Metropolitan Thames Valley Housing

Former Shredded Wheat Factory (South Side), Welwyn Garden City

Environmental Statement: Volume 1, Main Text

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1 INTRODUCTION

1.1 Metropolitan Thames Valley (hereafter referred to as 'the Applicant' or 'MTVH') is seeking to obtain planning permission for a Proposed Development at the South Side site of the Former Shredded Wheat Factory, Welwyn Garden City, (hereafter referred to as the 'Site').

1.2 The Proposed Development comprises the following:

'Hybrid planning application comprising:

- *Full planning application for 317 dwellings (Class C3) with associated access, parking, landscaping and other supporting infrastructure; and*
- *Outline planning application for up to 404 dwellings (Class C3) with all matters reserved except access.*

1.3 The ES identifies and records the results of assessments of the construction and operational phases of the Proposed Development and considers the potentially significant environmental effects the Proposed Development will create. The ES suggests a range of measures to mitigate the identified effects and, where opportunities exist, to introduce improvement measures.

Figure 1.1: Site Location

LEGISLATIVE FRAMEWORK FOR THE EIA

1.4 This ES has been prepared in accordance with the requirements set out in *The Town and Country Planning (Environmental Impact Assessment) Regulations 2017* (hereafter referred to as the EIA Regulations) (Ref. 1.1).

1.5 The EIA Regulations require that, before consent is granted for certain types of development, an EIA must be undertaken. The EIA Regulations set out the types of development which must always be subject to an EIA (Schedule 1 development) and other developments which may require assessment if they give rise to significant environmental impacts (Schedule 2). The reporting of an EIA takes the form of an Environmental Statement (ES).

1.6 The Proposed Development is a residential development, it therefore falls within Schedule 2, 10 (b) of the EIA Regulations.

1.7 Following consultation with relevant statutory bodies and a review of potential environmental impacts, Welwyn Hatfield Borough Council (WHBC) concluded that an EIA is required for the Proposed Development.

STRUCTURE OF THE ENVIRONMENTAL STATEMENT

1.8 The ES has been prepared on behalf of the Applicant, by a team of specialist consultants and also draws on existing studies and information where necessary.

1.9 The ES comprises three parts – the Main Text (Volume 1), the Figures and Technical Appendices (Volume 2) and the Non-Technical Summary (Volume 3). The ES forms part of a suite of reports that will support the planning application for the Proposed Development.

1.10 The ES provides:

- A description of the Site and its surroundings (Chapter 2);
- An overview of the approach and methodology of the EIA (Chapter 3);
- A description of reasonable alternatives considered in terms of design, technology, location, size and scale (Chapter 4);
- A description of the Proposed Development (Chapter 5);
- Identification of the development programme and construction (Chapter 6);

- The results of the analysis of the potentially significant environmental effects of the Proposed Development for the following disciplines: Transport and Access; Air Quality; Wind Analysis; Noise and Vibration; Townscape and Visual Amenity; Ecology and Nature Conservation; Water Quality, Hydrology and Flood Risk; Soils, Geology and Contaminated Land; Cultural Heritage, Socio-Economics, Climate Change and Waste (Chapters 7-18). Cumulative impacts are assessed within each of the Chapters where relevant; and
- A conclusion based on the findings of the EIA (Chapter 19).

1.11 Each of the technical sections of the ES comprises: an introduction; a methodology of assessment, review of relevant policy context, a description of the baseline (existing) conditions; an assessment of the likely environmental effects of the Proposed Development; a description of mitigation measures; a discussion on residual effects; and a summary. Technical Appendices in relation to these Chapters are provided as **Volume 2.**

1.12 In conclusion, with reference to the EIA Regulations, the ES contains those matters which must be included:

- A description of the development comprising information on the Site, design, size and other relevant features of the development;
- A description of the likely significant effects of the Proposed Development on the environment;
- A description of any features of the Proposed Development, or measures envisaged in order to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment;
- A description of the reasonable alternatives studied by the developer, which are relevant to the Proposed Development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the Proposed Development on the environment;
- A non-technical summary of the above information (Volume 3); and
- Any additional information relevant to the specific characteristics of the Proposed Development and to the environmental features likely to be significantly affected.

NATURE OF THE PLANNING APPLICATION

1.13 The Proposed Development, which has been assessed by the EIA process, is the subject of the hybrid planning application being made to WHBC seeking:

- Full planning application for 317 dwellings (Class C3) with associated access, parking, landscaping and other supporting infrastructure; and
- Outline planning application for up to 404 dwellings (Class C3) with all matters reserved except for access.

REFERENCES

Ref 1.1: Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 2017.

2 THE SITE AND SURROUNDINGS

2.1 The Site is located to the East of Welwyn Garden City town centre in Hertfordshire and falls within the administrative area of Welwyn Hatfield Borough Council (WHBC).

2.2 The Site measures circa 2.2 ha in size and forms the southern portion of the wider former Shredded Wheat Factory, Broadwater Road in Welwyn Garden City. It is immediately bound to the west by the A1000 Broadwater Road, to the north by Hydeway and the North Side site beyond, and to the west it is separated from the railway line by Curier Logistics distribution centre. The southern site boundary adjoins Phase One of the extant planning permission for the wider Shredded Wheat Factory site which is currently under construction.

2.3 The planning application boundary is shown in Figure 1.1.

2.4 The Site is currently clear of buildings following substantial demolition and clearance in connection with the implementation of planning permission 2018/0171/MAJ.

2.5 The Site is in a sustainable location, well connected to public transport and community facilities / amenities located in Welwyn Garden City town centre to the west. Welwyn Garden City train station is located adjacent to the west of the Site and serves the East Coast Mainline rail services with frequent services to Stevenage (10 minutes), London Kings Cross (23 minutes), Moorgate (47 minutes) and Cambridge (57 minutes). In addition, the Site benefits from a well-connected bus network which provides services to the wider area. The nearest bus stop is located on Broadwater Road.

2.6 The surrounding area comprises a variety of uses and building types, including low level industrial and commercial / business uses to the north and east, and Welwyn Garden City train station and town centre to the west. To the south is largely residential in character.

2.7 The Site is not located within a Conservation Area, however, it is within close proximity to the Welwyn Garden City Conservation Area, separated by the East Coast Mainline railway. The Welwyn Garden City Conservation Area is located approximately 40m west of the Site.

2.8 The Site is not located within an Area of Archaeological Significance. However, the adjacent North Side site does include the Grade II Listed Nabisco Shredded Wheat Factory and a number of associated factory buildings within its curtilage. The Grade II Listed Office Block of the Roche Products Factory is located to the south of the Site, beyond the Phase One South

Side site. The Grade I listed Hatfield House and Garden, a Registered Park and Garden is located approximately 4km to the south of the Site.

2.9 The Site is not covered by any statutory or non-statutory designated ecological sites. The Sherradspark Wood Local Nature Reserve is located approximately 875m to the northwest of the Site.

2.10 The Site lies within an area defined by the Environment Agency as Flood Zone 1 (<0.1% risk of flooding in any one year).

2.11 The Site is not located within a designated Air Quality Management Area.

2.12 The demolition of the existing buildings on-site has been completed.

3 ENVIRONMENTAL IMPACT ASSESSMENT METHODOLOGY

3.1 This ES is submitted as a requirement of the EIA Regulations. The key requirements of the EIA Regulations with regards to the assessment methodology are as follows:

- Provision of a description of the relevant aspects of the current state of the environment (baseline scenario) and future baseline scenario;
- Description of the likely significant effects of the development on the environment resulting from:
  a) The construction of the development, including where relevant demolition works;
  b) The use of natural resources;
  c) The emission of pollutants, noise, vibration, light, heat and radiation, the creation of nuisances and disposal and recovery of waste;
  d) The risks to human health, cultural heritage or the environment due to accidents or disasters;
  e) The cumulation of effects with other existing or approved projects; and
  f) The impact of the project on climate and the vulnerability of the project to climate change.
- Description of methods used to assess the significant effects and a description of the measures envisaged to avoid, prevent, reduce or offset identified significant adverse effects on the environment;
- Description of the expected significant adverse effects of the development on the environment from the vulnerability of the development to risks of major accidents or disasters where relevant.

3.2 The main objectives of the ES comprise:

- Establishing the existing baseline;
- Determining environmental conditions. This task was divided into two phases:

(i) collection and review of existing data relating to the Site, including a review of information held by statutory and non-statutory consultees; and

(ii) the enhancement of existing data, where necessary with information collected through site investigation and surveys.

- identifying, predicting and assessing the significance of the environmental impacts including beneficial, adverse, direct, indirect, long term, medium term, short term, temporary, permanent and cumulative impacts which could be expected as a result of the development proposals on those environmental issues that were considered to be potentially significant during the scoping process; and
- determining mitigation and management measures, which would be required in order to prevent, reduce or remedy any significant adverse effects along with consideration of enhancement measures which could be implemented to ensure positive benefits as a result of these proposals.

CONSULTATION

3.3 Pre-application consultation is an essential part of the EIA process and has been used to:

- identify available baseline data and the need for any further field surveys; and
- identify the main environmental issues that need to be assessed in detail.

3.4 Both statutory and non-statutory consultees have been consulted as part of the EIA. In addition, the Applicant is committed to consultation with local interested residents and parties regarding the development proposals.

3.5 Before and during the Outline Application for the wider development (Planning Reference 6/2018/0171/MAJ), detailed consultation was undertaken with local residents, key stakeholders and Welwyn Hatfield Borough Council (WHBC).

3.6 Four pre-application meetings and two design workshops were undertaken with WHBC since October 2019. As part of the pre-application process, the Applicant has also undertaken public consultation with the local communities. Pre-application consultation with the local community has included a number of public consultation events and public exhibition events. The feedback received has informed and shaped the proposals.

SCOPING THE EIA

3.7 The purpose of an EIA scoping exercise is to ensure that all relevant environmental issues with respect to the Proposed Development are identified from the outset and to confirm that the EIA process would conform to the requirements of the EIA Regulations. The EIA

Regulations require *'a description of the likely significant effects of the development on the environment'.*

3.8 An assessment of all environmental effects is not required, only those likely to be significant. By applying relevant guidance and professional judgement it is possible to identify those environmental areas that should be assessed.

3.9 Following completion of the scoping process, a scoping report was issued to WHBC. The scoping report detailed the findings of the scoping assessment and set out the proposed methodology for those technical areas deemed potentially likely to experience a significant effect as a result of the Proposed Development. These were identified as follows:

- Transport and Access;
- Air Quality;
- Wind Analysis and Pedestrian Comfort;
- Noise and Vibration;
- Townscape and Visual Amenity;
- Ecology and Nature Conservation;
- Water Quality, Hydrology & Flood Risk;
- Soils, Geology, Contaminated Land;
- Cultural Heritage;
- Socio-Economics, Population and Human Health; and
- Climate Change

3.10 Following receipt of the Scoping Opinion from WHBC in November 2020, an assessment of Waste has also been scoped in to the ES.

3.11 A copy of the Scoping Opinion is included as **Appendix 3.1** of this ES.

Environmental Topics Scoped out of ES

3.12 The following environmental topics have been scoped out of the ES:

- Daylight, Sunlight and Overshadowing; and
- Major Accidents and Disasters

3.13 The consented masterplan would not have required any study of daylight, sunlight or overshadowing impacts upon neighbouring residential properties, as none are located in sufficiently close proximity to be affected by the scheme. With regard to the current submissions of a hybrid application within the South Side site, this is being developed at the same time as the North Side site. There will therefore not be an impacts on any established or inhabited residential accommodation outside of the Site boundary. The is true of the Phase One of the South Side site, which is under construction and not inhabited and was developed as part of the same consented masterplan.

3.14 For the above reasons, both the Phase One of the South Side site and the North Side site would be tested similarly to proposed residential accommodation, as suggested in Appendix F of BRE daylight guidance. As such, it is considered more appropriate to deal with the technical assessments by means of a stand-alone report instead of an ES chapter, which in this instance would not result in a clear existing v's proposed scenario to base the significance of impacts upon. The stand-alone report will cover all relevant scenarios and provide all relevant tests for both the Phase One of the South Side site and the North Side site.

3.15 The proposed South Side scheme is residential in nature, and as such afforded limited and typical levels of glazing. It also site 50 to 70m away from the railways boundary, which is a substantial visual distance. Both of these factors would suggest that the scheme would not be likely to cause any potential Solar Glare for train drivers. Should any sun reflections be visible from a passing train, their duration would be momentary and the visible instances highly broken up in nature, owing to proposed façade being mainly solid.

3.16 Assessments of Daylight, Sunlight, Overshadowing and Solar Glare have therefore been scoped-out of the ES.

3.17 The vulnerability of the Proposed Development to risks from major accidents and / or disasters has been considered and a risk assessment completed. A summary of the findings of the risk assessment are presented in Table 3.1.

Table 3.1: Vulnerability to Risks from Major Accidents and / or Disasters Risk Assessment

Potential Major Accident / Disaster	Further Consideration Required	Where addressed in ES
Industrial Accident / Biological Hazard	No (screened out)	NA
Natural Disaster (Earthquake, Volcanic Eruptions, Severe Weather, Flooding)	Further assessment for Flooding only	Chapter 13: Water Quality, Hydrology and Flood Risk and Appendix 13.1: Flood Risk Assessment
Transport Accidents	Yes	Chapter 7: Transport and Access
Terrorist Incident	No (screened out)	NA

PROJECT TEAM

3.18 This ES has been completed by a team of specialist consultants with suitable qualifications as illustrated in Table 3.2 below. Further details of the qualifications and experience of the consultants undertaking the technical assessments are included in the statement of competence in **Appendix 3.2:**

Table 3.2: Consultant Team

Section	Consultant
Chapters 1 to 6	Entran Ltd
Chapter 7: Transport and Access	Entran Ltd
Chapter 8: Air Quality	Entran Ltd
Chapter 9: Wind Analysis and Pedestrian Comfort	Urban Microclimate Ltd
Chapter 10: Noise and Vibration	Entran Ltd
Chapter 11: Townscape and Visual Impacts	Bradley Murphy Design Ltd
Chapter 12: Ecology and Nature Conservation	Bradley Murphy Design Ltd
Chapter 13: Water Quality, Hydrology and Flood Risk	Curtins

Chapter 14: Soils, Geology and Contaminated Land	EAME
Chapter 15: Cultural Heritage	CityDesigner
Chapter 16: Socio-Economics and Human Health	Greengage
Chapter 17: Climate Change	Greengage
Chapter 18: Waste	EAME

ASSESSMENT CRITERIA

3.19 A number of criteria have been used to determine whether or not the potential effects of the Proposed Development are significant. Where possible, the effects have been assessed quantitatively.

3.20 The significance of effects have been assessed using one or more of the following criteria:

- international, national and local standards;
- relationship with planning policy;
- sensitivity of receiving environment;
- reversibility and duration of effect;
- inter-relationship between effects; and
- the results of consultations.

3.21 The effects that were considered to be significant prior to mitigation have been identified within the ES. The significance of these effects reflects judgement as to the importance or sensitivity of the affected receptor(s) and the nature and magnitude of the predicted changes. For example, a large adverse impact on a feature or site of low importance will be of lesser significance than the same impact on a feature or site of high importance.

3.22 The following terms have been used to assess the significance of effects where they are predicted to occur:

- Major Beneficial or Adverse effect – where the Proposed Development would cause a significant improvement (or deterioration) to the existing environment;

- Moderate Beneficial or Adverse effect – where the Proposed Development would cause a noticeable improvement (or deterioration) to the existing environment;
- Minor Beneficial or Adverse effect – where the Proposed Development would cause a barely perceptible improvement (or deterioration) to the existing environment; and
- Neutral/ Negligible – no discernible improvement or deterioration to the existing environment.

3.23 Where individual assessment sections deviate from these terms, the alternative terminology has been explained as appropriate within the relevant chapter.

3.24 A summary impact table that describes the potential impacts, mitigation measures and any residual effects for each of the environmental issues considered is provided at the end of each chapter, where relevant.

3.25 A non-technical summary of the ES is provided as **Volume 3.**

CUMULATIVE EFFECTS AND EFFECTS INTERACTIONS

3.26 Cumulative impacts from proposed or committed developments in the vicinity of the Proposed Development have been considered within each of the following technical chapters. The proposed or committed schemes considered are identified in Table 3.3.

Table 3.3: Proposed or Committed Developments

Site Name	Distance from the Site (km)	Location	Description
Phase One South Side site (Extant Planning Application)	Adjacent to Site	Adjacent to Site (south)	Residential development
North Side Site (Extant Planning Application)	Adjacent to Site	Adjacent to Site (north)	Residential led mixed use development
North Side Site (Revised Development)	Adjacent to Site	Adjacent to Site (north)	Residential led mixed use development currently under consideration by WHDC. Ref 6/2021/0181/MAJ.

Rank Xerox Ltd, Bessemer Road, Welwyn Garden City, AL7 1HE	375m north of Site	524335, 231475	Various applications of office to residential use. Details available on Welwyn Hatfield Borough Council online planning portal.
Pall Mall Distribution Site	Adjacent to Site	Adjacent to Site (west)	Part of the Broadwater Road West allocation site. Mixed use provision.
Mercury House, 1 Broadwater Road, Welwyn Garden City, AL7 3BQ	Adjacent to the North Side site (north)	524330, 212980	Change of use from B1 office to C3 residential, construction of roof and side extensions, creation of 43 residential apartments and cycle storage compound. Permission Granted. Details available on Welwyn Hatfield Borough Council online planning portal 6/2016/2624/FULL
Former Argos Direct Distribution Depot, 1 Bessemer Road, Welwyn Garden City, AL7 1HF	Adjacent to the North Side site (north)	524260, 213120	Erection of 2 industrial / distribution buildings comprising of commercial uses. Permission Granted. Details available on Welwyn Hatfield Borough Council online planning portal 6/2015/1957/MAJ
Land East of Bessemer Road	Adjacent to the North Side site (northeast)	524450, 213050 (approx.)	Regeneration of the Site to provide a new retail Aldi foodstore with associated parking, servicing and landscaping. Permission Granted. Details available on Welwyn Hatfield Borough Council online planning portal 6/2016/1058/FULL.
51 Bridge Road East, Welwyn Garden City, AL7 1JR	400m northeast of the Site	524584, 212938	Erection of 54 residential flats consisting of (19x 1-bed and 35 2-bed), with associated access, car parking, amenity space and landscaping involving the demolition of existing office building (B1). Ref: 6/2017/2104/MAJ
Biopark Broadwater Road Welwyn Garden City AL7 3AX	120m south of the Site	523971, 212508	Demolition of existing buildings and construction of 289 residential units (Use Class C3) and community hub (Use Class E/F.2), with public realm and open space, landscaping, access, associated car and cycle parking, refuse and recycling storage and supporting infrastructure. Ref: 6/2020/3420/MAJ
Accord House 28 Bridge Road East Welwyn Garden City AL7 1HX	160m southwest of the Site	524364, 212967	Removal of roof and addition of three new floors of residential accommodation comprising 24 x 1 bed flats and 1 x 2 bed flat. Details available on Welwyn Hatfield

			Borough Council online planning portal 6/2018/2472/MAJ
73 Bridge Road East, Welwyn Garden City, AL7 1UT	475m to the east of the Site	524760, 212826	Erection of two new buildings comprising 111 residential apartments. Details available on Welwyn Hatfield Borough Council online planning portal 6/2020/2268/MAJ
Former Roche Building, Broadwater Road, Welwyn Garden City, Hertfordshire, AL7 3AY	75m south of Site	524098, 212527	Erection of 209 dwellings and the retention and alteration of the existing listed building for community uses, together with associated open space, landscaping, car parking and new access arrangements Details available on Welwyn Hatfield Borough Council online planning portal N6/2010/1776/MA Change of use of former Roche Products Factory (Class B offices, research and manufacturing) to provide 34 residential units (Class C3) across basement, ground and first to third floors, with associated external alterations including excavation to the rear lightwell of southern elevation, additional and altered fenestration to the northern and southern elevations, creation of additional car parking and associated landscaping, together with internal alterations including the subdivision and reconfiguration of floorspace, the introduction of 5 new spiral staircases and provision of servicing within the building. Details available on Welwyn Hatfield Borough Council online planning portal 6/2016/1882/MA
29 Broadwater Road Welwyn Garden City AL7 3BQ	Adjacent to Site (east)	524248, 212650	Demolition of office building and erection of 128 flats with associated car parking, landscaping, amenity space, bin and cycle storage, with alterations to existing and formation of new access on Broadwater Road and alterations to the existing access on Broad Court.

			Details available on Welwyn Hatfield Borough Council online planning portal 6/2019/3024/MAJ
37 Broadwater Road Welwyn Garden City AL7 3AX	100m southeast of Site	524210, 212550	Construction of new build of 22 x 2 Bedroom and 2 x 3 Bedroom residential apartments with balconies and a roof garden. Layout of 26 car parking spaces, cycle parking, refuse store, internal access routes, landscaping and supporting infrastructure. Details available on Welwyn Hatfield Borough Council online planning portal 6/2018/2387/MAJ

3.27 The extant planning permission allows redevelopment of the North Side site and Phase One of the South Side. This planning permission has been implemented through the Phase One South Side site works.

3.28 A revised planning application for the North Side site is currently under consideration by WHDC. Where possible both the development allowed under the extant planning permission and the revised application for the North Side site are considered as committed developments with regards to the cumulative impacts.

3.29 Consideration has also been given to the effects arising from the interaction of impacts on different environmental topic areas arising from the Proposed Development. Where relevant, the interactions are discussed within the Technical Chapters.

4 ALTERNATIVES AND DESIGN EVOLUTION

INTRODUCTION

4.1 This chapter sets out the need for the Proposed Development and the reasonable alternatives considered by the Applicant. The EIA Regulations (Ref 1.1) states that an ES should include:

"a description of the reasonable alternatives studied by the developer, which are relevant to the proposed development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the development on the environment."

4.2 The following sections describe the reasonable alternatives considered by the Applicant in addition to the Proposed Development. Consideration has also been given to and commentary is provided on any alternatives or options considered by the Applicant as follows:

- The 'No Development' alternative;
- Alternative Sites; and
- Alternative Designs and Layouts.

'NO DEVELOPMENT' ALTERNATIVE

4.3 The Site has an extant consent allowing development of the Site which would be implemented if planning consent is not achieved for the current proposed masterplan. A 'No Development' option is therefore not considered.

ALTERNATIVE SITES

4.4 The Applicant has control of the Site and it is available for development. The Proposed Development is specific to the Site and as the Applicant has control of the land, other sites in the immediate vicinity have not been considered.

ALTERNATIVE DESIGNS AND LAYOUTS

4.5 The current Proposed Development has evolved over a number of design iterations, responding to local authority planning and development aspirations, public engagement and taking account of the Applicant's development objectives, design aspirations and prevailing environmental constraints. The evolution of the Development has therefore responded to a

variety of design and environmental issues and the resultant proposals are considered to offer the most advantageous design solution.

4.6 The wider site (including the North Side site and Phase One of the South Side site) has a consent for:

'Creation of a mixed-use quarter comprising the erection of up to 1,340 residential dwellings including 414 (31%) affordable dwellings (Use Class C3); 114 extra care homes (Use Class C2); the erection of a civic building comprising 494 m^2 of health (Use Class D1), 494 m^2 of community use (Use Class D1), 1,232 m^2 of office (Use Class B1) and 646 m^2 of retail (Class A1/A2/A3/A4/A5); alterations, additions and change of use of Grade II Listed Building and retained Silos to provide 5,096 m^2 of flexible business floorspace (Use Class B1), 265 m^2 Combined Heat and Power (Sui Generis), 2,494 m^2 International Art Centre (Use Class D1), 1,226 m^2 Gymnasium (Use Class D2), 1,576 m^2 of restaurant / coffee shop / bar (Use Class A1/A3/A4/A5), Creche / Day Nursery of 644 m^2 as well as a Network Rail TOC Building of 364 m^2; plus associated car parking, access, landscaping, public art and other supporting infrastructure.'

4.7 This consent was granted in February 2019 and remains extant. The application was made in full, the planning reference is Ref: 6/2018/0171/MAJ. This planning permission has been implemented following the start of works on the Phase One South Side site, which borders the Site to the south.

4.8 Prior to this the wider site (including the North Side site and Phase One of the South Side site) also obtained a consent for the development of an alternative scheme, however this consented scheme has not been implemented and the permission has since expired. The development was not considered to make best use of this land as required by local and national planning policy.

4.9 This previously consented scheme comprised the following:

- New build and change of use to include up to 850 dwellings, workspace, a healthcare facility, a hotel, class A1, A3 and A4 units and a community building;
- The demolition of non-original silos and factory and the refurbishment and change of use of the original silos, Production Building, Grain Store and Boiler House;
- The provision of landscaping to include a linear park, a Multi-Use Games Area (MUGA), allotments, green walls and a neighbourhood square; and

- Highway works, to include the widening of footways and the provision of cycleways to Broadwater Road and Bridge Road, together with works to Hydeway and the erection of a new footbridge from Bridge Road leading directly into the scheme.

4.10 This outline planning consent (Ref: N6/2015/0294/PP) was granted on 18th August 2017, together with an associated Listed Building Consent (N6/2015/0293/LB) and planning permission for footbridge improvements (6/2016/0457/FULL).

4.11 The design of the Proposed Development has evolved from the consented schemes. The revised design retains the garden city principles which underpinned the design approach for the consented scheme. The revised design builds on the knowledge accumulated for previous proposals, yet its design brief is inspired by new ideas and objectives as well as by previously established principles:

- To create beautiful, durable and useful buildings within an enjoyable setting;
- To provide a sustainable amount of new homes in a range of sizes and increased diversification of the end user demographic;
- To create public spaces that are well-connected, safe and inclusive and enjoyable.
- To create places with quality and character;
- To create beautiful and enjoyable new landscapes;
- To improve the quality, connectivity and accessibility of existing routes and infrastructure, with a focus on the North South connection between the former Shredded Wheat Factory and the Roche Building.

4.12 The blocks within the revised design remain in similar positions as in the extant application and the mews streets and central weave have been retained. The massing of the individual blocks has been amended in order to improve the number and quality of the units being proposed and respond to the wider developing context.

4.13 The footprint of Block 8 has been amended in order to open up the northern end of the weave where the South Side site meets the North Side site.

4.14 The massing has been reduced towards the southern end in order to allow more natural sunlight to the residential podium gardens which will sit in the middle of each block.

4.15 Additional roof terraces have been provided within the new blocks which provide additional residential amenity space for the future resident.

4.16 The final layout of the Proposed Development is identified in Chapter 5 and **Appendix 5.**

5 THE PROPOSED DEVELOPMENT

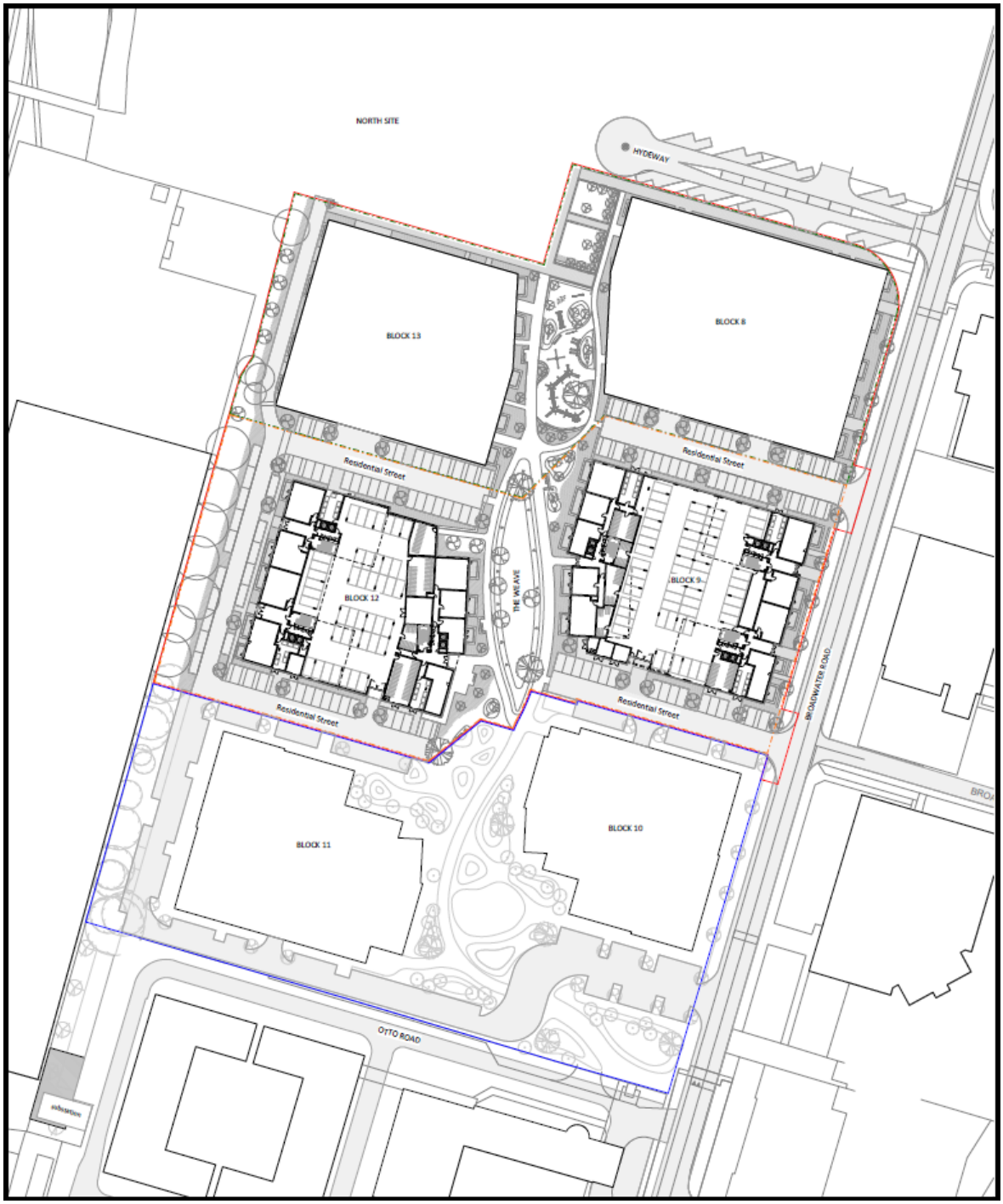
5.1 The Proposed Development comprises a site with an area of approximately 2.37 ha.

5.2 The planning application is hybrid and comprises the following:

- Full planning application for 317 dwellings (Class C3) with associated access, parking, landscaping and other supporting infrastructure; and
- Outline planning application for up to 404 dwellings (Class C3) with all matters reserved except for access.

5.3 The proposed site layout is presented in Figure 5.1 and further drawings provided in **Appendix 5.**

Figure 5.1: Proposed Site Layout



5.4 The masterplan aims to provide legible spaces and enhance the connectivity throughout the Site, while supporting a sense of community.

Character and Appearance

5.5 The proposed residential blocks are located around the central weave linear park and have been designed in order to maximise dual aspect units and minimise north facing single aspect units.

5.6 The blocks are designed to define and activate the edges of the Site and the central park. On the outer edges, the massing and expression is more formal, whilst a more playful architecture is proposed towards the central park.

5.7 Blocks 9 and 12, Phase Two of the Proposed Development, each contain a central courtyard which sits over a single level of covered parking. These courtyards contain amenity space for the residents. Breaks in the massing towards the south allow light into these spaces.

5.8 The blocks are based around three separate residential cores, two along the perimeter and one facing the central weave. Each core has a separate entrance at ground level, access to the covered parking and podium gardens.

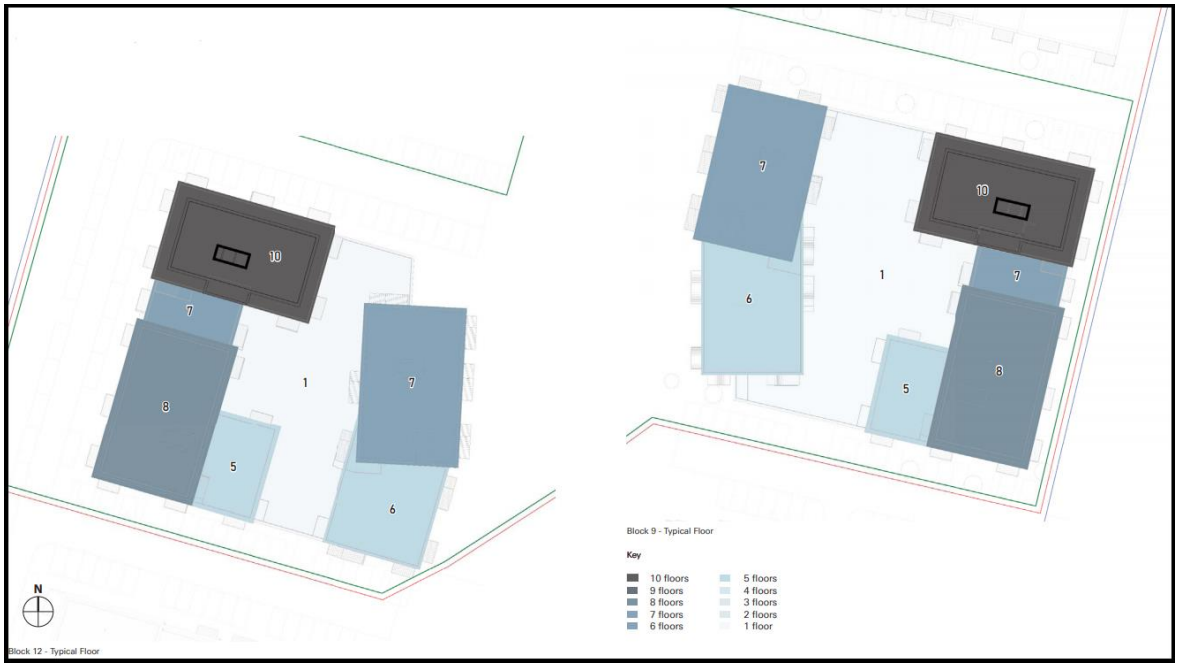
5.9 The proposals aim to maximise amenity space for the residents. In addition to the central park, there are a number of amenity spaces proposed for the resident's only. The main space is the central podium at first floor. Each core also has access to designated roof terrace which provides high level amenity space with good daylight and views. In addition to this each home has its own private external amenity in the form of a balcony or terrace.

Scale and Massing

5.10 For Blocks 9 and 12 (Phase Two of the Proposed Development) the height of buildings will range from five to 10 storeys. The tallest part of each block will be located at the outer northern corners. The buildings then step down to the South in order to improve sunlight on the podium garden. The massing steps down further towards the central weave park.

5.11 Figures 5.2 illustrates the proposed building heights within Block 9 and 12 of the Proposed Development.

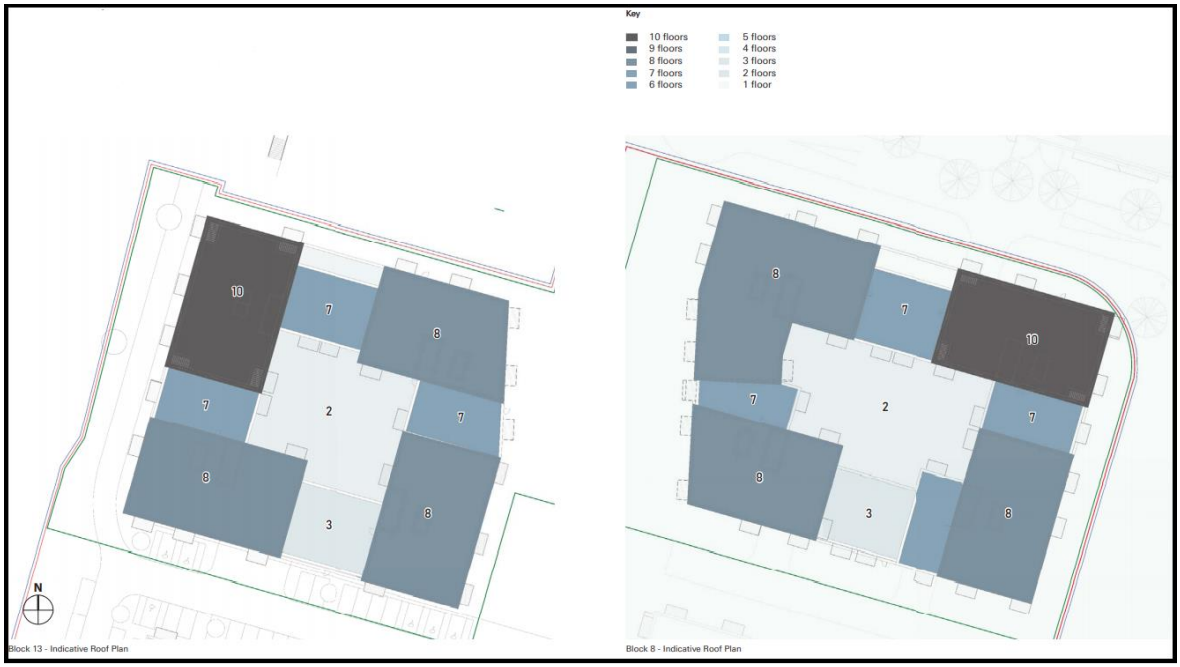
Figure 5.2: Building Heights within Blocks 9 and 12 (Phase Two)



5.12 For Blocks 8 and 13 (Phase Three of the Proposed Development) the height of buildings are currently indicative but will vary to a maximum of 10 storeys. The tallest part of each block will be located at the outer corners and will form the wayfinding gateways into the Site.

5.13 Figures 5.3 illustrates the indicative building heights within Block 8 and 13 (Phase Three) of the Proposed Development for which outline consent is sought.

Figure 5.3: Building Heights within Blocks 8 and 13 (Phase Three)



Density

5.14 The residential element of the Proposed Development will have an overall density of up to 304 dwellings per hectare, based upon a development area of 2.37 ha.

Quantum of Development

5.15 Table 5.1 identifies the quantity of the land proposed for the uses to be provided by the Proposed Development.

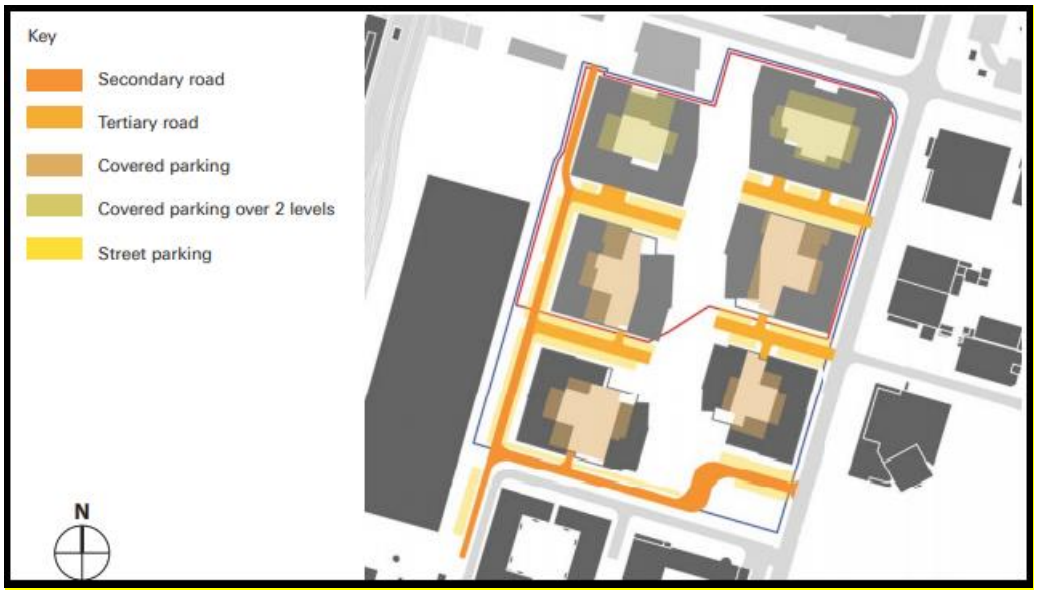
Table 5.1: Land Budget Summary

	Land Budget Summary
Site Area	2.37 hectares
Residential Element	
Density	304 dwellings per hectare
Total no of dwellings Phase Two (Use Class C3)	317
Total no of dwellings Phase Three (Use Class C3)	404
Open Space	
Central Weave	3745 m^2
Podium Level Communal Gardens	2894m^2
Roof Terrace Communal Gardens	2501m^2

Access and Parking

5.16 Access to the Site for road vehicles will be via access points off Broadwater Road as illustrated in Figure 5.4.

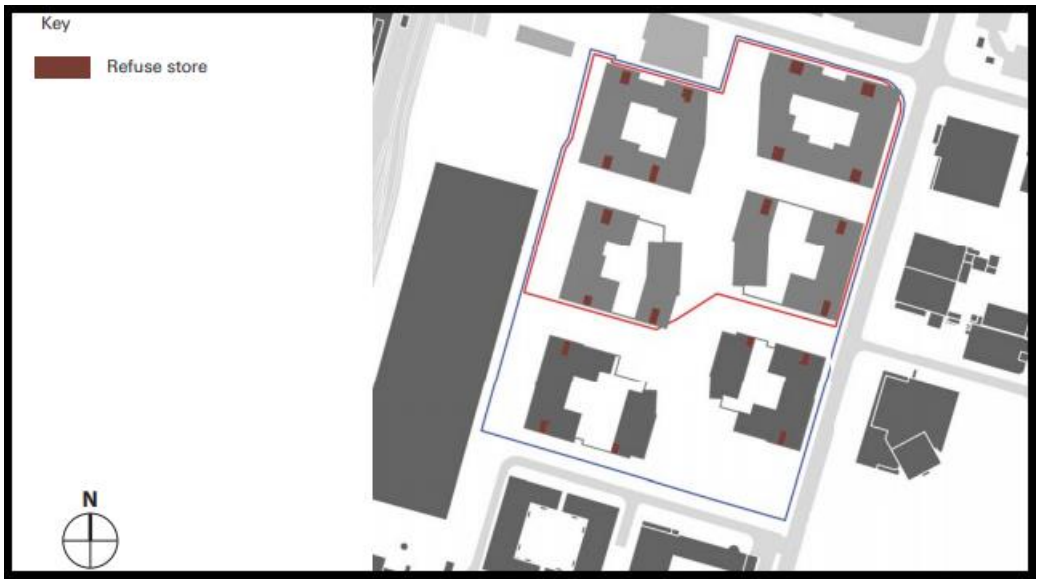
Figure 5.4: Vehicular Access



5.17 Car movements have been limited to the periphery of the Site to ensure that as much as possible of the areas used by pedestrians are free from car traffic.

