of the total population that are economically active as determined in the baseline assessment (56 %), the proposed development would be expected to accommodate 1,361 economically active residents, of which 1,288 (53 %) are assumed to be in employment.

6.108 The growing resident workforce would deliver economic output. Applying the GVA output per worker for the RBC area (£62,853) to the estimated 1,288 future residents assumed to be in employment, the proposed development would generate around £80.9 m in GVA per annum (based on current values).

6.109 The number of net jobs generated by the proposed development (76 direct jobs) is lower than the number of jobs on existing on-site operations (225 jobs) and therefore the proposed development would have a **Minor Adverse** effect (not significant) on employment at the local and borough level which would not require mitigation. However, the existing on-site uses only generate GVA of £10.2 million per annum whereas the proposed development would generate GVA of £23.6 million per annum (worst-case). For this reason, it is considered that the proposed development would have a permanent, **Moderate Beneficial** effect (significant) on economic output at the local and borough level which is considered significant but for which mitigation is not required.

Primary Healthcare

6.110 Baseline characteristics identified six GP practices within the study area, one of which (Russell Street Surgery) has a further two GP branches associated with the Practice. All six of the GP practices are currently accepting new patients (as at 12 December 2019). However, compared to the SE regional average of 1 GP for every 2,245 patients, the six GP practices are collectively operating above this average with 1 GP for every 3,327 patients. Assessed against the SE average, this indicates no spare capacity within the existing GP provision.

6.111 To assess worst-case for the primary healthcare receptor, it has been assumed that the proposed development would deliver 1,000 residential units, providing homes to approximately 2,430 people. This assessment assumes that all 2,430 people would be new to the area and therefore would need to register with a new GP. This again assumes a worst-case scenario as some residents are likely to already be from the local area and therefore already registered with a local GP.

6.112 Given that there is no capacity within the existing GP provision, it is considered that proposed development would have a **Moderate Adverse** effect (significant) on GP provision at the local level for which mitigation is required.

6.113 In addition, four dental practices have been identified within the study area. However, one of the four dental practices (Reading Dental Sedation Clinic) offers treatment by referral only. Of the remaining three dental practices, all three are accepting both new NHS and private patients which indicates available dental provision within proximity of the application site currently.

6.114 Although all three dentists are currently accepting both new NHS and private patients, it is uncertain (because there is no central patient register) as to whether there would be surplus capacity to accommodate an additional 2,430 patients generated by the proposed development. For this reason, it is considered that the proposed development would have a **Minor Adverse** effect (not significant) on dental provision at the local level which is not considered significant and for which mitigation is therefore not required.

Education

6.115 To assess worst-case for the education receptor, it has been assumed that the proposed development would deliver 1,000 residential units. Pupil yield arising from the proposed development's 1,000 residential units (assuming 400 x 1-bed apartments and 600 x 2-bed apartments) has been calculated through application of RBC's pupil yield multipliers set out earlier in this chapter (Table 6.5). Table 6.25 presents the resulting pupil yield by education phase.

Table 6.25: Pupil Yield from Proposed Development

Type	Number of Units	No. of Pupils		
		Rising Fives	Primary	Secondary
Flat/Apartment (1 bed)	400	0	0	0
Flat/Apartment (2 bed)	600	72	102	30
Total	1,000	72	102	30

6.116 The proposed development is anticipated to yield 72 early years pupils; 102 primary school aged pupils; and 30 secondary aged pupils.

[43] HCA (2015) Employment Densities Guide 3rd edition, Homes & Communities Agency

6.117 Baseline characteristics identified 77 vacancies within the existing early years education provision in the study area which is in excess of the 72 early year places calculated to arise from the proposed development. On this basis, the proposed development is considered to have a negligible effect (not significant) on early years education for which mitigation is not required.

6.118 The nearest primary school to the application site (E P Collier Primary School) is currently operating under-capacity with a surplus of 122 places. Furthermore, baseline conditions identified an existing surplus of 781 primary pupil places within a 2.6 km radius of the application site. DfE forecasts identify that by 2022/23 there will be a surplus of 264 primary school places for the Central West Primary Planning Area (in which the application site is located) which would be sufficient to accommodate the 102 primary places arising from the proposed development. On this basis, the proposed development is considered to have a negligible effect (not significant) on primary education for which mitigation is not required.

6.119 The nearest secondary school to the application site (Kendrick School) is currently operating slightly under-capacity with a surplus of 21 places. However, within 5.6km of the application site, there is currently a surplus of 1,928 secondary school places. DfE forecasts indicate that this surplus will diminish over coming years and by 2024/25 the surplus number of secondary places will have reduced to 133. Nonetheless, this would still be sufficient to accommodate the 30 secondary places arising from the proposed development.

6.120 On this basis, the proposed development is considered to have a **Negligible** effect (not significant) on education for which mitigation is not required.

Open/Play Space

6.121 Total population arising from the proposed development's 1,000 residential units is calculated to be 2,430 people. In the absence of specific guidance from RBC, the quantity of formal/informal open/play space required for the proposed development has been calculated using guidance from the Fields in Trust as set out earlier in this chapter (Table 6.6). Table 6.26 presents the resulting open/play space requirement.

Table 6.26: Open/play Space Requirements from Proposed Development

Open Space Typology	Type	Hectares
Playing pitches	Formal	3.6
All outdoor sports	Formal	3.8
Equipped/designated play areas	Formal	0.6
Other outdoor provision (MUGAs and skateboard parks)	Formal	0.7
Parks and gardens	Informal	1.9
Amenity open space	Informal	1.4
Natural and semi-natural	Informal	4.3

6.122 Baseline evidence established that there is a range of public open/play space within the required radial catchment of the application site according to RBC's Open Space Strategy.

6.123 The parameter plans for the proposed development identify that 10 % of the overall site area (equivalent to 1,770 m^2 or 0.177 ha) would be provided as publicly accessible open space including hard and soft landscaping, public realm and the provision of amenity spaces, including play space provision. The proposed development would therefore provide on-site delivery of open/play space which RBC are looking for where possible.

6.124 The overall provision of open space within the proposed development would: provide a net increase in open/play space provision in RBC; would help to create a high quality and attractive landscape; and make an important significant contribution towards the quality of life of local residents.

6.125 However, despite the proposed development increasing the quantum of open/play space provision in RBC, the proposed development's open/play space requirements (Table 6.26) cannot all be met by the 0.177 ha of open/play space being provided on-site. The proposed development is therefore likely to place additional demand on existing open/play space. On this basis, it is considered that the proposed development would have a **Negligible** effect on open/play space at the local and borough level, for which mitigation is not required.

Deprivation

6.126 Baseline evidence established that the application site is located within the LSOA of Reading 011F which is the 32nd most deprived LSOA in the RBC area (out of 97) and within the 4th decile nationally. However, Reading 011F is within the top 10% deprived nationally (1st decile) on the Barriers to Housing Services domain and the top 20% nationally (2nd decile) on the Crime and Disorder domain but is relatively less deprived in respect of Employment (7th decile) and Education, Skills and Training (6th decile).

6.127 The development parameters have been designed to be flexible and therefore the provision of any new homes would have the potential to improve deprivation related to housing. As identified in the baseline conditions, the Barriers to Housing and Services domain measures the physical and financial accessibility of housing, including household overcrowding and homelessness. The provision of 1,000 dwellings, 30 % of which would be affordable in accordance with Policy H3 of the adopted Reading Borough Local Plan, would provide homes across a range of tenures for 2,430 people.

6.128 However, to assess a worst-case scenario in respect of deprivation it has been assumed that no residential units would be delivered by the proposed development and that all of the proposed development's uses would be employment related. Given the existing use of the application site is employment related, the provision of new employment floorspace by the proposed development is not considered to the change the deprivation levels in respect of employment and therefore the proposed development is considered to have a **Negligible** effect (not significant) on deprivation at the local level for which mitigation is not required.

Crime

6.129 Baseline conditions identified that the rate of crime in the study area is higher than the average for the RBC area (27 compared to 10 incidents per 1,000 population). Incidents of shoplifting and bicycle theft are higher in the study area than in comparison to the RBC area, likely to be as a result of the railway station and retail units located within the study area.

6.130 The provision of 1,000 new homes by the proposed development would increase the resident population by 2,430 people and would naturally increase the opportunities for additional crime. However, an increase in population numbers and dwellings can also have a beneficial effect on levels of local safety, and on a perceived fear of crime, through an increase in footfall and through natural surveillance, particularly in an area where minimal footfall will have been present in the past.

6.131 However, given the development parameters have been designed to be flexible, the proposed development may not deliver any new housing and all of the uses may be employment related. The provision of office (B1a), hotel (C1) and leisure (D1-D2) floorspace has the potential to reduce incidents of shoplifting, but there is the potential for other types of crime to increase.

6.132 Nonetheless, the design of the proposed development would incorporate design measures that would assist in detracting anti-social behaviour. Design measures include landscaping and change in materials through paving, texture and colour which act as psychological barriers to prevent access in areas which

are private. A careful lighting strategy would be produced to ensure open visibility and prevent anti-social behaviour. Windows would be designed to maximise overlooking, whilst also protecting privacy.

6.133 Overall, it is considered that the proposed development would have a **Negligible** effect (not significant) on crime at the local level for which mitigation measures are not required.

Assessment of Residual Effects

Additional Mitigation

6.134 A **Moderate Adverse** (significant) effect on GP provision has been assessed at the local level for which mitigation is required. Effects can be mitigated via on-site provision (subject to market take up) or CIL payment, which can be used towards the extension of, or new provision of a GP service in the local area.

Enhancement Measures

6.135 There are no enhancement measures proposed in respect of socio-economics.

Demolition and Construction Residual Effects

6.136 No mitigation measures have been identified and therefore residual effects with respect to employment/economic output would remain temporary, **Major Beneficial**.