5.18 It is also proposed that refuse and recycling lorry movements are limited to the periphery of the Site, with no requirement for vehicles to track across defined public accessible spaces. The location of proposed refuse stores have been indicated on the Figure 5.5 below.

Figure 5.5: Location of Refuse Stores



5.19 Car parking will be largely located within undercroft areas but will be supplemented by on-street car parking spaces. Blocks 9 and 12 will have a single level of undercroft

parking.Blocks 8 and 13 (for which outline consent is sought) will have two levels, this is indicative at this time.

5.20 The scheme provides a network of streets and publicly accessible spaces designed to allow easy access. Landscaping of publicly accessible spaces has been designed to provide inclusive access throughout. Pedestrian crossing points along new roads and streets will either provide level access or dropped kerbs.

5.21 Safe and secure private cycle storage will be provided within each residential block as illustrated in Figure 5.6 below. Residents' cycle stores will generally be located adjacent to entrance lobbies and, as much as possible, with direct access to the peripheral road network and to secure car parking.

Figure 5.6: Location of Cycle Stores

Sustainable Urban Drainage System

5.22 A Sustainable Urban Drainage System (SUDS) has been prepared for the Proposed Development which has been designed to accommodate a 1 in 100 year rainfall event including a 40% allowance for climate change.

6 DEVELOPMENT PROGRAMME AND CONSTRUCTION

INTRODUCTION

6.1 This chapter describes the anticipated programme of development works and the key activities that would be undertaken on the Site during the construction phase of the project. It identifies, in general terms, the potential effects associated with construction activities and outlines proposals for their mitigation. Detailed consideration of construction-related environmental effects upon the various technical topics assessed, together with their associated mitigation measures, are provided in each of the technical assessment chapters of this ES.

6.2 It is proposed that a Construction Environmental Management Plan (CEMP) would be prepared and implemented for each construction phase of the Proposed Development. This would be discussed and agreed with WHBC prior to the commencement of works at the Site. An outline of the content of the CEMP is provided in this chapter.

6.3 Planning for construction is necessarily broad at this stage and may be subject to modification. For example, specific construction activities could vary in frequency depending upon the particular stage of works. Consequently, where uncertainty exists, the assessment has assumed a 'worst-case' situation. It is considered, however, that sufficient information is available at this stage to enable the likely significant environmental effects relating to the construction works to be identified and their significance assessed.

PROGRAMME OF WORKS

6.4 The construction period is anticipated to be approximately seven years to complete the Proposed Development in its entirety. The development of the South Side Site has been divided into three phases as illustrated in Figure 6.1 below. The Proposed Development comprises Phases Two and Three. Phase One is currently under construction.

Figure 6.1 – Development construction phases (including partially constructed Phase One of the South Side site)

DESCRIPTION OF THE WORKS

6.5 The proposed construction works can be divided into the following main stages:

- Enabling works;
- Site preparation;
- Construction of the development; and
- Removal of remaining construction elements.

Enabling Works

6.6 Enabling works will be undertaken prior to the start of the main construction works. The extent of these works would include:

- Establishment of site project offices and construction compound including car designated parking areas for contractors;
- Isolation or diversion of utility services impinging upon excavation areas;
- Provision of temporary electrical supplies and other required services for the duration of the construction works; and
- Erection of site hoardings including provision of a site security system.

Site Preparation

6.7 All existing non-critical infrastructure will be removed. The enabling works would entail the decommissioning and removal of any associated structures and communication infrastructure in all areas within the Site boundary. The works will include the use of heavy plant, with the potential for on-site material selection, dependant on site establishment and space to facilitate necessary plant. All works will be strictly managed to ensure that vehicle movement and dust are controlled and kept to a minimum. Further details on the management of dust are included in Chapter 8: Air Quality.

6.8 Site preparation works will also involve the breaking out of any hardstanding material, crushing and screening to produce stock piles of aggregate hardcore materials for use within the sub-base and foundation structures of the new buildings and roadways.

6.9 All live utilities and any live drainage would be capped off or diverted before any excavation works commence. A method statement will be produced outlining the process for identifying and disconnecting existing services at the Site.

6.10 Once the temporary works are in place, any groundworks or earthmoving would proceed. All material will be re-used on site where possible, or otherwise transported off-site where reuse is not possible.

Construction of the Proposed Development

6.11 This phase will include the construction of the access roads within the Proposed Development.

6.12 The Site would require new mains water, gas, electricity and IT/telephone connections. Statutory services will be brought into the Site as and when the programme dictates, although the trenching works will be carried out alongside the substructure work.

6.13 The operation of construction vehicles and general construction activities may give rise to the potential for surface runoff to become contaminated with hydrocarbons, silt or other construction materials. This may in turn lead to a contamination event should site drainage be allowed to enter watercourses. Excavations may require dewatering (of accumulated rainfall or runoff) during construction. In such circumstances, it will be important to ensure that the quality of this water is sufficiently high to allow discharge to an appropriate point. Further details on drainage are provided in Chapter 13: Water Quality, Hydrology and Flood Risk.

Removal of Remaining Construction Elements

6.14 This last phase will be undertaken at the end of the main construction works or where the construction has progressed to a stage where it can be undertaken at an earlier time. The extent of these works would include:

- Removal of site project offices and construction compound;
- Decommissioning of temporary electrical supplies and other required services utilised for the construction works; and
- Removal of site hoardings and site security system.

HOURS OF WORK

6.15 It is proposed that hours of work during the construction phase would be as follows:

- 0700-1900hrs on weekdays;
- 0700-1300hrs on Saturdays; and
- No working on Sundays or bank holidays.

6.16 These proposed hours would be agreed with the Local Authority Planning department prior to commencement of the works. Special working outside these hours, such as heavy plant activities and crane and equipment assembly, would be kept to a minimum and would be subject to prior agreement with reasonable notice by the Local Authority's Environmental Health Officer (EHO).

6.17 It is anticipated that none of the works outlined above will be carried out on Sundays or Bank Holidays without special prior agreement with WHBC and other relevant parties.

PLANT AND EQUIPMENT

6.18 The following plant and equipment is anticipated to be used during the construction works.

Table 6.1: Indicative Plant used during Construction

Plant and Equipment	Enabling works and Site Preparation	Construction	Services installation	Fit out	Landscaping
Concrete silo and ready-mix lorries		X	X		X
Concrete cutter, saws and splitters	X	X	X		X
Cranes and hoists	X	X			
Cutters, drills and small tools		X	X	X	
Excavators and breakers	X	X	X		X
Floodlights	X	X		X	
Fork lifts trucks		X	X	X	
Hydraulic benders and cutters		X	X	X	
Road Brush Vehicles		X	X	X	
Lorries/vans	X	X	X	X	X
Tarmac laying equipment		X			X
Scaffolding and access platforms		X		X	X
Temporary supports		X		X	
Tipper lorries		X			X
Wheel washers	X	X	X		X

Plant and Equipment	Enabling works and Site Preparation	Construction	Services installation	Fit out	Landscaping
Skips & Skip trucks	X	X		X	X

ENVIRONMENTAL MANAGEMENT AND MITIGATION

Environmental Management Plan

6.19 A principal construction contractor will be responsible for all aspects of construction operations. In line with best practice, the construction contractor will subscribe to the CCS (Considerate Contractors Scheme).

6.20 A CEMP would be prepared by the Principal Contractor which would include details of all relevant environmental management controls necessary for environmental protection during the construction works. This would follow best practice guidelines and would be agreed with the Local Authority Environmental Health Department.

6.21 The CEMP would include:

- Restrictions and targets for specific work activities in order to minimise environmental effects, including disruption and disturbance to local residents (if relevant), workers and the general public;
- Details of the means by which appropriate environmental monitoring, record keeping and reporting would be managed to ensure the above targets are being met;
- Procedure(s) to deal with necessary 'abnormal' works that may result in deviation from the agreed procedures and targets; and
- Provision for a programme of regular environmental audits and reviews at key stages in the construction programme.

6.22 The CEMP would place stringent contractual and procedural performance obligations upon trade contractors. These would be maintained and reinforced by commitments detailed below and, where relevant, within Chapters 7-16 inclusive. Such obligations would be enforced through subsequent detailed agreements with and consents provided by the Local Authority. A clear management structure and description of the responsibilities and authority of a specific Project Environmental Manager (PEM) would be included.

6.23 The PEM would have primary responsibility for liaising with the Planning Authority and other statutory agencies on environmental matters. It is anticipated that regular meetings would take place to review progress and to agree necessary options. Notwithstanding this, it is recognised that positive action and reaction by site operatives at the time of any environmental incident or breach of targets are essential components for effective environmental management.

6.24 The CEMP would address requirements in relation to environmental controls and would allow for, and include, the following:

- The appointment of an experienced PEM responsible for the preparation and implementation of the CEMP;
- Details of the phasing of the works, including information on construction works that may be carried out by trade contractors;
- Procedures for construction activities, highlighting any operations likely to result in adverse environmental effects, with an indication of the mitigation measures to be employed;
- Wheel washing and highway cleaning procedures;
- Reference to and provision of a framework for compliance with all legislation that would be relevant;
- Emergency procedures that would be implemented on the Site;
- Prohibited or restricted operations;
- Control limits of target criteria for environmental issues, where practicable;
- Requirements for monitoring and record-keeping;
- Mechanisms for third parties to register complaints and the procedures for responding to complaints;
- Provisions for reporting, public liaison and prior notification, especially where dispensations would be required;
- Details of construction operations, highlighting the operations most likely to result in disturbance and/or working outside core working hours, together with an indication of the expected duration of each activity;
- Possible departures from target criteria and details of how any adverse effects would be minimised or potential complaints addressed;
- Details of proposed routes for HGVs travelling to and from the Site;
- Provisions for auditing by the PEM, WHBC and other regulatory authorities, where appropriate;
- Details of plant to be used;

- Details of all construction works involving interference with a public highway, including temporary carriageway/footpath closures, realignments and diversions; and
- Housekeeping procedures and environmental management controls.

Contract Conditions

6.25 Individual trade contracts would incorporate appropriate requirements in respect of environmental control, based largely on the standards of 'good working practice' outlined in the EMP in addition to statutory requirements. Contractors would therefore be required to demonstrate how they would achieve the provisions of the EMP, how targets would be met and how potential adverse environmental effects would be minimised.

Management of Construction Works

6.26 The PEM would deal with queries from the public and other complaints and enquiries. This nominated individual would be named at the Site entrance, with a contact number and would be identified to the Local Authority and community groups, prior to the start of the Site activities and whenever a change of responsibility occurs.

6.27 Any complaints would be logged and reported to the relevant individual within the Local Authority (and *vice versa*) as soon as practicable.

6.28 The CEMP would specify the roles and responsibilities of the PEM and the appropriate Officers within Local Authority in respect of any breaches or complaints from the public. The required actions would be different in each specific case, depending on the operation, equipment or location.

Emergencies and Accidents

6.29 The building contractor would be required to maintain high safety standards on-site and to be fully compliant with current health and safety legislation.

6.30 An Emergency Incident Plan would be put in place to deal with potential spillages and/or pollution incidents. Any pollution incidents would be reported immediately to the regulatory bodies.

Materials Storage and Handling

6.31 Environmental issues would be considered in the procurement of raw materials and manufactured building components and all such materials would be appropriately stored on the Site to minimise damage by vehicles, vandals, weather or theft. Deliveries of hazardous materials would be supervised and a just-in-time deliveries system would be implemented to minimise storage times and reduce the risk of spillage on-site. Tanks and drums of liquid chemicals and fuels would be stored in bunded compounds. Packaging materials would be returned, where possible.

6.32 Contractors and their sub-contractors would be expected to maintain a tidy site and, where practical, to operate a 'just-in-time' policy for the delivery and supply of materials for the works.

6.33 Where possible, pre-fabricated 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 to surrounding sensitive receptors.

6.34 Mobile cranes would be used for general unloading and hoisting during the structural and envelope works. Passenger/goods materials hoists, fork lift trucks and other electric or hydraulically operated plant may be used to distribute and transport materials around the Site.

Waste Management and Minimisation

6.35 Waste would be generated during all stages of the construction works. Although specific materials cannot be identified at this stage of the design, potential sources of waste within the construction process are anticipated to comprise:

- Excavated material;
- Packaging – including plastics, wooden pallets, expanded foams;
- Waste materials generated from inaccurate ordering, poor usage, badly stored materials, poor handling, spillage; and
- Dirty water, for example from Site runoff containing silt.

6.36 It is the intention of the project to use all excavated material, wherever possible within the Proposed Development.

6.37 A Site Waste Management Plan (SWMP) would be developed and implemented detailing how waste created during the construction phase would be managed. This would be prepared by the Contractor in accordance with the Site Waste Management Plan Regulations 2008 and non-statutory guidance on preparation of SWMPs. All relevant Contractors would be required to investigate opportunities to minimise waste arisings at source and, where such waste generation is unavoidable, to maximise the recycling and reuse potential of construction materials. Recycling of materials would take place off-site, where noise and dust are less likely to result in effects to the occupants of surrounding properties. Appropriate waste management and recycling centres close to the Site would be identified prior to the construction works and contracts would be established with registered waste carriers and authorised waste disposers for construction waste.

6.38 All waste would be stored on the Site in accordance with the relevant legislation, in particular the Waste (England and Wales) Regulations 2011 (Ref 6.1) and no burning of construction waste would be undertaken at the Site.

6.39 The destination of all waste or other materials removed during construction would be notified to the relevant authority by the Contractor/Construction Manager for approval. Loads would only be deposited at authorised waste treatment and disposal sites. Deposition of waste would be in accordance with the requirements of the EA, Environmental Protection Act 1990 (EPA), the Controlled Waste Regulations 1992 as amended, the Hazardous Waste Regulations 2005 (Ref 6.2), the List of Wastes (England) Regulations 2005 (Ref 6.3) and the Waste (England and Wales) Regulations 2011.

Traffic and Access Management

6.40 An assessment of the potential effects of the Proposed Development on traffic and the local transportation network is presented in Chapter 7: Transport and Access.

6.41 Specific detail relating to the management of construction traffic will be presented within a dedicated construction transportation plan, which will be submitted for approval by the Local Authority post planning.

6.42 All construction traffic entering and leaving the Site would be closely controlled. Deliveries would be phased and controlled on a 'just-in-time' basis, wherever possible. This would minimise travel time and traffic congestion around the Site.

6.43 The majority of all deliveries would be made by standard HGVs, with no special access / delivery requirements.

6.44 It is anticipated that in the peak period of construction of the wider site, approximately 310 daily traffic movements would occur to and from the Site (arising from 155 vehicles of which less than 25 are classed as HGVs). Construction traffic will access the Site from Broadwater Road.

6.45 The Traffic Management Plan would detail the management of the above measures as well as the management of car parking on the Site and the Site labour force travel to the Site. No parking on public roads would be allowed and the Contractor/Construction Manager would be responsible for enforcing this requirement. Provision would be made within the Site for essential on-site parking. Any local traffic management measures for Site access would be agreed with the relevant authorities.

Air Quality and Dust

6.46 Site-specific best practice measures would be implemented by contractors to minimise the disturbance to local residents and other potentially sensitive receptors. These measures would include:

- Damping down surfaces during dry weather;
- Providing appropriate hoarding and/or fencing to reduce dust dispersion and restrict public access;
- Sheeting buildings, chutes, skips and vehicles removing wastes with the potential for dust generation;
- Appropriate handling and storage of materials, especially stockpiled materials;
- Restricting drop heights onto lorries and other equipment;
- Fitting all equipment with dust control measures such as water sprays wherever possible;
- Using a wheel wash, limiting speeds on the Site to 5 mph, avoidance of unnecessary idling of engines and routing of Site vehicles as far from sensitive properties as possible;
- Using gas powered generators rather than diesel, if possible (these are also quieter) and ensuring that all plant and vehicles are well maintained so that exhaust emissions do not breach statutory emission limits;
- Switching off all plant when not in use;

- No fires would be allowed on the Site; and
- Ensuring that a road sweeper is available to clean mud and other debris from hardstanding, roads and footpaths.

6.47 Full assessments of the potential effects of the construction works on air quality are presented in Chapter 8: Air Quality.

Hazardous Materials and Contaminated Land

6.48 Prior to construction, the Contractor would be required to prepare a Method Statement and Risk Assessment demonstrating how the safety of construction workers and the public would be addressed in terms of potentially harmful substances. Protective measures would include:

- Provision of adequate facilities and procedures for personal washing and changing;
- Provision and use of personal protective equipment (PPE);
- Implementation of dust suppression methods; and
- Implementation measures to avoid surface water ponding and the collection and disposal of the Site runoff.

6.49 Such measures should be carried out in accordance with the Protection of Workers and the General Public during the Development of Contaminated Land document and CIRIA Report 132: A Guide for Safe Working on Contaminated Sites (Ref 6.4).

6.50 Other practical methods of limiting risks from hazardous materials and contaminated land would include:

- The storage of all potentially hazardous materials on hard surfaced areas, with bunding to the satisfaction of the Environment Agency;
- The storage of ground tank oil in accordance with the Control of Pollution (Oil Storage) (England) Regulations, 2001 (Ref 6.5); and
- The treatment of any excess dewatering effluent prior to discharging to the foul sewerage system and only on the achievement of an approved discharge consent from Southern Water.

Site Drainage and Effects on Water Resources

6.51 The assessment of the potential effects of the Development proposals on water resources is presented in Chapter 13: Water Quality, Hydrology and Flood Risk. In summary, a precautionary approach would be adopted to appropriately manage construction-derived surface water run-off. As such, particular care would be taken to prevent any release or mobilisation of pollutants, which could pose a potential risk to receptors such as surface water and groundwater.

6.52 Best practice pollution prevention measures would be put in place to isolate environmentally damaging substances and prevent their release. These measures would be agreed in consultation with the Environment Agency and Thames Water and would include:

- Secure, careful siting and bunding of fuel storage facilities and any areas used for the storage of potentially hazardous materials;
- Use of drip trays when filling smaller containers from tanks or drums to avoid drips and spills;
- Works involving concrete would be carefully controlled and ready-mix concrete wagons would be washed out in a safe designated area;
- The avoidance of stockpiling materials wherever possible to prevent spills and, where undertaken, sheeting and covering these stockpiles and haulage vehicles loads;
- Management of the Site drainage to prevent sediment laden contaminated runoff entering the wider environment;
- Surface drainage would pass through settlement and oil interceptor facilities where required;
- Provision for the treatment and safe disposal of wastewaters, including water from dewatering pumping operations should these be undertaken;
- Appropriate management and transportation of the Site waste including the establishment of dedicated waste storage areas designed to prevent pollution, regular inspections and the implementation of waste minimisation and management plans as described above; and
- Ensuring that any water which may have come into contact with contaminated material would be disposed of in accordance with the Water Resources Act (1991) and other legislation, to the satisfaction of the Environment Agency.

6.53 Furthermore, any piling systems would be designed to minimise the risk of potential pathways for contamination to reach groundwater resources.

6.54 An Emergency Plan would be implemented, forming part of the CEMP, outlining procedures to follow in the instance of any accidents involving spillages. This would involve the provision of on-site equipment for containing spillages, such as emergency booms and chemicals to soak up spillages. Should an incident occur, the Environment Agency would be contacted immediately.

Protection of Ecological Resources

6.55 An assessment of the potential effects of the Development on ecological resources is presented in Chapter 12: Ecology and Nature Conservation.

6.56 Chapter 12 details the measures that will be taken to mitigate effects from the Proposed Development can be broadly summarised as follows:

- Screening during construction;
- No trenches or excavations to be left open, though if unavoidable, exit ramps will be put in place;
- Adherence to the EA's Pollution Prevention Guidance Notes;
- Careful timing of works; and
- Ecologically-informed lighting strategy for operational phase.

CUMULATIVE EFFECTS

6.57 Any cumulative effects during the construction phase are identified within Chapters 7-18 where relevant.

SUMMARY AND CONCLUSIONS

6.58 The construction effects of the Proposed Development would be managed through the development of a project and site-specific CEMP. The CEMP would be agreed with the Local Authority and other relevant bodies prior to the commencement of works which, as a minimum, would comply with the mitigation measures set out in this ES. The CEMP would outline methods for contractor and general public liaison, hours of work, methods to deal with complaints and outline management practices to control dust, traffic and access, waste, water pollution,

ecological and archaeological effects, ensuring a high level of control throughout the construction works.

6.59 The procedures within the CEMP would ensure the delivery of a high level of environmental control throughout the construction phase, thereby minimising the potential for adverse effects. Further detail regarding specific mitigation during construction works for the Proposed Development is presented within Chapters 7 to 18 of this ES.

REFERENCES

Ref 6.1: HMSO (2011) The Waste (England and Wales) Regulations 2011

Ref 6.2: Office of the Deputy Prime Minister (2005) The Hazardous Waste (England and Wales) Regulations, SI 2005 No.894. HMSO, Norwich.

Ref 6.3: HMSO (2005) The List of Wastes (England) Regulations 2005

Ref 6.4: CIRIA (2002) CIRIA Report 132 Good Practice Guidance For The Management of Contaminated Land. Safe Working Practices on Contaminated Sites.

Ref 6.5: HMSO (2001) Control of Pollution (Oil Storage) (England) Regulations.

7 TRANSPORT AND ACCESS

INTRODUCTION

7.1 This chapter assesses the potential effects of the Proposed Development in relation to transport and access. It summarises the findings of the Transport Assessment (TA), Framework Travel Plan (FTP) and Delivery & Servicing Plan (DSP) prepared by Entran Ltd, which are included as **Appendix 7.1.**

7.2 The existing transport network in the vicinity of the Site has been described in the context of national, regional and local transport policy. The effects of the Proposed Development on the network have been assessed taking into consideration future changes resulting from committed developments in the area and the net changes in travel demand resulting from the Proposed Development.

ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

Assessment Methodology

7.3 The Transport Assessment (TA) has been prepared in accordance with good practice guidance published by both the Department for Transport (DfT) and the (then) Department for Communities and Local Government (DGLG). The above guidance indicates that the assessment should set out the baseline conditions against which effects should be fully assessed. It also states that the TA should include details of the extant and lawful uses of the Site. For the purposes of the EIA, the existing observed baseline conditions are used as the basis of assessment.

7.4 The extant planning consent for the Site, encompassing both North and South Sides, was supported by a Transport Assessment prepared by Entran in January 2018, as well as a series of technical notes submitted during the determination period. The scope of that approved TA and the subsequent Technical Notes has informed the TA for the current Proposed Development.

7.5 It is important to note that the planning application for the approved development was also supported by an EIA. Transport and Access is included as a consideration of this EIA.

Significance Criteria

7.6 The potential effects and residual effects of the Proposed Development upon all transport modes have been assessed using the significance criteria in Table 7.1. These criteria have been based on professional judgement and outline the approach to categorising the significance of effects identified within the Transport Assessment.

Table 7.1 – Significance Criteria for Transport

Significance criteria	Description			
	Traffic	Public Transport	Walking & cycling	Construction traffic
Major adverse effect	>50% increase in either daily or peak hour traffic flows on any road.	>50% increase in either daily or peak hour passenger demand for public transport.	On and off-Site facilities for pedestrians and cyclists significantly degraded.	>50% increase in either daily or peak hour traffic flows on any road.
Moderate adverse effect	20%-50% increase in either daily or peak hour traffic flows on any road.	20%-50% increase in either daily or peak hour passenger demand for public transport.	On and off-Site facilities for pedestrians and cyclists degraded.	20%-50% increase in either daily or peak hour traffic flows on any road.
Minor adverse effect	5%-20% increase in either daily or peak hour traffic flows on any road.	5%-20% increase in either daily or peak hour passenger demand for public transport.	On Site facilities for pedestrians and cyclists degraded.	5%-20% increase in either daily or peak hour traffic flows on any road.
Neutral	<5% change in daily and peak hour traffic flows on all roads.	<5% change in daily and peak hour passenger demand for public transport.	Facilities for pedestrians and cyclists neither enhanced nor degraded.	<5% change in daily and peak hour traffic flows on all roads.
Minor beneficial effect	No increase in traffic on any road with 5%-20% reduction in daily and peak hour traffic flows on one or more roads.	5%-20% reduction in daily and peak hour passenger demand for public transport.	On Site facilities for pedestrians and cyclists enhanced.	5%-20% reduction in either daily or peak hour traffic flows on any road.
Moderate beneficial effect	No increase in traffic on any road with 20%-50% reduction in daily and peak hour traffic flows on	20%-50% reduction in daily and peak hour passenger demand for public	On and off-Site facilities for pedestrians and cyclists enhanced.	20%-50% reduction in either daily or peak hour traffic flows on any

Significance criteria	Description			
	Traffic	Public Transport	Walking & cycling	Construction traffic
	one or more roads.	transport.		road.
Manor beneficial effect	No increase in traffic on any road with >50% reduction in daily and peak hour traffic flows on one or more roads.	>50% reduction in daily and peak hour passenger demand for public transport.	On and off-Site facilities for pedestrians and cyclists significantly enhanced.	>50% reduction in either daily or peak hour traffic flows on any road.

7.7 In addition to the magnitude of effect as set out in Table 7.1 above, the duration and geographical extent of the effect are also considered. These are categorised as short term, medium term and long term; local, regional and national.

LEGISLATION, PLANNING POLICY AND GUIDANCE

National Planning Policy

7.8 Key national planning policy in relation to the transport effects of the Proposed Development comprises:

Department for Transport, Delivering a Sustainable Transport System (2008)

7.9 In October 2007, The Department for Transport (DfT) published 'Towards a Sustainable Transport System' (TaSTS) (Ref 7.1) and in December 2008 DfT published 'Delivering a Sustainable Transport System' (DaSTS) (Ref 7.2) both in response to the Eddington study. These reports set five clear goals for the UK's transport system.

- To support national economic competitiveness and growth, by delivering reliable and efficient transport networks;
- To reduce transport's emissions of carbon dioxide and other greenhouse gases, with the desired outcome of tackling climate change;
- To contribute to better safety, security and health and longer life expectancy by reducing the risk of death, injury or illness arising from transport, and by promoting travel modes that are beneficial to health;
- To promote greater equality of opportunity for all citizens, with the desired outcome of achieving a fairer society; and

- To improve quality of life for transport users and non-transport users, and to promote a healthy natural environment.

7.10 All integrated planning and transport policy must therefore be considered under the aegis of these goals.

Department for Transport, Creating Growth, Cutting Carbon – Making Sustainable Transport Happen (2011)

7.11 In January 2011, the Government published this White Paper (Ref 7.3). This paper outlined the coalition Government's vision for a transport system that is an engine for economic growth, but one that is also greener and safer and improves quality of life in our communities. It stated that investment on its own is not enough, we also need to help people to make transport choices that are good for society as a whole; however, it also stated that the Government recognises that it is not possible for public transport, walking or cycling to represent viable alternatives to the private car for all journeys, particularly in rural areas and for some longer multi-leg journeys and so the Government is committed to making car travel greener by supporting greener automotive technology.

Department for Communities and Local Government, National Planning Policy Framework (2019)

7.12 The NPPF (Ref. 7.4) sets out the Government's key objectives for achieving sustainable development. The NPPF was first published in March 2012 and revised in February 2019 in order to streamline the national planning policies set out in previous policy guidance and a number of related circulars. These have been combined into a single document to make the planning system more accessible, whilst still protecting the environment and promoting sustainable growth.

7.13 Paragraph 102 of the NPPF states that transport issues should be considered from the earliest stages of plan-making and development proposals, so that the potential impacts of development on the transport network can be addressed along with the environmental impacts that can be assessed and taken into account – including appropriate opportunities for avoiding and mitigating any adverse effects, and for net environmental gains.

7.14 Paragraph 105 advises that when setting local parking standards for residential and non-residential development, policies should take into account:

"a) the accessibility of the development;

b) the type, mix and use of development;

c) the availability of and opportunities for public transport;

d) local car ownership levels; and

e) the need to ensure an adequate provision of spaces for charging plug-in and other ultra-low emission vehicles."

7.15 Paragraph 108 states that:

"In assessing sites that may be allocated for development in plans, or specific applications for development, it should be ensured that:

- *appropriate opportunities to promote sustainable transport modes can be – or have been – taken up, given the type of development and its location;*
- *safe and suitable access to the site can be achieved for all users; and*

any significant impacts from the development on the transport network (in terms of capacity and congestion), or on highway safety, can be cost effectively mitigated to an acceptable degree."

7.16 The NPPF states in Paragraph 109 that ''*Development should only be prevented or refused on highways grounds if there would be an unacceptable impact on highway safety, or the residual cumulative impacts on the road network would be severe".*

7.17 Paragraph 110 of the NPPF states that new developments should prioritise sustainable modes of transport while Paragraph 111 states that *"All developments that will generate significant amounts of movement should be required to provide a travel plan, and the application should be supported by a transport statement or transport assessment so that the likely impacts of the proposal can be assessed".*

Department for Transport Guidance on Transport Assessments (2007)

7.18 DfT guidance on transport assessments (Ref.7.5) states that when preparing such reports due consideration should be given to factors such as environmental sustainability, managing existing networks and mitigating the residual effects of traffic. The guidance is intended to assist stakeholders in determining whether an assessment may be required and, if so, what the level and scope of that assessment should be. It also provides guidance on the content and preparation of transport assessments and transport statements.

7.19 A key difference between a Transport Assessment (TA) and the former Traffic Impact Assessment (TIA) is the requirement to seek to influence travel behaviour rather than merely predicting the transport effects of a development and providing for it. The DfT guidance is clear that this should be an iterative process whereby the impacts are determined and if they are not deemed acceptable the form of development should be reconsidered to maximise travel by sustainable modes of transport. Furthermore, unlike a TIA and an EIA, where a Site is unused or partially vacant the baseline conditions for a TA should take account of the extant uses of the Site.

Department for Communities and Local Government planning practice guidance (2014)

7.20 In 2014 DCLG published a suite of Planning Practice Guidance (PPG) including advice entitled "Travel plans, transport assessments and statements in decision taking" (Ref 7.6). The 2007 guidance has now been formally replaced by the PPG as current government guidance on the transport related effects of development; however, many highway authorities and practitioners still refer to the 2007 guide on certain matters detail.

Regional Policy and Guidance

Hertfordshire County Council Local Transport Plan 2018-2031 (2018)

7.21 The fourth Hertfordshire Local Transport Plan (LTP4) (Ref 7.7) sets out the highway authority's vision and strategy for the long-term development of transport in the county. It provides the framework for transport's support of the economic and social development of Hertfordshire over the plan period. The Hertfordshire vision is to provide a safe, efficient, resilient transport system that serves the needs of business and residents across Hertfordshire and minimises its impact on the environment. The LTP consists of:

- The Strategy – vision, goals and challenges
- Policy document – setting out the council's transport policies
- Implementation Plan – setting out intended short term and longer-term interventions (actions)
- Daughter documents – detailed strategies to support individual policy areas.

7.22 HCC state that the LTP4 will guide transport and land use decisions to 2031 and beyond. The plan says:

"This new LTP for Hertfordshire is a break from the plans that have preceded it and seeks to set the county on a different path in the development of its transport system. It is a transition in how we plan for a future transport system in the county in two aspects."

"A move away from a focus on car-based investment and capacity enhancement. These are now seen as a last resort", and

"A growing appreciation that transport is on the verge of great change. Technology and other drivers for change look likely to challenge the trend for increased economic growth to be accompanied with increased levels of car ownership and use."

Local Policy and Guidance

Welwyn Hatfield District Plan (2005)

7.23 The Welwyn Hatfield District Plan was adopted in 2005 and is the current adopted Local Plan which provides a framework for planning decisions in the borough. A number of policies have been 'saved' until it is replaced by a Local Development Framework.

7.24 Saved policy M1 sets out the Council's requirements for integrating transport and land use and policies. It states that development will be permitted in areas with accessibility to pedestrian and cycle routes and passenger transport services, or where these can be created. It states that *"the Council will give priority to walking and more sustainable modes of travel."*

7.25 Saved policy M2 states that *"Developers of major new traffic generating developments will be required to submit a transport assessment with the planning application. This must demonstrate the measures to be taken to minimise vehicular movements through improvements to passenger transport, pedestrian and cycling facilities and state whether new highways works or traffic management measures will be required."*

7.26 This is consistent with the NPPF and HCC policy in that new development is not required to predict and provide for car-borne journeys but instead should seek to limit reliance on the private car and promote sustainable travel behaviour.

7.27 Saved policy M3 requires development above adopted thresholds to be supported by a Green Travel Plan. It states that the implementation of measures included in a Green Travel Plan will be secured through planning conditions or a Section 106 Agreement. It should be

noted that the term Green Travel Plan has generally been replaced by the industry standard term Travel Plan.

7.28 Saved policies M5 and M6 require new developments to provide appropriate infrastructure for pedestrians and cyclists, to give priority to pedestrians and encourage cycling through the inclusion of safe cycle routes and secure cycle parking. Saved policy M8 states that the Council supports the use of powered two-wheelers as a more environmentally friendly mode of transport than the car. Policies M9 and M10 promote the improvement of passenger transport services and facilities throughout the district and state that priority will be given to buses, trains and taxis over the private car.

7.29 The Council's policy on parking standards for new development is set out in Policy M14. It states that parking provision for new development should to be provided in accordance with the standards set out in the Council's supplementary planning guidance on parking. It states that these standards are the maximum allowable provision (except for cycle parking and parking for disabled drivers).

7.30 The Council's Supplementary Planning Guidance on Parking Standards was adopted in 2004. It sets out the Council's Zonal approach to car parking restrains such that lower parking provision should be made in developments in more accessible locations. It includes residential and non-residential car parking standards as well as standards for car parking for disabled motorists, cycle parking standards and parking for powered two-wheelers. The parking ratios are set out in Appendix A of the SPD and are described as maxima (other than cycles and parking for disabled drivers).

7.31 In 2014 the Council adopted an 'Interim Policy for Car Parking Standards' which states that the standards set out in the 2004 SPD are subject to the Zonal approach but should be treated as guidelines rather than maximum or minimum standards.

Welwyn Hatfield draft Local Plan (2017)

7.32 The draft Local Plan was submitted for examination in 2017.

7.33 Policy SP1 is entitled Delivering Sustainable Development. Among wider principles about planning positively for growth is states that "*the location of new development should deliver a sustainable pattern of development which prioritises previously developed land;*

minimises the need to travel by directing growth to those areas with good transport networks and which are well served by jobs, services and facilities".

7.34 Section 7 is entitled 'Movement'. Within Section 7, Policy SP4 is entitled 'Transport and Travel'. It states that the Council will seek to support both planned growth and existing development with appropriate transport infrastructure, with the emphasis on promoting the use of sustainable modes of travel and on improving safety for all highway users,

7.35 Policy SADM 2 is entitled 'Highway Network and Safety'. It states that development proposals will be permitted provided:

i. *"There would be no unacceptable impacts on the local and /or strategic transport network. Development proposals which generate a significant amount of traffic movements must be accompanied by either a Transport Assessment or Transport Statement as appropriate in accordance with the criteria in the Hertfordshire County Council Highway Design Guidance;*

ii. *There would be no negative impacts on highway safety;*

iii. *They are designed to allow safe and suitable means of access and site operation; and*

iv. *They provide satisfactory and suitable levels of parking."*

7.36 Policy SADM 12 is entitled 'Parking Servicing and Refuse'. With regards to parking it states that the type and quantum of parking for new development will be informed by the Council's parking standards taking account of the site's location and accessibility, the nature and degree of likely parking demand, and the need to promote more sustainable forms of travel within the borough. The Council has not produced any new parking standards as part of the Local Plan examination, but the SADM 12 stated approach to determining appropriate provision is consistent with NPPF Paragraph 105.

BASELINE CONDITIONS

7.37 The Site is classed as brownfield land and is located on the eastern edge of Welwyn Garden City's town centre on Broadwater Road. The Site is bounded by the Wheat Quarter (North Side) to the north, Broadwater Road to the east, the consented South Side - Phase One residential development to the south and the East Coast Mainline to the west.

7.38 The Site currently takes vehicular access from five dropped-crossing (haulingway) style accesses from Broadwater Road.

7.39 The North Side includes a short spur road which links to a footbridge that connects the wider site to the Railway Station and Howard Shopping Centre on Howardsgate.

7.40 Broadwater Road forms part of the A1000 which links the A1(M), to the north of Welwyn Garden City, to the A414 and Hatfield to the south, before continuing on to North London.

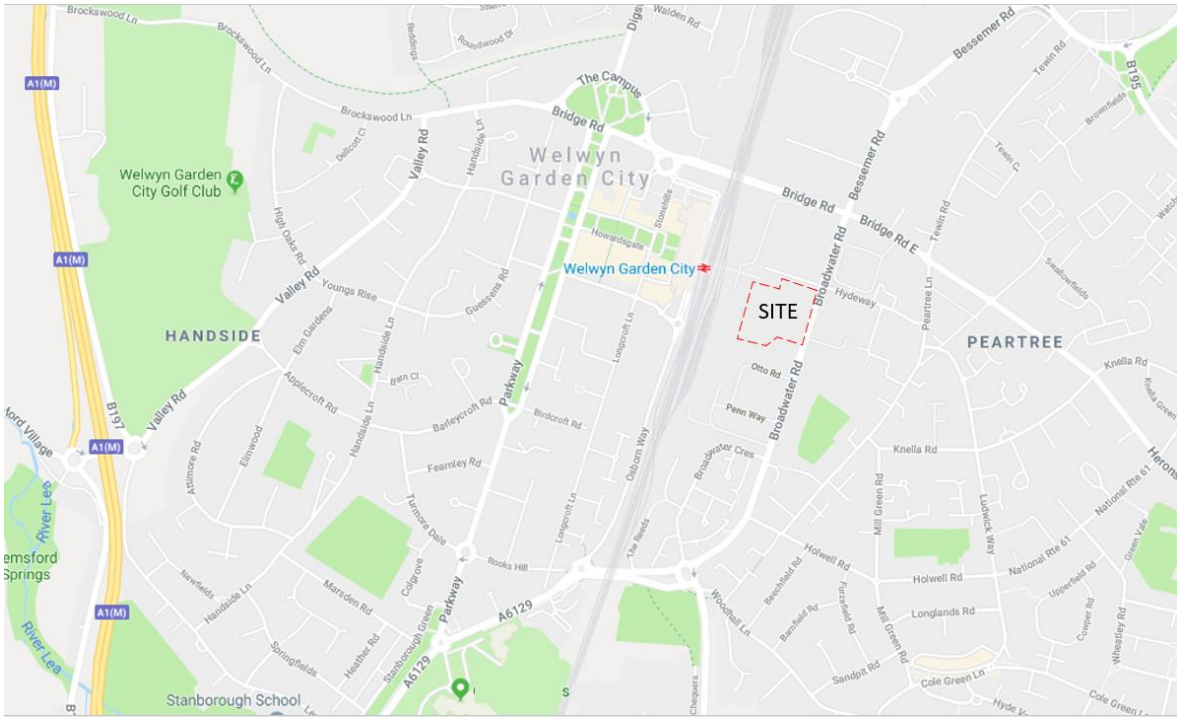
7.41 Broadwater Road has a width of approximately 8.0m and is subjected to a 30mph speed limit, which is enforced by speed cameras. There are a number of roads joining Broadwater Road which provides access to residential areas; there are also a number of employments sites with direct access on to Broadwater Road.

7.42 Bridge Road is a dual carriageway that runs from the east to west, with access to the town centre via Hunters Bridge which crosses the railway and is subjected to a 30mph speed limit. The width of the carriageway varies from 14m to 15.5m as the number of lanes changes from single to two lanes in either direction. There is a central reserve for the majority of its length.