Completed Development Residual Effects

6.137 Once the proposed development has reached completion and following the implementation of the additional mitigation measures (CIL payment), there would be:

- **Major Beneficial** residual effects on:
  - Local expenditure;
- **Moderate Beneficial** residual effects on:
  - Economic output;
- **Negligible** residual effects on:
  - Housing;
  - Early years/primary/secondary education;
  - GP provision (following mitigation);
  - Open/play space;
  - Deprivation; and
  - Crime
- **Minor Adverse** residual effects on:
  - Employment; and
  - Dental provision.

Summary of Residual Effects

6.138 Table 6.27 presents the residual socio-economic effects of the proposed development.

Table 6.27: Summary of Residual Socio-Economic Effects

Receptor	Residual Effect	Additional Mitigation	Nature of Residual Effect*					
			Scale of Effect **	+ -	D I	P T	R IR	St Mt Lt
Demolition and Construction								
Employment	Generation of construction employment	None required	Major	+	D/I	T	R	St
Economic output	Local expenditure	None required	Major	+	D/I	T	R	St
Completed Development								
Housing	No residential dwellings delivered	None required	Negligible	+	D	P	IR	Lt
Local expenditure	Increased spending from new employees	None required	Major	+	D	P	IR	Lt
Employment	Net loss of employment on-site	None required	Minor	-	D/I	P	IR	Lt
Economic output	Local expenditure	None required	Moderate	+	D/I	P	IR	Lt
Primary healthcare – GP provision	Demand for GP provision	CIL payment	Negligible	-	D	P	IR	Lt
Primary healthcare – Dental provision	Demand for dentist provision	None required	Minor	-	D	P	R	Lt
Education – early years	Demand on early years school places	None required	Negligible	+	D	P	IR	Lt
Education – primary	Demand on primary school places	None required	Negligible	+	D	P	IR	Lt
Education – secondary	Demand on secondary school places	None required	Negligible	+	D	P	IR	Lt
Open/Play space	Demand for open space	None required	Negligible	+	D	P	IR	Lt
Deprivation	Impact on levels of deprivation	None required	Negligible	+	D	P	IR	Lt
Crime	Impact on crime	None required	Negligible	+	D	P	IR	Lt

Notes:
* - = Adverse/ + = Beneficial/ +/- Neutral; D = Direct/ I = Indirect; P = Permanent/ T = Temporary; R=Reversible/ IR= Irreversible; St- Short term/ Mt –Medium term/ Lt –Long term.
**Negligible/Minor/Moderate/Major

6.139 The likely significant effects, i.e. those residual effects which are moderate or major in scale are as follows:

- Economic output during demolition and construction - **Moderate Beneficial** at the borough level; and
- Local expenditure - **Major Beneficial** at the local level.

Cumulative Effects

6.140 Table 6.28 provides a summary of the likely cumulative effects resulting from the proposed development and the inter-project cumulative developments identified.

Table 6.28: Inter-Project Cumulative Effects

Cumulative Development	Demolition and Construction		Completed Development	
	Cumulative Effects Likely?	Reason	Cumulative Effects Likely?	Reason
Former BMW Site – Thames Quarter (162166)	Yes	Demolition and construction stages overlap and therefore effects considered likely. 760 construction jobs created.	Yes	The development would provide 315 apartments introducing an additional 765 people to the area increasing demand for education and primary healthcare. 13 operational jobs would be created in supporting services.
Station Hill (151426 and 151427/allocation CR11c)	Yes	Demolition and construction stages overlap and therefore effects considered likely. 370 construction jobs created.	Yes	The mixed-use development would provide 475 residential units introducing 1,154 people to the area increasing demand for education and primary healthcare. Retail uses (A1-A5) proposed would provide between 4,900 and 8,845 operational jobs.
Toys R Us (170509)	Yes	Demolition and construction stages overlap and therefore effects considered likely.	Yes	The development would provide 765 residential units introducing an additional 1,859 people to the area increasing demand for education and primary healthcare. Retail (A1-A5) and leisure (D1-D2) uses would provide employment opportunities.
Land between Weldale Street and Chatham Street Reading (170326/allocated CR12b)	Yes	Demolition and construction stages overlap and therefore effects considered likely.	Yes	The development would provide 427 residential units introducing an additional 1,037 people to the area increasing demand for education and primary healthcare. Retail uses (A1-A3) would provide employment opportunities.
Network Rail Thames Valley Area site office/ Former Royal Mail site (182252/validated allocation CR11e)	Yes	Demolition and construction stages overlap and therefore effects considered likely.	Yes	The development would provide 658 residential units introducing an additional 1,599 people to the area increasing demand for education and primary healthcare. Retail (A1-A3) and Leisure (D1) would provide employment opportunities and the Health Centre (D1) would provide new primary healthcare.
Former Scottish and Southern Energy site (Awaiting application/allocation CR11e)	Yes	Demolition and construction stages overlap and therefore effects considered likely.	Yes	The development would provide 210 residential units introducing an additional 510 people to the area increasing demand for education and primary healthcare.
29 Station Road Reading, RG1 1LG (181930)	Yes	Demolition and construction stages overlap and therefore effects considered likely. 190 construction jobs created.	Yes	Provision of retail (A1-A5) and office (B1a) uses and a 135-bed hotel (C1) providing 124 direct operational jobs.
Broad Street Mall Broad Street Reading, RG1 7QG (182137/allocated CR12c)	Yes	Demolition and construction stages overlap and therefore effects considered likely. 632 demolition and construction jobs created.	Yes	The development would provide 493 residential units introducing an additional 1,198 people to the area increasing demand for education and primary healthcare. Retail uses (A1-A3) would provide 4 direct operational jobs.

Demolition and Construction Cumulative Effects

6.141 Demolition and construction effects are focused on employment.

6.142 For a number of the inter-projects, the application sites are currently occupied by existing retail/ employment floorspace. Details are not available as to the existing number of jobs on each site which would be lost through development of each of the inter-projects. However, employment would be created throughout both the demolition and construction stage across a range of disciplines from ground workers to construction management.

6.143 A minimum of 1,952 jobs would be created by the inter-projects and a further 544 by the proposed development during the demolition and construction stage. However, this is considered to provide a conservative estimate as detail on the number of demolition/construction jobs is not available for all projects.

6.144 Nonetheless, the creation of at least 2,496 jobs during the demolition and construction stage is considered to have a temporary, **Major Beneficial** effect (significant) at the Borough level for which mitigation is not required.

Completed Development Cumulative Effects

6.145 The inter-projects presented in Table 6.28 would cumulatively provide 3,343 additional residential units. When combined with the proposed development the total number of residential units that could cumulatively be delivered is 4,343 generating a population of 10,553 people. The worst-case assessment would assume that all of these people are new to the area and therefore would need to register with a local GP and dentist. Baseline conditions identified that local GP provision is currently operating over-capacity and therefore the cumulative schemes would have a **Major Adverse** effect on primary healthcare at the local level for which mitigation is required. However, it is noted that the cumulative scheme on the Network Rail Thames Valley Area site office/ Former Royal Mail site is proposing a new Health Centre. If delivered, this has the potential to reduce the effects on primary healthcare to **Negligible**.

6.146 The population accommodating the 4,343 residential units would also increase demand for education services within the local area. In the absence of detailed information for all of the inter-projects on the size of units to be provided, it has been assumed (to assess worst-case as the yields are higher) that all of the units would be 3+ bed flats/apartments. Applying the RBC pupil yield multipliers it is calculated that cumulatively the inter-projects and proposed development would generate a need for 674 (=602+72) early year places; 837 (=735+102) primary places; and 598 (=568+30) secondary places. The cumulative demand cannot be accommodated in the existing education provision (early years, primary and secondary) and therefore the cumulative schemes would have a **Major Adverse** effect on education for which mitigation is required. Effects can be mitigated via a CIL payment which can be used towards the extension of an existing, or provision of a new school(s) in the local area to be advised by Reading LEA.

6.147 Employment opportunities would be created by the cumulative schemes. Information available for the inter-projects report that between 5,041 and 8,986 operational jobs could be created by the proposed employment floorspace of the inter-projects with a further 76 jobs generated by the proposed development. However, the number of jobs created by the inter-projects is considered to provide a conservative estimate as detail on the number of operational jobs is not available for all projects. Furthermore, it is noted, for a number of the inter-projects, that the application sites are currently occupied by existing retail/employment floorspace which would be lost through development of the cumulative schemes. It is not possible to determine the net employment generation from the information available, or to calculate economic output.

6.148 The new population generated by the cumulative schemes (whether that be residential or employees) has the potential to generate local expenditure. Given the addition of up to 4,343 new homes to the area and the provision of employment floorspace, it is considered that the cumulative schemes would have a **Moderate Beneficial** effect on local expenditure at the local level.

6.149 All of the cumulative schemes provide hard and soft landscaping, public realm and open space to some degree which is considered to have a **Minor Beneficial** effect on open/play space in comparison to the existing uses on the application sites currently.

6.150 The cumulative schemes provide the potential to improve deprivation levels and whilst the schemes may be designed to reduce crime levels, details are not available from publicly accessible material. Therefore, it is considered that the cumulative schemes would have a **Negligible** effect on deprivation and crime in the local area.

7 AIR QUALITY

Introduction

7.1 This chapter of the ES considers the potential impacts and likely effects of the proposed development on air quality. The assessment includes a review the existing air quality within the study area; considers the suitability of the application site for the proposed development; and assesses the impact of the demolition and construction stage and completed development stage of the proposed development on air quality in the surrounding study area. Potential sources of emissions have been identified and assessed in the context of existing air quality and the nature and location of receptors.

7.2 The main air pollutants of concern are dust and particulate matter with an aerodynamic diameter of less than 10 µm (PM_{10}), typically generated during demolition and construction activities, and nitrogen dioxide (NO_2), PM_{10} and particulate matter with an aerodynamic diameter of less than 2.5 µm ($PM_{2.5}$), which are generated by road traffic and rail emissions.

7.3 The chapter provides a description of the methodology used in the assessment. This is followed by a description of the relevant baseline conditions at the application site and surrounding study area, and an assessment of the likely significant effects of the proposed development on air quality taking into account embedded mitigation. Additional mitigation measures are identified where appropriate to avoid, reduce or offset any significant adverse effects identified, and an overview provided of the nature and significance of residual effects. A cumulative scheme assessment has also been undertaken which considers the in-combination effects from the proposed development and other cumulative schemes.