7.43 The junction between Bridge Road and Broadwater Road is a four-arm signal-controlled junction with two approach lanes on Bridge Road east and three approach lanes on the other three arms. The signals include uncontrolled pedestrian crossings with central refuges on each arm.

7.44 Figure 7.1 below illustrates the local highway network around the Site.

Figure 7.1: Local Highway Network



Pedestrian Access

7.45 Acceptable journey distances on foot vary depending on the purpose of the journey, the environment in which the journey is taking place and of course the individual walking. The IHT guide 'Providing for Journeys on Foot' suggests that for journeys to work a desirable walking distance would be 500m, an acceptable walking distance would be 1km and the preferred maximum walking distance would be 2km.

7.46 The Site is accessible to the town centre and surrounding areas and facilities through an extensive footway network, which includes the footbridge linking Hydeway to the railway station. The town centre and railway station are both within approximately 200m form the Site, which is within the desirable walking distance for commuting and shopping.

7.47 There are footways along both sides of Broadwater Road, one with a grass verge between the carriageway and the footway, with the width varying from approximately 3.2m to 4m.

7.48 Bridge Road has footways along both sides of the carriageway, with the width varying from approximately 2.6m to 2.9m. The footways continue along Bridge Road East, although the width varies from approximately 2.3m on the north side and 3.9m on the south side.

7.49 There are currently two signal-controlled pedestrian crossings within 100m walk of the site providing access across Broadwater Road (south of Hydeway and north of Otto Way) as well as uncontrolled crossings at the junction between Broadwater Road, Bessemer Road and Bridge Road. All formal crossing points, whether controlled or uncontrolled, have flush dropped kerns and tactile paving.

7.50 Overall, the footways in the area around the site are generally in a reasonable state of repair and street lighting is provided.

Cycle

7.51 It is widely recognised that cycling has the potential to substitute for short car trips, particularly those that are less than 5km. The Site lies within 5km of every point in Welwyn Garden City and as such all local facilities, such as schools, leisure and employment sites are all within an acceptable cycling distance. The TA includes a full appraisal of existing cycle facilities.

Public Transport

7.52 The nearest bus stops are located on Broadwater Road, Bridge Road and Osborn Road. The entire Site is within 200m of six bus stops; these are served by 14 bus routes in total. Bus stop on Broadwater Road is served by the bus 601 with majority of the services severed by the bus stop of Bridge Road. The bus services, duration and frequency can be seen on Table 7.2. Full, current bus timetables can be found at arrivabus.co.uk, centrebus.info, greenline.co.uk, tfl.gov.uk and unobus.info.

Table 7.2 – Bus route summary

No	Details	Duration	Frequency
201	Welwyn Garden City – Welham Green	0923 – 1004	1 trip per day (Tuesday and Friday)
203	Welwyn Garden City – Watton at Stone	1245 - 1323	1 trip per day (Thursday only)
204	Welwyn Garden City – Panshanger Circular	1045 - 1424	2 trips per day (Tuesday, Thursday and Friday)

No	Details	Duration	Frequency
206	Welwyn Garden City – Panshanger Circular	0845 - 1505	2 trips per day (Tuesday, Thursday & Friday)
230	Welwyn Garden City – At. Albans	1032 - 1505	2 trips per day (Only Wednesday)
242	Welwyn Garden City – Waltham Cross	0814 - 1840	2 hours
301	Hemel Hempstead - Stevenage	0547 - 2348	20 – 30 mins
314	Welwyn Garden City – Hitchin	0740 - 0825	8 trips per day
315	Kimpton - Welwyn Garden City	0700 - 1825	4 trips per day
366	Luton – Welwyn Garden City - Hatfield	0606 - 1907	1 per hour
388	Herford - Welwyn Garden City - Stevenage	0637 - 0825	1 trip (Schooldays only)
401	Welwyn Garden City – Panshanger Circular	0610 - 1950	20 – 30 mins
403	Woodhall and Haldens Circular	0721 - 1904	30 – 40 mins
404	Welwyn Garden City – South Hatfield	0900 - 1755	2 hours
405	Welwyn Garden City – South Hatfield	1000 – 1655	2 hours
601	Borehamwood – St Albans - Welwyn Garden City	0616 - 2026	20 – 30 mins
653	Welwyn Garden City – New Greens	0548 - 2247	20 mins
724	Heathrow Airport - Harlow	0315 - 2209	20 -30 mins

7.53 It is clear that the Site is well served by frequent bus service which are located in close proximity to the Site. The services in Table 7.2 connect with the bus station allowing passengers to connect to the wider local bus network. The bus station is less than 500m walk from the Site.

Rail

7.54 The nearest rail station is Welwyn Garden City, located to the west of the Site and accessed via the footbridge which connects the Site to the town centre. The station is served by the Great Northern Route (southern end of East Coast Main Line). Welwyn Garden City train station benefits from a bus terminus, taxi rank and secure, covered cycle parking. Trains from Welwyn Garden City provide a direct link to London King's Cross station to the south and Peterborough to the north.

7.55 Baseline traffic figures for the surrounding highway network were derived from manual counts carried out in connection with a detailed assessment of a previous planning application for a mixed-use development ono this Site. Full details appended to the TA. Further baseline data was derived from permanent Department for Transport (DfT) count sites installed on roads in vicinity of the Site. A growth rate from the National Road Traffic Forecasts (NRTF) was applied to the traffic count data to establish predicted future year figures.

7.56 The resultant annual average daily traffic flows (AADT) on the highway network surrounding the Site are summarised in Table 7.3 below.

Table 7.3 - Baseline AADT two-way traffic flows

Link	2013 ATC Data	2017 growth	2018 growth	2025 growth
Bridge Road (w)	14130	14723	14851	15533
Bridge Road	14130	14723	14851	15533
Bessemer Road	11172	11641	11742	12281
Bridge Road (E)	11593	12080	12184	12744
Broadwater Road (N of Hydeway)	12186	12698	12807	13396
Broadwater Road (S of Hydeway)	12186	12698	12807	13396
Broadwater Road (S of Site)	12486	13010	13123	13726

Existing uses

7.57 The Site is classed as brownfield land and is located on the eastern edge of Welwyn Garden City's town centre on Broadwater Road. The northern part of the wider site (North Side), to the north of Hydeway, is mostly occupied by the Nabisco Shredded Wheat cereal production factory.

7.58 The Site, immediately south of Hydeway, contained buildings associated with industrial uses. The Site has been cleared and all former buildings have been demolished.

IDENTIFICATION AND EVALUATION OF KEY EFFECTS

Vehicle access and traffic flow

7.59 Vehicular access to the Proposed Development is gained from Broadwater Road via a number of existing and new cul-de-sac roads. The junction arrangements were agreed through a series of collaborative workshops with HCC and WHBC as part of the previous application. The agreed junction arrangements have therefore been retained as part of the current proposals. These predominantly shared space cul-de-sacs provide direct access to the parking areas but maintain the integrity of the pedestrian and cycle areas in the heart of the development.

7.60 Table 7.4 shows the named accesses to the Site and Figure 7.2 shows the access reference names and numbers.

Table 7.4 – Wider site accesses

Junction	Access
1	Bridge Road
2	Lind Grove
3	Hydeway
4	**Middle**
5	**Broad Court**
6	**Southern**

Figure 7.2 – Site access reference names and numbers

7.61 This matches the access descriptions from the consented scheme. It is important to note that all the access roads will remain private but will be subject to a statutory road naming process. The names given to these accesses in this report are therefore merely for ease of reference, and not intended as future road names. The accesses are described in greater detail below.

7.62 The extant planning permission provided access into the Site (Block 8) from Hydeway. However, the revised proposals for Phase 3 remove that means of access into the Site.

7.63 The middle access from Broadwater Road, will be a priority junction with Broadwater Road. The Site access arm will be raised to provide a shared surface within the Site. The

junction will provide access to a limited amount of surface level car parking and the undercroft parking beneath Block 8.

7.64 The site access immediately opposite Broad Court will be a priority junction with Broadwater Road. The site access arm will be raised to provide a shared surface within the Site. The junction will provide access to a limited amount of surface level car parking and the undercroft parking beneath blocks 9 (Phase Two) and 10 (Phase One).

7.65 The Southern Access into the Proposed Development from Broadwater Road will be a raised table priority junction, with Broadwater Road forming the main arms. The access road into the Site will continue as a shared surface although a separate footway/cycleway will be provided adjacent to it, providing direct access into the South Side site's central pedestrianised landscape area. The junction will provide access to a limited amount of surface level car parking as well as the undercroft parking beneath blocks 11 (Phase One), 12 and 13.

Demolition and Construction phase

7.66 A Construction Logistic Plan (CLP) would be implemented before construction works commence to provide management control and minimise congestion to public highways. Further details are contained in the TA.

7.67 The development of the South Side site has been divided into 3 phases. Each construction phase will have its own Demolition and Construction Management Plan, including control of access from the highway. Phase One is under construction and takes access from Broadwater Road via temporary construction accesses generally in the location of accesses 5 and 6 as well as existing dropped kerbs. Phase Two will utilise these construction accesses. Phase Three is intended to use junction 4 for construction purposes. Once construction is complete, these accesses will form vehicular access for the operational phase.

7.68 At construction phase, it is anticipated that the number of vehicular movements to and from the Site as a result of each phase of the construction will not be more than the number of trips generated by the completed development.

7.69 A detailed assessment of construction vehicle numbers was carried out and agreed with the highway authority as part of the approved development on this Site. A review of that information indicates that the construction of the Proposed Development will generate very similar vehicle numbers and patterns. It is estimated that during the peak period of demolition

and construction, approximately 310 daily traffic movements would occur to and from the wider site. This includes HGV traffic associated with demolition and construction activities as well as traffic generation by construction workers travelling to and from the Site.

7.70 The existing daily traffic movements on Broadwater Road is 13,123. Traffic generated by the Proposed Development during peak demolition and construction period would be therefore equate to 2.3% of the existing traffic movements. The predicted peak demolition and construction traffic represents a negligible proportion of additional traffic movement of Broadwater Road.

7.71 In addition, a percentage increase in traffic movements of less than 5% is considered to have insignificant effect on the operation of the local network. As such, is considered that any effect to driver delays, pedestrians and cyclists as a result of traffic during demolition and construction would be minimal and therefore the effect on the local highway network without an appropriate CLP would be **short term local minor adverse.**

7.72 The HGV trips will be spread throughout the day, as they will be made up of materials deliveries, off-site disposal and other trips related to the management of the construction process.

7.73 The daily traffic flow associated with the Proposed Development construction traffic is considered to be relatively low and the change in magnitude for severance is considered to be negligible adverse for all links assessed.

7.74 In general, the construction vehicles would use existing or newly constructed vehicle accesses from Bridge Road and Broadwater Road. Both these are main arterial routes with standard footways available either on one or both sides of the carriageway. On this basis, the change in magnitude for fear and intimidation is considered to be **short term minor adverse** for all links assessed.

Completed Development

7.75 The Site accesses have been designed around the swept path of a 11.3m long Refuse vehicle (4 axle), being the largest vehicle likely to visit the Proposed Development. The access has been designed such that all vehicles can enter and leave in a forward gear with ample stacking capacity within the Site so that no queuing will occur within the public highway.

7.76 In accordance with the methodology approved by HCC in connection with the consented scheme the residential vehicle trip generation has been calculated by reference to the TRICS® database. The vehicle trips were then distributed onto the highway network in proportion to the quantum of car parking served by each site access. The wider trip distribution onto the highway network is based on a detailed origin and destination analysis. This is described in detail in the TA.

7.77 Table 7.5 below, shows the increase in traffic on the local highway network.

Table 7.5 - Baseline AADT traffic increase

Link	2013 ATC Data	2017 growth	2018 growth	2025 growth	2025 + Ph1 + Dev	% incr
Bridge Road (w)	14130	14723	14851	15533	15980	3%
Bridge Road	14130	14723	14851	15533	17923	15%
Bessemer Road	11172	11641	11742	12281	14955	22%
Bridge Road (E)	11593	12080	12184	12744	13682	7%
Broadwater Road (N of Hydeway)	12186	12698	12807	13396	17341	29%
Broadwater Road (S of Hydeway)	12186	12698	12807	13396	17278	29%
Broadwater Road (S of Site)	12486	13010	13123	13726	17574	28%

7.78 In the absence of mitigation, the significance of the change in traffic on the local highway network would be **local long term moderate adverse** on the Broadwater Road and Bridge Road corridors. The level of impact would affect driver delay, severance for pedestrian and cyclists and would also have an effect on the potential for fear and intimidation for pedestrian and cyclists on those corridors.

7.79 The effect on pedestrian/cyclist delay is considered as **minor adverse** on the Bridge Road and Broadwater Road corridors. The effect on pedestrian delay at the Bridge Road/Broadwater Road junction would be **moderate adverse**.

7.80 The increase in pedestrian/cycle trips on Bridge Road, Broadwater Road and the footbridge over the railway would result in **moderate adverse long-term effect on** pedestrian/cyclists on the links and junctions considered.

ASSESSMENT OF CUMULATIVE EFFECTS

7.81 The Former Shredded What factory site (wider site) is the largest development to have any effect on the study area within the approved study period. An application has been submitted for a revised scheme for the North Side site which includes an increased number of residential units on the North Side. This scheme has also been taken into consideration here for the purpose of assessing any cumulative impacts. Other committed and allocated developments will have the potential to add traffic onto the local highway network within the study area. For this reason, all future year assessments have included for a level of growth in background traffic that takes account of the cumulative effects of committed developments.

Inter-Relationship Effects

7.82 There are inter-relationships with the air quality and noise chapters as identified through the use of traffic data within those assessments. No other inter-relationships with other topics are identified.

ENHANCEMENT, MITIGATION AND RESIDUAL EFFECTS

7.83 The wider development will deliver significant highway improvement works to Bridge Road and Broadwater Road as well as off-site highway improvements to increase operational capacity at a number of roundabouts remote from the Site. These works were secured by planning conditions which limit the level of occupancy of the wider site until the works have been completed.

7.84 All highway works will be delivered by means of a Section 278 Agreement with the local highway authority. The S278 technical approval will include a requirement for a traffic management plan to ensure safe working practices within the highway as well as minimal disruption to pedestrian and cycle movements.

7.85 The Proposed Development will enhance the existing permeability of the local walking and cycling network through implementation of a number of measures including provision of walking and cycling facilities through the Site. The wider site includes the refurbishment of the rail footbridge and the re-modelling of Bridge Road and Broadwater Road to reduce vehicle speeds and enhance pedestrian and cycle routes and crossings.

7.86 The development will also be supported by a four-part Transport Implementation Strategy comprising a Framework Travel Plan, Delivery and Servicing Plan, Car Park Management Plan and Construction Logistics Plan. These will be live management documents that will inform and influence the movement of people and goods to and from the Site.

7.87 The refurbished footbridge will improve links to the rail station and upgraded bus station for those travelling to and from the development as well as the wider local community.

7.88 As a result of the enhancements, it is anticipated that residents, employees and visitors will consider modes other than private car.

Demolition and Construction Phase

7.89 A Construction Logistics Plan (CLP) would be implemented before construction works commence to provide management control and minimise congestion to public highways. Prior to commencement on site a Construction Logistics Plan (CLP) will be drawn up in partnership with HCC and WHBC and submitted for approval. The CLP will comply with the guidance document *'Building a better future for freight: Construction Logistics Plans'.*

7.90 During the demolition and construction phase, details of the routing strategy, hours of operation, along with logistics and mitigation measures would be included in the CLP and CEMP which should be secured through a suitable planning condition. As a result, the likelihood is that construction vehicle movements will predominantly occur outside of peak hours such that operatives can avoid busy periods on the external network and avoid late nights/early hours to reduce the disturbance of nearby residents.

7.91 The development will be supported by a Construction Logistics Plan (CLP) which will include a route management strategy as well as dictate any limitations on construction vehicle delivery hours. It is anticipated that there would be minimal flows associated with construction during the peak hours and the change in magnitude of the Site access junctions for driver, pedestrian delay and pedestrian amenity are considered to be **neutral**.

7.92 The daily traffic flow associated with the construction traffic is likely to be minimal when compared to the operational phase and as with all major construction sites it is anticipated that in addition to the CLP, a CEMP will be secured through a suitable planning condition. It is considered that the residual potential for accidents and safety is **neutral** all links assessed.

7.93 On this basis, appropriate management is considered to result in a **neutral** effect on fear and intimidation for all links assessed. During the construction of the highway improvement works the effect on driver delay is considered to be **local short term minor adverse**, while pedestrian/cyclist delay and pedestrian/cyclist amenity are considered to have a magnitude of **short term minor adverse**.

Completed Development

7.94 The previously approved development on the former Shredded Wheat factory site included a comprehensive range of transport improvement measures. Some of these were integral components of the development, some were dictated by the SPD and some were proposed as mitigation measures to address the transport effects of development.

7.95 The wider site will deliver all the off-site transport improvements agreed as part of the consented scheme. These are set out below:

7.96 *Road hierarchy*; The southern access from Broadwater Road will be a major access road with a width of 6.0m where cars are parked at 90 degrees and a minimum of 4.8m otherwise. The carriageway has localised widening on bends where necessary. In addition, there will be a segregated footway provided through the central landscape area and to each of the residential blocks. The private access roads which form part of the internal road network, will all be shared surfaces with a width of approximately 6m. All accesses from Broadwater Road will have raised entrance tables to assist pedestrian/cycle movement along Broadwater Road.

7.97 *Broadwater Road improvements*; The wider development proposals will reallocate the existing highway land along Broadwater Road so that there is greater provision for pedestrians and cyclists. The existing carriageway will be narrowed to 6.75m while a 4m foot/cycleway would be provided along both sides of the carriageway across the site frontage, where possible. The narrowing of Broadwater Road will continue along its entire length, providing the opportunity to widen pedestrian and cycle facilities along the length of Broadwater Road as the area is redeveloped in the future, subject to land ownership. The existing pedestrian crossing facilities along Broadwater Road will be retained, although the signalised crossing south of Hydeway will be relocated further north.

7.98 *Bridge Road/ Hunters Bridge improvements;* Overall traffic calming measures proposed along Broadwater Road will be extended to include Bridge Road and Hunters Bridge so that the

characteristics of these roads are changed from being vehicle dominant to an area which is more attractive to pedestrians and cyclists. The proposals will narrow the highway land allocated to vehicles so that there is a single 3m lane in either direction. This in turn allows the foot/cycleways to be widened to 4m along both sides of the carriageway and a central pedestrian area of approximately 5.7m will also be provided.

7.99 *Rail Bridge;* The existing rail bridge between the Site and the railway station will be refurbished as part of the Proposed Development. This will include demolishing the existing steps on the site side of the rail lines and replacing them with a new set of much wider steps directly onto the newly created public square. The steps will include provision to wheel bicycles up onto the bridge. A range of bespoke cycle parking facilities will be provided beneath the steps. A lift will also be provided to allow access for the mobility impaired or for those with pushchairs for example. The bridge itself will be refurbished in agreement with Network Rail.

7.100 *Broadwater Road/ Bridge Road junction*; The existing signalised crossroads of Broadwater Road / Bridge Road and Bessemer Road will be altered to a shared space 'octabout'. The proposed octabout will operate along the same principals as a roundabout albeit on a less formal basis, as the intention is to introduce controlled uncertainty to drivers which will result in slower vehicle speeds and a more agreeable environment for pedestrians and cyclist.

7.101 *Broadwater Road/ Osborne Way / Stanborough Road junction;* The Stanborough Road arm of the Broadwater Road / Osborn Way / Stanborough Road roundabout will be widened to 8.5m to increase the approach capacity.

7.102 *Broadwater Road / A1000 Chequers roundabout;* The Broadwater Road and A1000 Chequers arms of the Broadwater Road / Broadwater crescent / A1000 Chequers roundabout will be improved to increase the flare lengths on both arms to increase the entry capacity.

7.103 *Hydeway West;* The kerb radii on the entry to Hydeway west will be increased to improve entry / egress for HGVs. The radii on the western arm of Hydeway will also be altered and the whole junction will become a raised table. Highway rights will be extinguished (stopped-up) from Hydeway west so that the road will become private in line with the other access roads into the Wheat Quarter. A 3m wide shared cycleway/footway will be provided along the southern side which will remain a public right of way between Broadwater Road and the new steps to the rail bridge.

7.104 Hydeway will be remodelled to allow for 'kiss and ride' facilities for those using the rail station as well as an informal taxi rank. This will encourage the use of public transport for longer journeys and will be a benefit to the wider local community.

7.105 *Peartree Lane / Ranvenfield cycle route;* The existing pedestrian crossing over Peartree Lane at the eastern end of Hydeway will be upgraded to allow cyclists to cross and then to use the carriageway of the cul-de-sac section of Peartree Lane rather than the footway.

7.106 The FTP has been developed to seek to influence modes of travel to the Site rather than merely predicting travel patterns and providing mitigation. The FTP promotes travel by sustainable modes of transport and provides a structure for the management of residents' and staff travel to the Proposed Development. It sets out objectives, obligations, targets and measures as well as means of securing and enforcing the FTP. Each phase of development will deliver a full Travel Plan for that phase prior to first occupation.

7.107 The DSP highlights the implications of the Proposed Development with regard to existing and also proposed servicing constraints and has been prepared in accordance with the Freight Transport Association document *'Designing for Deliveries'* and the guidance document "*Managing freight effectively: Delivery and Servicing plans.*

7.108 The DSP provides a strategy for managing deliveries including measures to reduce the number of vehicle trips, hours of delivery, route management, promotion of rail and membership of the Freight Operator Recognition Scheme (FORS).

7.109 The Proposed Development would result in an increase in traffic on the local highway network but the proposed junction improvements would ensure that the effects on capacity and driver delay are **Neutral.** The implementation of a FTP and DSP would improve the management of travel and deliveries to and from the Site.

7.110 The effects to the pedestrian/cyclist around the local highway network after the implementation of the extensive improvement works will have a **long term moderate beneficial** effect.

SUMMARY

7.111 A summary of potential effects, mitigation and resulting residual effects in relation to transport are summarised below in Table 7.6.

Table 7.6: Transport and Access Summary Table

Potential Effect	Nature of Effect (Permanent or Temporary)	Significance	Mitigation/ Enhancement Measures	Residual Effects
Construction Phase				
Traffic Generation	Temporary	Minor	CLP	Neutral
Disruption to pedestrians and cyclist	Temporary	Minor		Minor Adverse
Construction disruption to the local highway network	Temporary	Minor	CLP	Minor adverse
Completed Development				
Traffic Generation	Permanent	Neutral	Road development	Neutral
Cyclists	Permanent	Neutral	STP	Beneficial
Pedestrians	Permanent	Neutral	STP	Beneficial

REFERENCES

Ref 7.1: DfT (2007); ‘Towards a Sustainable Transport System’, DfT Publications, London

Ref 7.2: DfT (2008); ‘Delivering a Sustainable Transport System’, DfT Publications, London

Ref 7.3: DETR (2011); ‘Creating Growth, Cutting Carbon – Making Sustainable Transport Happen’, DfT Publications, London

Ref 7.4: DCLG (2012); 'National Planning Policy Framework’, HMSO

Ref 7.6: DfT (2007); ‘Guidance on Transport Assessment’, HMSO, Norwich.

Ref 7.6: DCLG (2014); ‘Travel Plans, Transport Assessments and Statements in decision taking’.

Ref 7.7: Hertfordshire County Council; (2018); ‘Hertfordshire Local Transport Plan’ (LTP4).

8 AIR QUALITY

INTRODUCTION

8.1 This chapter presents the findings of an assessment of local air quality effects associated with the Proposed Development.

8.2 The Proposed Development may introduce the following air quality effects;

- During the construction phase, suspended and re-suspended fugitive dust emissions from demolition / construction activities and vehicular emissions from construction traffic, including re-suspended dust from HGV movements.
- During the operational phase, vehicular emissions (primarily nitrogen dioxide (NO_2) and particulate matter (PM_{10} and $PM_{2.5}$) from increased traffic movements associated with the Proposed Development.

8.3 The potential effects of the Proposed Development on local air quality during both construction and operational phases have been assessed. For both phases, the type, source and significance of potential effects are identified and the measures that should be employed to minimise these effects are described.

8.4 A glossary of common air quality terminology is provided in **Appendix 8.1**.

ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

Scope of Assessment

8.5 The scope of the assessment has been determined in the following way:

- Review of air quality data for the area surrounding the Site and background pollutant maps; and
- Review of the traffic flow data, which has been used as an input to the air quality modelling assessment.

8.6 There is the potential for impacts on local air quality during both the construction and operational phases of the Proposed Development. During the construction phase, there is the potential for impacts to occur as a result of dust and PM_{10} emissions. Guidance provided by the Institute of Air Quality Management (IAQM) (Ref. 8.1) includes the following criteria for assessing the effects of construction dust:

- A sensitive 'human receptor' within 350m of the Site boundary or within 50m of the route used by construction vehicles on public highways up to 500m from the site entrance; and /or
- A sensitive 'ecological receptor' within 50m of the Site boundary or within 50m of the route used by construction vehicles on the public highway, up to 500m from the site entrance.

8.7 There are residential properties within 350 m of the Site boundary. An assessment of construction phase impacts of dust and particulate matter in relation to human health and nuisance has therefore been included in this assessment. There are no sensitive ecological habitats within 50m of the Site boundary or within 50m of the route used by construction vehicles up to 500m from the site entrance, therefore an assessment of construction phase impacts on sensitive ecological habitats has been scoped out of this assessment.

8.8 Construction traffic will contribute to existing traffic levels on the surrounding road network. The greatest potential for impacts on air quality from traffic associated with this phase of the Proposed Development will be in the areas immediately adjacent to the principal means of access for construction traffic which would be via Broadwater Road.

8.9 Information provided by the transport consultants indicated that during the peak construction period for the wider site (comprising the Proposed Development, the consented Phase One South Side site and the consented North Side site), there would be 310 additional vehicle movements which includes both HGVs and construction worker vehicles. Guidance provided by Environmental Protection UK (EPUK) and the IAQM (Ref. 8.2) provides threshold criteria for establishing when significant impacts on local air quality may occur and when a detailed assessment of potential impacts is required. At locations outside an AQMA, a change in light duty vehicles (LDV) of more than 500 per day and / or a change in heavy duty vehicles (HDV) of more than 100 per day is considered to result in potentially significant impacts on air quality. At locations within or adjacent to an AQMA, a change in LDVs of more than 100 per day and / or a change in HDVs of more than 25 per day is considered potentially significant.

8.10 The Site does not fall within an AQMA and there are no AQMAs declared within Welwyn Garden City. The number of daily HDV movements during the construction period is lower than 100 and the number of daily LDV movements is lower than 500, therefore a detailed assessment of construction traffic has been scoped out of this assessment.

8.11 During the operation of the Proposed Development there is the potential for impacts on local air quality to occur as a result of emissions from road vehicle trips generated by the operation of the Development.

8.12 Consideration has also been given to the suitability of the Site for residential development in terms of exposure. The Environment Agency (EA) have expressed concerns regarding the exposure of future occupant to emissions arising from the nearby stack at the British Lead Mill (BLM) Site which is located approximately 250m to the east of the Site. Detailed modelling of the emissions arising from the BLM Site has also been included in the assessment.

8.13 Details of the assessment methodology and the specific issues considered are provided below.

Construction Phase Methodology

8.14 To assess the potential impacts associated with dust and PM_{10} releases during the construction phase and to determine any necessary mitigation measures, an assessment based on the latest guidance from the IAQM (Ref 8.1) has been undertaken.

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

- demolition;
- earthworks;
- construction; and
- trackout.

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

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

Dust Emission Magnitude

8.18 The magnitude of the dust impacts for each source is classified as Small, Medium or Large depending on the scale of the proposed works. Table 8.1 summarises the IAQM criteria that may be used to determine the magnitude of the dust emission. These criteria are used in combination with site specific information and professional judgement.

Table 8.1: Dust Emission Magnitude Criteria

Source	Large	Medium	Small
Demolition	• Total building volume >50,000m^3 • Potentially dusty material (e.g. concrete) • Onsite crushing and screening • Demolition activities >20m above ground level.	• Total building volume 20,000 - 50,000m^3 • Potentially dusty material • Demolition activities 10 - 20m above ground level.	• Total building volume <20,000m^3 • Construction material with low potential for dust release • Demolition activities <10m above ground level • Demolition during wetter months
Earthworks	• Total site area >10,000m^2	• Total site area 2,500 -10,000m^2	• Total site area <2,500m^2

Source	Large	Medium	Small
	• Potentially dusty soil type (e.g. clay) • >10 heavy earth moving vehicles active at any one time • Formation of bunds >8m in height • Total material moved >100,000 tonnes	• Moderately dusty soil type (e.g. silt) • 5 - 10 heavy earth moving vehicles active at any one time • Formation of bunds 4 - 8m in height • Total material moved 20,000 - 100,000 tonnes	• Soil type with large grain size (e.g. sand) • <5 heavy earth moving vehicles active at any one time • Formation of bunds <4m in height • Total material moved <20,000 tonnes • Earthworks during wetter months
Construction	• Total building volume >100,000m^3 • On site concrete batching • Sandblasting	• Total building volume 25,000 - 100,000m^3 • Potentially dusty construction material (e.g. concrete) • On site concrete batching	• Total building volume <25,000m^3 • Material with low potential for dust release (e.g. metal cladding or timber)
Trackout	• >50 HGV movements in any one day (a) • Potentially dusty surface material (e.g. high clay content) • Unpaved road length >100m	• 10 - 50 HGV movements in any one day (a) • Moderately dusty surface material (e.g. silt) • Unpaved road length 50 - 100m	• <10 HGV movements in any one day (a) • Surface material with low potential for dust release • Unpaved road length <50m
(a) HGV movements refer to outward trips (leaving the site) by vehicles of over 3.5 tonnes.			

Receptor Sensitivity

8.19 Factors defining the sensitivity of a receptor are presented in Table 8.2.

Table 8.2: Factors Defining the Sensitivity of a Receptor

Sensitivity	Human (health)	Human (dust soiling)	Ecological
High	• Locations where members of the public are exposed over a time period relevant to the air quality objectives for PM_{10} (a) • Examples include residential dwellings, hospitals, schools	• Regular exposure • High level of amenity expected. • Appearance, aesthetics or value of the property would be affected by dust soiling.	• Nationally or Internationally designated site with dust sensitive features (b) • Locations with vascular species (c)

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

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

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

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

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

(e) Except commercially sensitive horticulture.

8.20 The sensitivity of a receptor will also depend on a number of additional factors including any history of dust generating activities in the area, likely cumulative dust impacts from nearby construction sites, any pre-existing screening such as trees or buildings and the likely duration of the impacts. In addition, the influence of the prevailing wind direction and local topography may be of relevance when determining the sensitivity of a receptor.

Area Sensitivity

8.21 The sensitivity of the area to dust soiling and health impacts is dependent on the number of receptors within each sensitivity class and their distance from the source. In addition, human

health impacts are dependent on the existing PM_{10} concentrations in the area. Tables 8.3 and 8.4 summarise the criteria for determining the overall sensitivity of the area to dust soiling and health impacts respectively.

Table 8.3: Sensitivity of the Area to Dust Soiling Effects on People and Property

Receptor Sensitivity	Number of Receptors	Distance from the source (a)			
		<20m	<50m	<100m	<350m
High	>100	High	High	Medium	Low
	10-100	High	Medium	Low	Low
	1-10	Medium	Low	Low	Low
Medium	>1	Medium	Low	Low	Low
Low	>1	Low	Low	Low	Low

(a) For trackout, the distance is measured from the side of roads used by construction traffic. Beyond 50m, the impact is negligible.

Table 8.4: Sensitivity of the Area to Human Health Impacts

Receptor Sensitivity	Annual Mean PM_{10} ($\mu g/m^3$)	Number of Receptors	Distance from the source (a)				
			<20m	<50m	<100m	<200m	<350m
High	> 32	> 100	High	High	High	Medium	Low
		10 - 100	High	High	Medium	Low	Low
		1 - 10	High	Medium	Low	Low	Low
	28 - 32	> 100	High	High	Medium	Low	Low
		10 - 100	High	Medium	Low	Low	Low
		1 - 10	High	Medium	Low	Low	Low
	24 - 28	> 100	High	Medium	Low	Low	Low
		10 - 100	High	Medium	Low	Low	Low
		1 - 10	Medium	Low	Low	Low	Low
	< 24	> 100	Medium	Low	Low	Low	Low
		10 - 100	Low	Low	Low	Low	Low
		1 - 10	Low	Low	Low	Low	Low

Receptor Sensitivity	Annual Mean PM_{10} ($\mu g/m^3$)	Number of Receptors	Distance from the source (a)				
			<20m	<50m	<100m	<200m	<350m
Medium	>32	> 10	High	Medium	Low	Low	Low
		1 - 10	Medium	Low	Low	Low	Low
	28-32	> 10	Medium	Low	Low	Low	Low
		1 - 10	Low	Low	Low	Low	Low
	<28	-	Low	Low	Low	Low	Low
Low	-	>1	Low	Low	Low	Low	Low
(a) For trackout, the distance is measured from the side of roads used by construction traffic. Beyond 50m, the impact is negligible.							

8.22 For each dust emission source (demolition, construction, earthworks and trackout), the worst-case area sensitivity is used in combination with the dust emission magnitude to determine the risk of dust impacts.

Risk of Dust Impacts

8.23 The risk of dust impacts prior to mitigation for each emission source is presented in Tables 8.5, 8.6 and 8.7.

Table 8.5: Risk of Dust Impacts – Demolition

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

Table 8.6: Risk of Dust Impacts – Earthworks and Construction

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

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

Table 8.7: Risk of Dust Impacts - Trackout

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

Operational Phase Methodology

Modelling of Road Traffic Emissions

8.24 Air quality at and in the vicinity of the Site arising from the surrounding road network has been predicted using the ADMS Roads (Version 5.0.0.1, March 2020) which is a commercially available dispersion model and has been widely validated for this type of assessment and used extensively in the Air Quality Review and Assessment process.

8.25 The ADMS Roads model uses detailed information regarding traffic flows on the local road network and local meteorological conditions to predict pollution concentrations at specific locations selected by the user. Meteorological data from Luton Airport Meteorological Station has been used for the assessment.

8.26 The model has been used to predict road specific concentrations of oxides of nitrogen (NO_x) and Particulate Matter (PM_{10} and $PM_{2.5}$) at selected receptors in the vicinity of the surrounding road network and within the Site itself. The predicted concentrations of NO_x have been converted to NO_2 using the NO_x to NO_2 calculator available on the Defra air quality website (Ref. 8.3).

8.27 Traffic data for road links adjacent to the Site has been provided by the Transport Consultants.

8.28 A summary of the traffic data used in the assessment can be found in **Appendix 8.2**. The data includes details of annual average daily traffic flows (AADT), vehicle speeds and percentage Heavy Duty Vehicles (HDV) for the assessment years considered. Low traffic

speeds have been assigned to appropriate road links to account for congestion and queuing vehicles.

8.29 The following scenarios have been included in the assessment:

- 2018 – base scenario (for verification purposes);
- 2025 – future base scenario plus committed developments
- 2025 – future base scenario plus committed developments plus Proposed Development (hereafter referred to as 'with development' scenario)

8.30 The emission factors released by Defra in August 2020, provided in the emissions factor toolkit EFT2020_10.1 have been used to predict traffic related emissions in 2018 and 2025 (the proposed opening year of the Proposed Development).

8.31 To predict local air quality, traffic emissions predicted by the model must be added to local background concentrations. Background concentrations of NO_x, NO_2, PM_{10} and $PM_{2.5}$ have been taken from the 2018 Defra background maps. The maps provide an estimate of background concentrations between 2018 and 2030. The data used for the modelling assessment are set out in Table 8.12.

8.32 Background concentrations for 2018 have been used to predict concentrations in 2025 assuming no change in future years. This is considered to represent a conservative approach to the prediction of future concentrations to take account of uncertainty in future background concentrations.

8.33 To determine the performance of the model at a local level, a comparison of modelled results with the results of monitoring carried out within the study area was undertaken. This process aims to minimise modelling uncertainty and systematic error by correcting the modelled results by an adjustment factor to gain greater confidence in the final results. This process was undertaken using the methodology outlined in Chapter 7, Section 4 of LAQM.TG(16). Full details of the model verification process are presented in **Appendix 8.3**.

8.34 An overall verification factor of 3.05 was determined which indicates that the model is underpredicting compared to the monitored concentrations in this area. The modelled NO_x concentrations were adjusted using this factor prior to conversion to NO_2 using the NO_x to NO_2 calculation tool available on Defra's website.

8.35 Local roadside monitoring data were not available for concentrations of PM_{10} and $PM_{2.5}$. Modelled PM_{10} and $PM_{2.5}$ concentrations have therefore been adjusted by the verification factor obtained for NO_x, which is consistent with the guidance provided in LAQM.TG(16).

8.36 LAQM.TG(16) does not provide a method for the conversion of annual mean NO_2 concentrations to 1-hour mean NO_2 concentrations. However, research (Ref. 8.4) has concluded that exceedances of the 1-hour mean objective are generally unlikely to occur where annual mean concentrations do not exceed 60 µg/m^3. Care has been taken to ensure that locations where the 1-hour mean objective is relevant are included in the assessment.

8.37 A quantitative assessment of air quality at and around the Site has been completed against the relevant Air Quality Strategy objectives set out in **Appendix 8.4.**

Modelling of Emissions from BLM Site

8.38 Emissions arising from the existing stack at the BLM Site have been assessed using ADMS Extra. The dispersion modelling has been carried out using five years (2015 to 2019) of hourly sequential meteorological data from Luton in order to take account of inter-annual variability and reduce the effect of atypical conditions.

8.39 Emission data was obtained from BLM, the input data to the model is provided in **Appendix 8.5.**

8.40 The presence of elevated terrain can significantly affect the dispersion of pollutants by increasing turbulence and reducing the distance between the plume centre line and ground level. However, as the topography in the vicinity of the Site is relatively flat, it was not necessary to consider the impact on the dispersion of emissions.

8.41 The presence of buildings close to emission sources can significantly affect the dispersion of pollutants by leading to a phenomenon called ‘downwash’. This occurs when a building distorts the wind flow, creating zones of increased turbulence. Increased turbulence causes the plume to come to ground earlier than otherwise would be the case and result in higher ground level concentrations closer to the stack.

8.42 Downwash effects are only significant where building heights are greater than 30% to 40% of the emission release height. The downwash structures also need to be sufficiently close for their influence to be significant. Relevant structures have been included in the modelling.

8.43 Oxides of nitrogen (NO_x) emitted to atmosphere as a result of combustion will consist largely of nitric oxide (NO), a relatively innocuous substance. Once released into the atmosphere, NO is oxidised to NO_2. The proportion of NO converted to NO_2 depends on a number of factors including wind speed, distance from the source, solar irradiation and the availability of oxidants, such as ozone (O_3).

8.44 A conversion ration of 70% NO_x: NO_2 has been assumed for comparison of predicted concentrations with the long-term objectives for NO_2. A conversion ratio of 35% has been utilised for the assessment of short-term impacts as recommended by EA Guidance (Ref 8.5).

8.45 A quantitative assessment of air quality at key locations on each floor of the Proposed Development has been completed against the relevant Air Quality Assessment Levels (AQS objective levels and Environmental Assessment Levels (EALs)) for the pollutants emitted from the BLM stack.

Significance Criteria

Construction Phase

8.46 The IAQM assessment methodology recommends that significance criteria are only assigned to the identified risk of dust impacts occurring from a construction activity following the application of appropriate mitigation measures. For almost all construction activities, the application of effective mitigation should prevent any significant effects occurring to sensitive receptors and therefore the residual effects will normally be negligible.

Operational Phase

8.47 The significance of the predicted impacts has been determined following the advice provided in the EPUK & IAQM planning guidance, in combination with professional judgement. The guidance recommends that the impact at individual receptors is described by expressing the magnitude of incremental change in pollution concentrations as a proportion of the relevant assessment level and examining this change in the context of the new total concentration and its relationship with the assessment criterion as summarised in Table 8.8.

Table 8.8: Impact Descriptors for Individual Receptors

Long Term Average Concentration at Receptor in Assessment Year	% Change in concentration relative to AQAL (a)			
	1	2-5	5-10	>10
75% or less of AQAL	Negligible	Negligible	Slight adverse	Moderate adverse
76-94% of AQAL	Negligible	Slight adverse	Moderate adverse	Moderate adverse
95-102% of AQAL	Slight adverse	Moderate adverse	Moderate adverse	Substantial adverse
103-109% of AQAL	Moderate adverse	Moderate adverse	Substantial adverse	Substantial adverse
110% or more of AQAL	Moderate adverse	Substantial adverse	Substantial adverse	Substantial adverse
(a) a change in concentration of less than 0.5% of the AQAL is considered insignificant, however changes between 0.5% and 1% are rounded up to 1%.				

8.48 The EPUK & IAQM guidance notes that the criteria in Table 8.8 should be used to describe impacts at individual receptors and should be considered as a starting point to make a judgement on significance of effects, as other influences may need to be accounted for. The EPUK & IAQM guidance states that the assessment of overall significance should be based on professional judgement, taking into account several factors, including:

- 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.