7.4 The chapter is accompanied by the following technical appendices in ES Volume 3:

- Appendix 7.1: Consultation with the Environmental Health Officer; and
- Appendix 7.2: Air Quality Technical Appendix.

Methodology

7.5 The assessment has been informed by the following legislation, policies and published guidance:

- International Legislation including:
  - The European Air Quality Framework Directive and Daughter Directives[1, 2];
- National Legislation including:
  - Part IV of the Environment Act 1995 (as amended)[3];
  - NPPF[4];
  - PPG [5];
- Regional Policy including:
  - Reading Borough Local Plan [6];
  - RBC Air Quality Action Plan (as revised) [7];
- National guidance and industry standards, including:
  - Air Quality Strategy for England, Scotland, Wales and Northern Ireland[8], which implements the European Union's Directives and sets out the air quality objectives (AQOs) and government policy on achieving these objectives;
  - Air Quality Standards (Amendment) Regulations 2016[9] which amended the Standard Regulations 2010[10];
  - Local Air Quality Management Technical Guidance 2016 (LAQM.TG(16))[11], which provides advice as to where the national AQOs apply and support to local authorities in carrying out their duties under the Environment Act 1995[12] and subsequent regulations;
  - IAQM guidance on the Assessment of Dust from Demolition and Construction[13]; and
  - IAQM guidance on Land-Use Planning and Development Control: Planning for Air Quality[14].

7.6 Further details of the relevant guidance is included in ES Volume 3: Technical Appendix 7.2.

Consultation

7.7 At the time of undertaking the assessment, the EIA Scoping Opinion remains outstanding.

7.8 In addition to the formal EIA Scoping Process, consultation with the RBC environmental health officer (EHO) was undertaken regarding the Scoping Report and the assessment methodology. Table 7.1 summarises the consultation that was undertaken with respect to the air quality assessment.

Table 7.1: Summary of Consultation

Consultee and Form/Date of Consultation	Summary of Comments	Action Taken
RBC EHO. Consultation e-mail sent 16 December 2019 to confirm the Air Quality Assessment Methodology (Volume 3: Technical Appendix 7.1). A response was received from EHO on 19 December 2019.	Qualitative assessment of the potential impact on local air quality from demolition and construction activities to be scoped into assessment.	A construction dust assessment has been undertaken and reported in the Assessment of Effects Section.
	Potential impacts on local air quality from the proposed development associated traffic emissions to be scoped into the assessment.	The proposed methodology has been agreed and followed. An assessment of potential on- and off-site impacts from road traffic and rail emissions has been undertaken and reported in the Assessment of Effects Section.
	Potential impacts from existing road traffic and rail emissions on the	

[1] European Commission. Directive 2008/50/EC. Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe.
[2] European Air Quality Directive 2004/107/EC. European Air Quality Directive 2004/107/EC of the European Parliament and of the Council of 15 December 2004 relating to arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in ambient air.
[3] Secretary of State, 1995.The Environment Act 1995 part IV Air Quality, HMSO
[4] Ministry of Housing, Communities and Local Government, 2019. National Planning Policy Framework. HMSO.
[5] https://www.gov.uk/government/collections/planning-practice-guidance.
[6] Reading Borough Council, 2019. Reading Borough Local Plan.
[7] Reading Borough Council, 2009. Air Quality Action Plan.
[8] Department of the Environment, Transport and the Regions (DETR) in Partnership with the Welsh Office, Scottish Office and Department of the Environment for Northern Ireland, 2007. The Air Quality Strategy for England, Scotland, Wales, Northern Ireland. HMSO, London.
[9] Statutory Instrument, 2016. No. 1184, The Air Quality Standards (Amendment) Regulations 2016. HMSO, London.
[10] Statutory Instrument, 2010. No. 1001, The Air Quality Standards Regulations 2010. HMSO, London.
[11] Department of the Environment, Food and Rural Affairs (Defra) in partnership with the Scottish Executive, The National Assembly for Wales and the Department of the Environment for Northern Ireland, 2016. Local Air Quality Management Technical Guidance, LAQM.TG(16). HMSO, London.
[12] Environment Act 1995, Part IV.
[13] Holman et al, 2014. IAQM Guidance on the Assessment of Dust from Demolition and Construction, Institute of Air Quality Management, London.
[14] Moorcroft and Barrowcliffe. et al., 2017. Land-use Planning & Development Control: Planning for Air Quality. v1.2. Institute of Air Quality Management, London.

Table 7.1: Summary of Consultation		
Consultee and Form/Date of Consultation	**Summary of Comments**	**Action Taken**
	proposed development to be scoped into the assessment.	
	No heating plant is being proposed as part of the proposed development.	Energy Plant emissions impacts have been scoped out of the assessment.
	No off-site industrial emissions in close proximity to the proposed development identified.	No action required.
	Modelled concentrations compared against the closest local monitoring data in order to verify the model output.	The ADMS model outputs have been verified as detailed in ES Volume 3: Technical Appendix 7.2.

Assessment Scope

7.9 The assessment has been based on a series of development parameters, assumptions and commitments, as described in Chapter 2: EIA Process and Methodology, in Chapter 4: Proposed Development Description, and in Chapter 5: Demolition and Construction Environmental Management. Due to the flexibility being sought in respect of land use classes, the air quality assessment has been undertaken based on a worst-case interpretation of the minimum and maximum land use schedule presented in Chapter 4: Proposed Development Description.

7.10 Therefore, the vehicle trip generation has been calculated based on the use classes with the highest trip generation and it has been assumed that the proposed development would be for residential use as that represents the most air quality sensitive receptor. The assessment therefore provides a 'worst-case scenario' for both the existing receptors and the proposed development regardless of use.

Technical Scope

7.11 The technical scope of the assessment has considered the following:

- Demolition and construction stage activities dust emissions following the IAQM Dust Guidance, identifying appropriate construction mitigation measures based on the identified level of risk;
- Demolition and construction traffic on the main road network, transporting materials and the workforce to and from the application site;
- Operational road traffic emissions generated by residents, workers and visitors to the proposed development;
- Assessment of impacts in relation to IAQM Guidance on Planning for Air Quality for existing receptors; and
- The potential exposure of future occupants of the proposed development to poor air quality including that from railway emissions generated by rail lines passing through Reading Railway Station.

7.12 Information regarding the demolition and construction works for the proposed development, specific activities and predicted traffic movements, is presented in Chapter 5: Demolition and Construction Environmental Management.

7.13 Vehicle movements associated with access, demolition and construction would vary through the construction programme, with short periods of peak heavy-duty vehicles (HDVs) movements mainly associated with excavation works and the delivery of materials. However, when the HDV movements are averaged over a full year period (Annual Average Daily Traffic - AADT), these would be significantly lower than peak movements. The maximum annual average number of HDV movements would be associated with the demolition, piling and earthworks, with an average of 140 two-way movements per week (in and out) during the standard demolition and construction working hours. When averaged over 24 hours and 7-day period the demolition and construction HDV daily movements would be below the threshold of 25 daily movements within an Air Quality Management Area (AQMA) for an assessment to be necessary according to IAQM guidance. Further mitigation would be provided through the implementation of the CEMP. Accordingly, the effects of demolition and construction related vehicle emissions would be negligible and have not been considered further within this chapter.

Spatial Scope

7.14 The study area for the demolition and construction stage assessment is defined as up to 350 m from the application site boundary for the assessment of demolition and construction dust emissions, as per the Institute of Air Quality Management's (IAQM) Dust Guidance.

7.15 For the completed development stage assessment, the study area for human health receptors for road traffic and rail emissions is defined as roads within 250 m of the application site, existing receptors and those roads which experience a significant increase in development traffic leading to adverse effects on local air quality, as per IAQM guidance[2] and Local Air Quality Management Technical Guidance. The approximate extent of the study area is shown in Figure 7.1.

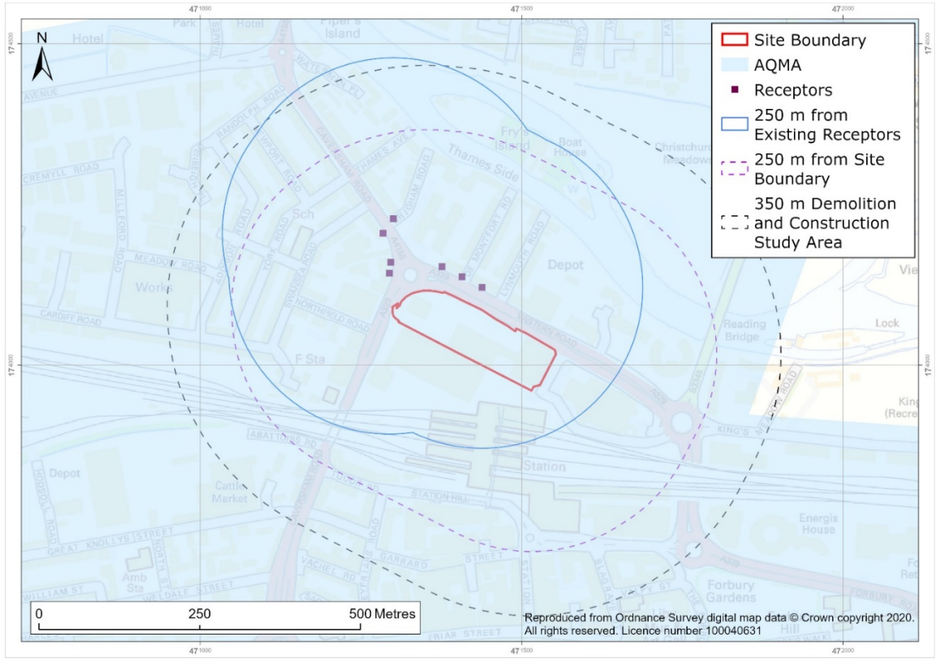

Figure 7.1: Spatial Scope

7.16 No designated ecological sites or other sensitive ecological receptors have been identified within the study area.

7.17 No existing off-site sources of industrial emissions have been identified within the study area that could have a potentially significant impact on the proposed development.

Temporal Scope

7.18 The baseline has been informed by continuous and passive air quality monitoring conducted by RBC covering up to 2018 and by traffic flow data provided by the transport consultant, Cole Easdon

Consultants, from surveys undertaken in 2019. As the change in traffic volume is considered negligible in the study area between 2018 and 2019, the baseline year has been assessed as 2018.

7.19 The anticipated year of opening for the completed development is 2025, with an earliest year of occupation in 2022. As road traffic emissions are predicted to decline with time, and to enable a more robust assessment approach, 2022 emission factors and background concentrations have been used to inform the air quality assessment. Predicted traffic flows for 2025 have been used as this represents the worst case in terms of the full extent of traffic generation from the proposed development.

7.20 In carrying out the assessment of completed development stage traffic impacts, the following temporal scope for the assessment scenarios has been assessed:

- Existing baseline 2018 (2019 traffic flows with 2018 air quality data to allow verification of the model predictions);
- Future baseline 2025 (using 2022 emission factors and background concentrations, as detailed above) + cumulative schemes;
- Future baseline 2025 + cumulative schemes + proposed development.

Baseline Characterisation Method

Desk Study

7.21 In order to establish baseline air quality at and within the vicinity of the application site, relevant monitoring data was reviewed and assessed. Data was obtained from the following sources:

- Continuous and passive air quality monitoring conducted by RBC covering up to 2018 and reported in the 2019 Air Quality Annual Status Report (ASR)[15]; and
- National pollution maps published by Defra. These cover the whole country on a 1x1 km grid[16].

Field Study

7.22 No site-specific field study was undertaken at the application site as the data obtained during the desk study was deemed to be adequate and representative of the application site conditions.

Assessment Method

Methodology

7.23 Full details of both demolition and construction and completed development stages assessment methodology, data and modelling parameters are provided in ES Volume 3: Technical Appendix 7.2.

Demolition and Construction Stage

7.24 During the demolition and construction stage, the main potential effects are dust annoyance and locally elevated concentrations of PM_{10}. The suspension of particles in the air is dependent on surface characteristics, weather conditions and on-site activities. Impacts have the potential to occur when dust generating activities coincide with dry, windy conditions, and where sensitive receptors are located downwind of the dust source. Separation distance is also an important factor as significant dust annoyance is usually limited to within a few hundred metres of its source. This is due to the rapid decrease in concentrations with distance from the source due to dispersion.

7.25 The assessment of potential construction dust impacts follows the guidance published by the IAQM on the assessment of the impacts of construction on air quality[11]. The guidance recommends that the risk of dust emission magnitude is combined with the sensitivity of the area surrounding the site to determine the risk of dust impacts from construction and demolition activities. The risk of dust arising in sufficient quantities to cause annoyance and/or health impacts is determined using four risk categories: high, medium, low or negligible. Depending on the level of risk for each activity, appropriate mitigation is selected.

7.26 The assessment has been carried out in a number of steps:

- Step 1, the need for a construction assessment was screened, based on the proximity of receptors;
- Step 2, the risk of dust impacts was assessed taking into account the level of activity and the proximity of sensitive receptors;
- Step 3, site specific mitigation integral to/embedded within the development proposals was reviewed and supplemented where necessary; and
- Step 4, the significance of the dust effects, after applying the application site-specific mitigation, was assessed.

7.27 The guidance recommends that no assessment of the significance of effects is made without mitigation in place, as mitigation is assumed to be secured by planning conditions, legal requirements or required by regulations.

Completed Development Stage

7.28 The changes to air quality due to local traffic emissions have been predicted using the ADMS Roads[17] (version 4.1.1) dispersion model. This model has been extensively validated against both field and laboratory data sets and against monitoring data in cities throughout the UK.

7.29 The model requires the user to provide various input data, including the Annual Average Daily Traffic (AADT) flow, the proportion of HDV, road characteristics (including road width and street canyon height, where applicable), and the vehicle speed. AADT flows and the proportions of HDVs, for roads within 250 m of the application site, and the extension of the modelled area, are presented in ES Volume 3: Technical Appendix 7.2.

7.30 In carrying out the assessment of operational traffic impacts, the three scenarios described in the temporal scope section above, have been assessed.

7.31 The model was run using 2018 meteorological data from Farnborough Station, which is considered to be the most representative meteorological monitoring station to the application site.

7.32 Traffic emissions were calculated using the Emission Factor Toolkit (EFT) v9, which utilises nitrogen oxides (NO_x), PM_{10} and $PM_{2.5}$ emission factors from the European Environment Agency COPERT 5 emission tool[18]. The traffic data were entered into the ADMS roads model, along with speed data to provide combined emission rates for each of the modelled road links.

7.33 Rail emissions were obtained from National Atmospheric Emissions Inventory[19] 1 km^2 resolution maps for rail subsector and directly added to the model.

7.34 The predicted concentrations of roadside NO_x were converted to roadside NO_2 using the LAQM conversion calculator available from the Defra air quality website[20].

7.35 Concentrations were predicted at several monitoring locations using 2018 monitoring data and 2019 traffic data in order to verify the modelled results.

[15] Reading Borough Council,2019. 2019 Air Quality Annual Status Report.
[16] Department of the Environment, Food and Rural Affairs (Defra),2019. 2017 Based Background Maps for NO_x, NO_2, PM_{10} and $PM_{2.5}$.
[17] https://www.cerc.co.uk/environmental-software/ADMS-Roads-model.html.
[18] Department for Environment Food and Rural Affairs. Emissions Factors Toolkit. https://laqm.defra.gov.uk/review-and-assessment/tools/emissions-factors-toolkit.htm.
[19] https://naei.beis.gov.uk/emissionsapp/
[20] Department for Environment Food and Rural Affairs. NO_x to NO_2 calculator. https://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html#NOxNO2calc

7.36 To present a robust assessment and take account of uncertainties relating to future vehicle emissions, the future modelling scenarios have utilised 2022 emission factors and background levels (as earliest potential occupation year) combined with 2025 traffic data.

Assessment Criteria

7.37 The criteria used to assess if an effect is significant or not, is set out in subsequent sub-sections. This is determined by consideration of the sensitivity of the receptor, magnitude of impact, duration of the effect, geographical extent of the effect and application of professional judgement.

Receptor Sensitivity Criteria

Demolition and Construction

7.38 The sensitivity of receptors has been classified as low, medium or high, in line with the IAQM guidance criteria set out in Table 7.2.

Table 7.2: Receptor Sensitivity Criteria – Demolition and Construction Stage

Sensitivity	Criteria
Low	• The enjoyment of amenity would not reasonably be expected; or • Property would not reasonably be expected to be diminished in appearance, aesthetics or value by soiling; or • There is transient exposure, where the people or property would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land. • Indicative examples include playing fields, farmland (unless commercially-sensitive horticultural), footpaths, short term car parks and roads.
Medium	• Users would expect to enjoy a reasonable level of amenity, but would not reasonably expect to enjoy the same level of amenity as in their home; • First occupants moving into residential dwellings on a large phased housing development; • The appearance, aesthetics or value of their property could be diminished by soiling; or • The people or property wouldn't reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land. • Indicative examples include parks and places of work.
High	• Users can reasonably expect enjoyment of a high level of amenity; or • The appearance, aesthetics or value of their property would be diminished by soiling; and • The people or property would reasonably be expected to be present continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land. • Indicative examples include dwellings, museums and other culturally important collections, medium- and long-term car parks and car showrooms.

Completed Development

Human Health Air Quality Objectives

7.39 The AQOs are the concentrations of pollutants in the atmosphere which can broadly be taken to achieve a certain level of environmental quality. The standards are based on the assessment of the effects on human health (including sensitive sub groups) or ecosystems. In general, these are concentration limits, above which sensitive members of the public (e.g. children, the elderly and the unwell) might experience adverse health effects. Objectives are policy targets often expressed as maximum concentrations not to be exceeded either without exception or with a limited number of exceedances within a specified timescale.

7.40 For some pollutants, there is both a long-term (e.g. annual mean) objectives and a short-term (e.g. one hour mean) objectives. These periods reflect the varying impacts on health of differing exposures to pollutants. Long-term objectives are generally lower than short-term objectives owing to the chronic health effects associated with exposure to low concentrations of pollutants for longer periods of time.

7.41 The AQOs relevant for this assessment are presented in Table 7.3.

Table 7.3: Human Health Air Quality Objectives

Pollutant	Time Period	Objective
Nitrogen Dioxide (NO_2)	Annual Mean	40 µg/m^3
	1-hour mean	200 µg/m^3 not to be exceeded more than 18 times a year
Fine Particulate Matter (PM_{10})	Annual mean	40 µg/m^3
	24-hour mean	50 µg/m^3 not to be exceeded more than 35 times a year
Fine Particulate Matter ($PM_{2.5}$)	Annual Mean	25 µg/m^3 (to be achieved by 2020)

7.42 The sensitivity of existing receptors surrounding the application site and the roads affected by the proposed development and proposed receptors introduced by the proposed development is dictated by the land use at that location. The relevance of the land use to specific air quality objectives is specified by LAQM.TG (16)[21]. No ecological receptors have been identified in close proximity to the application site which would be impacted from air quality during the operational stage. The sensitivity of receptors has been classified by which objective applies at that location, as set out in Table 7.4.

Table 7.4: Receptor Sensitivity Criteria – Completed Development Stage

Sensitivity	Criteria
Medium - where exposure would be short term and the 1 hour mean objective applies	All locations where the annual mean apply and: • hotels and gardens of residential properties; • kerbside sites (for example, pavements of busy shopping streets); • those parts of car parks, bus stations and railway stations etc. which are not fully enclosed, where members of the public might reasonably be expected to spend one hour or more; and • any outdoor locations where members of the public might reasonably expect to spend one hour or longer.
High - where exposure may be longer and the annual mean objective applies	• All locations where members of the public might be regularly exposed to pollutants for extended periods. Building façades of residential properties, schools, hospitals, care homes etc.