Sensitive Receptors

8.49 LAQM.TG(16) describes in detail typical locations where consideration should be given to pollutants defined in the Regulations. Generally, the guidance suggests that all locations '*where members of the public are regularly present'* should be considered. At such locations,

members of the public will be exposed to pollution over the time that they are present, and the most suitable averaging period of the pollutant needs to be used for assessment purposes.

8.50 For instance, on a footpath, where exposure will be transient (for the duration of passage along that path) comparison with short-term standard (i.e. 15-minute mean or 1-hour mean) may be relevant. In a school, or adjacent to a private dwelling, however; where exposure may be for longer periods, comparison with long-term (such as 24-hour mean or annual mean) standards may be most appropriate. In general terms, concentrations associated with long-term standards are lower than short-term standards owing to the chronic health effects associated with exposure to low level pollution for longer periods of time.

8.51 To assess the impact of emissions arising from the traffic generated by the Proposed Development pollutant concentrations have been predicted at 11 existing sensitive receptors within the vicinity of the Site including nearby residential properties and locations selected for short term exposure such as a bus stop, public house and library. Details of these sensitive receptors are presented in Table 8.9 and the locations are illustrated in Figure 8.1.

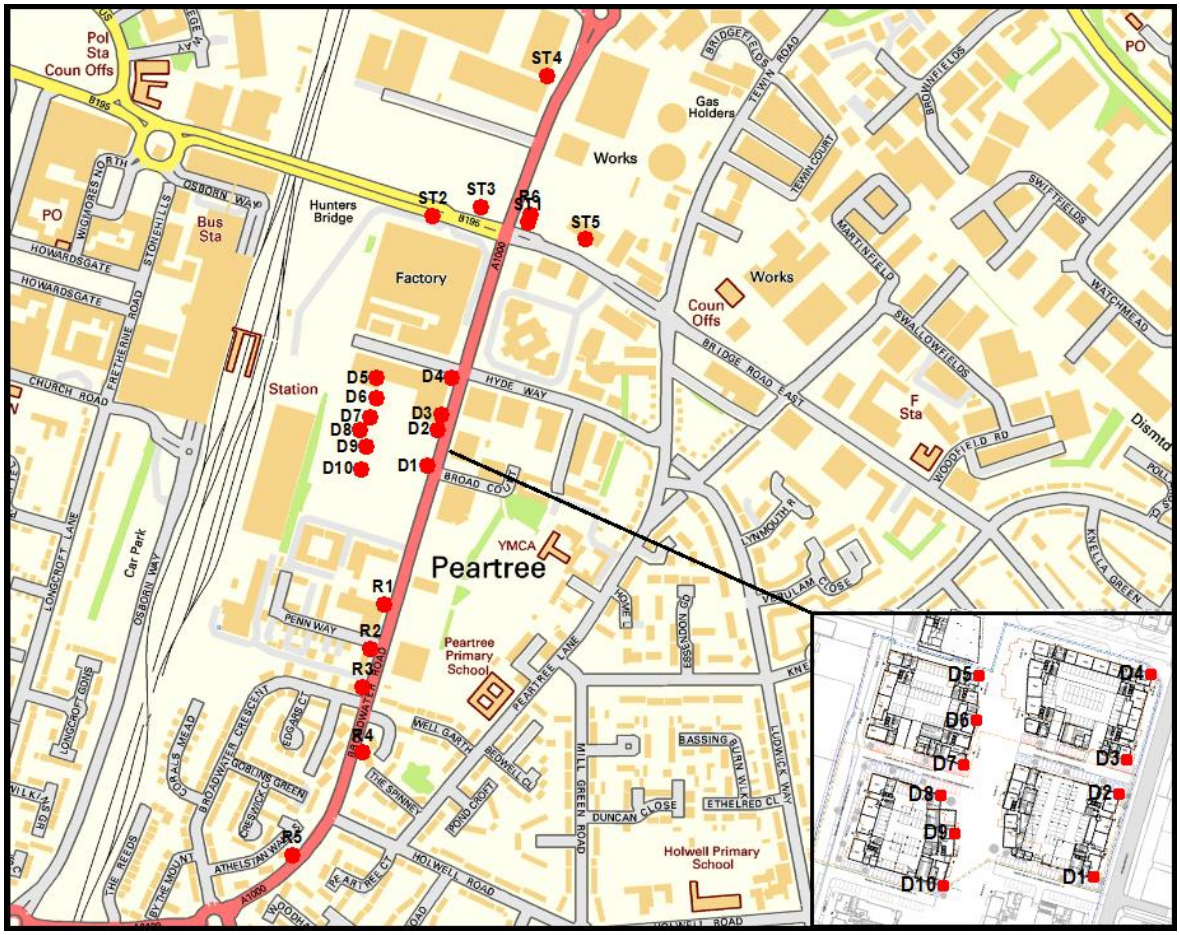
8.52 The modelling assessment also predicted concentrations at a number of locations representing locations within the Proposed Development itself (receptors D1 to D10) to assess the suitability of the Site for the proposed end use. Blocks 12 and 13 are distant from the road and therefore are only considered within the detailed model for the emissions arising from the BLM stack.

Table 8.9: Location of Sensitive Receptors

ID	Receptor	Type	Easting	Northing
R1	Flats on Broadwater Rd (nth of Penn Way)	Residential	524147.1	212527.1
R2	Flats on Broadwater Rd (sth of Penn Way)	Residential	524129.7	212466.8
R3	Flats on Broadwater Crescent	Residential	524119.3	212416.1
R4	Flats on Moatwood Green	Residential	524119.3	212327.8
R5	Flats on Athelsta Walk South	Residential	524024.8	212189.9
R6	Flat above The Bakehouse pub	Residential	524344.9	213051.5
ST1	The Bakehouse pub (Ground Floor)	Short-Term	524341.6	213041.2
ST2	Bus Stop on Bridge St	Short-Term	524212.8	213049.5

ID	Receptor	Type	Easting	Northing
ST3	Wickes store	Short-Term	524277.8	213061.1
ST4	Library	Short-Term	524366.7	213237.8
ST5	Halfords	Short-Term	524418.4	213017.7
D1	Block 9 NE Corner	Proposed Receptor	524205.3	212713.5
D2	Block 9 SE Corner	Proposed Receptor	524219.9	212762.2
D3	Block 8 NE Corner	Proposed Receptor	524224.4	212782.5
D4	Block 8 SE Corner	Proposed Receptor	524238.6	212832.0
D5	Block 13 NE Corner	Proposed Receptor	524138	212831.97
D6	Block 13 E Facade	Proposed Receptor	524136.81	212804.91
D7	Block 13 SE Corner	Proposed Receptor	524129.31	212779.2
D8	Block 12 NE Corner	Proposed Receptor	524115.59	212761.41
D9	Block 12 E Facade	Proposed Receptor	524124.09	212739.2
D10	Block 12 SE Facade	Proposed Receptor	524117.31	212708.7

Figure 8.1: Location of Receptors Considered within Models



LEGISLATION, PLANNING POLICY AND GUIDANCE

The European Directive on Ambient Air and Cleaner Air for Europe

8.53 European Directive 2008/50/EC (Ref. 8.6) of the European Parliament and of the Council of 21st May 2008, sets legally-binding Europe-wide limit values for the protection of public health and sensitive habitats. The Directive streamlines the European Union's air quality legislation by replacing four of the five existing Air Quality Directives within a single, integrated instrument.

8.54 The pollutants included are sulphur dioxide (SO_2), NO_2, $PM_{10,}$ $PM_{2.5}$, lead (Pb), carbon monoxide (CO), benzene (C_6H_6), ozone (O_3), polycyclic aromatic hydrocarbons (PAHs), cadmium (Cd), arsenic (As), nickel (Ni) and mercury (Hg).

Air Quality Strategy for England, Scotland, Wales & Northern Ireland

8.55 The Government's policy on air quality within the UK is set out in the Air Quality Strategy (AQS) for England, Scotland, Wales and Northern Ireland (AQS) published in July 2007 (Ref. 8.7), pursuant to the requirements of Part IV of the Environment Act 1995. The AQS sets out a framework for reducing hazards to health from air pollution and ensuring that international commitments are met in the UK. The AQS is designed to be an evolving process that is monitored and regularly reviewed.

8.56 The AQS sets standards and objectives for ten main air pollutants to protect health, vegetation and ecosystems. These are C_6H_6, 1,3-butadiene (C_4H_6), CO, Pb, NO_2, PM_{10}, $PM_{2.5}$, SO_2, O_3 and PAHs.

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

8.58 The air quality objectives are medium-term policy-based targets set by the Government which take into account economic efficiency, practicability, technical feasibility and timescale. Some objectives are equal to the EPAQS recommended standards or WHO guideline limits, whereas others involve a margin of tolerance, i.e. a limited number of permitted exceedances of the standard over a given period.

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

8.60 The AQS also contains a framework for considering the effects of a finer group of particles known as '$PM_{2.5}$'. Local Authorities are required to work towards reducing emissions / concentrations of $PM_{2.5}$, but there is currently no statutory objective incorporated into UK law at this time.

8.61 The AQS objective levels relevant to this assessment are set presented in **Appendix 8.4**.

Air Quality (England) Regulations

8.62 Many of the objectives in the AQS were made statutory in England through the *Air Quality (England) Regulations 2000* (Ref 8.8) and the *Air Quality (England) (Amendment) Regulations 2002* (the Regulations) (Ref 8.9) for the purpose of Local Air Quality Management (LAQM).

8.63 The Air Quality Standards Regulations 2010 (Ref 8.10) came into force on the 10th June 2010 and have adopted into UK law the limit values required by EU Directive 2008/50/EC. These regulations prescribe the 'relevant period' (referred to in Part I2V of the Environment Act 1995) that local authorities must consider in their review of the future quality of air within their area. The regulations also set out the air quality objectives to be achieved by the end of the 'relevant period'.

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

Local Air Quality Management (LAQM)

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

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

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

8.68 The Department of Environment, Food and Rural Affairs (Defra) has published technical guidance for use by local authorities in their Review and Assessment work (Ref. 8.11). This guidance, referred to in this chapter as LAQM.TG(16), has been used where appropriate in the assessment.

National Planning Policy Framework

8.69 The National Planning Policy Framework (NPPF) (Ref. 8.12) sets out the Government's planning policies for England and how these are expected to be applied. At the heart of the NPPF is a presumption in favour of sustainable development.

8.70 The NPPF states that the planning system has three overarching objectives in achieving sustainable development including a requirement to *'contribute to protecting and enhancing our natural, built and historic environment; including making effective use of land, helping to improve biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy.*'

8.71 Under Section 15: Conserving and Enhancing the Natural Environment, the NPPF (paragraph 170) requires that *'planning policies and decisions should contribute to and enhance the natural local environment by …preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible help to improve local environmental conditions such as air and water quality'*

8.72 In dealing specifically with air quality the NPPF (paragraph 181) states that *'planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas. Opportunities to improve air quality or mitigate impacts should be identified, such*

as through traffic and travel management, and green infrastructure provision and enhancement. So far as possible these opportunities should be considered at the plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications. Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan'.

8.73 Paragraph 183 states that *'the focus of planning policies and decisions should be on whether proposed development is an acceptable use of land, rather than the control of processes or emissions (where these are subject to separate pollution control regimes). Planning decisions should assume that these regimes will operate effectively.'*

Welwyn Hatfield District Plan (Saved Policies) (Ref. 8.13)

8.74 Policy R18 – Air Quality states:

'The Council will have regard to the potential effects of a development on local air quality when determining planning applications. Consideration will be given to both the operational characteristics of the development and to the traffic generated by it. Any development within areas designated as Air Quality Management Areas must have regard to guidelines for ensuring air quality is maintained at acceptable levels as set out in the Air Quality Strategy.'

Welwyn Hatfield Borough Council Emerging Local Plan (Ref. 8.14)

8.75 A revised Local Plan was submitted for examination on 15th May 2017. The emerging plan contains the following policies relevant to air quality:

8.76 Policy SADM18 – Environmental Pollution states:

'Prevailing air quality and potential impacts upon air quality arising from airborne emissions, dust and odour associated with the construction and operation of a proposal (including vehicular traffic) will be considered when determining applications. Proposals that would result in or be subject to unacceptable risk to human health and the natural environment from air pollution, or would prejudice compliance with national air quality objectives, will be refused

An Air Quality Assessment that demonstrates how prevailing air quality and potential impacts upon air quality have been considered and how air quality will be kept to an acceptable standard

through avoidance and mitigation will be required for major and minor development proposals that are:

i. *Likely, due to the nature of the proposal, to give rise to significant air pollution;*
ii. *Within an Air Quality Management Area;*
iii. *Within 50 metres of a major road or heavily trafficked route;*
iv. *Within proximity to a source of air pollution which could present a significant risk to human health; and/or*
v. *Particularly sensitive to air pollution due to their nature, such as schools, health care establishments or housing for older people.'*

Control of Dust and Particulates associated with Construction

8.77 Section 79 of the *Environmental Protection Act (1990*) provides the following definitions of statutory nuisance relevant to dust and particles:

- *'Any dust or other effluvia arising on industrial, trade or business premises and being prejudicial to health or a nuisance', and*
- *'any accumulation or deposit which is prejudicial to health or a nuisance'.*

8.78 Following this, Section 80 states that where a statutory nuisance is shown to exist, the local authority must serve an abatement notice. Failure to comply with an abatement notice is an offence and if necessary, the local authority may abate the nuisance and recover expenses.

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

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

EPUK & IAQM Land Use Planning and Development Control

8.81 Environmental Protection UK (EPUK) & Institute of Air Quality Management (IAQM) published the Land Use Planning and Development Control Air Quality guidance in January

2017 (Ref. 8.2) to provide guidance on the assessment of air quality in relation to planning proposals and ensure that air quality is adequately considered within the planning control process.

8.82 The main focus of the guidance is to ensure all developments apply good practice principles to ensure emissions and exposure are kept to a minimum. It also sets out criteria for identifying when a more detailed assessment of operational impacts is required, guidance on undertaking detailed assessments and criteria for assigning the significance of any identified impacts.

8.83 This guidance has been used within this assessment.

Assessment of Dust from Demolition and Construction

8.84 The IAQM published guidance in 2014 on the assessment of emissions from demolition and construction activities (Ref. 8.1). The guidance sets out an approach to identifying the risk of impacts occurring at nearby sensitive receptors from dust generated during the construction process and sets out recommended mitigation measures based on the identified risk. This guidance has been used within this assessment.

BASELINE CONDITIONS

Welwyn Hatfield Borough Council Review and Assessment of Air Quality

8.85 Welwyn Hatfield Borough Council (WHBC) has carried out reviews of the air quality in the area, the air quality within the borough is generally good and as a result WHBC has not declared any AQMAs. Monitoring has indicated one area where the monitored levels are at the objective level, WHBC continue to monitor this location.

8.86 WHBC currently monitor air quality within the borough using a network of diffusion tubes and one roadside $PM_{2.5}$ monitor.

Automatic Local Monitoring Data

8.87 WHBC operate one automatic monitoring site, this is a BAM $PM_{2.5}$ monitor, which is currently positioned at a roadside location approximately 3.7km to the south of the Site. Monitoring commenced at this Site in spring 2016. Data from this site is summarised in Table 8.10.

Table 8.10: $PM_{2.5}$ Concentrations measured at the Nearest Automatic Monitor (µg/m³)

Monitoring Site	Statistic	Year				
		2014	2015	2016	2017	2018
Great North Rd/A1000	Annual Mean (µg/m³)	-	-	9	13	11
Data obtained from WHBC Air Quality Annual Status Report for 2019						

8.88 Annual mean $PM_{2.5}$ concentrations recorded at Great North Rd/A1000 have been consistently well below the 25 µg/m³ objective since 2016.

8.89 Based on the data recorded at this site, $PM_{2.5}$ concentrations are expected to meet the annual mean objective at the Site.

Non-Automatic Monitoring

8.90 NO_2 diffusion tube monitoring is carried out at a number of locations within the area. Data from the closest monitoring sites to the Site are presented in Table 8.11. Monitoring is also undertaken at a number of urban background sites within the regulatory area, however none are in a location that would be representative of the area of the Site, for completeness these are included in Table 8.11 below.

Table 8.11: Annual Mean NO_2 Concentrations Measured by Diffusion Tube (µg/m³)

Site Name	Site Type	OS Grid Reference	Annual mean concentrations (µg/m³)				
			2014	2015	2016	2017	2018
WH18 – Broadwater Rd	Roadside	524285, 212988	42	35	40	37	35
WH2 - Parkway	Roadside	523656, 213133	25	24	24	-	-
WH2*, Bus Station, & Wigmores North WGC	Urban Background	523804, 213092	-	-	43	35	21
WH28 – Taxi Rank, WGC	Roadside	523815, 212960	-	-	33	27	25
WH31 – Herns Lane, WGC	Roadside	525553, 213056	-	-	-	-	21
WH23a Raymonds Plain, WGC	Roadside	523988, 211574	-	-	-	-	24

WH9 – Mount Pleasant Close, Hatfield	Urban Background	523519, 209890	22	21	22	21	19
WH10 – The Ryde	Urban Background	523377, 209858	21	20	22	21	17
WH11 – Thistle Grove	Urban Background	526249, 211617	18	15	18	18	15
WH12 – The Commons	Urban Background	525852, 211187	19	15	18	17	15
WH13 - Alconbury	Urban Background	527150, 212966	17	14	16	17	15
WH15 – Great North Road, Hatfield	Roadside	522604, 210859	28	22	24	22	21

8.91 The monitoring data shows NO_2 concentrations in excess of the relevant AQS objective level have been experienced at locations near to the Site. However, no exceedances were recorded in 2017 and 2018.

8.92 Diffusion tubes cannot monitor short-term NO_2 concentrations, however, as previously discussed, research has concluded that exceedances of the 1-hour mean objective are generally unlikely to occur where annual mean concentrations do not exceed 60 µg/m^3. Annual mean NO_2 concentrations were below 60 µg/m^3 at all monitoring sites between 2014 and 2018 therefore it is expected that the 1-hour objective is being met at these locations.

Defra Background Maps

8.93 Additional information on background concentrations in the vicinity of the Site has been obtained from the Defra background pollutant maps. The 2018 Defra background maps provide estimated concentrations for the years 2018 to 2030. For the purposes of this assessment 2018 background concentrations have been obtained.

8.94 The average pollutant concentrations from the grid squares representing the assessment area have been extracted from the maps which include the Site and road links included in the modelling assessment. The background concentration for each pollutant used in the assessment is presented in Table 8.12 below.

Table 8.12: Estimated Annual Mean Background Concentrations from Defra Maps (µg/m^3)

Year	NO_x	NO_2	PM_{10}	$PM_{2.5}$
2018	24.1	17.2	15.2	10.4

8.95 Defra undertakes monitoring of trace elements at a number of locations in the UK as part of the UK Heavy Metals Network. Average concentrations of Lead (Pb), Arsenic (As), Cadmium (Cd) and Copper (Cu) measured between 2015 and 2019 at the nearest monitoring site which is Chadwell St Mary, an urban background site are summarised in Table 8.13 below. Concentrations of Antimony (Sb) are not measured in the UK.

Table 8.13: Estimated Annual Mean Background Concentrations (µg/m^3)

Pollutant	Average Concentration
Lead	0.01204
Arsenic	0.00098
Cadmium	0.00025
Copper	0.0105

8.96 Monitoring of polychlorinated dibenzo-p-dioxins and Furans is currently carried out by Defra at six locations in the UK (Hazelrigg, High Muffles, London, Manchester, Auchencorth Moss and Weybourne) as part of the Toxic Organic Micropollutants (TOMPS) Network. A summary of the annual mean concentrations measured between 2014 and 2016, which are the latest available data from the Defra website is presented in Table 8.14.

Table 8.14: Estimated Annual Mean Background Concentrations (fg/m^3)

Monitoring Site	Type	2014	2015	2016
London	Urban background	2.9	4.4	18.7
Manchester	Urban background	17.0	6.0	8.7
Auchencorth Moss	Rural background	0.01	-	0.2
High Muffles	Rural background	1.4	1.1	4.4
Hazelrigg	Rural background	2.6	5.3	3.1
Weybourne	Rural background	1.6	1.4	20.4

8.97 In general, the concentration of dioxins and furans at rural locations is considerably lower than at urban locations. The average concentration measured at the two urban background monitoring sites from 2014 to 2016 is 9.6 fg/m^3 and is assumed to be reasonably representative of the background dioxin and furan concentrations at the Site.

8.98 The emissions from the BLM stack also include emissions for VOC which have been provided as an emission of total carbon. For the purposes of assessment, this has been assumed to be benzene. Defra provide mapped background concentration for benzene for the year 2010. This has been adjusted using the adjustment factors also provided by Defra to provide a background concentration for benzene for the year 2021 of 0.456$\mu g/m^3$.

IDENTIFICATION AND EVALUATION OF KEY EFFECTS

Construction Phase Effects

Area Sensitivity

8.99 The Proposed Development Site is the South Side site of the former Shredded Wheat Factory. The Site is currently clear of buildings following substantial demolition and clearance in connection with the implementation of planning permission 2018/0171/MAJ. An assessment of dust effects associated with demolition have not therefore been included within this assessment.

8.100 The assessment of dust impacts is dependent on the proximity of the most sensitive receptors to the site boundary. Residential properties proposed as part of the consented North Side and Phase One of the South Side sites have been included as receptors. A summary of the receptor and area sensitivity to health and dust soiling impacts is presented in Table 8.15.

Table 8.15: Sensitivity of Receptors and the Local Area to Dust Impacts

Receptor	Distance from Site Boundary (m)	Approx. Number of Receptors	Sensitivity to Health Impacts (a)		Sensitivity to Dust Soiling Impacts	
			Receptor	Area	Receptor	Area
Residential Properties	<20 m	10-100	High	Low	High	High
Overall Sensitivity of the Area			**Low**		**High**	
(a) Estimated background PM_{10} concentration is 15.2 µg/m^3.						

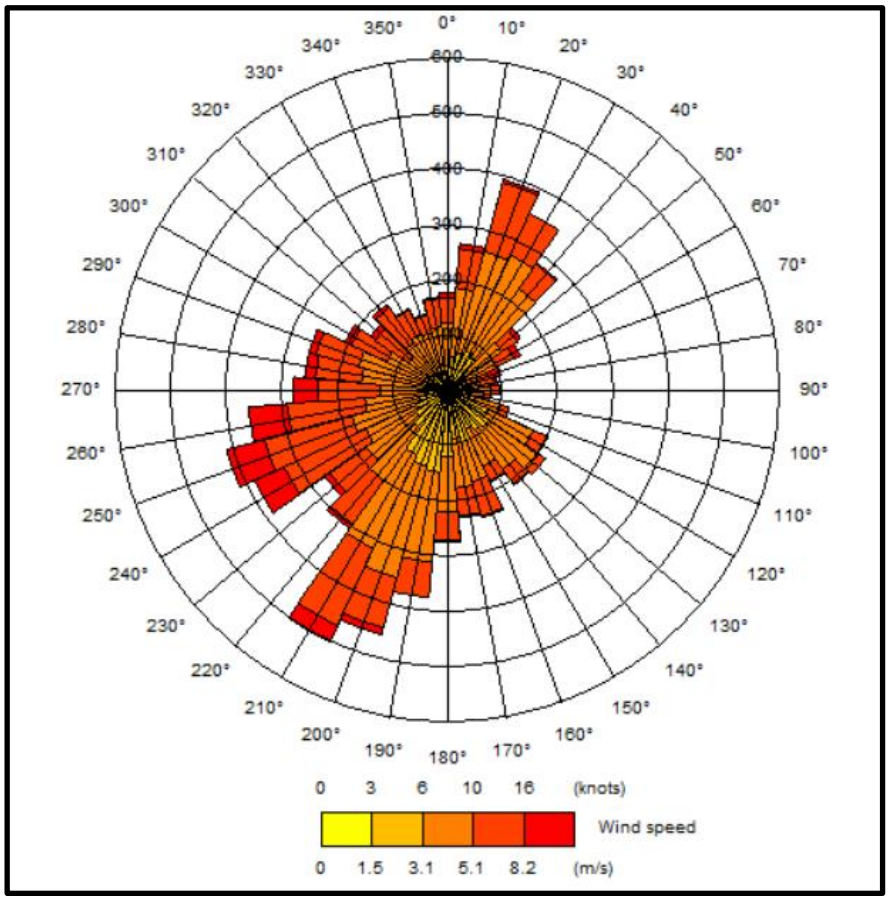
8.101 It is understood that the access to the Site is off Broadwater Road, construction traffic will travel along Bridge Road and Broadwater Road to gain access to the Site. Within the IAQM guidance it is indicated that impacts from trackout as a result of construction vehicles moving on the road network can result in impacts up to 500 m from the site access points and within 50 m of the roadside. The consented North Side is located within 50 m of Bridge Road and Broadwater Road within 500 m of the Site access and the consented Phase One of the South Side scheme is within 50m of Broadwater Road within 500m of the Site access. The sensitivity of the area to impacts from trackout is considered to be high for dust impacts and low for human health impacts.

8.102 The precise behaviour of the dust, its residence time in the atmosphere, and the distance it may travel before being deposited will depend upon a number of factors. These include wind

direction and strength, local topography and the presence of intervening structures (buildings, etc.) that may intercept dust before it reaches sensitive locations. Furthermore, dust would be naturally suppressed by rainfall.

8.103 A wind rose from Luton Airport is provided in Figure 8.2, which shows that the prevailing wind is from the southwest, therefore receptors to the northeast of the Site are the most likely to experience dust impacts from the Proposed Development. The area to the northeast of the Site is predominantly commercial. The highest risk of impacts is expected to occur in this location.

Figure 8.2: Wind Rose for Luton Airport Meteorological Station (2018)



Dust Emission Magnitude

8.104 Earthworks will primarily involve excavating material, haulage, tipping and stockpiling. This may also involve levelling of the site and landscaping. The area of the Site is greater than 10,000 m^2 and therefore classed as *'large'* in terms of emissions magnitude based on the IAQM guidance.

8.105 Dust emissions during construction will depend on the scale of the works, method of construction, construction materials and duration of build. The main construction material would involve the use of concrete, known to be a dusty material. The volume of the proposed buildings is not known but due to the size of the Site and to ensure a worst-case assessment, the dust emission magnitude is considered to be *'large'*.

8.106 Factors influencing the degree of trackout and associated magnitude of effect include vehicle size, vehicle speed, vehicle numbers, geology and duration. The number of HGV movements (leaving the site) is likely to be between 10 and 50 per day, therefore dust emission magnitude due to trackout is considered to be *'medium'.*

Dust Risk Effects

8.107 A summary of the potential risk of dust impacts, based on the low overall sensitivity of the area to human health and high overall sensitivity to dust soiling impacts, is presented in Table 8.16.

Table 8.16: Risk of Dust Impacts Prior to Mitigation

Source	Impact Magnitude	Human Health Risk	Dust Soiling Risk
Earthworks	Large	Low	High
Construction	Large	Low	High
Trackout	Medium	Low	Medium

Operational Phase Effects

Predicted NO_2 Concentrations

8.108 Annual mean NO_2 concentrations, predicted at the identified receptor locations are presented in Table 8.17 below.

Table 8.17: Predicted Annual Mean NO_2 Concentrations (µg/m^3)

Receptor	2025 Base + Committed	2025 Base + Committed + Development	Concentration Change due to Development (% of Objective)	Magnitude of Impact
R1	21.6	21.8	0.5	Negligible
R2	21.7	21.9	0.5	Negligible
R3	23.3	23.6	0.7	Negligible
R4	21.9	22.1	0.5	Negligible
R5	23.9	24.3	0.8	Negligible
R6	22.3	22.5	0.4	Negligible
ST1	24.7	24.9	0.5	-
ST2	25.3	25.4	0.2	-
ST3	24.7	24.9	0.3	-
ST4	20.2	20.4	0.3	-
ST5	20.2	20.3	0.2	-
D1 ground floor	-	22.8	-	-
D1 1st floor	-	20.6	-	-
D1 2nd floor	-	19.1	-	-
D1 3rd floor	-	18.4	-	-
D1 6th floor	-	17.7	-	-
D1 9th floor	-	17.5	-	-
D2 ground floor	-	23.0	-	-
D2 1st floor	-	20.7	-	-
D2 2nd floor	-	19.1	-	-
D2 3rd floor	-	18.4	-	-
D2 6th floor	-	17.7	-	-
D2 9th floor	-	17.5	-	-
D3 ground floor	-	22.6	-	-
D3 1st floor	-	20.6	-	-
D3 2nd floor	-	19.1	-	-
D3 3rd floor	-	18.4	-	-
D3 6th floor	-	17.7	-	-
D3 9th floor	-	17.5	-	-
D4 ground floor	-	22.6	-	-
D4 1st floor	-	20.6	-	-

Receptor	2025 Base + Committed	2025 Base + Committed + Development	Concentration Change due to Development (% of Objective)	Magnitude of Impact
D4 2nd floor	-	19.2	-	-
D4 3rd floor	-	18.5	-	-
D4 6th floor	-	17.8	-	-
D4 9th floor	-	17.5	-	-

8.109 The results of the modelling indicate that in the opening year of 2025, the AQS objective level for annual mean NO_2 concentrations will be met at all of the existing receptor locations included within the assessment.

8.110 According to criteria set out in Table 8.8, the impact at all of the existing sensitive receptors where the annual mean objective level is applicable is considered to be **negligible**.

8.111 Within the Site itself, the annual mean NO_2 concentrations are predicted to be well below (less than 75% of) the relevant AQS objective level and therefore the impact with regards to new exposure is considered to be **negligible**.

8.112 Concentrations of annual mean NO_2 predicted within the study area are all well below 60µg/m^3 therefore it is considered likely that the AQS objective level for hourly mean NO_2 concentrations will also be met. Therefore, the impact of the Proposed Development on the surrounding existing receptors and with regards to new exposure for hourly mean NO_2 concentrations is also considered to be **negligible**.

Predicted PM_{10} Concentrations

8.113 Predicted annual mean PM_{10} concentrations at the selected receptor locations are presented below in Table 8.18.

Table 8.18: Predicted Annual Mean PM_{10} Concentrations ($\mu g/m^3$)

Receptor	2025 Base + Committed	2025 Base + Committed + Development	Concentration Change due to Development (% of Objective)	Magnitude of Impact
R1	16.7	16.7	0.2	Negligible
R2	16.7	16.8	0.2	Negligible
R3	17.3	17.4	0.2	Negligible
R4	16.8	16.9	0.2	Negligible
R5	17.5	17.6	0.3	Negligible
R6	16.6	16.6	0.1	Negligible
ST1	17.1	17.2	0.1	-
ST2	17.4	17.4	0.0	-
ST3	17.1	17.1	0.1	-
ST4	16.2	16.2	0.1	-
ST5	16.2	16.3	0.1	-
D1 ground floor	-	17.1	-	-
D1 1st floor	-	16.3	-	-
D1 2nd floor	-	15.8	-	-
D1 3rd floor	-	15.6	-	-
D1 6th floor	-	15.4	-	-
D1 9th floor	-	15.3	-	-
D2 ground floor	-	17.1	-	-
D2 1st floor	-	16.4	-	-
D2 2nd floor	-	15.8	-	-
D2 3rd floor	-	15.6	-	-
D2 6th floor	-	15.4	-	-
D2 9th floor	-	15.3	-	-
D3 ground floor	-	17.0	-	-
D3 1st floor	-	16.3	-	-
D3 2nd floor	-	15.8	-	-
D3 3rd floor	-	15.6	-	-
D3 6th floor	-	15.4	-	-
D3 9th floor	-	15.3	-	-
D4 ground floor	-	17.0	-	-
D4 1st floor	-	16.3	-	-

Receptor	2025 Base + Committed	2025 Base + Committed + Development	Concentration Change due to Development (% of Objective)	Magnitude of Impact
D4 2nd floor	-	15.8	-	-
D4 3rd floor	-	15.6	-	-
D4 6th floor	-	15.4	-	-
D4 9th floor	-	15.3	-	-

8.114 The results of the modelling indicate that in the opening year of 2025, the predicted annual mean PM_{10} concentrations will be well below (less than 75% of) the objective level of 40 µg/m^3 at all the selected receptors both with and without the Proposed Development operational.

8.115 At all of the receptors included in the assessment, the impact is classed as **negligible** based on criteria set out in Table 8.8.

8.116 Within the Site itself, predicted annual mean PM_{10} concentrations are predicted to be well below (less than 75% of) the relevant AQS objective level. The impact of the Proposed Development with regards new exposure to annual mean PM_{10} concentrations is therefore considered to be **negligible**.

8.117 LAQM.TG(16) provides a relationship between predicted annual mean concentrations and the likely number of exceedances of the short-term (24-hour mean) PM_{10} objective of 50 µg/m^3 (N), where:

$$N = -18.5 + 0.00145 \times \text{annual mean}^3 + (206/\text{annual mean}).$$

8.118 The objective allows 35 exceedances per year, which is equivalent to an annual mean of 32 µg/m^3.

8.119 Based on the above approach, the maximum number of days where PM_{10} concentrations are predicted to exceed 50µg/m^3 at an existing sensitive receptor is between 0 and 2 days with a change of less than one day as a result of the operation of the Proposed Development. The impact on 24-hour PM_{10} concentrations is therefore also considered to be **negligible**.

8.120 Within the Site itself, the maximum number of days where PM_{10} concentrations are predicted to exceed 50µg/m^3 is less than 1 day. The impact of the Proposed Development with regards new exposure to 24 hour PM_{10} concentrations is therefore also considered to be **negligible**.

Predicted $PM_{2.5}$ Concentrations

8.121 Predicted annual mean $PM_{2.5}$ concentrations at the identified receptor locations are presented in Tables 8.19 below.

Table 8.19: Predicted Annual Mean $PM_{2.5}$ Concentrations (µg/m^3)

Receptor	2025 Base + Committed	2025 Base + Committed + Development	Concentration Change due to Development (% of Objective)	Magnitude of Impact
R1	11.2	11.3	0.2	Negligible
R2	11.2	11.3	0.2	Negligible
R3	11.6	11.6	0.2	Negligible
R4	11.3	11.3	0.2	Negligible
R5	11.7	11.7	0.2	Negligible
R6	11.2	11.2	0.1	Negligible
ST1	11.5	11.5	0.1	-
ST2	11.6	11.7	0.0	-
ST3	11.5	11.5	0.1	-
ST4	10.9	11.0	0.1	-
ST5	11.0	11.0	0.0	-
D1 ground floor	-	11.4	-	-
D1 1st floor	-	11.0	-	-
D1 2nd floor	-	10.7	-	-
D1 3rd floor	-	10.6	-	-
D1 6th floor	-	10.5	-	-
D1 9th floor	-	10.4	-	-
D2 ground floor	-	11.5	-	-
D2 1st floor	-	11.0	-	-
D2 2nd floor	-	10.7	-	-
D2 3rd floor	-	10.6	-	-
D2 6th floor	-	10.5	-	-

Receptor	2025 Base + Committed	2025 Base + Committed + Development	Concentration Change due to Development (% of Objective)	Magnitude of Impact
D2 9th floor	-	10.4	-	-
D3 ground floor	-	11.4	-	-
D3 1st floor	-	11.0	-	-
D3 2nd floor	-	10.8	-	-
D3 3rd floor	-	10.6	-	-
D3 6th floor	-	10.5	-	-
D3 9th floor	-	10.4	-	-
D4 ground floor	-	11.4	-	-
D4 1st floor	-	11.0	-	-
D4 2nd floor	-	10.8	-	-
D4 3rd floor	-	10.6	-	-
D4 6th floor	-	10.5	-	-
D4 9th floor	-	10.5	-	-

8.122 The results of the modelling assessment indicate that in the opening year of 2025, predicted annual mean $PM_{2.5}$ concentrations will be well below (less than 75% of) the 25 µg/m^3 AQS objective level at the selected receptor locations both with and without the Proposed Development in operation.

8.123 At all of the receptors included in the assessment, the impact is classed as **negligible** based on criteria set out in Table 8.8.

8.124 Within the Site itself, annual mean $PM_{2.5}$ concentrations are predicted to fall well below (less than 75% of) the relevant AQS objective level. The impact with regards to new exposure is therefore also considered to be **negligible**.

Assessment of Exposure to Emissions from BLM Stack

8.125 Concentrations were predicted at heights representing all of the floors within the Proposed Development. The highest concentrations were predicted for floor 9, therefore only concentrations at floor 9 are presented in the tables below.

Particulate Matter (PM_{10} and $PM_{2.5}$)

8.126 Predicted annual mean and 24-hour mean PM_{10} concentrations at the selected receptors within the Proposed Development due to emissions from the BLM stack are presented in Table 8.20 below. For the purposes of assessment, all particulates are assumed to be PM_{10} which is likely to be an overestimation.

Table 8.20: Predicted Annual Mean and 24 Hour Mean PM_{10} Concentrations (µg/m^3)

Receptor	Annual Mean		90.41st percentile of 24-hour mean	
	PC	PC (as % AQS)	PC	(PC as % AQS)
D1 9th floor	0.0021	0.005	0.0087	0.017
D2 9th floor	0.0022	0.005	0.0100	0.020
D3 9th floor	0.0023	0.006	0.0110	0.022
D4 9th floor	0.0027	0.007	0.0126	0.025
D5 9th floor	0.0018	0.005	0.0074	0.015
D6 9th floor	0.0017	0.004	0.0075	0.015
D7 9th floor	0.0016	0.004	0.0072	0.014
D8 9th floor	0.0015	0.004	0.0069	0.014
D9 9th floor	0.0015	0.004	0.0071	0.014
D10 9th floor	0.0014	0.004	0.0064	0.013
AQAL	40		50	
Background	15.2		30.4	
Maximum PEC	15.2027		30.4126	
Maximum PEC (%AQAL)	38.007		60.825	
Short term background concentrations are twice the long term background concentration i.e. 2 x15.2				

8.127 The results of the modelling demonstrate that predicted annual mean and 24-hour mean PM_{10} concentrations within the Proposed Development are well below the relevant standards. The process contributions from the BLM stack at the locations within the Proposed Development are very low, future residents will therefore not be exposed to elevated PM_{10} concentrations arising from the BLM stack.

8.128 Predicted annual mean $PM_{2.5}$ concentrations at the selected receptors within the Proposed Development due to emissions from the BLM stack are presented in Table 8.21 below.

For the purposes of assessment, all particulates are assumed to be $PM_{2.5}$ which is likely to be an overestimation.

Table 8.21: Predicted Annual Mean $PM_{2.5}$ Concentrations (µg/m^3)

Receptor	Annual Mean	
	PC	PC (as % AQS)
D1 9th floor	0.0021	0.008
D2 9th floor	0.0022	0.009
D3 9th floor	0.0023	0.009
D4 9th floor	0.0027	0.011
D5 9th floor	0.0018	0.007
D6 9th floor	0.0017	0.007
D7 9th floor	0.0016	0.007
D8 9th floor	0.0015	0.006
D9 9th floor	0.0015	0.006
D10 9th floor	0.0014	0.006
AQAL	25	
Background	10.4	
Maximum PEC	10.4027	
Maximum PEC (%AQAL)	41.611	

8.129 The results of the modelling demonstrate that predicted annual mean $PM_{2.5}$ concentrations within the Proposed Development are well below the relevant standards. The process contributions from the BLM stack at the locations within the Proposed Development are very low, future residents will therefore not be exposed to elevated $PM_{2.5}$ concentrations arising from the BLM stack.

Lead (Pb)

8.130 Predicted annual mean concentrations of Lead at the selected receptors within the Site due to emissions from the BLM stack are presented in Table 8.22 below.

Table 8.22: Predicted Annual Mean Lead Concentrations (µg/m^3)

Receptor	Annual Mean	
	PC	PC (as % AQS)
D1 9th floor	0.00028	0.112
D2 9th floor	0.00029	0.115
D3 9th floor	0.00030	0.121
D4 9th floor	0.00036	0.144
D5 9th floor	0.00025	0.098
D6 9th floor	0.00023	0.093
D7 9th floor	0.00022	0.087
D8 9th floor	0.00020	0.082
D9 9th floor	0.00020	0.081
D10 9th floor	0.00019	0.076
AQAL	0.25	
Background	0.01204	
Maximum PEC	0.0124006	
Maximum PEC (%AQAL)	4.960	

8.131 The results of the modelling demonstrate that predicted annual mean Lead concentrations within the Proposed Development are well below the relevant standard. The process contributions from the BLM stack at the locations within the Proposed Development are very low, future residents will therefore not be exposed to elevated Lead concentrations arising from the BLM stack.

Antimony (Sb)

8.132 Predicted annual mean and hourly mean concentrations of Antimony at the selected receptors within the Proposed Development due to emissions from the BLM stack are presented in Table 8.23 below.