Impact Magnitude Criteria

Demolition and Construction Stage

7.43 The criteria provided in the guidance produced by the IAQM was used to assess the potential risk of impacts to air quality from demolition and construction activity in the absence of mitigation during the demolition and construction stage of the proposed development as outlined in ES Volume 3: Technical Appendix 7.2. The methodology combines the magnitude of dust emissions together with the sensitivity of the receptor to identify low, medium or high risk of dust impacts in the absence of mitigation for the four stages of construction; demolition, earthworks, construction and trackout (the movement of dust and dirt from a construction/demolition site onto the public road network).

[21] Department of the Environment, Food and Rural Affairs in partnership with the Scottish Executive, The National Assembly for Wales and the Department of the Environment for Northern Ireland, 2016. Local Air Quality Management Technical Guidance, LAQM.TG(16). HMSO, London.

Completed Development Stage

7.44 The assessment of the proposed development impacts on local air quality has used the approach developed by the IAQM and Environmental Protection UK (EPUK) guidance, which considers the change in air quality as a result of a proposed development on existing receptors. The guidance has produced a matrix which is to be used to calculate the impacts at individual receptor locations, as shown in Table 7.5. It takes into account both the magnitude of change at each receptor and the resulting overall concentration. The absolute concentration of the receptor is also taken into consideration i.e. if the receptor is close to or above the UK air quality objective level, marginal changes in magnitude may be determined to be moderate, however if the receptor is less than 75 % of the UK air quality objective level marginal changes in magnitude may be determined to be negligible.

Table 7.5: EPUK/IAQM Impact Descriptors for Individual High Sensitivity Receptors

Long-term average concentration at receptor with development	Percentage (%) Change in Concentration Relative to Annual Mean Air Quality Objective (AQO)			
	<1	2 – 5	6 – 10	>10
75 % or less of AQO	Negligible	Negligible	Slight	Moderate
76 – 94 % of AQO	Negligible	Slight	Moderate	Moderate
95 – 102 % of AQO	Slight	Moderate	Moderate	Substantial
103 – 109 % of AQO	Moderate	Moderate	Substantial	Substantial
110 % of more of AQO	Moderate	Substantial	Substantial	Substantial

Notes:
Where concentrations increase, the impact is described as adverse, and beneficial where it decreases.
*% change rounded to nearest whole number. Where the % change is less than 0.5% the impact will be Negligible.

7.45 Similar criteria have not been provided for medium sensitivity receptors where the short term air quality objectives would apply i.e. amenity and commercial locations. In urban areas, particularly where residential receptors are widespread, it is generally accepted that the annual mean objectives applicable at high sensitivity receptors are the most reliable for evaluating the severity of impacts.

7.46 Furthermore, it is difficult to predict impacts on short term objectives from traffic impacts as the air quality model (as set up for the assessment) does not provide reliable prediction of one-hour mean NO_2 concentrations. However, research has concluded that exceedances of the one-hour mean objective are unlikely to occur where annual mean concentrations do not exceed 60 µg/m^3 [22,23]. This relationship has been used to assess whether exceedances of the hourly mean objective are likely. Similarly, PM_{10} annual mean concentrations below 32 µg/m^3 are used to screen the 24 hour PM_{10} mean objective.

Significance Criteria

Demolition and Construction Stage

7.47 Using the IAQM assessment methodology to identify the appropriate level of mitigation, and on the assumption that the identified mitigation measures are applied and are commensurate with the risk of potential dust impacts, the IAQM guidance indicates that that the potential for residual effects to arise during the demolition and construction stage would be at worst 'slight adverse' and would be temporary in nature.

7.48 Residual effects during the demolition and construction stage would either be short term i.e. less than a year in duration.

Completed Development Stage

7.49 The IAQM guidance states that the overall significance of the effect on air quality should be based on professional judgement, taking into account the predicted impacts at the modelled receptor locations and "*…will need to take into account such factors as:*

- *The existing and future air quality in the absence of the development;*
- *The extent of current and future population exposure to the impacts; and*
- *The influence and validity of any assumptions adopted when undertaking the prediction of impacts."*

7.50 The overall significance of the effect on local air quality, however, is a binary judgement, i.e. the overall effect is either significant or it is not significant, and there are no degrees of significance of the overall effect. Moderate or substantial impacts may be considered to be a significant environmental effect, whereas negligible or slight impacts would not be considered significant.

7.51 In the case of air quality, completed development effects are expected to be long term i.e. to persist for more than five to ten years.

Assumptions and Limitations

7.52 There are many components that contribute to the uncertainty in predicted concentrations. Although the model has been extensively validated against field data sets and their use has gained wide acceptance throughout the UK, no computer-based model is able to totally replicate actual conditions as it is required to simplify real-world conditions into a series of algorithms. The model used in this assessment also is dependent upon several sources of data which will have inherent uncertainties associated with them. The model uncertainty has been estimated using the root mean square error and is presented in ES Volume 3: Technical Appendix 7.2.

7.53 The assessment has relied on data provided by the RBC and Defra to characterise baseline conditions on the application site. It has been assumed that these data have been reported correctly.

7.54 The assessment of the air quality effects is based on a worst-case interpretation of the development parameters. The proposed development traffic impacts have been assessed using predicted traffic flows provided by the Applicant and its Transport Consultant, Cole Easton Consultants.

7.55 The traffic modelling has used 2018 background data, monitoring data, meteorological data and 2019 traffic data to verify the model. 2018 was the latest year with full monitoring results available.

7.56 The modelling has assumed a level site and has not taken terrain impacts into account.

7.57 The completed development modelling has been based on 2022 emission factors and background concentrations, whilst utilising traffic flows for 2025. This is considered to provide an appropriately conservative assessment taking into account the uncertainties regarding future vehicle emission factors. Traffic emissions were calculated using the latest Emission Factor Toolkit (EFT) v9, which utilises emission factors from the European Environment Agency COPERT 5 emission tool.

Baseline Conditions

Existing Baseline

Local Air Quality Monitoring

[22] A, Cook, 2008. Analysis of the relationship between annual mean nitrogen dioxide concentration and exceedances of the one-hour mean.

[23] Marner, D Laxen and B,2003. Analysis of the relationship between one-hour and annual mean nitrogen dioxide at UK roadside and kerbside monitoring sites

7.58 RBC has declared one AQMA covering Reading City Centre and major radial routes into Reading due to exceedances of the NO_2 annual mean objective. The application site is located within Reading AQMA.

7.59 RBC operate both continuous automatic monitoring and passive diffusion tube monitoring of air quality at a number of locations within the borough. A summary of the closest and most representative monitoring locations is presented in Table 7.6 to Table 7.8 and the location shown in Figure 7.2.

Table 7.6: Measured NO_2 Concentrations (µg/m³)

Site ID	Location	Type	Distance to Application Site (m)	Annual mean (µg/m³)				
				2014	2015	2016	2017	2018
Automatic								
RD1	Caversham Road	R	360	41	38	39	37	40
Diffusion Tubes								
DT51	108 Caversham Road	R	126	48	41	41	40	42
DT52	31a Vastern Road	R	33	40	36	37	38	33
DT53	131 Caversham Road	R	133	47	40	36	36	35
Objective				40				

Notes:
Exceedances highlighted in **bold.**
R: Roadside.

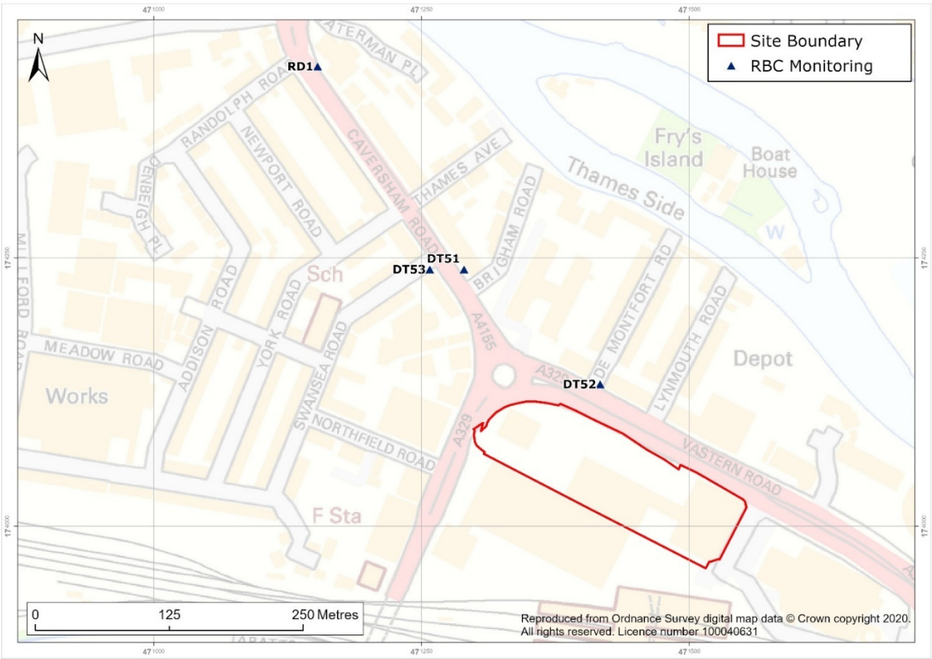

Figure 7.2: Air Quality Monitoring Locations

7.60 The results of NO_2 hourly mean (short-term) measured exceedances are presented in Table 7.7.

Table 7.7: Measured Exceedances of Hourly Mean NO_2 Objective

Site ID	Number of Hours >200 (µg/m³)				
	2014	2015	2016	2017	2018
RD1	0	1	0	0	7
Objective	**18 (200)**				

7.61 The results of the PM_{10} monitoring at RD1 monitoring site are shown in Table 7.8. There is no $PM_{2.5}$ monitoring undertaken in close proximity to the application site.