Table 8.23: Predicted Annual Mean and Hourly Mean Antimony Concentrations (µg/m^3)

Receptor	Annual Mean		Hourly Mean	
	PC	PC (as % AQS)	PC	(PC as % AQS)
D1 9th floor	0.0000048	0.000096	0.00024	0.00016
D2 9th floor	0.0000049	0.000099	0.00022	0.00015
D3 9th floor	0.0000052	0.000103	0.00024	0.00016
D4 9th floor	0.0000061	0.000123	0.00027	0.00018
D5 9th floor	0.0000042	0.000084	0.00021	0.00014
D6 9th floor	0.0000040	0.000080	0.00020	0.00013
D7 9th floor	0.0000037	0.000075	0.00019	0.00013
D8 9th floor	0.0000035	0.000070	0.00019	0.00013
D9 9th floor	0.0000034	0.000069	0.00020	0.00013
D10 9th floor	0.0000033	0.000065	0.00018	0.00012
AQAL	5		150	
Background concentrations of Antimony are not measured in the UK				

8.133 The results of the modelling demonstrate that predicted annual mean and hourly mean Antimony concentrations within the Proposed Development are well below the relevant standards. The process contributions from the BLM stack at the locations within the Proposed Development are very low, future residents will therefore not be exposed to elevated Antimony concentrations arising from the BLM stack.

Arsenic (As)

8.134 Predicted annual mean concentrations of Arsenic at the selected receptors within the Proposed Development due to emissions from the BLM stack are presented in Table 8.24 below.

Table 8.24: Predicted Annual Mean Arsenic Concentrations (µg/m^3)

Receptor	Annual Mean	
	PC	PC (as % AQS)
D1 9th floor	0.000003	0.106
D2 9th floor	0.000003	0.108
D3 9th floor	0.000003	0.113
D4 9th floor	0.000004	0.134
D5 9th floor	0.000003	0.092
D6 9th floor	0.000003	0.087
D7 9th floor	0.000002	0.081
D8 9th floor	0.000002	0.076
D9 9th floor	0.000002	0.075
D10 9th floor	0.000002	0.072
AQAL	0.003	
Background	0.00098	
Maximum PEC	0.0009840	
Maximum PEC (%AQAL)	32.8	

8.135 The results of the modelling demonstrate that predicted annual mean Arsenic concentration within the Proposed Development is well below the relevant standard. The process contribution from the BLM stack at the locations within the Proposed Development is very low, future residents will therefore not be exposed to elevated Arsenic concentrations arising from the BLM stack.

Cadmium (Cd)

8.136 Predicted annual mean concentrations of Cadmium at the selected receptors within the Proposed Development due to emissions from the BLM stack are presented in Table 8.25 below.

Table 8.25: Predicted Annual Mean Cadmium Concentrations (µg/m^3)

Receptor	Annual Mean	
	PC	PC (as % AQS)
D1 9th floor	0.0000032	0.063
D2 9th floor	0.0000032	0.065
D3 9th floor	0.0000034	0.068
D4 9th floor	0.0000040	0.080
D5 9th floor	0.0000028	0.055
D6 9th floor	0.0000026	0.052
D7 9th floor	0.0000024	0.049
D8 9th floor	0.0000023	0.046
D9 9th floor	0.0000023	0.045
D10 9th floor	0.0000022	0.043
AQAL	0.005	
Background	0.00025	
Maximum PEC	0.0002540	
Maximum PEC (%AQAL)	5.08	

8.137 The results of the modelling demonstrate that predicted annual mean Cadmium concentrations within the Proposed Development are well below the relevant standard. The process contributions from the BLM stack at the locations within the Proposed Development are very low, future residents will therefore not be exposed to elevated Cadmium concentrations arising from the BLM stack.

Copper (Cu)

8.138 Predicted annual mean and hourly mean concentrations of Copper at the selected receptors within the Proposed Development due to emissions from the BLM stack are presented in Table 8.26 below.

Table 8.26: Predicted Annual Mean and Hourly Mean Copper Concentrations (µg/m^3)

Receptor	Annual Mean		Hourly Mean	
	PC	PC (as % AQS)	PC	(PC as % AQS)
D1 9th floor	0.0000113	0.00011	0.00057	0.00028
D2 9th floor	0.0000116	0.00012	0.00053	0.00026
D3 9th floor	0.0000121	0.00012	0.00058	0.00029
D4 9th floor	0.0000144	0.00014	0.00063	0.00031
D5 9th floor	0.0000099	0.00010	0.00050	0.00025
D6 9th floor	0.0000094	0.00009	0.00047	0.00024
D7 9th floor	0.0000087	0.00009	0.00045	0.00022
D8 9th floor	0.0000082	0.00008	0.00046	0.00023
D9 9th floor	0.0000081	0.00008	0.00047	0.00023
D10 9th floor	0.0000077	0.00008	0.00041	0.00021
AQAL	10		200	
Background	0.0105		0.021	
Maximum PEC	0.0105144		0.02163	
Maximum PEC (%AQAL)	0.10514		0.01081	
Short term background concentrations are twice the long term background concentration i.e. 2 x0.0105				

8.139 The results of the modelling demonstrate that predicted annual mean and hourly mean Copper concentration within the Proposed Development are well below the relevant standards. The process contributions from the BLM stack at the locations within the Proposed Development are very low, future residents will therefore not be exposed to elevated Copper concentrations arising from the BLM stack.

Dioxins and Furans

8.140 Predicted annual mean concentrations of Dioxins and Furans at the selected receptors within the Proposed Development due to emissions from the BLM stack are presented in Table 8.27 below.

Table 8.27: Predicted Annual Mean Dioxins and Furans Concentrations (µg/m³)

Receptor	Annual Mean	
	PC	PC (as % Background)
D1 9th floor	0.0225	0.235
D2 9th floor	0.0231	0.241
D3 9th floor	0.0242	0.252
D4 9th floor	0.0288	0.300
D5 9th floor	0.0197	0.205
D6 9th floor	0.0187	0.195
D7 9th floor	0.0175	0.182
D8 9th floor	0.0163	0.170
D9 9th floor	0.0162	0.168
D10 9th floor	0.0153	0.160
Background	9.6	

8.141 The results of the modelling demonstrate that predicted annual mean Dioxin and Furan concentrations within the Proposed Development are low in comparison to the background concentration.

VOCs (as total carbon)

8.142 Predicted annual mean and hourly mean concentrations of VOCs at the selected receptors within the Proposed Development due to emissions from the BLM stack are presented in Table 8.29 below.

Table 8.29: Predicted Annual Mean and Hourly Mean VOCs Concentrations (µg/m³)

Receptor	Annual Mean		Hourly Mean	
	PC	PC (as % AQS)	PC	(PC as % AQS)
D1 9th floor	0.45	8.9	22.4	11.5
D2 9th floor	0.45	9.1	20.5	10.5
D3 9th floor	0.48	9.5	21.8	11.2
D4 9th floor	0.56	11.3	24.5	12.5
D5 9th floor	0.39	7.7	19.7	10.1

Receptor	Annual Mean		Hourly Mean	
	PC	PC (as % AQS)	PC	(PC as % AQS)
D6 9th floor	0.37	7.3	18.5	9.5
D7 9th floor	0.34	6.9	17.2	8.8
D8 9th floor	0.32	6.4	17.7	9.1
D9 9th floor	0.32	6.4	18.1	9.3
D10 9th floor	0.30	6.1	16.3	8.4
AQAL	5		195	
Background	0.456		0.912	
Maximum PEC	1.20		25.4	
Maximum PEC (%AQAL)	20.4		13.0	
Short term background concentrations are twice the long term background concentration i.e. 2 x 0.456				

8.143 The results of the modelling demonstrate that predicted annual mean and hourly mean VOC concentration within the Proposed Development are well below the relevant standards. The future residents will therefore not be exposed to elevated VOC concentrations.

Uncertainty

8.144 There are many components that contribute to the uncertainty in predicted concentrations. The model used in this assessment is dependent upon the traffic data that have been input which will have inherent uncertainties associated with them. There is then additional uncertainty as the model is required to simplify real-world conditions into a series of algorithms. These are typical uncertainties for such an assessment.

ASSESSMENT OF CUMULATIVE EFFECTS

8.145 Cumulative effects can potentially be experienced during both the construction and operational phases. During the construction phase, cumulative effects of dust and particulate matter generated from on-site activities may be experienced in locations in close proximity to two or more development sites and when the timing of the construction phases overlap. There may also be an effect due to the increased construction traffic on local roads if construction vehicles are to use the same routes to access the sites. During the operational phase,

cumulative effects may be experienced due to the additional road vehicles generated by one or more schemes if the traffic is likely to affect the same local roads.

8.146 Details of the committed developments considered cumulatively within this assessment are outlined in Chapter 3.

Construction Phase Effects

8.147 Guidance provided by the IAQM suggests that effects of dust and particulate matter generated from a construction site may be experienced up to 350m from the site. There are a number of committed developments located within 350m of the Site. The closest committed developments are the consented Phase One South Side and North Side sites which are located adjacent to the Site. Phase one of the South Side site development is currently under construction. Residential properties proposed as part of the consented North Side and Phase One South Side sites have been included as receptors in the above assessment of construction phase impacts. The area that is within 350m of the Site and the North Side site and Phase One of the South Side site is primarily occupied by commercial buildings, although some residential properties to the east and west are also within 350m of both sites. There are no sensitive receptors that fall within 350m of both the Site and any of the other committed developments detailed in Chapter 3 of this ES.

8.148 The construction programmes of the Phase One South Side site or the North Side site have not yet been finalised, therefore specific details on the timing of phases is not available. Dust arising from construction activities drops out of the atmosphere relatively quickly, the majority of the impact will therefore be within the nearest 100m of the combined sites. The closest buildings to the sites are commercial buildings, residential properties are located at least 200m from the combined site area. It is therefore likely that the most sensitive properties i.e. the residential properties will likely experience less dust effects and be screened to some effect by the nearer commercial properties.

8.149 All of the construction sites would be the subject of stringent mitigation measures similar to those that would be implemented during construction of the Proposed Development. The cumulative impact of the Proposed Development and the committed developments is therefore considered to remain negligible following the implementation of the relevant site specific Dust Management Plans.

Operational Phase Effects

8.150 The traffic flows used for the assessment were calculated to account for the additional traffic from the committed developments in the area including the traffic flows associated with the consented Phase One South Side and North Side sites. The assessment of the significance of the Proposed Development effects has therefore taken into account the cumulative effect of the Site and the committed developments on predicted future pollutant concentrations.

8.151 The committed developments include the both the extant planning application for the North Side site and the amended application. Traffic flows associated with the amended North Side site have been determined to be lower than those assessed for the extant application. As the flows for the extant planning application for the North Side site have been included in the traffic flows used in the above assessment and these are higher than the amended application, the assessment can be considered to have considered both applications.

Inter-Relationship Effects

8.152 There are inter-relationships with the transport chapter as identified through the use of traffic data within the assessment. No other inter-relationships with other topics are identified.

ENHANCEMENT, MITIGATION AND RESIDUAL EFFECTS

Mitigation

Construction Phase

8.153 The control of dust emissions from construction site activities relies upon management provision and mitigation techniques to reduce emissions of dust and limit dispersion. Where dust emission controls have been used effectively, large-scale operations have been successfully undertaken without impacts to nearby properties.

8.154 A high risk of dust soiling impacts and a low risk of human health (PM_{10}) effects is predicted at adjacent receptors during construction of the Proposed Development. Appropriate mitigation measures for the Site have been identified following the IAQM guidance and based on the risk effects presented in Table 8.16. It is recommended that the 'highly recommended' measures set out in the IAQM guidance and reproduced below are incorporated into a Dust Management Plan (DMP) and approved by WHBC prior to commencement of any work on site:

'Highly Recommended' Measures

- develop and implement a stakeholder communications plan that includes community engagement before work commences on site;
- display the name and contact details of the person accountable for air quality and dust issues on the site boundary (i.e. the environment manager/engineer or site manager);
- display the head or regional office contact information on the site boundary;
- record all dust and air quality complaints, identify cause, take appropriate measures to reduce emissions in a timely manner and record the measures taken;
- make the complaints log available to the local authority when asked;
- record any exceptional incidents that cause dust and/or air emissions, either on- or off- site and the action taken to resolve the situation in the log book;
- hold regular liaison meetings with other high risk construction sites within 500m of the site boundary, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised. It is important to understand the interactions of the off-site transport/deliveries which might be using the same strategic road network routes;

- undertake daily on-site and off site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results and make the log available to the local authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and window sills within 100m of the site boundary, with cleaning to be provided if necessary;
- carry out regular site inspections to monitor compliance with the DMP, record inspection results and make inspection log available to WHBC when asked;
- carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the local authority when asked;
- increase frequency of site inspection by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged periods of dry or windy conditions;
- agree dust deposition, dust flux or real-time PM_{10} continuous monitoring locations with the Local Authority. Where possible commence baseline monitoring at least three months before work commences on site.
- plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible;
- erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles;
- fully enclose site or specific operations where there is a high potential for dust production and the activities are being undertaken for an extensive period;
- avoid site runoff of water or mud;
- keep site fencing, barriers and scaffolding clean using wet methods;
- remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If being re-used on site, cover as detailed below;
- cover, seed or fence stockpiles to prevent wind whipping;
- ensure all vehicles switch off engines when stationary - no idling vehicles;
- avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable;
- impose and signpost a maximum-speed limit of 15mph on surfaced and 10mph on un-surfaced haul roads and work areas;
- produce a Construction Logistic Plan to manage the sustainable delivery of goods and materials;
- implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking and car-sharing);

- only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction e.g. suitable local exhaust ventilation systems;
- ensure an adequate water supply on site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate;
- use enclosed chutes and conveyors and covered skips;
- minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate;
- ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods;
- avoid bonfires and burning of waste materials;
- re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable;
- use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable;
- only remove the cover in small areas during work and not all at once;
- avoid scabbling (roughening of concrete surface) if possible;
- ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place;
- ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery;
- use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site;
- avoid dry sweeping of large areas;
- ensure vehicles entering and leaving the site are covered to prevent the escape of materials during transport;
- inspect on-site haul routes for integrity and instigate necessary repairs to the surfaces as soon as reasonably practicable;
- record all inspections of haul routes and any subsequent action in a site log book;
- install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned;
- implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable);

- ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit; and
- access gates to be located at least 10 m from receptors where possible.

8.155 In addition to the 'recommended' measures, the IAQM guidance also sets out one 'desirable' measure which should also be considered for inclusion within the DMP. This is:

- for smaller supplied of fine powder materials ensure bags are sealed after use and stored appropriately to prevent dust;

Operational Phase

8.156 The Proposed Development is predicted to result in a negligible impact on local air quality therefore on-site mitigation measures are not considered necessary.

8.157 The Site is highly accessible on foot, by bike and by bus and rail. Secure cycle parking spaces for each dwelling is included within the proposals. As part of the wider consent, improvements will be made to Bridge Road and Broadwater Road as well as links into the town centre to enhance the pedestrian and cycle environment around the Site.

8.158 As indicated within the Framework Travel Plan, it is also envisaged that a car club would be operated within the Site and a Residents Travel Information Pack will be provided to provide the residents with information on sustainable travel options. The likely content of the Residents' Travel Pack will be:

- Car club membership and information;
- Cycle route information;
- Sustrans leaflets on the beneficial effects of walking and cycling;
- Free or discounted reflective clothing;
- Free or discounted bicycle locks / helmets;
- Details of local cycle groups;
- Details of BikeBUDi travel system;
- Bus and rail route / timetable information;
- Free bus 'taster' tickets;
- Details of car sharing websites and details of CarBUDi travel systems;
- Taxi company information and details of TaxiBUDi travel system; and
- Supermarket home delivery details.

8.159 This list is not exhaustive or a prescriptive list of what will be in the travel pack but provides details of the likely content of the pack. Details of the final pack will be agreed in partnership with the Council.

Residual Effects

Construction Phase

8.160 Following implementation of the measures recommended for inclusion within the DMP the impact of emissions during construction of the Proposed Development would be *negligible*.

Operational Phase

8.161 The Proposed Development is predicted to have a negligible impact on local air quality.

SUMMARY

8.162 An air quality impact assessment has been undertaken to assess both construction and operational effects associated with the Proposed Development.

8.163 An assessment of the potential effects during the construction phase identified that releases of dust and particulate matter are likely to occur during site activities. Through good site practice and the implementation of suitable mitigation measures, the effect of dust and particulate matter releases may be effectively mitigated and the resultant effects are considered to be negligible.

8.164 Dispersion modelling has been carried out to assess the impact of the operational development on local air quality. The assessment has shown that NO_2, PM_{10} and $PM_{2.5}$ concentrations are predicted to be below the relevant objective limits throughout the study area and within the Site itself. The results indicated that the impact of the emissions arising from the traffic generated by the Proposed Development is negligible. The impact with regards new exposure is also considered to be negligible, therefore the Site is considered to be suitable for the proposed use with regards to air quality.

Table 8.30: Air Quality Summary Table

Potential Effect	Nature of Effect (Permanent or Temporary)	Significance	Mitigation/ Enhancement Measures	Residual Effects
Dust and particulate matter generated during the construction phase	Temporary	-	The adoption of *best practice and measures outlined in the IAQM guidance*	Negligible
Effects on Local Air Quality from emissions from construction traffic	Temporary	Negligible	None	Negligible
Effects on Local Air Quality from emissions from road traffic generated by the operation of the Proposed Development	Permanent	Negligible	None	Negligible
Exposure of occupants to pollutants emitted from the nearby BLM Stack	Permanent	Negligible	None	Negligible

REFERENCES

Ref 8.1: Institute of Air Quality Management (2014); 'Guidance on the assessment of dust from demolition and construction version 1.1'.

Ref 8.2: Environmental Planning UK & Institute of Air Quality Management. Land-use Planning and Development Control: Planning for Air Quality, January 2017

Ref 8.3: http://uk-air.defra.gov.uk

Ref 8.4: D. Laxen and B Marner (2003) Analysis of the relationship between 1-hour and annual mean nitrogen dioxide at UK roadside and kerbside monitoring sites.

Ref 8.5: Environment Agency AQMAU, Conversion Rates for NOx and NO_2

Ref 8.6: Air Quality Directive 2008/50/EC

Ref 8.7: The Air Quality Strategy for England, Scotland, Wales and Northern Ireland (2007)

Ref 8.8: The Air Quality (England) Regulations 2000 - Statutory Instrument 2000 No.928

Ref 8.9: The Air Quality (England) (Amendment) Regulations 2002 - Statutory Instrument 2002 No.3043

Ref 8.10: The Air Quality Standards Regulations 2010 – Statutory Instrument 2010 No. 1001

Ref 8.11: Department for Environment, Food and Rural Affairs (Defra), (2016): Part IV The Environment Act 1995 Local Air Quality Management Review and Assessment Technical Guidance LAQM.TG(16).

Ref 8.12: Communities and Local Government: *National Planning Policy Framework* (March 2012)

Ref 8.13: Welwyn Hatfield District Plan (Saved Policies) (2005)

Ref 8.14: Welwyn Hatfield Borough Council Emerging Local Plan

9 WIND MICROCLIMATE

INTRODUCTION

9.1 This chapter addresses the wind microclimate effects of the Proposed Development and includes an assessment of the potential impacts on pedestrian safety and comfort as a result of changes in wind conditions and pedestrian activities created by the Proposed Development. The assessment methodology, legislative and policy context, assessment of potential effects in the foreseen scenario and recommendations for mitigation in case of any adverse impacts is included in this chapter.

LEGISLATION, PLANNING, POLICY AND GUIDANCE

National Planning Policy

9.2 There are no policies within the National Planning Policy Framework (NPPF) (2019) directly relating to wind microclimate issues, however the NPPF emphasises the benefits of a high-quality built environment and the National Design Guide (October 2019) ,which forms part of the associated planning practice guidance, identifies the potential for a building's size and shape (particularly in the case of tall and large buildings) to affect the wind microclimate.

Local Planning Policy

9.3 The Welwyn Hatfield District Plan (2005) includes Policy D3 Continuity and Enclosure which states that: *"Developments will be expected to enhance the public realm by: Taking the microclimate into account in the orientation and design of buildings and spaces."*

9.4 The District Plan is in the process of being replaced by the Local Plan, which was submitted for examination in 2017. The draft plan (Proposed Submission August 2016) includes Policy SP 9 Place Making and High Quality Design which indicates that proposals for taller buildings should positively respond to *"Micro-climate and wind tunnelling"* within their design solution.

9.5 The council's Broadwater Road West Supplementary Planning Document (December 2008) includes Section 6 Design Guidance: Blocks, which states:

6.11 One of the key objectives set out in chapter 1 aims to..."create urban grain capable of supporting appropriate uses while reflecting the town centre morphology".

6.12 The proposed urban grain of the site should be characterised by large blocks, continuous building lines and active frontages. Wide streets provide an opportunity for surveillance and tree planting which will play a crucial role in security, micro-climate and street enclosure.

Guidance

9.6 The assessment of environmental wind flows lies outside the scope of BS EN 1991-1-4:2005 (Ref 9.1), the current UK and European Standard for wind actions on structures, which focuses on wind loading issues. However, consideration has been given to the Guidance for Tall Buildings (Ref 9.2).

9.7 The impact of environmental wind on pedestrian spaces and the consequent suitability of these spaces for planned usage are described by the industry standard Lawson criteria (Ref 9.3), which are recognised by local planning authorities as suitable benchmark criteria for wind assessments.

ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

9.8 With reference to the policies and guidance outlined above, the Proposed Development does not include buildings which would be considered tall in terms of wind effects. Nevertheless, an experience-based desk study has been carried out to provide a qualitative assessment of the likely effects of the Development on the pedestrian level wind environment. The study considers the Proposed Development massing and exposure in conjunction with long-term wind climate statistics applicable to the Site, and draws on extensive experience in the assessment of wind flows, gained from wind tunnel testing of similarly massed schemes within similar urban settings. These detailed studies were based on the aforementioned Lawson criteria for pedestrian comfort and safety.

9.9 For Blocks 8 and 13, submitted in outline, the assessment focuses on the Illustrative Scheme. For wind microclimate there is no single worst-case layout based on the parameter plans. A building built out to a maximum height / footprint may be the worst case for conditions around the base of that particular building, but may increase the shelter to downwind buildings and amenity spaces, and therefore may not be the worst case for the rest of the Site or

surrounds. Parameters also exclude features such as landscaping and sensitive receptors such as entrances. The Illustrative Scheme represents a more realistic Site layout for the outline proposals and, as such, better describes the 'likely' Site conditions resulting from the Proposed Development. However, it should be noted that the Illustrative Scheme (both buildings and landscaping) is indicative and demonstrates only one possible way in which the outline proposals could be delivered. To ensure the assessment is based on the Development applied for, the potential for additional effects within the constraints of the Parameter Plans is therefore also considered.

9.10 Long-term wind frequency statistics from Heathrow and London City Airports were combined and corrected to apply directly at the Site, taking account of differences in upwind terrain and altitude between the weather centres and the Site, based on the widely accepted Deaves and Harris log law wind model of the atmospheric boundary layer and BS EN 1991-1-4:2005.

9.11 Details of the Lawson criteria for pedestrian safety, or distress, are presented in Table 9.1 and are based on the exceedance of the threshold wind speeds, considering mean-hourly and gust-equivalent-mean values, occurring once per annum. These thresholds represent wind speeds with the potential to destabilise the less able or more susceptible members of the public (including elderly, cyclists and children) and able-bodied users.

Table 9.1 Lawson Criteria for Pedestrian Safety or Distress

Threshold mean-hourly wind speed exceeded once a year	Safety Rating		Qualifying Comments
15 m/s	S2	Unsuitable for general public	Less able and cyclists find conditions physically difficult.
20 m/s	S1	Unsuitable for able-bodied	Able-bodied persons find conditions difficult. Physically impossible to remain standing during gusts.

9.12 Details of the Lawson criteria for pedestrian comfort are presented in Table 9.2 and are based on the exceedance of threshold wind speeds, considering mean-hourly and gust-equivalent-mean values, occurring less than 5% of the time. The thresholds represent upper bounds of acceptability for a range of common activities. The value of 5% has been established as giving a reasonable allowance for extreme and relatively infrequent winds that are acceptable within each category.

Table 9.2 Lawson Criteria for Pedestrian Comfort

Threshold Mean-hourly Wind Speed Exceeded < 5% of the Time	Comfort Rating / Activity		Qualifying Comments
4m/s	C4	Long-term Sitting	Reading a newspaper and eating and drinking.
6m/s	C3	Standing or short-term Sitting	Appropriate for bus stops, window shopping and building entrances.
8m/s	C2	Walking and Strolling	General areas of walking and sightseeing.
10m/s	C1	Business walking	Local areas around tall buildings where people are not likely to linger.

9.13 The pedestrian level wind environment assessment is summarised in terms of suitability for various activities, based on expected seasonal comfort and safety ratings in accordance with the Lawson criteria, detailed above. The assessment takes full account of seasonal variations in wind conditions and pedestrian activities. Thus conditions for recreational activities focus on summer, but also consider spring and autumn. Recreational activities do not consider winter comfort ratings as it is anticipated that users would not demand suitable conditions 95% of the time in winter, but would instead be satisfied to use the amenity spaces on occasions when conditions, including precipitation and temperature, permit. Conditions for pedestrian thoroughfare, access or waiting (for example at bus stops) consider all seasons, with winter being predominantly the critical season due to generally higher wind speeds in the winter months.

9.14 For the suitability assessment the activities considered, and their relation to the Lawson criteria, are shown in Table 9.3. The table is ordered in terms of decreasing sensitivity to wind speeds. Conditions considered suitable for the more sensitive activities would also be suitable for the subsequent, less sensitive, uses.

Table 9.3 Suitability Assessment

Suitability		Target Lawson comfort and safety criteria for specified seasons
Outdoor seating	For long periods of sitting, such as for an outdoor café or picnic area.	'Long-term sitting' (C4) in at least summer.
Entrances, waiting areas	For pedestrian ingress/egress at entrances, or short periods of sitting or standing such as at a bus stop, taxi rank, meeting point, window shopping, etc.	'Standing or short-term sitting' (C3) in all seasons.
General leisure (excluding seating areas)	For leisure uses excluding long periods of outdoor sitting, such as active leisure, general park spaces, children's play area, etc.	'Standing or short-term sitting' (C3) from spring to autumn.
Thoroughfare	For pedestrian access to, and passage through, the Site and surrounding area.	'Walking or strolling' (C2) desired in all seasons but 'Business walking' (C1) could be acceptable in some areas.
Unsuitable	Unsuitable for all activities.	Exceeds comfort criterion for 'Business walking' (C1) or safety criteria (S1/S2).

Limitations and Assumptions

9.15 The assessment represents a professional opinion of likely effects and provides an expert qualitative review of expected pedestrian level wind conditions, based on consideration of the massing and exposure of the Proposed Development in conjunction with long-term wind statistics applicable to the Site.

9.16 Historical wind statistics are used as standard practice due, in part, to lack of certainty in potential future changes in wind patterns, though any changes are expected to be minor.

SIGNIFICANCE OF IMPACT

9.17 The significance of any effects is assessed based on the likely suitability of wind conditions in each area against the current or planned pedestrian activities, with the sensitivity of receptors considered high.

- Effects on pedestrian safety are generally considered major. Where the effect is of small spatial extent and is marginal relative to the safety criteria, it is considered moderate.

- Effects on pedestrian comfort where conditions change from suitable to unsuitable (for adverse impact) or from unsuitable to suitable (for beneficial impact) for current or planned activities are deemed moderate.
- Where conditions change from marginal (or tolerable) to suitable or unsuitable for current or planned activities the effect is deemed minor. Similarly a change from suitable or unsuitable to marginal / tolerable is also deemed minor.
- Any effect that does not alter the suitability of wind conditions with respect to current or planned activities is considered negligible.

9.18 As an example, where conditions at a building frontage with no current entrances are suitable only for strolling and a proposed development introduced an entrance in this area, wind conditions would need to improve to be suitable for pedestrian ingress / egress for the effect to be negligible. If wind conditions became marginally windy for an entrance, the effect would be minor adverse even if wind speeds were lower, due to the introduction of a more sensitive activity.

9.19 Where existing conditions are calmer than required, an increase in wind speeds could be accommodated without the effect being significant, provided conditions remain suitable for pedestrian activities.

BASELINE CONDITIONS

9.20 The wind climate expected at the Site is summarised in Figure 9.1 in terms of the annual and seasonal wind speed and direction probability distributions at a reference height of 33 m, corresponding to the approximate maximum roof height of the Proposed Development, relative to local ground level.

9.21 Based on the wind climate statistics, the prevailing winds at the Site blow from the south-westerly sector. Wind speeds are generally highest during winter, when the most frequent strong winds blow from the west-south-west. Wind speeds are generally lower during summer. North-easterly winds are common during spring but, although potentially cold, these winds are generally light. South-easterly winds are generally light, rarely occurring and usually do not cause adverse impacts on pedestrian level conditions.

9.22 Applying these wind statistics at the Site, an area free from localised building effects (either sheltering or acceleration) would be expected to generally experience pedestrian level wind conditions rated (in accordance with the Lawson criteria) as comfortable for 'standing or short-term sitting' from spring to autumn, though winter conditions may be marginal for such uses and may be suitable only for ‘leisurely strolling’ in more open areas.

9.23 The existing Site has been cleared of previous buildings and vegetation. In addition, there is currently no public access to the Site and thus no sensitive uses. On this basis, existing conditions within the Site are expected to be safe and comfortable for any required work activities.

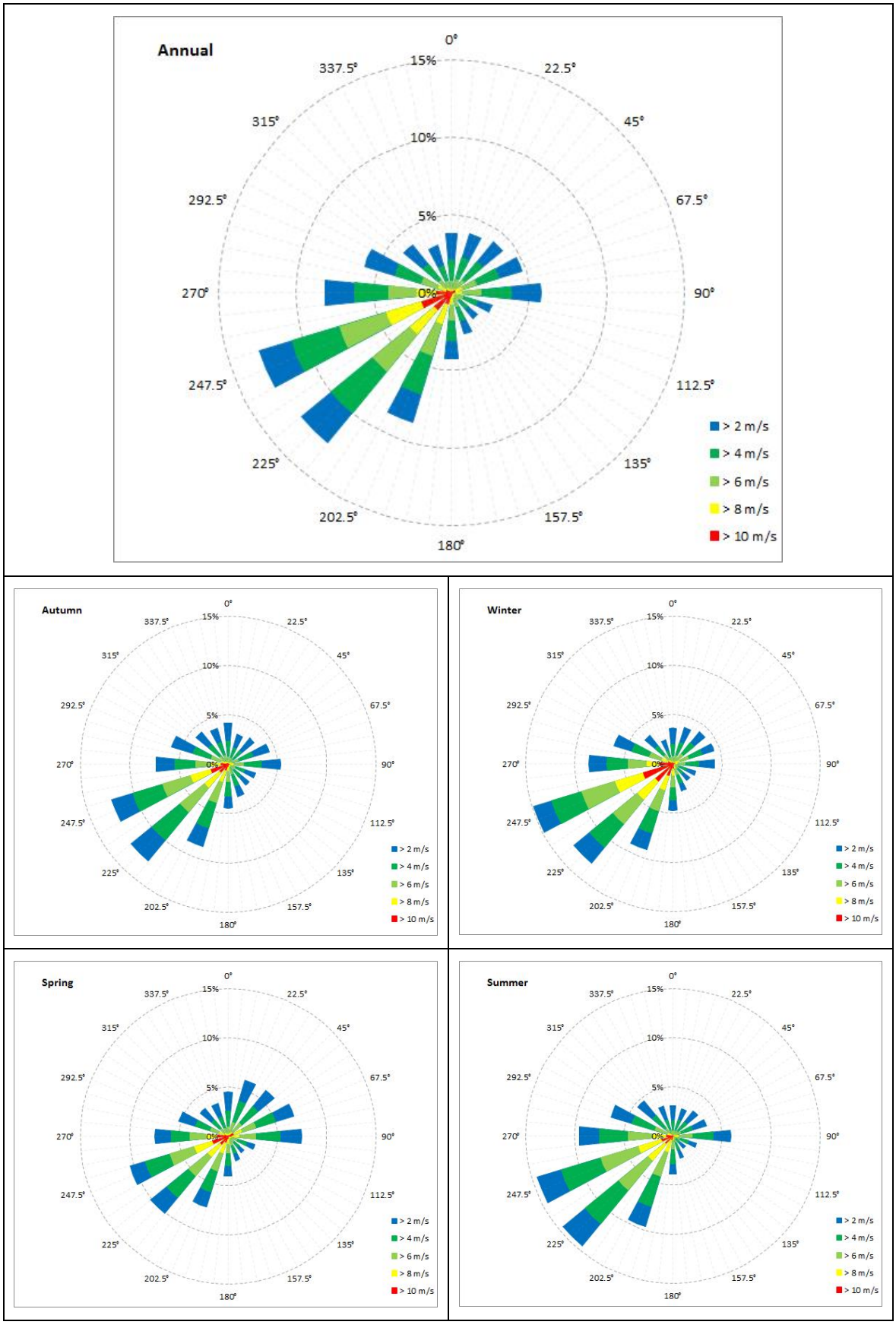
9.24 The surrounding area mainly comprises decommissioned industrial buildings and large areas of cleared land to the north of the Site, low-level commercial buildings to the east and a warehouse (with Welwyn Garden City railway station and The Howard Centre beyond) to the west. To the south of the Site, the consented Phase 1 development (of the Former Shredded Wheat Factory Site – South Side) has commenced construction. However this is considered under the cumulative effects section and the baseline assessment considers a cleared site to the south.

9.25 In the absence of any dominant structures in and around the Site, existing pedestrian level wind conditions are expected to be dictated by exposure to prevailing south-westerly winds.

9.26 On this basis, conditions around the existing Site are expected to rate as safe for all users, in accordance with the Lawson criteria for pedestrian safety.

9.27 In terms of pedestrian comfort, surrounding thoroughfares are expected to be suitable for at least leisurely strolling and entrances to surrounding buildings are generally expected to enjoy suitable conditions for pedestrian ingress / egress. The platforms at Welwyn Garden City railway station are sheltered from prevailing south-westerly winds by the adjacent retail centre and are also expected to experience suitable conditions for short periods of standing or sitting, awaiting a train. No amenity spaces have been identified within the immediate surrounding area.

Figure 9.1 Wind Climate at Site (at reference height of 33 m)



IDENTIFICATION AND EVALUATION OF KEY EFFECTS

Construction Phase

9.28 The wind environment is largely dictated by the building masses which will vary throughout the construction phase, such that any effects will be short term, though the exposure of surrounding receptors to prevailing winds will not be significantly increased at any stage. Pedestrian activities within the Site will also be different during construction and will include restrictions on pedestrian movements in some areas for health and safety reasons. Pedestrian perception of conditions both within the Site and in the surrounding area is also likely to be affected by expectations of conditions around a building site, with pedestrians more likely to tolerate adverse conditions as they can appreciate it as a temporary situation. Therefore, the assessment of wind environment has been limited to the operational phase of the Proposed Development.

Operational Phase

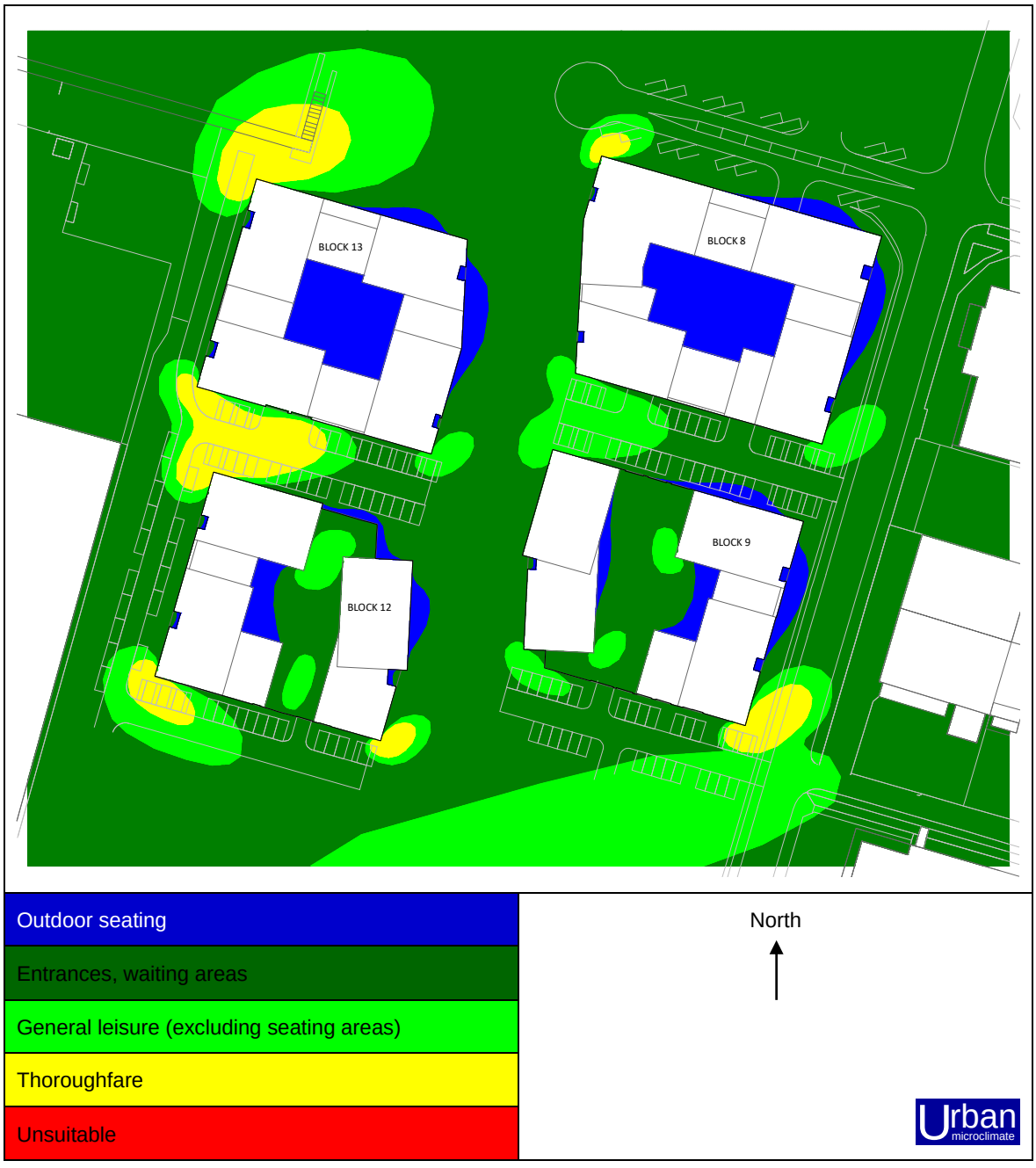
9.29 The completed Proposed Development will comprise buildings of modest height in terms of wind effects, which will limit the potential for significant downdraughts (where higher speed winds from higher levels would be deflected down towards ground level). However, the Site is relatively exposed and the buildings do represent significant obstructions to winds approaching from most directions. There is therefore potential for channelling of pedestrian level winds around and between the buildings. In particular, the northwest and southwest corners of the western plots (Blocks 12 and 13) and the southwest and southeast corners of the southern plots (Blocks 12 and 9) are potentially susceptible to prevailing south-westerly winds accelerating around the corners.

9.30 The highest wind speeds are generally expected to occur around the exposed northwest corner of Block 13. In the absence of the future Former Shredded Wheat Factory Site – North Side development, it is expected that hoardings would be included along the neighbouring site boundary, which would help alleviate channelling of prevailing south-westerly and westerly winds into the open space to the north of Block 13.

9.31 The Proposed Development also includes proposals for substantial soft-landscaping. This includes large, semi-mature, deciduous trees (ranging in heights from around 4 - 5 m up to around 5 - 7 m) with dense canopies around the Site perimeter and along the linear park, between the plots. Areas of shrub planting also include tall shrubs or hedging in key areas, such as around seating. The soft landscaping is expected to help alleviate the channelled winds.

9.32 The expected pedestrian level wind environment in and around the Site, resulting from the above effects, is discussed below and indicatively presented in terms of suitability for pedestrian activities in Figure 9.2 (based on the categories described in Table 9.3). Figure 9.2 accounts for the general effects of the proposed landscaping but, at the current level of assessment, does not account for very localised effects of individual elements, though these features are discussed below, where relevant.

Figure 9.2 Suitability Assessment



Pedestrian Safety

9.33 As discussed above, the Proposed Development is of modest height in terms of wind effects. As a result, pedestrian level wind conditions in and around the Site are expected to remain rated as safe for all users.

9.34 The Proposed Development is therefore expected to have **negligible** effect with respect to pedestrian safety.

Pedestrian Comfort

Thoroughfares

9.35 In terms of pedestrian comfort, with respect to wind force, there is potential for wind conditions around the northwest corners of Blocks 12 and 13 and the southeast corner of Block 9 to be marginally windy for leisurely strolling during winter, with conditions being suitable, ideally, only for fast walking normally associated with business activities. However, winter conditions are expected to be only marginally above the Lawson criterion for leisurely strolling and are likely to be considered tolerable for pedestrian access to and passage through or past the Proposed Development. This potential effect is therefore considered to be of **minor adverse** significance.