Table 7.8: Measured PM_{10} concentrations

Site ID	2014	2015	2016	2017	2018
Annual mean (µg/m³)					
RD1	33	28	20	23	24
Objective	40				
Number of 24-hours exceeding 50 (µg/m³)					
RD1	31(51)	8(41)	5	7	3
Objective	35				

Notes:
If the period of valid data is less than 85 %, the 90.4th percentile of 24-hour means is provided in brackets.

Assessment of Monitoring Data

7.62 Measured NO_2 concentrations at the closest monitoring site to the application site, DT52 Vastern Road, have been below the objectives between 2015-2018.

7.63 Measured NO_2 concentrations at the automatic site RD1 Caversham Road have been above or within 10 % of the annual mean objective for the past five years. No exceedances of the 1-hour mean objective have been reported in the past five years. NO_2 concentrations at DT51 Caversham Road have been above the objective for the past five years, while at DT53 (across the road) concentrations have been below the objective between 2016-2018. The variation in measured concentrations along Caversham Road is likely to be due to the prevailing wind direction and the canyon effect created by the building arrangements, which creates recirculation regions and limits pollutant dispersion.

7.64 Measured PM_{10} concentrations have been well below the annual and 24 hour mean objectives.

7.65 There is no clear trend in concentrations over time for both NO_2 and PM_{10} concentrations. However, for all monitoring sites, lower annual mean concentrations were recorded in 2018 compared with those recorded in 2014.

7.66 NO_2 concentrations at the application site would be expected to be similar to measured concentrations at DT52, i.e. the application site is likely to meet the relevant air quality objectives. Measured concentrations along Caversham Road are expected to be higher than the anticipated concentrations at the application site and measured concentrations along Vastern Road due to higher traffic flows and building configurations. Some variation in NO_2, PM_{10} and $PM_{2.5}$ concentrations would be expected across the application site, with the highest concentrations close to the road links due to the emissions from road traffic.

Background Maps

7.67 Background concentrations are those levels that would be observed away from specific sources such as roads and industry. Defra provides modelled predictions of background concentrations of air pollutants over the whole of the UK with a grid resolution of 1 km^2. Table 7.9 details the NO_2, PM_{10} and $PM_{2.5}$ background levels at the application site for 2018.

7.68 Mapped background concentrations were calibrated against background concentrations measured at the Reading New Town Automatic Urban and Rural (AURN)[24] monitoring site (see ES Volume 3: Technical Appendix 7.2 for more details).

7.69 The background concentrations are all well below the relevant objectives.

Table 7.9: DEFRA 2018 Background Mapping (µg/m³)

Year	Grid Reference (x, y)	NO_2	PM_{10}	$PM_{2.5}$
2018	471500, 174500[a]	25.8	13.1	7.1
	471500, 173500[b]	30.7	12.6	6.7
Objective		40	40	25

Notes:
a: Monitoring sites, existing receptors and application site (excluding b);
b: south-west corner of the application site.

Future Baseline

7.70 Despite the Department of Transport[25] estimated traffic growth on the transport network between 2019-2025 (without the proposed development in place), air quality at background and roadside locations is expected to gradually improve in future years due to the renewal of the vehicle fleet with lower emission factors. National policies, such as the intention to ban new combustion engine private vehicle sales by 2040, would hasten and enforce this process.

7.71 As per the Temporal Scope (paragraph 7.18), construction of the first plot is expected to be to be completed in 2022. Based on the above, the future baseline air quality at this date in the absence of the proposed development would be expected to be broadly similar or slightly improved when compared with the existing situation.

7.72 Table 7.10 presents details the NO_2, PM_{10} and $PM_{2.5}$ background levels at the application site for 2022. The background concentrations are all well below the relevant objectives and confirm a predicted decrease in background concentrations between 2018 and 2022.

Table 7.10: DEFRA 2022 Background Mapping (µg/m³)

Year	Grid Reference (x, y)	NO_2	PM_{10}	$PM_{2.5}$
2022	471500, 174500[a]	22.7	12.5	6.8
	471500, 173500[b]	26.7	12.0	6.3
Objective		40	40	25

Notes:
a: Monitoring sites, existing receptors and application site (excluding b);
b: south-west corner of the application site.

Existing Sensitive Receptors

7.73 The application site is located in a populated area, with numerous sensitive receptors located in the immediate vicinity of the application site. Sensitive receptors were chosen to reflect places where members of the public would receive relevant exposure to annual mean and hourly pollutant concentrations from vehicle emissions. When identifying these receptors, particular attention has been paid to assessing impacts close to junctions, where traffic may become congested, and where there is a combined effect of several road links. The receptors identified as being sensitive to the proposed development and which have been 'scoped-in' to the assessment are summarised Table 7.11 and displayed on Figure 7.3. Receptor locations were modelled at a height of 1.5 m representing exposure at ground floor level.

Table 7.11: Summary of Sensitive Receptors

Receptor ID	Location	X (m)	Y(m)	Sensitivity
R1	106 Caversham Road	471300	174228	High (residential)
R2	119 Caversham Road	471284	174205	
R3	Flat Above 99-113 Caversham Road	471296	174160	
R4	Flat above 97-111 Caversham Road	471294	174143	
R5	17 Vastern Road	471376	174154	
R6	31-51 Vastern Road	471438	174121	
R7	29 Vastern Road	471407	174137	

[25] Department of Transport (2019). Trip End Model Presentation Program (TEMPro).

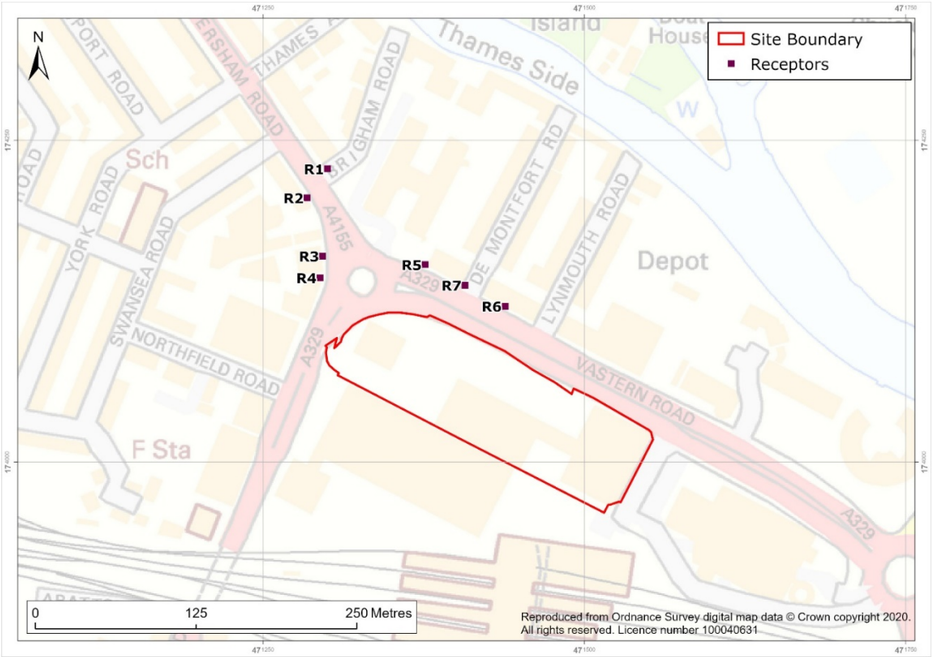

Figure 7.3 Air Quality Receptor Locations

Future Sensitive Receptors

7.74 The proposed development would be sequenced across the application site. Therefore it is likely that Building A could be occupied in advance of the completion of Buildings B, C and D. Were this to occur, Buildings B and C would be at an advanced stage of construction/ fit out such that significant dust emissions would be unlikely. These buildings would also by virtue of their massing, provide protection and screening from on-going works at Building D, which would be delivered in the final phase. Likewise, occupants of Buildings B and C would not be significantly affected by Building D works as these would be at an advanced stage, limiting the potential for significant dust effects. Accordingly, on-site residential receptors have not been considered within the demolition and construction assessment.

7.75 To assess the application site suitability for the proposed development, concentrations were predicted for a regular grid resolution of 10 x 10 m across the study area in order to present a contour of the annual mean concentrations geographically on a map (shown in Figure 7.4). The contours were modelled at a height of 1.5 m and 4.5 m representing exposure at ground floor and first floor level.

Assessment of Effects

Demolition and Construction Effects

7.76 In the absence of mitigation, there are three potential significant sources of emissions that could affect air quality during demolition and construction stage:

- coarse and fine dust from construction activities including:
  - demolition of existing structures;
  - earthworks and site preparation;
  - construction of building structures, including foundations, which may include piling;
  - materials handling such as storage of materials in stockpiles and spillage;
  - construction of on and off-site highway improvements; and
  - hard and soft landscaping and open space. demolition, excavation, earthmoving, materials storage and movement of construction vehicles.
- exhaust emissions from demolition and construction related traffic; and
- construction plant, both mobile and stationary (e.g. cranes and generators), which emit a mixture of exhaust gases.

7.77 There are numerous off-site residential properties within 350 m of the application site and within 50 m of the routes proposed to be used by construction traffic, thus using the IAQM guidance, a detailed assessment of demolition and construction dust impacts is required.

7.78 Dust impacts would be greatest in dry weather following long periods without rain and with the wind blowing towards sensitive receptors. Depending on wind speed and turbulence it is likely that the majority of dust will be deposited within 100 m of the source. Meteorological data from Farnborough Station (Volume 3 Technical Appendix 7.2), suggests that prevailing winds are typically south-westerly.

7.79 Using the evaluation criteria within the IAQM's Guidance, the potential dust emission magnitude has been identified for each stage of the proposed development as shown in Table 7.12 based on information presented in ES Chapter 5: Demolition and Construction Environmental Management.

Table 7.12: Dust Emission Impact Magnitude for Proposed Development Works

Activity	Dust Emission Magnitude	Justification
Demolition	Small	Demolition works are anticipated to be delivered in four phases with total building volume per phase expected to be less than 20,000 m^3.
Earthworks	Large	Total site area greater than 10,000 m^2.
Construction	Large	The development would have a total estimated construction volume of over 100,000 m^3.
Trackout	Medium	It is assumed that maximum HDV movements over the course of the development would be between 10-50 HDV outward movements per day. This range is typical for a development of this size. Unpaved road length would be between 50-100 m.