9.36 Otherwise, conditions on thoroughfares within and alongside the Site are expected to be suitable for at least leisurely strolling and are therefore expected to suitable for pedestrian access to, and passage through or past, the Proposed Development. The likely wider effect on thoroughfares is therefore considered **negligible**.

Building Entrances

9.37 The main residential entrances to the Proposed Development are recessed and / or located away from areas of potential accelerated winds discussed above, and are expected to enjoy suitable conditions for pedestrian ingress / egress. The likely effect on the main residential entrances is therefore considered **negligible**.

Amenity Spaces

9.38 Most of the linear park, running from north to south through the centre of the Site, including the areas with benches, is expected to enjoy suitable conditions for at least short periods of sitting throughout the year and would be considered suitable for a meeting point or children's play space, for example. Benches will also be locally sheltered by hedging of around 1.2 m height and, subject to appropriate configuration of these elements, it is expected that suitable conditions for long periods of outdoor sitting, such as for picnics, could be achieved during at least summer. The effect on the linear park is therefore considered **negligible**.

9.39 The central, podium-level, courtyards within Blocks 8 and 13 are substantially enclosed and are expected to enjoy amenable conditions for recreational uses, including outdoor seating during at least summer. These effects are considered **negligible**.

9.40 The Block 9 and 12 podium-level courtyards are more open and, particularly in the absence of the Phase 1 development, are potentially susceptible to channelling of prevailing south-westerly winds along the podium spaces. Resulting conditions are expected to be suitable for general recreational activities including at least short periods of standing or sitting from spring through to autumn, and would be considered suitable for a play space for example. However, suitable conditions for longer periods of outdoor sitting, such as for picnics, may be limited to the more sheltered recessed areas and areas benefiting from localised sheltered from hedging (once the hedges mature). Overall, this mix of conditions would generally be considered acceptable for a large amenity space, and this effect is considered **negligible** to no worse than **minor adverse**.

Surrounding Area

9.41 The Proposed Development is not expected to have any significant effect on the suitability of wind conditions within the surrounding area. Surrounding thoroughfares are expected to remain suitable for at least leisurely strolling. Entrances to surrounding buildings are expected to generally retain suitable conditions for pedestrian ingress / egress, and the platforms at Welwyn Garden City railway station are expected to retain suitable conditions for short periods of standing, awaiting a train. The likely effect on the suitability of surrounding wind conditions is therefore considered **negligible**.

Roof-top Terraces

9.42 The Proposed Development's roof-top terraces are generally expected to enjoy suitable conditions for recreational uses including at least short of sitting or standing, and would be considered suitable for uses such as viewing or play spaces. Furthermore, the terraces will include raised planters and will allow for hedgerows and taller shrubs around seating areas. With appropriate configuration of these elements to shelter the seating, it is expected that suitable conditions for long periods of outdoor sitting will be enjoyed during at least summer. Overall, the effect on the Proposed Development's roof-top terrace is considered **negligible**.

Potential for Additional Effects within the Constraints of the Phase 3 Parameter Plans

9.43 The above assessment is based on the Illustrative Scheme for Blocks 8 and 13 (submitted in outline), as representative of 'likely' Site conditions. Overall, the Illustrative Scheme is similar in massing and layout to the Parameter Plans. Relative to the Illustrative Scheme, the Parameters would allow potential increases in the heights of taller blocks by up to around 1.8 m. Provided that the detailed design of the buildings and landscaping takes account of the wind effects and design features discussed above, particularly with regards to entrances and amenity spaces, no significant additional effects within the constraints of the Parameter Plans are expected.

CUMULATIVE EFFECTS

9.44 Newly completed, or nearing completion, developments within the immediate surrounding area are accounted for in the baseline and impact assessments discussed above.

9.45 With regards to consented future surrounding developments, the only schemes with potential for significant cumulative wind microclimate effects are Phase 1 of the Former Shredded Wheat Factory Site – South Side and the Former Shredded Wheat Factory Site – North Side development, to the south and north of the Site respectively.

9.46 The main effect of these future developments on conditions within the Proposed Development is expected to be an increase in the shelter from prevailing south-westerly along the south of the Site. In particular, conditions around the southeast corner of Block 9 are expected to improve to be suitable for leisurely strolling and the Block 9 and 12 podium level courtyard may also be enhanced, particularly in the south parts of each podium space.

However, this is not expected to materially affect the overall significance of effects within the Site, which are expected to remain **negligible** to **minor adverse**.

9.47 The Proposed Development lies to the north-north-east of Phase 1 of the South Side and is unlikely to have any significant adverse effects on conditions within Phase 1, which are expected to be dictated by prevailing south-westerly winds.

9.48 With regards to the North Side, there is potential for the Proposed Development to channel prevailing south-westerly winds between Block 13 and the Bridge Community Building, towards the space between the North Side's Block 1 and LDS Building. Although this space benefits from significant soft-landscaping, and the accelerated winds around the northwest corner of Block 13 are expected to be reduced relative to the existing surrounding context (due to the back-pressure created by the North Side development and the associated landscaping), there is potential for conditions to be slightly windy for short periods of sitting, such as for a meeting point, at least during winter. However, the adjacent Sensory Garden, between Block 1 and the Bridge Community Building is not expected to be significantly affected and is expected to generally enjoy suitable conditions for outdoor seating. Given the close proximity of this more amenable environment, conditions are overall expected to be at least tolerable for proposed recreational uses and this localised effect would be considered **negligible** to no worse than **minor adverse**.

9.49 Otherwise, no further significant cumulative effects are expected and conditions in and around the Site are expected to be similar to those discussed above for the Proposed Development with the existing surrounding context

Inter-Relationship Effects

9.50 There are no inter relationships with other topics identified.

ENHANCEMENT, MITIGATION AND RESIDUAL EFFECTS

9.51 Enhancement measures mainly comprise localised sheltering of seating through hedging, tall shrub planting or screening, as discussed above.

9.52 With these measures implemented, conditions within the Site are expected to be generally suitable, and no worse than tolerable, for planned pedestrian activities and no further mitigation is proposed. Expected residual effects are therefore as discussed above.

SUMMARY

9.53 The Proposed Development is expected to have **negligible** effect on pedestrian level wind conditions with regards to pedestrian safety, and conditions in and around the Site are expected to rate as safe for all users.

9.54 In terms of pedestrian comfort, with respect to wind force, thoroughfares within and alongside the Site are expected to be generally suitable, and at least tolerable, for pedestrian access to, and passage through or past, the Proposed Development. These effects are considered to range from **negligible** to **minor adverse**.

9.55 Main entrances to the Proposed Development are expected to enjoy suitable conditions for pedestrian ingress / egress. Effects on entrances are therefore considered **negligible**.

9.56 Recreational spaces are expected to have generally suitable, and no worse than tolerable, conditions for planned activities. Effects on amenity spaces are therefore mainly **negligible** with some localised effects of no worse than **minor adverse** significance.

9.57 The Proposed Development is expected to have **negligible** effect on the pedestrian level wind conditions within the existing surrounding area.

9.58 Any adverse cumulative effects are expected to be limited to no worse than localised **minor adverse**, at the space between the North Side's Block 1 and LDS Building.

REFERENCES

Ref. 9.1: BS EN 1991-1-4:2005 Eurocode 1: Actions on structures - Part 1-4: General actions - Wind actions

Ref. 9.2: Chartered Association of Building Engineers and English Heritage. “Guidance on Tall Buildings” (July 2007)

Ref. 9.3: Lawson, T.V "The Determination of the Wind Environment of a Building Complex before Construction" Department of Aerospace Engineering, University of Bristol Report Number TVL 9025 (May 1990)

10 NOISE AND VIBRATION

INTRODUCTION

10.1 This chapter of the Environmental Statement (ES) assesses the likely environmental significant effects, with respect to noise and vibration

10.2 In the context of this assessment, noise is defined as unwanted or undesirable sound derived from sources such as road traffic, or construction works that interfere with normal activities, including conversation, sleep or recreation. Vibration is defined as the transmission of energy through the medium of ground or air resulting in small movements of the transmitting medium, such as a building, which can cause discomfort or even damage to structures if the movements are large enough.

10.3 In summary, the chapter addresses:

- The potential constraints from existing sources of noise on the internal and external noise environments at the Proposed Development and where necessary, the types of measures that might be adopted to overcome these constraints;
- The impact of noise and vibration on existing sensitive receptors during the demolition and construction phase;
- The potential effect of road traffic noise from the Proposed Development on surrounding sensitive receptors following completion and habitation of the Proposed Development: and
- The effect of the existing noise and vibration climate on the Development.

10.4 A glossary of common noise terminology is provided in **Appendix 10.1**

10.5 The assessment has considered the noise and vibration effects from the Proposed Development as shown on the Site Layout Plan in **Appendix 10.2.**

LEGISLATION, PLANNING POLICY AND GUIDANCE

National Policy: National Planning Policy Framework

10.6 The National Planning Policy Framework (NPPF) (February 2019) sets out the Government's planning policies for England and how these should be applied. At the heart of the NPPF is a presumption in favour of sustainable development.

10.7 Under Section 15; Conserving and enhancing the natural environment, the following is stated in paragraph 170:

> *"Planning policies and decisions should contribute to and enhance the natural and local environment by:*
>
> *preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability"*

10.8 The NPPF goes on to state in paragraph 180 that:

> *"Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:*
>
> *a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;*
>
> *b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason"*

Noise Policy Statement for England, 2010 (NPSE)

10.9 The NPSE seeks to clarify the underlying principles and aims in existing policy documents, legislation and guidance that relate to noise. It also sets out the long term vision of Government noise policy:

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

10.10 The NPSE clarifies that noise should not be considered in isolation of the wider benefits of a scheme or development, and that the intention is to minimise noise and noise effects as far as is reasonably practicable having regard to the underlying principles of sustainable development.

10.11 The first two aims of the NPSE follow established concepts from toxicology that are applied to noise impacts, for example, by the World Health Organisation. They are:

- NOEL – No Observed Effect Level - the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise; and
- LOAEL – Lowest Observed Adverse Effect Level - the level above which adverse effects on health and quality of life can be detected.

10.12 The NPSE extends these to the concept of a significant observed adverse effect level.

- SOAEL – Significant Observed Adverse Effect Level - The level above which significant adverse effects on health and quality of life occur.

10.13 The NPSE notes:

> *"it is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times".*

Planning Practice Guidance (PPG) – Noise

10.14 The Government's PPG on noise provides guidance on the effects of noise exposure, relating these to people's perception of noise, and linking them to the NOEL and, as exposure increases, the LOAEL and SOAEL.

10.15 As exposure increases above the LOAEL, the noise begins to have an adverse effect and consideration needs to be given to mitigating and minimising those effects, taking account of the economic and social benefits being derived from the activity causing the noise. As the noise exposure increases, it will then at some point cross the SOAEL boundary.

10.16 The LOAEL is described in PPG as the level above which "noise starts to cause small changes in behaviour and / or attitude e.g. turning up the volume of the television, speaking more loudly, or, where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life."

10.17 PPG identifies the SOAEL as the level above which "noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area."

Welwyn Hatfield District Plan, 2005

10.18 The District Plan was produced to cover the period up to 2011 and will be replaced by the Welwyn Hatfield Borough Council Local Plan. The District Plan is the currently adopted local plan and policies have been saved until the adoption of the current draft Local Plan and the plan contains the local planning framework, policies and proposals used to guide the development of the local area.

10.19 The council aims to ensure that noise-sensitive developments are protected from potential sources of noise in order to maintain a good quality of life with respect to potential noise impacts.

10.20 The District Plan identifies that proposal for development should consider possible increase in future noise levels and newly introduced potentially noisy activities. Proposal should identify the need for mitigation and where required identify the level of mitigation required.

10.21 Policy R19 of the District Plan requires that proposals do not generate unacceptable noise or vibration at existing sensitive receptors and that proposed sensitive receptors would not be affected by unacceptable levels of noise or vibration

10.22 The policy identifies that permission will be granted where adequate protection of noise and vibration can be achieved for both existing and proposed sensitive receptors.

Welwyn Hatfield Borough Council Draft Local Plan, 2016

10.23 The Welwyn Hatfield Local Plan sets out the framework for the borough for the years 2013-2032 and provides policies for proposal within the district.

10.24 The plan identifies that available and up to date guidance and British Standards are used within noise and vibration assessments to ensure robust collection and assessment of data is achieved.

10.25 Policy SADM 18 requires that a noise and vibration impact assessment is undertaken where there is a potential for impacts due to the introduction of the proposal. The policy sets out the required approach to noise and vibration that should be adopted to ensure an acceptable environment.

ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

Construction Phase Methodology

10.26 The impact of noise and vibration during construction of the Proposed Development requires prediction and assessment in accordance with the guidance presented in BS 5228 1:2009+A1:2014 ‘Code of practice for noise and vibration control on construction and open sites. Noise’ (Ref 9.3).

Changes in Road Traffic Noise

10.27 The impact of changes in noise level resulting from changes in traffic flow and composition on existing roads as a result of the operational development requires assessment in accordance with the guidance presented in the Design Manual for Roads and Bridges (DMRB) Volume 11, Section 3 Part 7 – HD 213/11 Noise and Vibration, 2011 (Ref 10.4).

Sound from Proposed Fixed Plant

10.28 Limits relating to the introduction of any plant or commercial sources are derived based on the guidance presented by BS 4142:2014+A1:2019 'Methods for Rating and Assessing Industrial and Commercial Sound' (Ref 10.5).

Noise at Proposed Residential Properties

10.29 The ambient noise at residential dwellings is assessed against the guidance provided by BS 8233:2014 'Sound Insulation and Noise Reduction for Buildings' for both the day and night-time periods (Ref 10.6).

10.30 Night time maximum noise levels are assessed against the guideline noise level for the onset of sleep disturbance provided by the WHO Guidelines for Community Noise (Ref 10.7).

ASSESSMENT CRITERIA

10.31 The measurement, prediction and assessment of noise and vibration levels associated with the Proposed Development and the significance of their potential impacts have been assessed in accordance with national and local planning policy and guidance and recognised codes of practice. A three-stage process has been adopted. First, the sensitivity of the noise and vibration receptors is assessed. This is followed by an assessment of the magnitude of the noise and vibration impacts and finally the significance of impacts. These are discussed below and have been specifically applied to the following conceptual significance impact matrix as appropriate.

Sensitivity

10.32 The criteria set out in Table 10.1 below have been applied to identify noise/vibration sensitive receptors either on or adjacent to the Site. The receptors are termed 'local' (within 600m of the Site).

Table 10.1 – Noise and Vibration Receptors

Sensitivity	Description	Receptor
High	Receptors that are especially susceptible to noise/vibration	Residential dwellings, Schools, Hospitals, Care Homes
Moderate	Receptors where a reasonable degree of noise disturbance is acceptable	Offices
Low	Receptors where noise is tolerable	Retail shops, restaurants
Negligible	Receptors where noise is not likely to be a factor	Sports Grounds, commercial and industrial environments

Effect Magnitude: Construction Phase

10.33 Noise levels generated by construction activities have the potential to impact upon nearby noise-sensitive receptors. However, the magnitude of the potential impact will depend upon a number of variables, such as:

- the noise generated by plant or equipment used on site;
- the period of time that construction plant is operational;
- the distance between the noise source and the receptor; and
- the level of likely attenuation due to ground absorption and barrier effects.

10.34 BS 5228 sets out a methodology for predicting, assessing and controlling noise levels arising from a wide variety of construction and related activities. As such, it can be used to predict noise levels arising from the operations at proposed construction sites. BS 5228 also sets out tables of sound power levels generated by a wide variety of construction plant to facilitate such predictions.

10.35 The prediction procedure essentially involves taking the source noise level of each item of plant and correcting it for (i) distance effects between source and receiver (ii) percentage operating time of the plant; (iii) barrier attenuation effects; (iv) ground absorption; and (v) facade corrections. The latter correction involves a 3dB noise increase due to the reflection effects for a receiving point location 1m in front of a building facade.

10.36 Noise levels generated by the proposed site operations and experienced at local receptors will depend upon a number of variables, for example:

- the amount of noise generated by plant and equipment being used at the development site generally expressed as a sound power level;
- the periods of operation of the plant at the development site, known as the 'on-time';
- the distance between the noise source and the receptor, known as the 'stand-off';
- the attenuation due to potential barrier effects; and
- the reflection of noise due to the presence of hard vertical faces such as walls.

10.37 BS 5228 gives several examples of acceptable limits for construction or demolition noise. The most simplistic being based upon the exceedance of fixed noise limits and states in paragraph E.2:

> *"Noise from construction and demolition sites should not exceed the level at which conversation in the nearest building would be difficult with the windows shut.".*

> *"Noise levels, between say 07.00 and 19.00 hours, outside the nearest window of the occupied room closest to the site boundary should not exceed: 70 decibels (dBA) in rural, suburban areas away from main road traffic and industrial noise or 75 decibels (dBA) in urban areas near main roads in heavy industrial areas. These limits are for daytime working outside living rooms and offices."*

10.38 The construction noise impact considers the noise magnitude and adverse effect levels as provided in the Noise Policy Statement for England, 2010 (Ref 10.8) and the Planning practice guidance (PPG) provided in March 2014 and last updated in July 2019 by the Department for Communities & Local Government in its on-line planning guidance to assist with interpretation of the NPPF as shown in Table 10.2.

Table 10.2 - Construction Noise Magnitude

Day	Time (hours)	Averaging Period T	LOAEL $L_{pAeq,T}$ (dB)	SOAEL $L_{pAeq,T}$ (dB)*
Mondays to Fridays	0700 - 0800	1 hour	60	70
	0800 - 1800	10 hours	65	75
	1800 - 1900	1 hour	60	70
	1900 - 2200	1 hour	55	65
Saturdays	0700 - 0800	1 hour	60	70
	0800 - 1300	5 hours	65	75
	1300 - 1400	1 hour	60	70
	1400 - 2200	1 hour	55	65
Sundays & Public Holidays	0700 - 2200	1 hour	55	65
Any night	2200 - 0700	1 hour	45	55

* The measured levels should be monitored in order to ensure that the levels presented in the table are not exceeded for a period of 10 or more days of working in any 15 consecutive days or for a total number of days exceeding 40 in any 6 consecutive months.

10.39 It is worth noting that the purpose of the target construction noise criteria is to control the impact of construction noise insofar as is reasonably practicable, whilst recognising that it is unrealistic for developments of this nature to be constructed without causing some degree of disturbance in the locality. Hence, even if the criteria adopted for this assessment is achieved, noise from construction activities is likely to be readily noticeable. It is further noted that the local authority may restrict the hours of construction and construction related traffic on the site.

Construction Vibration

10.40 Vibration may be impulsive, such as that due to hammer-driven piling; transient, such as that due to vehicle movements along a railway; or continuous, such as that due to vibratory driven piling. The primary cause of community concern generally relates to building damage from both construction and operational sources of vibration, although, the human body can perceive vibration at levels which are substantially lower than those required to cause building damage.

10.41 Damage to buildings associated solely with ground-borne vibration is not common and although vibration may be noticeable, there is little evidence to suggest that they produce cosmetic damage such as a crack in plaster unless the magnitude of the vibration is excessively high. The most likely impact, where elevated levels of vibration do occur during the construction phase, is associated with perceptibility.

10.42 BS 5228 indicates that the threshold of human perception to vibration is around 0.15mm/s, although it is generally accepted that for the majority of people vibration levels in excess of between 0.15 and 0.3 mm/s peak particle velocity (PPV) are just perceptible.

10.43 There are currently no British Standards that provide a methodology to predict levels of vibration from construction activities, other than that contained within BS 5228 which relates to percussive or vibratory piling only. Therefore, it is not possible to accurately predict levels of vibration during the site preparation and construction phases of the development. As such, to control the impact of vibration during the site preparation and construction of the Proposed Development, limits relating to the perceptibility of vibration have been set.

10.44 Accordingly 1 mm/s ppv has been selected as the target criteria to control the impact of construction vibration, with the criteria for assessing the magnitude of vibration impacts according to the margin by which this target criterion is achieved or exceeded presented in Table 10.3 below. This target criterion is based on the guidance contained within BS 5228, experience from previous sites and accepted vibration policy criteria across a range of enforcing authorities elsewhere in the UK. The limits are presented in terms of peak particle velocity (PPV) as it is the simplest indicator for both perceptibility and building damage.

Table 10.3 - Ground- vibration effect levels for permanent residential buildings

Vibration		
Lowest Observed Adverse Effect Level	PPV mm/s	1
Significant Observed Adverse Effect Level	PPV mm/s	10

10.45 Again, it is worth noting that the purpose of the target construction vibration criteria is to control the impact of construction vibration insofar as is reasonably practicable and is entirely based on the likelihood of the vibration being perceptible, rather than causing damage to property. Hence, although vibration levels in excess of 1 mm/s ppv would be considered a Major Adverse impact in respect of the likelihood of perceptibility, they would not be considered significant in terms of the potential for building damage, which would require levels of at least 15 mm/s ppv to result in minor cosmetic damage in light / unreinforced buildings.

Effect Magnitude: Completed Development

10.46 The aim of noise policy within the UK is to protect individuals from excessive noise levels both in the workplace and within their homes. It has been recognised that severe annoyance to individuals due to noise can lead to sleep disturbance and adverse health effects.

10.47 The NPPF does not give a set of criteria for external noise assessment and therefore guidance within contemporary British Standards and other internationally published documents has been considered.

10.48 For the purposes of this assessment, external noise levels for residential use have been applied to the residential accommodation and derived on the basis of internal noise criteria outlined in British Standard 8233 and World Health Organisation (WHO) guidance.

10.49 BS 8233 makes recommendations for the control of noise in and around buildings. It suggests appropriate criteria for different situations, and is primarily intended to guide the design of new or refurbished buildings undergoing a change of use rather than to assess the effect of changes in the external noise climate. The guidance provides desirable indoor ambient noise levels for dwellings which are summarised in Table 10.4 below.

Table 10.4 - Noise Criteria for Residential Use Buildings

Activity	Location	0700 to 2300	2300 to 0700
Resting	Living room	35 dB $L_{Aeq,16\ hour}$	-
Dining	Dining room/area	40 dB $L_{Aeq,16\ hour}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16\ hour}$	35 dB $L_{Aeq,8\ hour}$
Note 4 Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or $L_{Amax,f}$ depending on the character and number of events per night. Sporadic noise events could require separate values.			

10.50 To allow a quantitative assessment of effect significance, effects have been assigned based on the excess of the BS 8233 criteria and the typical façade reductions, as provided within BS 8233. Reductions of 15 dB and 33 dB are typically afforded for partially open and closed windows, respectively.

10.51 Accordingly, where a reduction of 15 dB is required to achieve the BS 8223 criteria this is an indication that no mitigation is required. The effect is therefore considered as Negligible.

10.52 A 3 dB increase in noise level is considered to constitute a perceptible change, with a 10 dB increase resulting in a perceived doubling in sound level. A Minor effect is considered to be present in instances up to 9 dB above the Negligible criteria, where a sound may be perceived as no more than twice as loud as noise levels at the Negligible threshold value. Where the criteria is exceeded by more than 15 dB and up to 24 dB a Minor significance of effect is identified.

10.53 Based on the 33 dB reduction provided within BS 8233 for closed windows, noise levels up to 33 dB above the BS 8233 criteria are controllable with typical insulated double glazing and adequate ventilation. An identified required façade reduction between 25 and 33 dB is therefore considered a Moderate effect.

10.54 Where the required façade reduction exceeds 33 dB, a Major effect is identified. Sufficient glazing and ventilation would be likely for habitable rooms that are subject to these effects in order to suitably reduce internal noise levels.

10.55 For all identified effects, the significance could be considered as Negligible with the installation of typical glazing and ventilation options. Where suitable glazing and ventilation options are required, windows may remain openable to allow for purge ventilation or to be used at the occupants' discretion.

10.56 BS8233:2014 states that for traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments. However, it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable.

10.57 In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited.

10.58 The internal noise levels recommended in BS 8233 are almost identical to those presented in WHO guidelines for community noise (internal to buildings). Internally, the WHO guidance is that in order to avoid sleep disturbance the period noise level ($L_{Aeq,T}$) should not exceed 30 dB and individual noise events should not exceed 45 dB L_{Amax}. Section 3.4 of the WHO Guidelines states that for good sleep, indoor noise levels should not exceed approximately 45 dB L_{Amax} more than 10-15 times a night. On the basis of the WHO's 15 dB façade insulation for windows partly open; this equates to external L_{Amax} of 60 dB that should not be exceeded more than 10-15 times per night.

Fixed Plant and Commercial Activity

10.59 British Standard BS 4142:2014+A1:2019 Methods for Rating and Assessing Industrial and Commercial Sound is intended to be used for the assessment of whether sound of industrial and/or commercial nature is likely to give rise to complaints from people residing in nearby dwellings. The Standard, which was updated in 2014, states that such sound can include:

- sound from industrial and manufacturing processes;
- sound from fixed installations which comprise mechanical and electrical plant and equipment;
- sound from the loading and unloading of goods and materials at industrial and/or commercial premises; and,
- sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes, such as that from forklift trucks, or that from train or ship movements on or around an industrial and/or commercial site.

10.60 The procedure contained in BS 4142 for assessing the likelihood of complaints is to compare the measured or predicted sound level from the source in question, the 'specific sound level', at the assessment position with the background sound level. Where sound contains acoustic features, such as tonality, impulsivity or other noticeable characteristics then a correction is added to the specific sound to obtain the 'rating level' that reflects the contextual setting of the Site.

10.61 To assess the likelihood of complaints, the measured background sound level is subtracted from the rating level. BS 4142 states:

'Typically, the greater this difference, the greater the magnitude of the impact;

- *A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context;*

- *A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context; and,*

- *The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.'*

10.62 BS 4142 also states that "where a new noise-sensitive receptor is introduced and there is extant industrial and/or commercial sound, it ought to be recognized that the industrial and/or commercial sound forms a component of the acoustic environment. In such circumstances other guidance and criteria in addition to or alternative to this standard can also inform the appropriateness of both introducing a new noise-sensitive receptor and the extent of required noise mitigation."

10.63 Further to the above, extant commercial activity would be suitably covered within the assessment of the completed development. Accordingly, the internal ambient noise levels at residential properties, inclusive of any extant commercial activity, should remain below the threshold criteria provided in BS 8233.

Road Traffic Noise

10.64 The impact of any changes in road traffic noise levels has been considered against the principles and guidance presented within the Design Manual for Roads and Bridges (DMRB) Part 7 HD213/11 Noise and Vibration, 2011. DMRB presents an impact significance matrix for assessing the magnitude of changes in noise level for the short and long term and can be used as criteria for assessing the impact of any changes in road traffic noise levels, as shown in Tables 10.5 and 10.6.

10.65 The DMRB states that:

> *'The impact of a Proposed Development at any location can be reported in terms of changes in absolute noise level. In the UK the standard index used for traffic noise is the $L_{A10,18hr}$ level, which is quoted in decibels'*

10.66 In order to determine whether changes in traffic noise levels are likely to occur as a result of the Proposed Development, noise levels have been predicted in accordance with the methodology contained within the Calculation of Road Traffic Noise (CRTN) (Ref 10.9), based on traffic flow data for the local road network with and without the Proposed Development.

Table 10.5 - Semantic Descriptors for Traffic Noise in the Short Term

Change in Noise Level $L_{A10,18\ hr}$ dB	Magnitude of Impact
0	No Change
0.1 to 0.9	Negligible
1 to 2.9	Minor
3 to 4.9	Moderate
5+	Major

Table 10.6 - Semantic Descriptors for Traffic Noise in the Long Term

Change in Noise Level $L_{A10,18\ hr}$ dB	Magnitude of Impact
0	No Change
0.1 to 2.9	Negligible
3 to 4.9	Minor
5 to 9.9	Moderate
10+	Major

BASELINE CONDITIONS

10.67 Due to the current COVID-19 issues, road traffic and rail movements may be limited. The ambient environment is therefore likely to be atypical and not conducive to a representative assessment of noise levels at the Proposed Development.

10.68 Therefore, the ambient noise conditions across the Site for the year of opening have been determined by computer noise modelling in conjunction with consideration of traffic data for the year 2025 and noise data obtained during the June 2018 survey.

10.69 Following completion and validation of the 2018 noise model, the traffic links/flows for 2025 (with development) were incorporated in order to calculate future ambient noise across the Proposed Development.

10.70 The primary purpose of the noise survey was to gather acoustic information on the baseline noise levels at the Site during daytime and night-time periods. This data is used to validate a computer noise model for the assessment of the suitability of the Site for residential development.

10.71 The noise measurements were undertaken at two locations with the microphones at a height of 1.5 metres above local ground level and under free-field conditions. The microphones were fitted with protective windshields for the measurements. All measurement equipment used during the noise surveys conformed to relevant Type 1 specifications.

10.72 A summary of the noise measurement is presented in Table 10.7. The noise measurement locations are shown in **Appendix 10.2**.

Table 10.7 – Summary of Measured Noise Levels

Monitoring Position	Measured Sound Pressure Level, dB re. 2x10-5 Pa.		Measured Sound Pressure Level, dB re. 2x10-5 Pa.		
	Day Time (07:00 - 23:00)		Night-time (23:00 - 07:00)		
	$L_{Aeq,T}$	$L_{A90,T}$	$L_{Amax,F}$	$L_{Aeq,T}$	$L_{A90,T}$
P1	60	48	75	53	43
P2	68	59	82	63	39

10.73 All noise measurements were undertaken by consultants competent in environmental noise monitoring, and, in accordance with the principles of BS 7445: 2003 (Ref 10.10). The broadband noise parameters of $L_{Aeq,T}$, $L_{A10,T}$, $L_{A90,T}$, and $L_{Amax,F}$ were recorded at each location.

Vibration

10.74 The vibration levels on the Site were assessed subjectively during the noise survey and no vibration was observed. It is therefore considered that a vibration survey is not required for the purpose of this assessment.

IDENTIFICATION AND EVALUATION OF POTENTIALLY SIGNIFICANT EFFECTS

10.75 This section considers the potential effects associated with the noise egress during the construction and operation of the Proposed Development.

10.76 Potential noise impacts arising from the completed development include the consideration of access roads and building services noise. The potential noise and vibration effects on the Proposed Development from existing road and rail sources have also been considered.

Construction Noise

10.77 The operation of equipment associated with site preparation and construction of the Proposed Development has the potential to result in noise effects at existing noise sensitive receptors in the vicinity.

10.78 Specific detail on the type of plant is not available at this stage, therefore construction noise levels are based on the likely plant together with generic plant detail contained within BS5228-1:2009+A1:2014. The type of piling is not yet known. As such, for the purposes of the assessment Continuous Flight Auger (CFA) piling is assumed.

10.79 Calculations were carried out in accordance with the methodology prescribed within BS 5228. Calculations representing a likely worst-case scenario over a one-hour period with plant operating at the closest point to the nearest Noise Sensitive Receptor and in the absence of mitigation are presented. In practice, noise levels would tend to be lower owing to greater separation distances and screening effects.

10.80 The construction noise predictions have been undertaken for the noisiest construction phases to provide assessment levels at the nearest noise sensitive receptors. The highest noise levels are from plant usually associated with earthworks, piling, concreting, road pavement and general construction site activities and the facade noise levels used for the assessment are as follows:

- Enabling works 84 dB(A) at 10m
- CFA Piling 85 dB(A) at 10m
- Sub Structure 80 dB(A) at 10m
- Road pavement 81 dB(A) at 10m
- Super Structure 85 dB(A) at 10m

10.81 With regard to barrier attenuation effects, acoustic screening would be provided by permanent structures on the intervening land between the proposed construction areas and receptor locations, in addition to the natural screening that may be afforded by the topography of the area. To provide a robust assessment however, the construction noise predictions assume no attenuation from site hoardings at receptor locations.

10.82 Construction noise levels have been predicted at the closest existing representative noise sensitive receptor locations (R1 to R3) to the Proposed Development. The receptors are representative of the likely worse case impacts, with approximate distances from the Proposed Development of 25 m. The receptor locations are shown in **Appendix 10.2**.

10.83 The predicted noise levels are 'worst case', assuming the closest distance between the source of construction noise and the receptor in order to calculate a likely worst noise level at the calculation location. The noise levels predicted at the closest façade of each construction assessment position during each phase and sub-phase of the works are shown in Table 10.8.

Table 10.8 – Likely worst-case Façade Construction Noise Levels $L_{Aeq,T}$ dB

Receptor	Noise Level, dB, During Construction Phase (rounded to 0 dp)				
	Enabling Works	Piling	Sub-structure	Roads	Super-structure
R1	74	75	70	71	75
R2	74	75	70	71	75
R3	74	75	70	71	75

10.84 The comparison of the results presented in Table 10.8 with the target noise criterion of 75 dB $L_{Aeq,T}$ identifies that façade noise levels for the nearest existing noise sensitive locations are predicted to be meet the target criteria for all construction related operations due to the intervening distances.

10.85 It should be noted that all construction activities would not occur simultaneously nor would activities be operated at the closest distance to the residential areas for a long period of the time as assumed for the purposes of a likely worst-case scenario assessment.

10.86 Additionally, construction activity pertaining to the creation or amendment of roads would occur at distances greater than those used in this assessment.

10.87 Comparison of these results with the criteria presented in Table 10.2 identifies that for all phases, at the residential receptors, construction noise effects would be classified as below SOAEL. Due to the moderate sensitivity of the receptors, the significance of the likely worst case assessment is classed as Moderate prior to mitigation.

10.88 In addition to construction plant operating on the Site, there would be movement of materials to and from the Site by road. Construction traffic would be managed to minimise the temporary and intermittent adverse effects that construction traffic can cause.

10.89 Mitigation measures are considered later in this chapter. These measures will be adhered to in order to ensure low likelihood of adverse impacts.

Construction Vibration

10.90 Table 10.9 below details the distances at which certain construction activities could give rise to a just perceptible level of vibration. These figures are based on historical field measurements.

Table 10.9 – Distances at which vibration may be just perceptible

Construction Activity	Distance (m)
Excavation	10-15
Heavy Vehicles (e.g. dump trucks)	5-10
Hydraulic Breakers	15-20
Large Rotary Piling Rig	20-30
Driven Piling Rig (if required)	10-20

10.91 On the basis of the distances at which vibration from various construction activities is likely to be perceptible, no residential uses are likely to be affected. Notwithstanding this, mitigation measures to control the impact of construction vibration are presented in the following section.

Operational Phase

Site Suitability – Existing Noise Climate

10.92 The future suitability of the Site for residential accommodation has been confirmed by considering the calculated noise contours and the guidance adopted for this Chapter.

10.93 Noise emission levels affecting the Proposed Development have been calculated using predictive computer noise modelling. The noise modelling software (Cadna-A) uses algorithms based on ISO 9613 'Attenuation of sound during outdoor propagation' to predict noise levels generated at receiver locations by noise sources.

10.94 The noise levels have been predicted across the Site. Noise levels have been calculated at individual residential buildings. Noise contours have been calculated at 4 m above ground level.

10.95 The primary noise sources affecting the Proposed Development are identified as road traffic on Broadwater Road and the surrounding road network as well as rail traffic on the East Coast Main Line. Extant commercial activity to the west of the Proposed Development has also been included within the noise model.

10.96 Following verification of the existing scenario, the proposed road traffic flows for the year 2025 have been modelled, including the likely increased traffic due to the Proposed Development.

10.97 The future noise levels at the Proposed Development Site have been assessed by considering the results of the calculations against the guidance provided in BS 8233 and the WHO Guidelines.

10.98 Calculated daytime and night-time noise contours are presented in **Appendix 10.3 and 10.4**, respectively. The calculated facade reductions required at each proposed dwelling are presented graphically, for each storey level, in **Appendix 10.5 to 10.14**.

10.99 Roof and façade constructions typically achieve an attenuation of at least 55 dB Rw, with the windows and trickle ventilators being the weakest part of any facade. Suitable glazing and ventilation options at these properties should be incorporated at the indicated façades to allow windows to remain closed.

10.100 Based on the quantitative assessment methodology and prior to mitigation, effects up to Moderate significance are identified at façades overlooking Broadwater Road and at the closest façade overlooking the railway. Effects up to Minor significance are calculated for the remainder of facades

10.101 All effects are considered Negligible with the incorporation of appropriate façade glazing and ventilation, provided it does not compromise the façade with regards to noise reduction.

10.102 Where Minor effects are identified, typical glazing and ventilation options would achieve the BS 8233 criteria without specific consideration of mitigation options.

10.103 Moderate effects are also achievable with typical ventilation. However, it is prudent that the proposed glazing and ventilation are specified to achieve the identified façade reductions, in order to ensure effects are sufficiently mitigated.

10.104 The effects vary between floors and therefore the glazing and ventilation requirements should be selected based on the individual requirement. The glazing and ventilation options should be specified to ensure the identified reductions are achieved as a minimum.

10.105 To ensure the R_W values take account of possible low frequency noise, the sound reduction index of each element should include a correction for the C_{tr} urban traffic noise spectrum. The ventilation should achieve this value when open, to allow ventilation to the dwelling. Additionally, the glazing and ventilation installation must maintain the integrity of the façade with regard to noise insulation.

10.106 Ambient noise levels at rooftop and external amenity areas are calculated to be below 55 dB and therefore achieve the upper guideline noise level as provided within BS 8233.

10.107 Noise levels at balcony areas with a line of sight to the road/rail sources are unlikely to meet the BS 8233. However, BS 8233 identifies that noise limits are not always necessary at balconies and that these spaces offer a compromise between higher noise levels and convenience of living, to allow for activities such as washing clothes or potting plants.

10.108 BS 8233 states that higher noise levels should not prohibit development. Additionally, further amenity space is provided within the Proposed Development where external noise levels are calculated to fall below the BS 8233 criteria.

10.109 With consideration to the above, due to the added convenience for residents and the availability of additional amenity spaces, the impact at balcony areas has not been deemed necessary for the purpose of this assessment and noise levels within these areas should not prohibit development.

10.110 The WHO Guidelines states that indoor noise levels should not exceed approximately 45 dB L_{Amax} more than 10-15 times a night to ensure there are no negative health effects related to sleep disturbance.

10.111 Measured maximum night time noise levels at both monitoring locations, with windows closed, would achieve the WHO criteria with no more than 10-15 exceedances observed at P2 and no exceedances at P1. Maximum $L_{Amax,F}$ noise levels are considered to achieve the criteria set out in the WHO Guidelines, provided sufficient glazing and ventilation options are employed.

10.112 The mitigation options identified following consideration of ambient noise levels are likely to be adequate for the control of both ambient $L_{Aeq,T}$ and night time maximum noise levels.

Proposed Fixed Plant

10.113 Any proposed plant and activities will be specified to ensure compliance with the relevant design standards contained within BS 4142.

10.114 The proposed plant has not yet been specified, and detailed data is not yet available. Limits have therefore been identified in order to inform the design of the proposed plant items/activities during the detailed design stage.

10.115 The proposed plant would be specified and sufficiently mitigated as required, such that suitable conditions are maintained at the nearby residential dwellings. In accordance with BS 4142, the Rating level of any plant (inclusive of penalties accounting for acoustic features) should remain below the background sound level during all periods of operation.

10.116 BS 4142 provides assessment periods of:

- Daytime, 07:00 – 23:00; and
- Night-time, 23:00 – 07:00.

10.117 The background sound levels identified for the purpose of the assessment are presented within Table 10.7. Fixed plant would be specified such that the calculated combined Rating level at the nearest residential receptors does not exceed these limits.

Road Traffic Noise

10.118 The traffic flow data provided from the Transport Assessment has been used as the basis for the road traffic noise assessment. The 18-hour Annual Average Weekday Total (AAWT) flows were provided for the local road network surrounding the Proposed Development. The without development flows, which include other identified consented development, have been provided for the year 2025. The consented development flows have been provided for the year 2025 to allow for consideration of the with development scenario against the without development scenario. These traffic flows are shown in **Appendix 10.15**.

10.119 Traffic noise predictions have been made using the CRTN prediction methodology. The methodology has been used to predict the magnitude of any change in noise level resulting from the Proposed Development at the roadside of the local network.

10.120 The predicted changes in noise level on existing road links, identified with respect to the road traffic noise impact assessment criteria, are presented in Table 10.10 for the day and night-time periods.

Table 10.10 – Change in Noise Level on Local Road Network in, 2030

Link ID	Road Link	Change in Daily Traffic Flow Between 'Do Something' and 'Do Minimum' Scenarios, 2025	
		Increase in Flow	Noise Change, dB
1	Bridge Road (W)	442	0.1
2	Bridge Road	2,367	0.6
3	Bessemer Road	2,648	0.8
4	Bridge Road (E)	928	0.3
5	Broadwater Road (N of Hydeway)	3,906	1.0
6	Broadwater Road (S of Hydeway)	3,842	1.0
7	Broadwater Road (S of Site)	3,811	1.0

10.121 Table 10.10 identifies that there are no increases in noise level of more than 1 dB due to the introduction of the Proposed Development. DMRB states that this is likely to result in a Negligible impact in the long and short term.

ENHANCEMENT, MITIGATION AND RESIDUAL EFFECTS

Construction Phase

10.122 To control the impact of noise during construction of the Proposed Development, contractors will ensure that works are carried out in accordance with best practicable means (BPM) as described in BS 5228 comprising of the following:

- Where possible, 'silenced' plant and equipment will be used;
- Where vehicles are standing for a significant period of time, engines will be switched off;
- Acoustic enclosures will be fitted where possible to suppress noisy equipment;
- Plant will operate at low speeds, where possible, and incorporate automatic low speed idling;
- Where possible, electrically driven equipment will be selected in preference to internal combustion powered, hydraulic power in preference to pneumatic and wheeled in lieu of tracked plant;
- All plant will be properly maintained (greased, blown silencers replaced, saws kept sharpened. Teeth set and blades flat, worn bearings replaced etc);
- Consideration will be given to temporary screening or enclosures for static noisy plant to reduce noise emissions and plant should be certified to meet any relevant EC Directives;
- All contractors will be made familiar with the guidance in BS 5228 (Parts 1 & 2) which will form a pre-requisite of their appointment; and
- Early and good public relations with the adjacent tenants and occupants of buildings will also reduce the likelihood of complaints.

10.123 These general measures to control construction noise will be incorporated within the Construction Environmental Management Plan (CEMP) and/or detailed in construction method statements. By adopting the recommended best practicable means, construction noise levels can typically be reduced by 10 dB(A).

10.124 The CEMP will present procedures to control the potential impact of noise at any proposed residential units that are occupied prior to the completion of the construction activities at the Site. Essentially, where construction activities associated with any phase are identified to be within the critical distances, consideration will be given to the use of quieter techniques or

targeted and specific noise mitigation measures (such as reduced duration of operation, enclosure of equipment etc.) to ensure continued compliance with the criterion limit.

10.125 The existing residential properties are located at a distance greater than 30 m and therefore further mitigation measures to reduce the vibration effects are not required.

Residential Dwellings

10.126 The glazing and ventilation elements are typically the weakest acoustic link in the construction of a building façade. Therefore, in order to assess the acoustic performance of the residential accommodation units of the Proposed Development, it is appropriate in the first instance to explore the level of protection that will be afforded by the performance of the glazing and ventilation elements in combination.

10.127 Sufficient ventilation is required for living rooms and bedrooms, where the construction of a façade will rely on closed windows to achieve the criteria. The required reductions across each storey are presented in **Appendix 10.5 to 10.14.**

10.128 The calculated impacts vary across the Site and typical mitigation measures are more than likely to be sufficient at facades identified as requiring a reduction up to 24 dB.

10.129 Typical glazing and ventilation options are considered to achieve up to 33 dB reduction. However, it is prudent that glazing and ventilation options are appropriately specified where facades a reduction of at least 25 dB is calculated; to protect future occupants from adverse effects.

10.130 Examples of façade mitigation include acoustic air bricks, trickle ventilation and mechanical ventilation. Any passive or mechanical system should allow for sufficient airflow whilst maintaining the integrity of the façade with regard to noise insulation. The specification of the glazing should be selected with consideration to the required façade reduction. Detailed façade calculations can be undertaken following confirmation of the design, should such calculations be required.

10.131 Assessment of the Proposed Development indicates that ambient $L_{Aeq,T}$ noise levels in external amenity areas would meet the BS 8233 upper guidelines value.

10.132 Section 3.4 of the WHO Guidelines states that for good sleep, indoor noise levels should not exceed approximately 45 dB L_{Amax} more than 10-15 times/night. With the assumed façade reduction the maximum indoor noise level during the night time would remain below 45 dB $L_{Amax,F}$.

10.133 When relying on closed windows to meet noise criterion, acoustically treated ventilation should be provided to habitable rooms. The windows should be openable, such that the choice of meeting the internal noise levels is provided and the windows may be opened at the occupants discretion.

10.134 It should be noted that the sound reduction performances detailed above apply to habitable rooms, such as living rooms and bedrooms, only. For non-habitable rooms, such as kitchens, bathrooms, stairways, halls, landings etc, lower acoustic performance glazing configurations are permissible.

10.135 For those façades where windows need to be closed to meet the internal noise targets, an additional means of ventilation will be necessary to ensure compliance with Approved Document F of the current Building Regulations.

Fixed Plant

10.136 The sound from fixed plant will be specified such that sound levels remain below the limits specified in this chapter.

10.137 Mitigation options will be specified during the detailed design stage, as appropriate. Effects from fixed plant would be negligible following specification and assessment of proposed items.

RESIDUAL EFFECTS

Construction Phase

10.138 Calculated construction noise levels indicate that noise levels are likely to remain below the 75 dB $L_{Aeq,T}$ criterion noise level. With the implementation of the mitigation measures outlined above, at least a 10dB(A) reduction in general construction noise is anticipated. On this basis, residual construction noise levels would be significantly below the specified criteria

10.139 With the appropriate mitigation measures, the residual construction noise effects at all receptors would be LOAEL, when compared with the significance criteria adopted for this assessment and provides a Minor to Negligible noise effect.

Operational Phase - Site Suitability

10.140 The residential area is calculated to fall below the BS 8233 criteria following consideration of appropriate mitigation. Maximum levels exceed the WHO criteria for sleep disturbance during the night-time, however measured maximum levels are unlikely to exceed for more than the required 10-15 times per night with the incorporation of mitigation measures.

10.141 The residual noise effect is considered to be Negligible following incorporation of suitable mitigation.

Operational Phase – Proposed Fixed Plant

10.142 Fixed plant items will be specified during the detailed design stage. All plant and studio building will be specified such that rating levels at the nearest residential receptors fall below the specified background sound levels.

10.143 Whilst the effect cannot be quantitively assessed, any proposed plant will be specified such that the resulting effect is Negligible.

Operational Phase - Road Traffic Noise

10.144 The assessment indicates that the Proposed Development will have a Negligible impact on the levels of road traffic generated noise in both the long and short term.

CUMULATIVE EFFECTS

10.145 Identified nearby developments that may potentially give rise to cumulative effects are identified in Chapter 3. The noise and vibration assessment has considered the combined road traffic movements from these future committed developments as part of the predicted future baseline conditions. However, in order to provide consistency with the EIA Regulations, the potential cumulative effects are presented below.

Short Term

10.146 The construction activity at each of the future committed development sites has the potential to cause localised noise disturbance around each development site. However, it is not known whether the construction activities from each development will occur at the same time as those on the Site.

10.147 Construction activities at the Former Shredded Wheat Factory North Side site may give rise to cumulative effects in instances where construction activity at both sites takes place in close proximity to an identified receptor. The sensitivity of the nearby receptors is identified as moderate and impacts are likely to be Minor to Negligible with incorporation of BPM measures.

10.148 Cumulative effects are therefore unlikely between the two sites. However, a Moderate effect is identified as a likely worst case.

10.149 There are unlikely to be any cumulative effects from construction noise due to the intervening distance between the Site and the other development sites.

Long Term

10.150 The committed developments would lead to additional traffic movements on local roads. However, an increase in traffic noise levels of 3 dB would be required for the long term noise change to be considered a Minor impact.

10.151 The assessment at proposed residential dwellings has considered the additional traffic movements from the Proposed Development and committed developments and determined that the significance of effects will be Negligible with the incorporation of appropriate glazing and ventilation.

10.152 There are no other expected significant cumulative effects due to the intervening distance between the Site and the other development sites.

10.153 With consideration to the above, the potential cumulative effects from the Proposed Development and identified nearby developments are likely to be negligible.

Inter-Relationship Effects

10.154 There are inter-relationships with the transport chapter as identified through the use of traffic data within the assessment. These effects are considered as part of the assessment and the traffic flows are included within the noise model. There are no identified inter-relationship effects with other topics.

SUMMARY

10.155 This chapter has considered the likely effects of the Proposed Development with respect to noise and vibration. These include the effects of existing conditions on the Proposed Development and the effects of noise and vibration generated from construction of the Proposed Development on surrounding properties. Limits have been specified for the operational phases. The detailed design of the Proposed Development will ensure that noise emissions from the Site would remain below the specified background sound levels.

10.156 The assessment has been based on a computer noise model, informed and validated using environmental noise measurements and traffic data provided for the surrounding road links.

10.157 The impact of noise and vibration during construction of the Proposed Development has been predicted and assessed in accordance with BS 5228. Generic mitigation measures have been recommended, which when implemented are capable of ensuring that the impact of noise and vibration during the construction of the Proposed Development is adequately controlled.

10.158 An assessment has been carried out in accordance with the adopted criteria to determine the suitability of the Site for residential accommodation. Proposed units will require appropriate consideration of glazing and passive or active ventilation specification in order to achieve the required internal noise levels. It is proposed that this consideration is made for all properties identified as experiences a Moderate significant effect.

10.159 The impact of the increase in road traffic associated with the Proposed Development has been assessed. Likely short and long term effects due to any increase in road traffic are identified as Negligible for all existing receptors adjacent to the surrounding roads.

10.160 A summary of the noise significance and residual effects for the Site are presented in Table 10.11.

Table 10.11 - Noise Summary Table

Potential Effect	Nature of Effect (Permanent or Temporary)	Significance	Mitigation/ Enhancement Measures	Residual Effects
Noise: Construction Impacts	Direct, Temporary Short-Term Local	Minor	Implementation of Best Practicable Means to control noise emissions	Minor to Negligible
Vibration: Construction Impacts	Direct, Temporary Short-Term Local	Negligible	Implementation of Best Practicable Means to control vibration	Negligible
Noise: Site Suitability	Direct, Permanent Long-Term Local	Minor to Major	Appropriate sound insulation	Negligible
Vibration: Site Suitability	Direct, Permanent Long-Term Local	Negligible	None	Negligible
Noise: Changes in road traffic noise	Direct, Permanent Long-Term Local	Minor to Negligible	None	Minor to Negligible

REFERENCES

Ref 10.1: Planning Policy Guidance PPG24 ‘Planning and Noise’. 1994 The Stationary Office, 1994

Ref 10.2: The National Planning Policy Framework, February 2019, The Stationary Office, 2012

Ref 10.3: British Standard 5228:-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites. Noise

Ref 10.4: Design Manual for Roads and Bridges (DMRB) Volume 11, Section 3 Part 7 – HD 213/11 Noise and Vibration, 2011

Ref 10.5: BS 4142:2014+A1:2019 Methods for Rating and Assessing Industrial and Commercial Sound

Ref 10.6: British Standard 8233: 2014 Sound Insulation and Noise Reduction for Buildings

Ref 10.7: World Health Organisation (WHO): 1999, ‘Guidelines for Community Noise’, WHO, Geneva

Ref 10.8: Noise Policy Statement for England, 2010 (NPSE)

Ref 10.9: The Department for Transport, 1988, ‘Calculation of Road Traffic Noise (CRTN)’, The Stationary Office

Ref 10.10: British Standard 7445: 2003: Description and measurement of environmental noise. BSI, 2003

11 TOWNSCAPE AND VISUAL AMENITY

INTRODUCTION

11.1 This chapter aims to identify and describe the nature and significance of the effects likely to arise as a result of the Proposed Development on the existing townscape character and the visual amenity of people.

11.2 This Townscape & Visual Impact Assessment (TVIA) was carried out by Joanne John CMLI, a chartered landscape architect from Bradley Murphy Design.

11.3 This chapter provides a description of the methods used in the assessment, followed by a description of the relevant baseline conditions of the Site and surrounding area. An assessment is then presented of the likely significant effects of the Proposed Development during the construction works and once the Proposed Development is completed and operational. Mitigation measures are identified, where appropriate, to avoid, reduce or offset any adverse effects identified, together with an assessment of the significance of likely residual effects.

11.4 This chapter should be read in conjunction with the following Figures contained in **Appendix 11.4:**

- **Figure 11.1: Site and Study Area**
- **Figure 11.2: Planning Policy and Designations**
- **Figure 11.3: Heritage Trails**
- **Figure 11.4: History of Development for Shredded Wheat Factory**
- **Figure 11.5: Land Use**
- **Figure 11.6: Scale**
- **Figure 11.7: Spatial Context**
- **Figure 11.8: Townscape Character Areas**
- **Figure 11.9: Zone of Theoretical Visibility (ZTV 1)**
- **Figure 11.10: Zone of Theoretical Visibility (ZTV 2)**
- **Figure 11.11: Viewpoint Location Plan**

11.5 In addition, the following technical appendices accompany the text and are referred to throughout the chapter:

- **Appendix 11.1: TVIA Methodology**
- **Appendix 11.2: Planning Policy and Guidance**

- **Appendix 11.3: Vista3D Winter Wireline Assessment**
- **Appendix 11.4: Vista3D Summer Wireline Assessment**
- **Appendix 11.5: Figures**

11.6 To aid the reader, a glossary of terms is provided in **Appendix 11.1**.

11.7 This TVIA considers the contribution heritage and ecological features make to the character and value of the townscape and visual receptors, along with an assessment of the likely effect of the Proposed Development on the townscape character and views associated with heritage features. It must be noted that this assessment has been carried out in landscape / townscape and visual terms only, as an assessment of impact on heritage assets and their wider cultural setting (e.g. impacts on cultural and historic associations) are considered to be beyond the remit of this TVIA and are covered by **Chapter 15 Heritage**. Impacts on ecological assets are covered by **Chapter 12 Ecology and Biodiversity**. This TVIA does not assess direct or any other indirect effects on heritage or ecological resources.

SCOPE OF ASSESSMENT

11.8 Townscape assessment is comprised of two interrelated parts:

- a townscape assessment, which considers the effects of the Proposed Development on the physical townscape and the potential for changes in its character;
- a visual assessment, which considers the potential changes to the visual context arising from the Proposed Development including general setting and views for local residents, walkers, visitors and vehicular traffic, collectively these are described as ‘receptors’.

11.9 A preliminary study area of 5km from the centre of the Site was identified to conduct initial baseline studies, considering the nature and scale of the Proposed Development in relation to the existing physical characteristics of the townscape. This preliminary study area was considered to be sufficient to account for potential significant effects that may arise as a result of the Proposed Development.

11.10 Zones of Theoretical Visibility (ZTV) were then modelled to digitally identify those areas of the landscape / townscape that theoretically would be visually connected to the development. Two ZTVs were modelled as follows.

- **ZTV 1:** represents the implementation of the proposed built form as part of the 'Extant Consented Scheme' (granted planning permission in February 2019 to redevelop the former Shredded Wheat Factory site to accommodate up to 1,340 homes ref:6/2018/0171/MAJ) that would theoretically be visible, based on the consented building heights, taking account of the effect that settlements and significant woodland blocks / belts would have on views toward the consented Proposed Development and therefore illustrates a reasonably realistic area within which the Proposed Development could theoretically be visible during the summer months. This is based on the consented parameter building envelope and storey heights.
- **ZTV 2**: represents the proposed built form within the Site that would theoretically be visible, based on the building heights for the Proposed Development, taking account of the effect that settlements and significant woodland blocks / belts would have on views toward the Proposed Development and therefore illustrates a reasonably realistic area within which the Proposed Development could theoretically be visible during the summer months. This is based on the parameter building envelope and storey heights as illustrated in Appendix 5.

11.11 Whilst the ZTV indicated that the Proposed Development might be visible beyond 1km of the Site, it is considered that any views experienced by potential receptors in these areas would be either very distant or largely screened and that the magnitude of change would be lower than that experienced by receptors located within a 1km radius. Following a request from Historic England and due to the ZTV indicating potential visibility, long distance views from within and near to Hatfield House and Gardens, a Registered Park and Garden of Historic Interest and popular tourist attraction, were considered as part of the assessment.

11.12 The position of all viewpoints was agreed with Welwyn Hatfield Council as part of the EIA Scoping and Pre App process.

Reference Material and Data Sources

11.13 In order to capture a comprehensive description of the baseline position for landscape and visual receptors, information has been collated using desk study and field survey. The desk study identified potentially sensitive / designated landscape resources by reference to national Geographic Information System (GIS) databases, OS maps and existing published information, relevant planning policy guidance and / or designated or protected views. This stage has also

enabled the identification of potential visual receptors such as public rights of way (PROW), residential properties or designated assets.

11.14 The desk study included a review of the following sources of information:

- The National Planning Policy Framework (2019) (Ref. 11.1);
- Saved policies of Welwyn Hatfield District Plan (2005) (Ref. 11.2);
- Broadwater Road West, Supplementary Planning Document, Welwyn Hatfield Borough Council (2008) (Ref. 11.3);
- Welwyn Garden City Conservation Area Appraisal, Welwyn Hatfield Borough Council (2007) (Ref. 11.4);
- Peartree Conservation Area Character Appraisal and Management Plan, Welwyn Hatfield Borough Council (2019) (Ref. 11.5);
- Draft Local Plan Proposed Submission, Welwyn Hatfield Borough Council (2016) (Ref. 11.6);
- Ordnance Survey Mapping at 1:25,000 and 1:10,000 scale
- Aerial photography of the Site and wider area (Google Earth, www.maps.google.co.uk and www.bing.com/maps)
- Multi Agency Geographic Information for the Countryside (MAGIC) interactive mapping (www.magic.gov.uk)
- National Heritage List for England Map Search, Historic England (http://www.historicengland.org.uk)
- National Cycle Network mapping (www.sustrans.org.uk)

11.15 During fieldwork, a series of representative photographs were taken by Vista3D, representing both the winter and summer context for each view. These are presented as a series of panoramic viewpoints, included to illustrate landscape / townscape character in the area and also as specific representative viewpoints. These have been used to inform the assessment of both landscape / townscape and visual impacts and are included at **Appendix 11.3 & 11.4** respectively.

ASSESSMENT METHODOLOGY

11.16 The assessment was undertaken in accordance with the principles of good practice set out in the following published guidance produced by the relevant professional organisations concerned with landscape / townscape and visual impact assessment:

- Landscape Institute and the Institute of Environmental Management & Assessment (2013), Guidelines for Landscape and Visual Impact Assessment Third Edition (GLVIA3) (Ref. 11.7), Routledge;
- Landscape Institute (2013), GLVIA3 Statement of Clarification 1/13 (Ref 11.8);
- Landscape Institute (2019), Technical Guidance Note 06/19, Visual Representation of Development Proposals (Ref. 11.9); and
- Natural England (2014), An Approach to Landscape Character Assessment (Ref 11.11).

11.17 Whilst linked, the assessment of landscape / townscape and visual effects are treated separately in TVIA. Full details of the methodology are included at **Appendix 11.1.** In summary, the approach used to identify and assess townscape and visual effects is as follows:

- collate baseline information through desk study research and field-based survey work, select appropriate townscape and visual receptors and establish their value;
- determine susceptibility of townscape and visual receptors to the type of change proposed (i.e. the Proposed Development);
- combine value with susceptibility to determine sensitivity of townscape and visual receptors to the nature of change proposed (i.e. the Proposed Development);
- determine and describe the nature and magnitude of change likely to be experienced by townscape and visual receptors as a result of the Proposed Development;
- describe any measures (mitigation) to avoid or reduce the magnitude of any adverse impact;
- assess the significance of effects on townscape and visual receptors through consideration of the sensitivity of receptors and the magnitude of change; and
- identify those effects that are considered important to decision making.

Significance Criteria

11.18 Following the methodology summarised above, the following steps are applied to derive the significance of any townscape or visual effects.

Sensitivity

11.19 The sensitivity of a landscape resource or visual receptor is derived by determining its value (defined by qualities including whether it is a protected landscape / townscape or view, its level of tranquillity, cultural associations, condition etc.) and combining this with its susceptibility to the nature of development proposed (ability of the landscape / townscape or view to accommodate the change proposed). **Tables A.01** and **A.02** at **Appendix 11.1** define the criteria for determining the value of townscape and visual receptors, whilst Tables **A.03** and **A.06** define the criteria for determining the susceptibility of townscape and visual receptors.

11.20 **Table 11.1** below defines how these criteria are combined to derive the sensitivity of townscape or visual receptors.

Table 11.1 – Matrix for determining sensitivity of townscape or visual receptors

		VALUE				
SUSCEPTIBILITY		Very Low	Low	Medium	High	Very High
	Very Low	Negligible	Low	Low	Moderate	Moderate
	Low	Low	Low	Moderate	Moderate	High
	Medium	Low	Moderate	Moderate	High	High
	High	Moderate	Moderate	High	High	Very High
	Very High	Medium	High	High	Very High	Very High

11.21 The magnitude of impact for townscape or visual change is influenced by a number of factors including the extent to which townscape features are lost and / or altered, the introduction of new features into the townscape and the resulting change in the physical and / or perceptual characteristics of the townscape or view. It is determined by, but not limited to:

- the size and scale of the impact;
- the extent of the geographical area over which the change is likely to be felt;
- the duration of the impact and its potential reversibility; and
- the proximity of the receptor to the change and the nature of the effect.

11.22 Table A.05 and A.08 at **Appendix 11.1** define the criteria for determining the magnitude of impact on townscape and visual receptors. As an example, Table 11.2 below provides the criteria for determining the magnitude of impact for landscape / townscape change.

Table 11.2 – Criteria for determining magnitude of landscape / townscape change

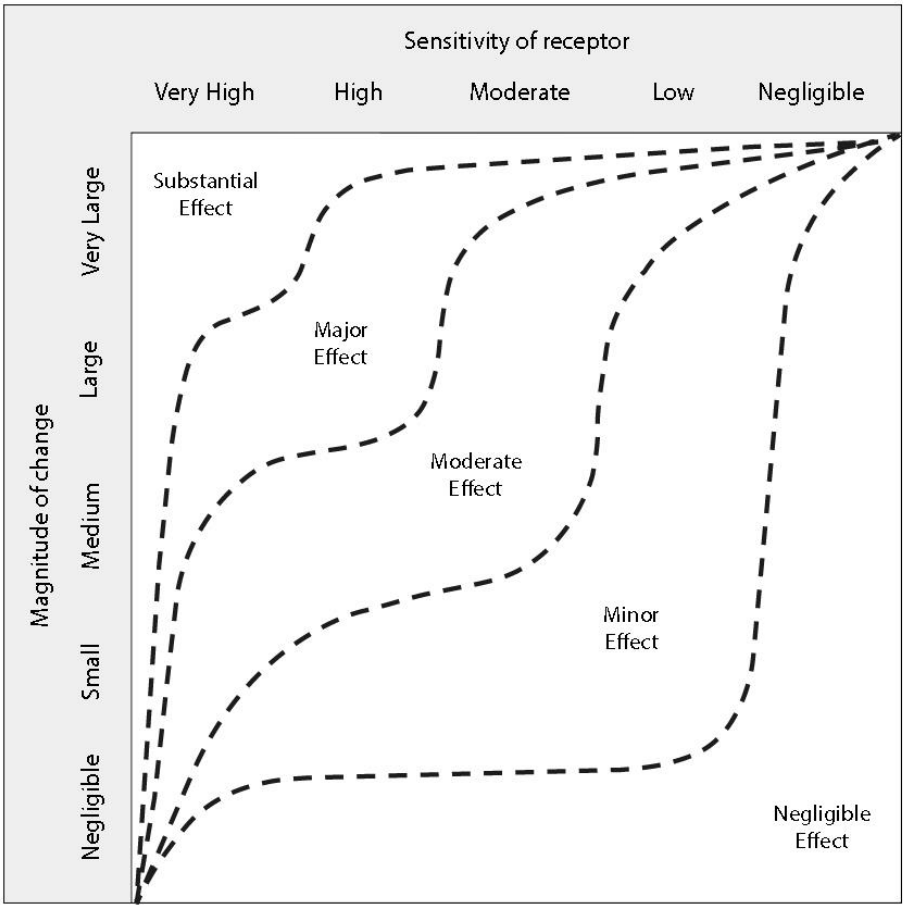
Magnitude	Criteria
Very Large	The size and scale of change is considered to be very high due to the total loss of or alteration to existing landscape / townscape character or highly distinctive / important features and elements, and / or the addition of uncharacteristic conspicuous features and elements, resulting in a complete change to key aesthetic or perceptual qualities. The geographical extent of change would influence the landscape / townscape at a national level. Impacts would be considered long term and would either be irreversible or very difficult to reverse in practical terms.
Large	The size and scale of change is considered to be high due to the notable loss of or alteration to existing landscape / townscape character or distinctive / important features and elements, and / or the addition of uncharacteristic noticeable features and elements, degrading the integrity of key aesthetic or perceptual qualities. The geographical extent of change would influence the landscape / townscape at a regional level. Impacts would be considered long term and would either be irreversible or very difficult to reverse in practical terms.
Medium	The size and scale of change is considered to be medium due to the partial loss of or alteration to existing landscape / townscape character or features and elements, and / or the addition of uncharacteristic features and elements, resulting in key aesthetic or perceptual qualities out of scale or at odds with the local pattern and landform. The geographical extent of change would influence the landscape / townscape at a local level. Impacts would be considered medium term and / or potentially reversible, although it may not be practical to do so.
Small	The size and scale of change is considered to be low due to minor loss or alteration of existing landscape features and elements, resulting in a discernible negative effect to key aesthetic or perceptual qualities. The geographical extent of change would influence the immediate setting of the proposed development. Impacts would be considered short term and / or potentially reversible and in practical terms would easily be achievable.

Magnitude	Criteria
Negligible	The size and scale of change to existing landscape / townscape features and elements is considered to be barely discernible. The geographical extent of change would influence the Site only. Impacts would be considered short term / temporary and / or easily reversible and in practical terms would very easily be achievable.

11.23 The final conclusions for both landscape and visual effects are based on a combination of sensitivity and magnitude of change (impact). The overall judgement on the nature and level of these effects, referred to as significance, is based on the sequential combination of each criteria, leading to a balanced justification as described by the criteria provided in Tables A.10 and A.11 at **Appendix 11.1**, with professional judgement applied to inform this determination. The matrix in Table 11.3 below provides an indication of how significance is determined by this combination of sensitivity and magnitude but it is not applied without due consideration of the specific details of the Site and development under consideration.

11.24 Describing the effects likely to arise as a result of the Proposed Development and determining their significance requires the application of professional judgement to weigh the findings of the sensitivity of receptors against the predicted magnitude of change (impact), which can be beneficial, adverse or neutral.

Table 11.3 - Matrix for determining significance of effect



11.25 For the purposes of this assessment, the significance of effects is described in relation to their importance to decision making and have been defined as follows:

- **Substantial** - Considerable effect (by extent, duration or magnitude of impact) of more than local importance or in breach of recognised acceptability, legislation, policy and/or standards. Considered to be very important and material to decision making.
- **Major** - Obvious effect (by extent, duration or magnitude of impact) considered to be important and material to the decision making process.
- **Moderate** - Potential to be material to decision making.
- **Minor** - slight, very short or highly localised effect, not important for decision making.
- **Negligible / Neutral** - No important effect, not relevant to decision making.

Cumulative Effects

11.26 As noted in the Methodology at **Appendix 11.1**, cumulative effects fall into two distinct types:

- Effects arising from within the project itself, where effects under different topics can combine to potentially increase effects on a single receptor or environmental resource. The assessment of these cumulative effects is covered elsewhere in the ES.
- Effects from other reasonably foreseeable projects in combination with the Proposed Development. The cumulative assessment of these landscape and visual effects are considered as part of this LVIA.

11.27 When considered in isolation, the environmental effects from an individual development upon any single receptor or landscape resource may not be significant. However, when there is potential for effects from a number of individual developments to interact, they will be considered in combination, which may result in the cumulative effect being significant.

11.28 It should be noted that the cumulative effect reported is not the sum of the effects for each project. A potential cumulative effect arises when the effect of the whole may be considered to be greater than the sum of the two parts, where the two developments in combination may result in an effect of greater significance. The cumulative assessment defines this additional effect.

Assumptions and Limitations

11.29 This assessment is based on views from publicly accessible locations. Where an impact on residential and other private views (e.g. commercial properties) is noted this has, necessarily, been estimated.

11.30 The viewpoints identified in this assessment are illustrative of the potential impact from a representative range of receptors including residences, rights of way, public open spaces, private open spaces, commercial operations, the road network etc. This chapter does not necessarily identify all locations from where the Proposed Development would potentially be visible.

11.31 The construction work for the Proposed Development is proposed over an approximate seven year period, carried out in various phases. The effects for each receptor would be largely constrained to their facing edge and it is assumed that all construction work would commence and be completed at the same time per phase. It is assumed that landscape mitigation would be implemented in various parts of the Site throughout the implementation period, alongside or at the end of the respective phase. As a result, to avoid over complication of the TVIA, the post-

completion (Year 0) and post mitigation establishment (Year 15) is assumed as being achieved concurrently around the Proposed Development.

11.32 No limitations have been identified that would affect the conclusions of this assessment for EIA purposes.

LEGISLATION, PLANNING POLICY AND GUIDANCE

11.33 A detailed review of all planning policy has been undertaken and those of greatest relevance to the Site, the Proposed Development and the TVIA are included at **Appendix 11.2**. In summary, these include the relevant parts and policies of the following:

- The National Planning Policy Framework (2019)
- Saved policies R1, R11, R17, R28 D1, D2, D4, D8, OS1 and EMP3 of Welwyn Hatfield District Plan (2005).
- The design guidance outlined in the Broadwater Road West Supplementary Planning Document (2008).
- Emerging local plan policies SP1, SP3, SP9, SP11, SP12, SADM 15, SADM 16, SADM 18, SADM 21, SP17, of the Welwyn and Hatfield Draft Local Plan Proposed Submission (2016).

BASELINE CONDITIONS

Site Context

11.34 In townscape terms, the Site is situated within the Peartree industrial area of Welwyn Garden City, on an area of brownfield land previously used for industrial purposes. The Site and study area for the assessment are illustrated on Figure 11.1.

Townscape Character

11.35 Townscape character evolves over time and is largely shaped by cultural, technological and economic influences. The interaction of these various factors leads to the creation of a distinct, recognisable and consistent pattern of elements which combine to form townscape character.

11.36 Table 11.4 identifies the 14 distinct LTCAs relevant to the Site which are illustrated on Figure 11.8 and described below.

Table 11.4 – Local Townscape Character Areas (LTCA)

Area	LTCA
Area 1	Sherrards Park
Area 2	Shire Park Business Area
Area 3	Broadwater Road Industrial Area (Site)
Area 4	Peartree Modern Business & Industrial Area
Area 5	Peartree Residential Area
Area 6	Broadwater Crescent Residential Area
Area 7	Chequers Parkland
Area 8	Longcroft Lane Area
Area 9	Barleycroft Road
Area 10	Parkway Residential Area
Area 11	Handside Lane Area
Area 12	Parkway Retail Area
Area 13	Brockswood Lane Area
Area 14	The Campus

Area 1: Sherrards Park

11.37 The nearest point of LTCA 1 is approximately 550m, to the north west of the Site boundary. The Sherrards Park area was developed in the 1930s and the majority lies within the Welwyn Garden City Conservation Area. The key characteristics of this area include the following:

- 2 storey, red brick, residential housing featuring large gardens, wide verges and tree lined streets;
- linear residential streets lined either side by detached and semi-detached houses;
- landform in this area rises from Digswell Road towards Sherrards Park Wood; and
- strong sense of tranquillity within the area due to the numerous mature trees that provide a strong sense of enclosure and assist in filtering views of the surrounding urban area.

11.38 The strong sense of enclosure created within this LTCA by the coverage of mature trees and residential streets, combined with the built form and vegetation on its interface with the adjacent LTCA 14, significantly limits intervisibility from this LTCA towards the Site.

11.39 Whilst there are limited, distant, glimpsed views towards the tops of the existing silos within the North Side site of the former Shredded Wheat Factory site (refer to Viewpoint 9), for the most part, the vegetation and built form within this LTCA prevent the Proposed Development having a significant effect on the character of this area, therefore, this LTCA is not considered further.

Area 2: Shire Park Business Area

11.40 The nearest point of LTCA 2 is approximately 275m, to the east of the Site boundary. This area formed part of the original masterplan for Welwyn Garden City as an industrial zone. Due to the decline in industrial activities over the last century the Shire Park Business Area has introduced modern office and business use to the area. The key characteristics of this area include the following:

- modern, uniform, 20th century medium to large offices and business units featuring formal ornamental planting, hedges and in some instances, street trees;
- recent Times Square development off Bessemer Road (Chase New Homes) has been built on the former Xerox complex and comprises a 541 residential development with the first phase complete and Orion House offices;
- individual plots have associated car parking whilst commercial units feature larger spaces for HGV access and loading bays;
- Swallowfields Industrial Area;
- built form is typically two to three storeys high featuring pitched roofs;
- large infrastructure roads featuring a high capacity of vehicular movement and associated noise; and
- offices tend to be brick clad with large windows while industrial units are clad with composite materials and aluminium.

11.41 There is limited intervisiblity between this character area and the Site due to the scale and mass of the built form within this LTCA combined with the intervening industrial built form located to the North of LTCA 3.

11.42 LTCA 2 is considered to be of **low value**. Whilst the buildings and landscaping within the office plots are well maintained, the townscape lacks distinctiveness and is absent of any distinct features or townscape designations.

Area 3: Broadwater Road Business Area (Site)

11.43 The Site (which forms part of the former Shredded Wheat Factory site) lies within LTCA 3. The wider former Shredded Wheat Factory site forms approximately 40% of this character area and, as a result, has a strong influence on how this area is perceived. The LTCA includes the industrial zone, around Broadwater Road and Bridge Road, which once formed part of the original masterplan for Welwyn Garden City. The area features some of the oldest industrial development within Welwyn Garden City, most notably the former Shredded Wheat Factory (Grade II listed). Until recently, there were glimpsed views of the silos and original factory building, set amongst later additions to the factory. These later additions have been removed, allowing more open views of these original features, affording a temporary visual dominance ahead of consented development of the surrounding factory site.

11.44 The key characteristics of this area include the following:

- heritage industrial buildings, some of which listed, with small pockets of office and commercial use along Broadwater Road, whereas north of Bridge Road features a large proportion of more recent commercial, storage and distribution warehouses;
- a large proportion of brownfield land and derelict industrial buildings in state of change, as a result of the decline in industrial activities over the last century, which is evident on the Site and the wider former Shredded Wheat Factory site;
- large scale industrial activity, notably the modern BioPark facility immediately to the south of the Site, off Broadwater Road (subject to planning application for residential);
- main arterial roads Broadwater Road and Bridge Road bisect the area and create a visual, physical and noise detractor and large expanses of hardstanding associated with car parking and storage for commercial units off Bessemer Road; and
- whilst new businesses, commercial and office developments are present amongst the industrial uses, the large vacant plots and derelict industrial buildings retain the strongest influence as a post-industrial townscape.

11.45 LTCA 3 is considered to be of **low - medium value,** reflective of the condition and quality of the townscape and its associated elements, which are generally poorly maintained, degraded and in places derelict. The LCTA is improving in value, with high quality residential and commercial developments under construction off Bridge Road.

Area 4: Peartree Modern Business and Industrial Area

11.46 LTCA 4 lies adjacent the Site's eastern boundary, with LTCA 3 on the opposite side of Broadwater Road. A large proportion of Peartree was allocated for industrial development in the original masterplan for Welwyn Garden City. Few if any remnants of the original industrial built form remain having been replaced by modern industrial built form and offices over the last few decades. The key characteristics of this area include the following:

- piecemeal development varying in use and scale, giving a fragmented, discordant character;
- large expanses of hardstanding associated with car parking for the office blocks;
- a notable building within this LTCA is no. 29 Broadwater Road, which comprises a five storey angular modern office block; and

- main arterial roads (Broadwater Road and Bridge Road) lie on the LTCA boundary and create a visual / physical barrier and noise detractor.

11.47 There is strong intervisibility between this area and LTCA 3 due to their close proximity (refer to Viewpoints 11 and 14).

11.48 LTCA 4 is considered to be of **low value**, reflective of the area lacking coherence, owing to the mix of uses and scales of built form, within a townscape considered low quality with limited distinctiveness.

Area 5: Peartree Residential Area

11.49 The nearest point of LTCA 5 is approximately 200m, to the south east of the Site boundary. The Peartree residential area was built in the 1920s to 1930s for the workers of the factories on Broadwater Road. The southern part of the LTCA lies within Peartree Conservation Area. The key characteristics of this area include the following:

- one and a half to two storey, red brick residential housing with a diverse mix of ages, styles and types;
- a significant number of more modern 1980s properties present on Peartree Lane, whilst in other areas infill has occurred, replacing the original 1920s residential built form;
- residential built form is arranged as short terraces aligned with the roads with the occasional detached dwelling; and
- compared to the western residential areas within Welwyn Garden City the housing within Peartree is of a much higher density with less open space and street planting.

11.50 There is a limited degree of intervisiblity between LTCA 5 and the existing built form associated with the former Shredded Wheat Factory site. Glimpsed views of the tops of the silos are possible within a few of the open spaces and residential roads (refer to Viewpoint 4).

11.51 LTCA 5 is considered to be of **medium value**, reflective of part of the area designated a Conservation Area due to the special architectural and historic interest. The remainder of the area lacks unity, due to the diverse mix of housing ages and styles, the absence of townscape designations and the high density of houses within the area, which overall reduces the sense of tranquillity.

Area 6: Broadwater Crescent Residential Area

11.52 The nearest point of LTCA 6 is approximately 80m, to the south east of the Site boundary. This area was originally developed in the 1920s as a series of small residential closes, however the original dwellings suffered from severe damp leading to demolition and rebuild in 1986. The key characteristics of this area include the following:

- predominantly two storey, red brick, semi-detached and terraced houses;
- the former Roche Products Factory site, now a 21st Century residential development (The Mirage) featuring four storey apartments and three storey terraces;
- the offices of the Roche Products Factory (Grade II listed), designed by Otto R. Salvisberg in the 1940s, retained as part of the Mirage development;
- Broadwater Crescent is lined with street trees which, combined with the built form within the LTCA, provide a sense of enclosure to the area; and
- due to the close proximity of neighbouring industrial buildings, such as the BioPark building, there is a visual industrial presence on the skyline (refer to viewpoint 5).

11.53 There is limited intervisiblity between this area and the Site, with glimpsed views of the silos and chimney available between buildings and street trees.

11.54 LTCA 6 is considered to be of **low value**, reflective of the mix and diversity of residential built form, the presence of industrial visual detractors and the lack of public open space which, combined with the high density of housing within the area, reduces the sense of tranquillity.

Area 7: Chequers Parkland

11.55 The nearest point of LTCA 7 is approximately 625m, to the south of the Site boundary. The area features a recreational green space and the Twentieth Mile Bridge adjacent to the East Coast Mainline railway. The key characteristics of this area include the following:

- the LTCA is enclosed by the A6129 and A1000 main arterial roads which isolates the area from the surrounding residential areas and forms a physical, visual and noise barrier; and
- the dual lane bridge which carries the A6129 has an engineered character due to its high brick walls and steel railings.

11.56 The strong sense of enclosure created within this LTCA by the coverage of mature trees within the recreational green space, combined with the built form and vegetation on its interface with the adjacent LTCA 6, significantly limits intervisibility from this LTCA towards the Site. Therefore, this LTCA is not being considered further as part of the assessment.

Area 8: Longcroft Lane Area

11.57 The nearest point of LTCA 8 is approximately 150m, to the west of the Site boundary, separated by the East Coast Mainline railway. This area lies within Welwyn Garden City Conservation Area. The key characteristics of this area include the following:

- Longcroft Lane forms the principal straight residential road running south from the Town Centre;
- residential development is linear in character, with two storey red brick cottage style houses grouped in terraces;
- the residential built form dates back to the 1920s and 30s and formed part of the original Louis de Soissons masterplan;
- the layout of these properties display typical traits of the Garden City movement, with notably large gardens, generous public open space and wide verges lined with street trees; and
- the frontages of properties in this area are typically enclosed by formal hedges.

11.58 There is limited intervisibility between the area and the Site due to the extent of built form and vegetation within the area, combined with intervening vegetation along the East Coast Mainline Railway and Osborn Way.

11.59 LTCA 8 is considered to be of **medium value**, reflective of the well maintained residential setting, unity of the built form and the amount of vegetation present within front gardens, streets and verges, which combine to provide an aesthetically pleasing composition to the area. The use of the area is likely to be limited to the local community.

Area 9: Barleycroft Road

11.60 The nearest point of LTCA 9 is approximately 570m, to the west of the Site boundary. The Barleycroft Road residential area was developed in the 1920s to 1930s and lies within the Welwyn Garden City Conservation Area. The key characteristics of this area include the following:

- a mix of 1920s detached properties and two storey post war terraces;
- the post war terraces differ from the earlier 1920s development due to the use of shared gardens and lawns and car parking spaces resulting in a large proportion of on street parking in the area; and
- the 1920s development typically comprises two to two and half storey red brick dwellings arranged around small greens.

11.61 The strong sense of enclosure created within this LTCA, by the coverage of mature trees and residential streets, combined with the built form and vegetation on its interface with the adjacent LTCA 10, significantly limits intervisibility from this LTCA towards the Site. Therefore, this LTCA is not being considered further as part of the assessment process.