7.80 The closest sensitive receptors to construction activity within 350 m of the application site would be residential properties along Vastern Road and Caversham Road. The residential properties are considered to be a high sensitivity receptor.

7.81 The next stage of the process is to define the sensitivity of the assessment area to dust soiling and human health impacts. This process combines the sensitivity of the receptor with the distance from the source to determine the overall sensitivity. The sensitivity of the area to dust impacts (taking into account distance to construction activity) is provided in Table 7.13.

Table 7.13: Sensitivity of Study Area to Dust Impacts

Sensitivity to Dust Soiling	Sensitivity to Human Health Impacts
Medium: between 10 - 100 existing residential receptors located within 50 m of the application site; partial operating retail park during phased demolition works; and first occupants within the application site overlapping with demolition and construction phases.	Low: 10 - 100 residential properties within 20 m of the site boundary and its trackout routes. PM_{10} concentrations from local roadside monitoring was 24 µg/m^3 in 2018 (RD1, see Table 7.8). However, concentrations at the application site are expected to be lower at the time phase 1 demolition begins and during construction (Q2 of 2021 to 2022; see Figure 7.4).

Table 7.13: Sensitivity of Study Area to Dust Impacts	

7.82 The dust emission magnitude determined in Table 7.12 has been combined with the sensitivity assessment in Table 7.13 to define the risk of impacts for each stage of the proposed development works in the absence of mitigation, as shown in Table 7.14.

Table 7.14: Risk of Dust Impacts in the Absence of Mitigation at Proposed Development

Sensitivity of Study Area	Dust Emission Magnitude for Each Stage			
	Demolition (Small)	Earthworks (Large)	Construction (Large)	Trackout (Medium)
Dust Soiling (Medium)	Low Risk	Medium Risk	Medium Risk	Low Risk
Human Health (Low)	Negligible	Low Risk	Low Risk	Low Risk

7.83 Overall, without mitigation, the highest risk of dust soiling impacts is likely to be medium for earthworks and construction activities. The risk of human health effects from PM_{10} is likely to be low for earthworks, construction and trackout activities. In accordance with the IAQM guidance, mitigation measures associated with the highest level of risk should be applied, i.e. a medium-risk site.

Embedded Mitigation and Standard Good Practice

7.84 The control of dust and construction traffic emissions from a construction site relies upon good site management and mitigation techniques to reduce emissions of dust and limit dispersion. A summary of the mitigation measures recommended in the IAQM guidance to reduce impacts from high risk sites is provided in Table 7.15 and in Chapter 5: Demolition and Construction Management (Table 5.7), which also includes mitigation measures to minimise impacts from HDV traffic and non-road mobile machinery (NRMM) associated with the construction works on the application site. The mitigation measures for both direct impacts and those from traffic would be detailed within the application site's CEMP, which would be secured by means of an appropriately worded planning condition.

Table 7.15: Recommended Dust Mitigation Measures for Medium Risk Sites

Phase	Mitigation Measure
Communications	• Develop and implement a stakeholder communications plan. • Display the name and contact details of persons accountable on the site boundary. • Display the head or regional office information on the site boundary.
Management	• Develop and implement a dust management plan. • Record all dust and air quality complaints, identify causes and take measures to reduce emissions. • Record exceptional incidents and action taken to resolve the situation. • Carry out regular site inspections to monitor compliance with the dust management plan and record results. • Increase site inspection frequency during prolonged dry or windy conditions and when activities with high dust potential are being undertaken. • Plan site layout so that machinery and dust causing activities are located away from receptors, as far as possible. • Erect solid screens or barriers around dusty activities or the site boundary at least as high as any stockpile on site.

Table 7.15: Recommended Dust Mitigation Measures for Medium Risk Sites

Phase	Mitigation Measure
	• Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period. • Avoid site run off of water or mud. • Keep site fencing, barriers and scaffolding clean using wet methods. • Remove potentially dusty materials from site as soon as possible. • Cover, seed or fence stockpiles to prevent wind whipping. • Ensure all vehicles switch off engines when stationary. • Avoid the use of diesel or petrol powered generators where possible. • Produce a Construction Logistics Plan to manage the delivery of goods and materials. • Only use cutting, grinding and sawing equipment with dust suppression equipment. • Ensure an adequate supply of water on site for dust suppressant. • Use enclosed chutes and conveyors and covered skips. • Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use water sprays on such equipment where appropriate. • Ensure equipment is readily available on site to clean up spillages of dry materials. • No on-site bonfires and burning of waste materials on site.
Demolition	• Incorporate soft strip inside buildings before demolition (retaining walls and windows in the rest of the building where possible, to provide a screen against dust). • Ensure water suppression is used during demolition. • Avoid explosive blasting, using appropriate manual and mechanical alternatives. • Bag and remove any biological debris or damp down such material before demolition.
Earthworks	• Re-vegetate earthworks and exposed areas /soil stockpiles to stabilise surfaces as soon as practicable. • Only remove the cover in small areas during work and not all at once.
Construction	• Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless required for a particular process. • Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored silos with suitable emissions control systems.
Trackout	• Use water assisted dust sweepers on the site access and local roads. • Avoid dry sweeping of large areas. • Ensure vehicles entering and leaving the site are covered to prevent escape of materials. • Record inspection of on-site haul routes and any subsequent action, repairing as soon as reasonably practicable. • Install hard surfaced haul routes which are regularly damped down. • Install a wheel wash with a hard-surfaced road to the site exit where site layout permits. • The site access gate to be located at least 10 m from receptors where possible.

Significance of Demolition and Construction Stage Effects

7.85 The IAQM guidance recommends that no assessment of the significance of demolition and construction stage effects is made without mitigation in place. With the implementation of the CEMP and Chapter 5: Demolition and Construction Management measures, the construction and demolition dust and vehicle emissions effects in the area are considered to be temporary and not significant.

Completed Development Effects

Embedded Mitigation

7.86 As part of the Applicant's commitment to ensure an appropriate development response, the Applicant and the design team have developed a number of measures within the development proposals to ensure that the potential for adverse effects are avoided.

7.87 An Energy Statement is submitted accompanying the application, demonstrating how the proposed development would reduce the energy consumption, and related emissions, incorporating energy efficiency measures. The proposed development's heating system is a water to water based heat pump system and no combustion plant being proposed as part of the development.

7.88 The proposed development would provide 10 % of the application site area for open space ensuring that the landscape strategy delivers a high quality public realm. The landscape masterplan would provide green infrastructure which would assist in reducing particulate concentrations.

7.89 The proposed development has been set-back approximately 6 m from Caversham and Vastern Road kerbside, which is the main source of air pollution for the potential future residents.

Existing Sensitive Receptors

7.90 Emissions from road traffic are the major contributor to poor air quality in urban areas within the UK and contribute to exceedance of the AQOs in close proximity to the application site.

7.91 The results of the dispersion modelling at existing receptors as a result of the completed proposed development are shown in Table 7.16 to Table 7.18.

Table 7.16: Predicted Annual Mean NO_2 at Existing Receptors (µg/m³)

Receptor	Future Base + Cumulative	Future Base + Cumulative + Proposed Development	Development Traffic Contribution	% Change in concentration relative to Assessment Level (AQAL)	Impact Descriptor
R1	32.3	32.1	-0.2	-0.5%	Negligible
R2	33.2	33.0	-0.3	-0.6%	Negligible
R3	31.1	30.8	-0.3	-0.8%	Negligible
R4	32.1	31.7	-0.4	-0.9%	Negligible
R5	31.7	32.7	1.0	2.5%	Slight Adverse
R6	30.5	31.6	1.1	2.7%	Slight Adverse
R7	31.0	31.8	0.8	1.9%	Slight Adverse
Objective	**40**		-		

Table 7.17: Predicted Annual Mean PM_{10} at Existing Receptors (µg/m³)

Receptor	Future Base + Cumulative	Future Base + Cumulative + Proposed Development	Development Traffic Contribution	% Change in concentration relative to Assessment Level (AQAL)	Impact Descriptor
R1	14.4	14.4	0.0	-0.1%	Negligible
R2	14.6	14.5	-0.1	-0.1%	Negligible
R3	14.2	14.1	-0.1	-0.2%	Negligible
R4	14.3	14.3	-0.1	-0.2%	Negligible
R5	14.3	14.4	0.2	0.5%	Negligible
R6	14.0	14.2	0.2	0.5%	Negligible
R7	14.1	14.3	0.1	0.3%	Negligible
Objective	**40**		-		

Table 7.18: Predicted Annual Mean $PM_{2.5}$ at Existing Receptors (µg/m³)

Receptor	Future Base + Cumulative	Future Base + Cumulative + Proposed Development	Development Traffic Contribution	% Change in concentration relative to Assessment Level (AQAL)	Impact Descriptor
R1	7.7	7.7	-0.03	-0.1%	Negligible
R2	7.8	7.8	-0.03	-0.1%	Negligible
R3	7.5	7.5	-0.04	-0.2%	Negligible
R4	7.6	7.6	-0.04	-0.2%	Negligible
R5	7.6	7.7	0.1	0.4%	Negligible
R6	7.5	7.6	0.1	0.5%	Negligible
R7	7.5	7.6	0.1	0.3%	Negligible
Objective	**25**		-		

7.92 The predicted NO_2, PM_{10} and $PM_{2.5}$ concentrations in 2025 without and with the proposed development in place are below the relevant objectives at all assessed existing receptor locations.

7.93 The changes in annual mean NO_2 range from a maximum reduction of approximately 0.9 % along Caversham Road (receptor R4) to a maximum increase of approximately 2.7 % along Vastern Road (receptor R6). The changes in annual mean PM_{10} and $PM_{2.5}$ would be ±1 % for all receptors.

7.94 The proposed development would replace the current existing retail park triggering a net reduction of vehicle flows on the road network surrounding the proposed development and causing a pollutant concentrations reduction along Caversham Road. The proposed development massing and height may create a localised canyon like effect at Vastern Road which would affect pollutant dispersion and is predicted to cause a pollutant concentration increase at the assessed receptors along Vastern Road.

7.95 The predicted annual mean NO_2 concentrations for all receptors are predicted to be well below 60 µg/m³. This indicates that the hourly mean objective is unlikely to be exceeded at outdoor locations of these receptors where the hourly mean would apply. None of the predicted annual mean PM_{10} concentrations exceed 32 µg/m³ and therefore the 24-hour mean PM_{10} objective is not predicted to be exceeded.

7.96 The impact on annual mean NO_2 concentrations is described as **Slight Adverse** at receptors along Vastern Road (R5 to R7), as outlined in Table 7.5. The impact on annual mean NO_2 concentrations is described as **Negligible** at receptors along Caversham Road (R1 to R4), as outlined in Table 7.5, with an overall improvement in air quality along this road. Overall, considering the conservative nature of the assessment, combining 2022 emission factors and backgrounds with 2025 traffic data, and the IAQM criteria for assessing significance, the air quality effects of the proposed development on existing receptors is considered to be permanent and **Not Significant**.

Proposed Development Future Receptors

7.97 Existing (or projected) air quality could impact the occupants of the proposed development, through the introduction of new sensitive receptors into an area of poor air quality.

7.98 The suitability of the application site for the proposed development and the need for mitigation has been assessed against the annual mean NO_2 objective of 40 µg/m^3 as this is the objective most likely to be breached. Figure 7.4 shows the annual mean NO_2 contour for 40 µg/m^3 and 36 µg/m^3 (within 10 % of the objective) for the completed development modelled at 1.5 m height to represent ground floor exposure. The 40 µg/m^3 contour is limited to the road and only intersects the application site boundary on the western site access on Caversham Road, where there would be no residential receptors. The 36 µg/m^3 contour intersects the application site boundary and the façade of the plots along Vastern Road.

7.99 The application site is compliant with the PM_{10} and $PM_{2.5}$ AQOs and therefore these have not been shown.

7.100 The predicted NO_2, PM_{10} and $PM_{2.5}$ concentrations at the application site with proposed development in place are below the relevant objectives at all floor levels. The application site is suitable for the proposed development without the need for mitigation.

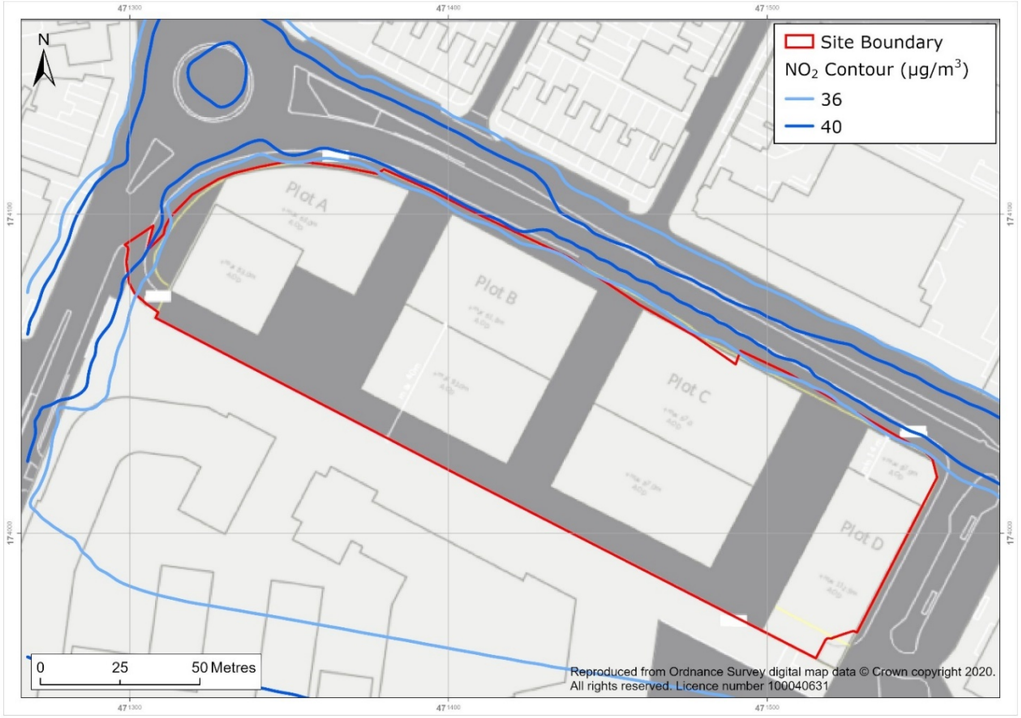

Figure 7.4: Predicted Concentrations at Proposed Development

Assessment of Residual Effects

Additional Mitigation

7.101 No additional mitigation is required.

Enhancement Measures

7.102 No enhancement measures are proposed in respect of air quality.

Demolition and Construction Residual Effects

7.103 With appropriate mitigation in place the residual effect of demolition and construction effects remain as reported in the assessment of effects section; Negligible and not significant.

Completed Development Residual Effects

7.104 At existing receptors the proposed development results in a **Slight Adverse** effect on air quality which is direct and permanent, but which is overall considered to be not significant.

7.105 Air quality objectives are expected to be met at on-site sensitive receptors during operation of the proposed development and therefore result in a direct and permanent negligible effect on air quality which is not significant.

Summary of Residual Effects

7.106 The residual air quality effects are summarised in Table 7.19.

Table 7.19: Summary of Residual Air Quality Effects

Receptor	Residual Effect	Additional Mitigation	Nature of Residual Effect*					
			Scale of Effect **	+ -	D I	P T	R IR	St Mt Lt
Demolition and Construction								
Existing Off-site Human Health and Amenity	Dust Soiling and PM_{10} due to demolition and construction works	None required	Negligible	+/-	D	T	R	Mt
Existing Off-site Human Health	NO_2, PM_{10} and $PM_{2.5}$ due to vehicle emissions	None required	Negligible	+/-	D	T	R	Mt
Completed Development								
Existing Off-site Human Health	NO_2, PM_{10} and $PM_{2.5}$ effects due to vehicle emissions	None required	Slight Adverse	-	D	P	IR	Lt
Future On-site Human Health and Amenity	NO_2, PM_{10} and $PM_{2.5}$ effects due to local air quality	None required	Negligible	+/-	D	P	IR	Lt

Notes:
* - = Adverse/ + = Beneficial/ +/- Neutral; D = Direct/ I = Indirect; P = Permanent/ T = Temporary; R=Reversible/ IR= Irreversible; St- Short term/ Mt –Medium term/ Lt –Long term.
**Negligible/Minor/Moderate/Major

7.107 None of the reported residual air quality effects would be significant.

Cumulative Effects

7.108 A review of potential cumulative schemes has been undertaken with reference to criteria listed in Chapter 2: EIA Process and Methodology. Table 7.20 provides a summary of the likely cumulative effects resulting from the proposed development and the cumulative developments.

7.109 Potential cumulative demolition and construction effects could occur should construction of cumulative schemes occur at the same time as the proposed development. Demolition and construction stages of approved cumulative schemes within 350 m of the proposed development are not expected to overlap with the demolition and construction stage of the proposed development.

7.110 Moreover, significant cumulative effects are unlikely to occur as each scheme is anticipated to employ similar dust mitigation techniques such that the individual construction stage effects are not significant, alone or in combination.

7.111 The future year traffic data included in the air quality model has taken into account future predicted traffic growth, as well as cumulative schemes in the area. The assessment has therefore predicted the cumulative concentrations arising from cumulative schemes in the area in 2025. No significant effects on air quality are anticipated as a result of the operation of the proposed development in combination with other cumulative schemes.

Table 7.20: Inter-Project Cumulative Effects

Cumulative Development	Demolition and Construction		Operation / Completed Development	
	Cumulative Effects Likely?	Reason	Cumulative Effects Likely?	Reason
Approved Projects (including Resolution to Approve)				
Former BMW Site – Thames Quarter	No.	No overlapping demolition and construction stages expected. Scheme anticipated to employ similar dust mitigation techniques as the proposed development.	No	Cumulative concentrations predicted and considered not significant.
Station Hill	No.	No overlapping demolition and construction stages expected. Scheme anticipated to employ dust mitigation techniques as the proposed development.	No	Cumulative concentrations predicted and considered not significant.
Kenavon Drive; Land between Weldale Street and Chatham Street, Reading; and 52 to 55 Friar Street and 12 Greyfriars Road, Reading RG1 1DX	No.	Considerable distance between the proposed development and the cumulative schemes (over 350 m)	No	Cumulative concentrations predicted and considered not significant.
29 Station Road Reading, RG1 1LG	No.	No overlapping demolition and construction stages expected. Scheme anticipated to employ dust mitigation techniques as the proposed development.	No	Cumulative concentrations predicted and considered not significant.
Reasonably Foreseeable Schemes				
Network Rail Thames Valley Area site office/ Former Royal Mail site	Unknown	The timeframes are unknown and there is potential for demolition and construction phases to overlap.	No	Proposed residential scheme with minimal traffic expected.

Table 7.20: Inter-Project Cumulative Effects

Cumulative Development	Demolition and Construction		Operation / Completed Development	
	Cumulative Effects Likely?	Reason	Cumulative Effects Likely?	Reason
		Nevertheless, the scheme is anticipated to employ dust mitigation techniques similar to the proposed development and cumulative effects are unlikely.		
Former Scottish and Southern Energy site	Unknown	The application has not yet been submitted. The timeframes are unknown and there is potential for demolition and construction phases to overlap. Nevertheless, the scheme is anticipated to employ dust mitigation techniques similar to the proposed development and cumulative effects are unlikely.	Unknown	The application has not yet been submitted.
Broad Street Mall Broad Street Reading, RG1 7QG	No	Considerable distance between the proposed development and the cumulative schemes (over 350 m)	No	Cumulative concentrations predicted and considered not significant.