Area 10: Parkway Residential Area

11.62 The nearest part of LTCA 10 is approximately 380m, to the west of the Site boundary. The Parkway residential area lies within the Welwyn Garden City Conservation Area. The key characteristics of this area include the following:

- Neo-Georgian houses that are well maintained and designed by Louis de Soissons in 1924;
- Parkway provides a dramatic approach to the town centre from the south providing views North towards The Campus and Digswell Road;
- the central parkway garden is the defining feature; a linear park lined by a boulevard of tall Poplars allowing for dramatic views towards the Coronation Fountain;
- the main vista along Parkway runs on a north / south axis focusing views along its length;
- the built form includes short terraces and detached houses of two to two and a half storeys; and
- properties generally have short open frontages with plot boundaries delineated by white wooden post and chain fencing.

11.63 There is a limited degree of intervisiblity between LTCA 10 and the Site due to the extent of intervening built form and vegetation.

11.64 The strong sense of enclosure created within this LTCA by the central linear parkway featuring boulevard trees, combined with the built form and vegetation on its interface with the adjacent LTCA 8 and 12, significantly limits intervisibility from this LTCA towards the Site.

11.65 Whilst there are limited, distant, glimpsed views towards the tops of the existing silos, within the North Side, for the most part, the angle of view, vegetation and built form within and adjacent to this LTCA prevents the Proposed Development having a significant effect on the character of this area. Therefore, this LTCA is not being considered further as part of the assessment.

Area 11: Hanside Lane Area

11.66 The nearest part of LTCA 11 is approximately 570m, to the west of the Site boundary. The Handside Lane Area lies within the Welwyn Garden City Conservation Area. The key characteristics of this area include the following:

- linear residential land use, containing a large portion of the original 1920s built form in Welwyn Garden City;
- a former rural road pre-dating Welwyn Garden City exhibiting some original features, notably portions of the hedgerows and trees;
- houses are typically two storey short terraces with the occasional detached properties; and
- unity of character is quite strong, however the integrity is affected by alterations made to individual housing plots, through the extension of on plot parking spaces.

11.67 The strong sense of enclosure created within this LTCA by the coverage of trees and linear residential streets, combined with the built form and vegetation on its interface with the adjacent LTCA 12, significantly limits intervisibility from this LTCA towards the Site. Therefore, this LTCA is not being considered further as part of the assessment.

Area 12: Parkway Retail Area

11.68 The nearest point of LTCA 12 is approximately 150m, to the west of the Site boundary, separated by the East Coast Mainline railway. This area lies within the Welwyn Garden City town centre and Conservation Area. The key characteristics of this area include the following:

- the main commercial centre of Welwyn Garden City and the Northern extent of Parkway;
- defined by the large open green spaces, long vistas and a neo-Georgian department store building;
- an Eastern arm of Parkway branches off to form Howardsgate, a central open space framed by tall Poplars at the end of which is the modern Howard Centre;
- the Howard Centre (a shopping centre developed in the 1990s) and car park forms a prominent visual mass on the LTCA's Eastern boundary; and
- many of the original houses within the character area have been converted to either offices or surgeries.

11.69 LTCA 12 is considered to be of **high value**, reflective of the area exhibiting townscape and landscape elements of high quality and condition, large areas of formal public open space, prominent landscape vistas, boulevards of trees and neo-Georgian built form that overall combines to form an aesthetically pleasing townscape composition. The LTCA's location within Welwyn Garden City town centre means it is experienced by the broader community including visitors and tourists.

Area 13: Brockswood Lane Area

11.70 The nearest point of LTCA 13 is approximately 680m, to the north west of the Site boundary. The key characteristics of this area include the following:

- Brockswood Lane, a long sinuous road which connects the town with the A1M motorway, lined on either side by detached and semi-detached two storey dwellings;
- there is very little unity within this area due to the variety of building styles and materials;
- the majority of built form dates from the 1920s, with more recent buildings, such as Woodside House, situated closer to the town centre;
- whilst this road is relatively busy with traffic, the area is enclosed on its Northern side by Sherrards Park Wood providing a slight rural character and a sense of tranquillity in comparison to the nearby town centre.

11.71 The strong sense of enclosure created within this LTCA by the coverage of mature trees and residential built form, combined with the built form and vegetation on its interface with the

adjacent LTCA 14, significantly limits intervisibility from this LTCA towards the Site. Therefore, this LTCA is not being considered further as part of the assessment.

Area 14: The Campus

11.72 The nearest point of LTCA 14 is approximately 270m, to the north west of the Site boundary, separated by the East Coast Mainline railway. This area lies within the Welwyn Garden City town centre and Conservation Area. The key characteristics of this area include the following:

- The Campus borders a formal green open space featuring mature trees and pathways;
- institutional and civic buildings enclosing the campus green, displaying a variety of building styles ranging from modernist to neo-Georgian;
- large areas of car parking, for the associated civic land uses, which visually detracts from the quality of the townscape area;
- the building styles vary, however the use of material is sympathetic to the traditional Garden City architecture; and
- The Campus is elevated at the Northern end of the Parkway providing a strong vista South down its length, framed by a tree boulevard.

11.73 LTCA 14 is considered to be of **high value**, reflective of the area exhibiting townscape and landscape elements of high quality and condition, large areas of formal public open space, prominent landscape vistas down the length of Parkway, boulevards of trees and modernist to neo-Georgian built form that overall combines to form an aesthetically pleasing townscape composition. The LTCA's location within Welwyn Garden City town centre means it is experienced by the broader community including visitors and tourists.

Heritage

11.74 The heritage features of importance to the townscape and landscape of the Site and wider study area are described in **Chapter 14** of this ES and include the history and heritage value of the Site, listed buildings and their setting within and surrounding the Site. Statutory and non-statutory heritage designated sites and features within a 1km study area of the Site are illustrated on Figures 11.2 & 11.3.

Listed Buildings Within the Surrounding Area

11.75 The Site does not feature any listed buildings, however the North Side of the former Shredded Wheat Factory site (part of the 'Extant Planning Permission') features the former Nabisco Shredded Wheat Factory (Grade II listed).

11.76 One of the first manufacturing industries to locate to the town was Shredded Wheat, as the American company considered the garden city image would be ideal for the production of their 'health' food. The Shredded Wheat factory finally ceased production in January 2008, after 73 years in Welwyn Garden City.

11.77 The listing of the factory includes the original production hall and silos designed by Louis de Soissons, built between 1926 and 1928. The silos are a strong visual landmark in specific views within Welwyn Garden City. The original 1920s parts of the factory complex designed by Louis de Soissons, including the production hall, boiler house, grain house and first 18 wheat elevators (silos) are considered to be of the highest significance architecturally and historically. The 1920's parts of the factory complex were retained as part of the Extant Planning Permission of the former Shredded Wheat factory site, with all other built form subsequently removed. These demolition works have opened up views of these 1920s parts of the factory however, only key views of these features will remain on completion of the extant consented development across the wider area of the former factory site.

11.78 There are listed buildings beyond 1km of the Site, however the enclosure created by the townscape, built form and vegetation significantly limits intervisibility with the Site, therefore these listed buildings are not being considered further as part of the assessment. The exception to this is Hatfield House (Grade I), 4.3km to the South of the Site, considered further under Registered Park and Gardens below. The following listed buildings are within 1km of the Site:

- Hand Side Farmhouse (Grade II)
- The Barn Theatre (Grade II)
- The Old Cottage (Grade II)
- Digswell Lodge (Grade II)
- Office block (Buildings 1 to 4) to Roche Products Factory (Grade II)

11.79 Hand Side Farmhouse, The Barn Theatre, The Old Cottage and Digswell Lodge have no intervisibility with the Site, due to the enclosure created by the surrounding built form and vegetation, as well as the orientation of the building, in the case of The Old Cottage. As such,

these Grade II Listed buildings would be unaffected by the Proposed Development and are not being considered further as part of the assessment.

11.80 There is one listed building in close proximity that shares direct intervisibility with the Site. Office block (Buildings 1 to 4) to Roche Products Factory (Grade II) is a former office block to the Roche Factory, designed by Otto Salvisberg and constructed in the late 1930s. It is located on Broadwater Road, adjacent to the former Shredded Wheat Factory site's southern boundary, south of the extant consented Phase 1 area which is currently in construction. The listed building lies within the curtilage of a new 21st century residential development called 'The Mirage'.

Conservation Areas

11.81 The Site itself is not within a conservation area however it is in close proximity to both Welwyn Garden City and Peartree Conservation Areas.

11.82 The Welwyn Garden City Conservation Area is located approximately 150m from the Site's western boundary, separated by the East Coast Mainline Railway, and covers the pre-war Garden City including the Town Centre, Parkway and adjoining residential areas. Welwyn Garden City Conservation Area was designated in 1967; intended to preserve the architectural unity of the town.

11.83 The Welwyn Garden City Conservation Area Appraisal considers that the principal historic significance of Welwyn Garden City lies in its planning and states *"possibly the highest expression of the visionary physical, social, cultural and economic ideals of their period, drawn together by the Garden City's founders, management and professional. In planning terms the level of significance is global, attracting study and visits from many countries".*

11.84 The Peartree Conservation Area is located approximately 440m to the south of the Site boundary, situated in the south east of Welwyn Garden City and comprises residential and retail areas, largely built to the designs of the city architect Louis de Soissons. The Peartree Conservation Area Character Appraisal and Management Plan considers the special architectural and historic interest, which justifies the designation of the conservation area containing the following features:

- Planned low income housing, providing interesting contrast to the contemporary developments in the west of the town.

- Good example of the application of the Garden City Principles.
- Much of the original street plan remains as well as many surviving architectural features indicative of Louis de Soisson's Neo-Georgian architectural style.
- Tree lined avenues and open frontages adding to the dominant feeling of green space.

Registered Parks and Gardens

11.85 Hatfield House is a Grade I listed Registered Park and Garden, featuring medieval parkland located approximately 2.8km to the South of the Site boundary, with Hatfield House (Grade I) and The Palace (Grade I) both listed buildings located approximately 4.3km to the South of the Site boundary. Hatfield Park lies adjacent to the east side of the village of Hatfield, and incorporates several former medieval hunting parks. The 7.5km^2 estate features an early 17th century mansion surrounded by extensive and complex gardens and park, created from the medieval parks of Hatfield. The grounds are gently undulating, with a plateau towards the west boundary, on which stands Hatfield House and Old Palace within the centre of the estate.

Land Use

11.86 The land use within the Site and wider study area is illustrated in Figure 11.5.

Within the Site

11.87 The Site is brownfield land, cleared of built form featuring tree vegetation on its boundaries.

11.88 Land use within the Site is considered to be of **low value**, reflecting its condition, lack of built form and quality.

Within the Study Area

11.89 The land use pattern for Welwyn Garden City still reflects Louis de Soissons' original 1921 masterplan; a town defined clearly by land use zones set nearly a Century ago. The town's shopping core remains in the same location, albeit much larger in size with many additions, not least the Howard Centre built in the 1990s. The industrial work zone remains in its original location although this has expanded considerably in size and is now more reliant on the road infrastructure than the railway. The Shire Park Business Area to the North East of the town has

introduced office and business land use due to the decline in industrial activities. The Times Square development off Bessemer Road (Chase New Homes) has been built on the former Xerox complex and comprises a 541 unit residential development scheme with the first phase complete.

11.90 As a result of the industrial, commercial and office uses surrounding Broadwater Road and Bridge Road, Peartree residential area has become increasingly distanced, both physically and psychologically from the town's core, located on the opposite side of the railway lines. Due to the decline in industry in this part of Welwyn Garden City and the increase in demand for housing, the Site and the former Shredded Wheat Factory site has been identified as an area suitable for mixed use development, by the Broadwater Road Supplementary Planning Document (2008), to assist in bridging the east and west sides of the town.

11.91 The land use within and immediately surrounding the Site and along Broadwater Road is currently in a state of change, with full planning permission being granted in February 2019 to redevelop the former Shredded Wheat Factory site to accommodate up to 1,340 homes (ref:6/2018/0171/MAJ). This is also evident by the recently completed residential developments along Broadwater Road including the Mirage, Birkin Court and the recent development of Mercury House 1 Broadwater Road to residential use. Further residential development is proposed at 29 and 37 Broadwater Road and Biopark (Broadwater Gardens - ref:6/20203420/MAJ) currently being considered at planning and assessed as part of the assessment of the cumulative effects.

11.92 The land north of Hydeway associated with the wider former Shredded Wheat Factory site contains the retained 1920s parts of the Shredded Wheat factory complex designed by Louis de Soissons, including the production hall, boiler house, grain house and first 18 wheat elevators (silos). These former Shredded Wheat Factory buildings remain largely derelict and disconnected from the surrounding townscape, due to the removal of former disused factory buildings.

11.93 Land use within the wider study area spatially reflects the original Louis de Soissons' masterplan for Welwyn Garden City. The western residential area, shopping core and educational land uses surrounding the town centre within Welwyn Garden City Conservation Area exhibit a townscape of high quality and condition, considered to be of **high value**.

11.94 The industrial, commercial and residential uses to the north and east, separated from the town centre by the East Coast Mainline Railway, exhibit a townscape of limited distinctiveness and is generally poorly maintained, considered to be of **low value.**

Open Space and Landscape

11.95 Public open space and green space provision within 1km of the centre of the Site is illustrated on Figure 11.7.

Within the Site

11.96 The Site lies on private, brownfield land which is enclosed by security fencing on its outer boundaries. The Site is cleared of built form featuring construction activity associated with the extant permission for development of the wider former Shredded Wheat Factory site. There is a small proportion of vegetation, comprising trees and scrub, concentrated along the Site's western boundary.

11.97 An Arboricultural Implications Assessment, undertaken by Bradley Murphy Design (BMD) accompanies the planning application for the Site, this confirms the majority of trees are classified as grade B and C, defined as low to moderate value.

11.98 Overall open space and landscape within the Site is consider to be of **low value**, reflecting primarily the lack of public access and the small proportion of landscape elements evident within the Site, which for the most part are of low to moderate value.

Within the Wider Study Area

11.99 In the wider study area, public open space and green space provision is largely concentrated within the Welwyn Garden City town centre along Howardsgate and Parkway. Areas of formal lawns, seating, boulevards of trees and framed views are key features of these spaces alongside the more informal open space at the Campus. Within the industrial and business park areas to the east of the town, the amount of public open space and landscape is limited to verges and street tree planting. Within Peartree and Handside, residential development is centred around small pockets of public open space and wide tree lined verges.

11.100 Whilst there is a high proportion of public open green space within Welwyn Garden City town centre, desk top analysis and study visits have indicated a lack of formal play provision for

young children across the town and an underuse of areas such as Parkway by the public, who seem to prefer the more intimate and town centric Howardsgate or the more flexible open space of the Campus.

11.101 The focus of existing public open space around the town centre, close to the Site, provides the opportunity to link the east and west sides of Welwyn Garden City through the use of quality green spaces. This is supported by the Broadwater Road West SPD (2008), which states for development of the former Shredded Wheat Factory site: *"the provision of well landscaped open space and planting is intrinsic to the character of Welwyn Garden City and should be a key feature of this development".*

Scale and Height

11.102 Building scales within 1km of the centre of the Site are illustrated on Figure 11.6. It is important to note that Figure 11.6 only illustrates storey heights and does not show the existing building height. The following observations can be made:

- large scale three storey buildings are concentrated within Welwyn Garden City town centre and include the 1990s Howard Centre;
- buildings within Welwyn Garden City town centre rarely rise above five storeys;
- the highest storey heights surrounding the Site are generally five storey buildings used for retail, industrial and commercial use, however, the Biopark located to the south of the Site and 29 Broadwater Road offices to the east of the Site are much greater than five storeys in height, with the Biopark taller than the existing silos within the North Side;
- to the southeast of the Site towards Peartree, the scale of the buildings decreases and are predominantly one to two storey;
- a large proportion of the industrial and commercial buildings surrounding Bridge Road and Broadwater Road are two to three storeys however their overall height often incorporates architectural detailing that increases the overall height. These buildings are equivalent of a five storey residential building as the storey heights are often around 5m where residential built form is usually around 3m;
- 29 Broadwater Road is an existing office block on Broadwater Road directly to the east of the Site, five storeys in height;
- the residential developments to the south of the Site (The Mirage and Birkin Close) incorporates three to four storey high apartment buildings; and

- aside from the Biopark located to the south of the Site and 29 Broadwater Road offices to the east of the Site, the existing silos within the former Shredded Wheat Factory site (North Side) are the highest built form surrounding the Site.

Layout and Urban Grain

11.103 From an analysis of the urban grain surrounding the Site, the following observations can be made:

- the urban grain and layout is closely related to the current land use and informed by the large scale built form associated with the town centre, industrial zone and commercial areas;
- buildings are orientated on an approximate north / south and east / west axis still reflecting Louis de Soissons' original 1921 masterplan;
- within the town centre the architectural layout is defined by the low urban density dominated by open space; and
- there is a finer urban grain to the south east of the Site on the residential edge of Peartree that has been reflected in the more recent development to the south of the Site, north of Broadwater Crescent.

Visual Amenity

11.104 The Zone of Theoretical Visibility, within which the Proposed Development is likely to be visible, is shown in Figure 11.10. The viewpoints subject to the visual assessment are identified in Table 11.5 and their locations are shown on Figure 11.11. The description of each viewpoint is presented below and photographs of each existing viewpoint are provided in the Wirelines Assessments at Appendix 11.3 and 11.4.

Table 11.5 – Viewpoints

Viewpoint	Location
Viewpoints 1 & 1a	Bridge Road (B195) looking South East from the railway bridge
Viewpoint 2	Broadwater Road (A1000) at the junction with Bridge Road (B195)
Viewpoint 3	Hydeway looking West
Viewpoint 4	Knella Road / Peartree Lane, Peartree
Viewpoint 5	Corals Mead, Broadwater Crescent
Viewpoint 6	Welwyn Garden City Rail Station
Viewpoint 7	Parkway looking East along Howardsgate
Viewpoint 8	The Campus, Parkway

Viewpoint	Location
Viewpoint 9	Pentley Park, Sherrards Park
Viewpoint 10	Network Rail footbridge – 1
Viewpoint 11	Hydeway / Broadwater Road junction
Viewpoint 12	Osborn Way footbridge
Viewpoint 13 & 13a	Bridge Road (B195) looking south
Viewpoint 14	Broadwater House / Mercury Way / Albany Place
Viewpoint 15	Otto Road / Southern Site boundary
Viewpoint 16	Network Rail footbridge – 2
Viewpoint 17	Wigsmore North
Viewpoint 18	Broadwater Road / Penn Way
Viewpoint 19 A & B	Hatfield House 1st Floor and Roof
Viewpoint 20 A, B & C	Hatfield House and Gardens (Southern Approach)
Viewpoint 21 A, B & C	Hatfield House Parkland (publicly accessible path)
Viewpoint 22 A & B	Hatfield House Deer Park (private area of parkland)
Viewpoint 23	Essendon Public Footpath 5 (Edge of Essendon Conservation Area)
Viewpoint 24	Junction of Essendon Public Footpath 11 and 12
Viewpoint 25	Campus West
Viewpoint 26	Junction of Church Road and Parkway
Viewpoint 27	Furzefield Road, Peartree Conservation Area

Viewpoints 1 & 1a: Bridge Road (B195) Looking South East from the Railway Bridge

11.105 Viewpoints 1 and 1a are located on Bridge Road and are located c. 280 – 250m to the northwest of the Site boundary. Receptors on Bridge Road include vehicle users, cyclists and pedestrians. The bridge forms a key vehicular route for those travelling east / west and features a footpath that pedestrians use to access the town centre. Bridge Road forms part of the Welwyn Garden City Peartree Trail (as illustrated on **Figure 11.3**) which is a heritage walking trail for visitors and tourists to Welwyn Garden City. This view is also, therefore, representative for this group of receptors.

11.106 The receptors view is sequential and receptors at Viewpoint 1 heading east along Bridge Road experience direct foreground views of the East Coast Mainline railway and associated infrastructure, beyond which there are oblique partial views of the Site, featuring temporary construction cabins and activity associated with implementation of the extant planning permission. Beyond the Network Rail bridge crossing, the tops of trees defining the Site's western boundary are visible in the distance. Further along Bridge Road, at Viewpoint 1a, the receptors views are filtered by intervening vegetation bordering the former Shredded Wheat Factory site boundary, beyond which there are oblique glimpsed views of the Site.

11.107 The original 1920s former Shredded Wheat Factory production hall and silos (Grade II listed) and prominent chimney, part of the former Shredded Wheat Factory site (North Side), are visible along the skyline.

11.108 In the distance, to the rear of the Network Rail bridge crossing, warehouses within the Pall Mall industrial estate are visible. There are glimpsed views through existing vegetation, in the distance, towards the Office block (Buildings 1 to 4) of the former Roche Products Factory (Grade II listed) and residential apartments within the Mirage development, off Penn Way.

11.109 Whilst the view allows for some appreciation of the listed buildings on the former Shredded Wheat Factory site (North Side), the unkempt appearance of the buildings, the parcel of intervening scrubland along with views of the railway and industrial features all detract from the visual amenity and result in a neglected appearance.

11.110 Whilst the general value of sequential views from Bridge Road for vehicle users, cyclists and pedestrian receptors is considered **low**, sequential views are experienced by receptors on the edge of a townscape designated a Conservation Area, therefore the overall value is considered **medium.**

11.111 Bridge Road forms part of the Peartree Trail Heritage Trail and is used by a moderate proportion of visitors, to appreciate views of historic buildings and spaces within Welwyn Garden City and Conservation Area. The value attached to viewpoint 1 and 1a from these heritage trail receptors is considered **high**.

11.112 For the future baseline, with the site developed under the extant consent, the view will feature new residential built form, which would positively alter the skyline and view composition. Whilst the proportion of views towards the 1920s production hall, chimney and silos within the North Side site would reduce, the appearance of the 1920s Grade II Listed built form would improve overall as part of the proposed restoration works. As receptors move further east along Bridge Road the implementation of built form on the North Side would inhibit views internally towards the Site and the Proposed Development.

Viewpoint 2: Broadwater Road (A1000) at the Junction with Bridge Road (B195)

11.113 Receptors at the junction between Broadwater Road (A1000) and Bridge Road (B195) include vehicle users, cyclists and pedestrians, and users of the Peartree Trail, with the viewpoint approximately 200m, to the north-east of the Site boundary.

11.114 The foreground view is dominated by the Bridge Road and Broadwater Road junction, including associated infrastructure (lighting columns, traffic lights and signage) and vehicular movement. The recently built Mercury House, including a glass façade is also within the view and provides a positive enhancement to the immediate townscape in the view. The boundary and buildings, located within the north eastern part of the former Shredded Wheat Factory site (North Side), are visible in the middle ground beyond the road junction. In the distance the north eastern boundary of the Site is partially visible, delineated by a security fence and tree vegetation adjacent to Broadwater Road. The upper storey of block 4 within the Taylor Wimpey residential development, referred to as the 'Mirage', is partially visible in distant views, to the rear of which the Bio Park is visible on the skyline in the distance.

11.115 The 1920's silos and production hall, retained as part of the extant planning permission of the former Shredded Wheat Factory site, are visible along the skyline in the middle ground. The unkempt appearance of these former Shredded Wheat Factory buildings, boundary vegetation, visual street "clutter" such as street lighting and signage along with the vehicular traffic movement at the junction, all detract from the amenity of this view.

11.116 Whilst the general value of sequential views from the Broadwater Road / Bridge Road junction for vehicle users, cyclists and pedestrian receptors is considered **low**, the road forms part of the Peartree Trail Heritage Trail and is of local importance, used by a moderate proportion of visitors, to appreciate views of historic buildings and spaces within Welwyn Garden City. The value attached to the view from these heritage trail receptors is, therefore, considered to be **medium**.

11.117 For the future baseline, with the entire Former Shredded Wheat Factory site developed under the extant consent, the view will feature residential perimeter apartments, that would create a positive urban edge. The scale of the consented North Side perimeter apartments on the junction corner is proposed at 9 storeys high, stepping down to 7 storeys either side, introducing significantly taller built form than previously present on this edge of the Former Factory site or in the adjacent vicinity. The implementation of the consented built form on the North Side would limit views of the Site and any views of the Proposed Development would be seen in the context of the consented residential development along Broadwater Road and the Phase One area currently under construction.

Viewpoint 3: Hydeway Looking West

11.118 Receptors along Hydeway are occupiers of residential properties, vehicle users, pedestrians and cyclists, with the viewpoint approximately 250m, to the east of the Site boundary.

11.119 The view for vehicle users, pedestrians and cyclists, for the most part, is channelled and framed along Hydeway by built form and vegetation towards the Site's north eastern boundary. Breaks in the built form and vegetation provide partial glimpsed, filtered, distant views of the former Shredded Wheat Factory chimney and silos, within the North Side site.

11.120 Residential receptors include properties that directly front onto Hydeway, at the junction with Peartree Lane, currently experiencing sharply oblique, distant, glimpsed views of the top of the chimney and silos within the North Side site. The angle and orientation of these properties and the enclosure created by hedgerow and tree vegetation, limits views to the upper storeys, and for the most part, views are screened by intervening vegetation.

11.121 Whilst the general value of views from Hydeway for vehicle users, cyclists and pedestrian receptors is considered **low**, the residential receptors discussed above, along Hydeway, all have a proprietary interest in their views, therefore, their value is considered to be **high**.

11.122 For the future baseline, with the Site developed under the extant consent, the view will feature glimpsed to partial views of the perimeter apartment blocks along Broadwater Road, through intervening vegetation, with views of the listed silos and chimney screened by the extant consented development on the North Side. The Proposed Development will be seen in the context of the consented North Side residential development.

Viewpoint 4: Knella Road / Peartree Lane, Peartree

11.123 This viewpoint represents residential receptors, vehicle users, cyclists and pedestrians within the Peartree Estate on Peartree Lane and Knella Road, with the viewpoint approximately 380m, to the south east of the Site boundary.

11.124 Residential receptors include properties that directly front onto Peartree Lane and Knella Road, where residents currently experience, oblique, distant, partial glimpsed views of the top of the former Shredded Wheat Factory silos within the North Side site. The silos are visible

along the skyline, above and to the rear of trees and residential built form located in the foreground and middle ground views, and viewed alongside offices at 29 Broadwater Road.

11.125 The angle and orientation of these residential properties and the enclosure created by surrounding residential and office built form and vegetation, limits views towards the Site and, for the most part, views are screened.

11.126 The view for vehicle users, pedestrians and cyclists along Knella Road and Peartree Lane, for the most part, are channelled and framed by built form and vegetation. Breaks in the built form provide indirect glimpsed, distant views towards the tops of the Silos within the North Side site.

11.127 Whilst the general value of views from Knella Road and Peartree Lane for vehicle users, cyclists and pedestrian receptors is considered **low**, the residential receptors discussed above, along Knella Road and Peartree Lane, all have a proprietary interest in their views therefore a **high** value is attached to their view.

11.128 For the future baseline, with the Site developed under the extant consent, the view will feature distant, partial glimpsed oblique views of the upper extents of the perimeter apartment blocks, above existing intervening residential built form and vegetation.

Viewpoint 5: Corals Mead, Broadwater Crescent

11.129 This viewpoint represents residential receptors on the northern end of Corals Mead, with the viewpoint approximately 380m, to the south west of the Site boundary.

11.130 Residential receptors currently experience oblique, foreground views of the Bio Park building, to the rear of a hedgerow boundary, which forms a dominant impermeable mass and visual detractor in the view. The Biopark and hedgerow vegetation currently encloses and screens views towards the Site. The upper extents of the Taylor Wimpey residential development, referred to as the 'Mirage', are partially visible, in the distant view.

11.131 The residential receptors discussed above, on Coral Meads, have a proprietary interest in their view therefore the value attached to their view is **high**.

11.132 For the future baseline, with the Site developed under the extant consent, the view will feature the upper limits of perimeter apartments on Broadwater Road and residential blocks to

the South Side would be visible to a limited degree. The implementation of the consented built form on the Phase 1 South Side would inhibit views of the Site and views of the Proposed Development would be seen in the context of the consented development and limited to the upper limits.

Viewpoint 6: Welwyn Garden City Rail Station

11.133 Receptors from this viewpoint are commuters standing on the station platform and train passengers, with the viewpoint approximately 150m, to the west of the Site boundary.

11.134 Commuters and train passengers currently experience views of the opposite platform, signage, overhead cables, plant and other furnishings, which make up the foreground view. Scattered trees, vegetation and security fencing are visible, in the middle ground, defining the North Side site. The western elevation of the 1920s production hall and silos (Grade II listed), part of the North Side site, are visible along the skyline, in the middle ground view.

11.135 The tops of trees and the upper storey of the self storage unit on Broadwater Road at the junction with Hydeway are visible in the distance.

11.136 Whilst the general value of sequential and static views from this location for passenger receptors is considered **low**, views are experienced by receptors on the edge of a townscape of local importance designated a Conservation Area, therefore, the value attached for these receptors is considered **medium.**

11.137 For the future baseline, with the Site developed under the extant consent, the view will feature residential built form, adjacent and facing out to the railway, visible in the near distance, along the skyline. Whilst the consented development results in the limited loss of views towards the listed buildings, the introduction of high quality built form, landscaping and the refurbishment of the listed built form represents an obvious positive visual change to the townscape view.

Viewpoint 7: Parkway Looking East along Howardsgate

11.138 Receptors from this viewpoint include people utilising the public open space along Parkway and Howardsgate and users of the Welwyn Garden City Town Centre (Route 1) heritage trail, with the viewpoint approximately 480m, to the west of the Site boundary. This view is identified within WHBC's Conservation Area Appraisal as '*an important key view or vista'*.

11.139 The receptors' foreground view features a linear formal public open space and avenues of trees which, combined with the built form on its edges, channels and frames the view down the Eastern axis of Howardsgate, towards the Howard Shopping Centre, visible in the distance. Whilst there are limited to distant glimpsed views of the upper extents of the silos and chimney within the North Side site, the enclosure created by the surrounding built form, Howard Shopping Centre and vegetation limits and screens views towards the Site.

11.140 Parkway and Howardsgate lie within the Welwyn Garden City Conservation Area and town centre - these are key areas of public open space, experienced by the broader community including visitors and tourists, representing a recognised 'key view or vista' from the Conservation Area Appraisal. Therefore, the value attached to the view from these receptors is **high**.

11.141 For the future baseline, with the Site developed under the extant consent, the view will feature the tops of the perimeter apartment blocks, projecting above the Howard shopping centre. The majority of the consented development would be screened by existing intervening built form (Howard Centre) and vegetation.

Viewpoint 8: The Campus, Parkway

11.142 Receptors from this viewpoint include people utilising the public open space within The Campus and users of the Welwyn Garden City Town Centre (Route 2) heritage trail, with the viewpoint approximately 650m to the north west of the Site. This view is identified within WHBC's Conservation Area Appraisal as '*an important key view or vista'*.

11.143 The receptors' foreground view comprises formal public open space featuring mature trees, planting and seating areas. This extends to the middle ground with filtered partial views of civic built form, which frames and encloses the Campus and the view. The clock tower of the WHBC Offices is a notable feature, on the skyline in distant views, beyond which the upper extents of the 1920s silos and chimney within the North Side site are visible.

11.144 The Campus within Welwyn Garden City town centre is a key area of public open space, experienced by the broader community including visitors and tourists, located within Welwyn Garden City Conservation Area and from a recognised 'key view or vista'. Therefore, the value attached to this view is considered to be **high**.

11.145 For the future baseline, with the Site developed under the extant consent, the view will feature slim portions of the upper limits of the perimeter apartment blocks, above the existing civic built form and seen through intervening vegetation. The majority of the consented development would be screened by existing intervening built form and vegetation.

Viewpoint 9: Pentley Park, Sherrards Park

11.146 Receptors from Pentley Park are occupiers of residential properties, vehicle users, pedestrians and cyclists, with the viewpoint approximately 1.25km, to the north west of the Site boundary.

11.147 The view for vehicle users, pedestrians and cyclists are constrained by intervening vegetation and built form framing and channelling views along the road and in the direction of travel. Whilst there are limited to distant glimpsed views of the upper extents of the silos within the North Side site, the enclosure created by the surrounding built form and vegetation limits and screens views towards the Site.

11.148 Residential receptors include properties that directly front onto Pentley Park, where residents currently experience oblique, distant, glimpsed views of the top of the silos within the North Side site. The angle and orientation of these properties and the enclosure created by the surrounding built form and vegetation, is considered to limit views and for the most part, views are screened. The residential receptors have a proprietary interest in their view therefore the value attached to their view is **high.** The general value of views from Pentley Park for vehicle users, cyclists and pedestrian receptors is considered **low**.

11.149 For the future baseline, with the Site developed under the extant consent, whilst there are limited, distant, glimpsed views towards the tops of the retained silos and chimney, within the North Side site, for the most part the majority of the consented development would be screened by existing intervening built form and vegetation.

Viewpoint 10: Network Rail Footbridge – 1

11.150 Receptors from this viewpoint are pedestrians using the Network Rail footbridge, which connects the Howard Shopping Centre in the west to Hydeway in the east, with the viewpoint approximately 100m, to the west of the Site boundary.

11.151 Pedestrians experience elevated views from the footbridge across the East Coast Mainline railway towards industrial land featuring perimeter security fencing, warehouses and areas of hardstanding, visible in the foreground view. The listed 1920's Shredded Wheat Factory buildings that are visually prominent from this view, located within the North Side site, include the western elevation of the production hall, grain house, silos and chimney, projecting above the factory hall.

11.152 The view for pedestrians is constrained by the footbridge infrastructure and intervening vegetation framing and channelling views along the bridge and in the direction of travel, resulting in partial to glimpsed views of the Site.

11.153 From the Network Rail footbridge the value of views for pedestrian receptors is considered to be **low** as there is no evidence of any specific value attached to these views.

11.154 For the future baseline, with the Site developed under the extant consent, the view will feature the perimeter apartment blocks, providing a high quality, mixed used development. The consented development will replace the unkempt, derelict, industrial land visible in the foreground.

Viewpoint 11: Hydeway

11.155 Receptors at the junction between Hydeway and Broadwater Road (A1000) include vehicle users, pedestrians and cyclists, with the viewpoint approximately 20m, to the east of the Site boundary.

11.156 The view for vehicle users, pedestrians and cyclists is channelled and framed along Hydeway by built form and vegetation towards the Site's eastern boundary. Scattered mature trees feature in the foreground view, to the rear of which, site hoarding is visible bordering Broadwater Road, defining the Site's eastern boundary.

11.157 The 1920's silos and site hoarding are visible, within and along the boundary of the North Side site, framing and channelling views along Hydeway, where the red brick built form of the Howard Centre is visible in the distance.

11.158 The physically and visually enclosed nature of the Site's eastern boundary, as a result of the site hoarding and existing mature trees, restrict views into the lower levels of the Site from this location.

11.159 From Hydeway the value of views from vehicle users, cyclists and pedestrian receptors is considered **low** as there is no evidence of any specific value attached to these views which, until recently, were dominated by derelict 1950s and 1960s buildings of the former factory.

11.160 For the future baseline, with the Site developed under the extant consent, the view will feature the perimeter apartment blocks along Broadwater Road and Hydeway, improving the street scene and providing an active and positive edge. The view along Hydeway would be terminated by tree planting and artwork within Goodman Square and the perimeter apartment blocks framing this space, resulting in the loss of distant views towards the Howard Centre. The consented proposals would screen views of the 1920s listed buildings from this position.

Viewpoint 12: Osborn Way footbridge

11.161 Receptors on Osborn Way footbridge are pedestrians walking between the multi storey car park and the Howard Shopping Centre, with the viewpoint approximately 270m, to the north west of the Site boundary.

11.162 The receptors' view is elevated and framed on either side by built form, which channels the view towards a line of vegetation and perimeter fencing visible in the foreground bordering the East Coast Mainline railway. The railway line, overhead lines and gantry structures are visible in the middle ground, between the intervening vegetation, forming visual detractors across the length of the view.

11.163 In the distance the built form within the North Side site and Mercury House along Broadwater Road are visible along the skyline. The western elevation of the 1920s former Shredded Wheat Factory production hall, within the North Side site, is partially visible, above and to the rear of existing vegetation either side of the railway whilst the top of the 1920s silos and chimney are visible, above and to the rear of the production hall building.

11.164 The enclosure created by the surrounding built form and vegetation, limits views towards the Site and views are, for the most part, screened.

11.165 Whilst the general value of sequential views from this location for pedestrian receptors is considered **low**, views are experienced by receptors on the edge of a townscape of local importance designated a Conservation Area (albeit dominated in this location by the 1990s built form of the Howard Centre), therefore, the value attached for these receptors is considered **medium.**

11.166 For the future baseline, with the Site developed under the extant consent, the view will feature partial distant views of the perimeter apartment block 2 and 3 within the North Side site and glimpsed views of the 1920's production hall and silos. The majority of the South Side consented development would be screened by existing intervening built form and vegetation.

Viewpoints 13 & 13a: Bridge Road (B195) Looking South

11.167 Receptors on Bridge Road (B195) include vehicle users, cyclists and pedestrians, and users of the Peartree Trail, with the viewpoints approximately 250m, to the north of the Site boundary.

11.168 Perimeter fencing and vegetation are visible in the foreground, along the length of these views, bordering Bridge Road. The 1920s production hall on the North Side is visible in the foreground view, to the rear of which are glimpses of the upper extent to the silos. The Howard Centre dominates the right of view along the horizon, whilst offices at 29 Broadwater Road and commercial buildings are visible in the distance along Broadwater Road, to the left of view.

11.169 While the view allows for some appreciation of the listed buildings on Site, the unkempt appearance of the buildings, their surroundings, the vegetation and fencing along Bridge Road, and enclosed nature of the view all detract from the visual amenity and result in a neglected appearance. The existing built form within the North Side site combined with existing vegetation on Bridge Road limits views into the lower levels of the Site.

11.170 Whilst the general value of views from Bridge Road for vehicle users, cyclists and pedestrian receptors is considered **low**, Bridge Road forms part of the Peartree Heritage Trail and is used by a moderate proportion of visitors, to appreciate views of historic buildings and spaces within Welwyn Garden City. Therefore, the value of the view from these heritage trail receptors is considered to be **medium**.

11.171 For the future baseline, with the Site developed under the extant consent, the view will feature residential apartment blocks 3,6 and 7 of the North Side site facing out onto Bridge Road, replacing views of the current degraded factory buildings. Views towards the retained and enhanced listed 1920s silos and production hall would be opened up through deliberate breaks in the built form between perimeter Blocks 2 & 6 and between Blocks 6 & 7, when viewed from various locations along this kinetic route (see alternative viewpoint 13a). The majority of the South Side consented development would be screened by proposed intervening built form within the North Side site.

Viewpoint 14: Broadwater Road / Mercury House / Albany Place

11.172 Receptors on Broadwater Road (A1000) include vehicle users, cyclists and pedestrians and users of the Peartree Trail, with the viewpoint approximately 120m, to the north east of the Site boundary.

11.173 Tall security fencing and hedgerow vegetation is visible in the foreground view bordering Broadwater Road. The 1920's production hall and silos (Grade II Listed), within the North Side site, are visible to the rear of the fencing. The upper storey of block 4, within the Taylor Wimpey residential development referred to as the 'Mirage', is partially visible in distant views, to the rear of which the Bio Park is visible on the skyline in the distance. The existing security fencing and hedgerow combined with existing vegetation on Broadwater Road limits views into the lower levels of the Site.

11.174 Whilst the general value of views from Broadwater Road for vehicle users, cyclists and pedestrian receptors is considered **low**, Broadwater Road forms part of the Peartree Heritage Trail and is used by a moderate proportion of visitors, to appreciate views of historic buildings and spaces within Welwyn Garden City. Therefore, the value of the view from these heritage trail receptors is considered to be **medium**.

11.175 For the future baseline, with the Site developed under the extant consent, the view will feature residential apartment blocks 6 and 7 of the North Side site in the foreground, framing views toward the refurbished listed buildings and public realm improvements, which would introduce an active, permeated, positive street scene and positive urban edge along Broadwater Road.

Viewpoint 15: Otto Road / Southern Site Boundary

11.176 Otto Road is a private road which forms part of the recently completed Taylor Wimpey residential development, referred to as the 'Mirage', and receptors include residents of block 4, with the viewpoint approximately 80m, to the south of the Site boundary.

11.177 The large expanse of derelict land and construction activity within the Site dominates the foreground and middle ground view and provides open expansive views across the Site towards the 1920s silos and chimney within the North Side site.

11.178 A line of existing mature trees are visible framing the left side of the view, defining the Site's western boundary, beyond which there are partial filtered views of the Pall Mall Site and the pedestrian footbridge over the East Coast Mainline railway, whilst the office block at 29 Broadwater Road is visible to the far right of the view.

11.179 The residential receptors noted above, have a proprietary interest in their view, therefore their value is considered to be **high**.

11.180 For the future baseline, with the Site developed under the extant consent, the view of the 1920s Silos will be retained – seen over the central park of The Weave and framed by residential blocks of the South Side development.

Viewpoint 16: Network Rail footbridge – 2

11.181 Receptors from this viewpoint are pedestrians using the Network Rail footbridge, directly adjacent to the western Site boundary, where it enters the North Side site along Hydeway.

11.182 The pedestrian's elevated position on the bridge, provides direct, clear views of the 1920s silos, grain house and chimney of the former Shredded Wheat Factory (Grade II Listed), in the foreground view. The Western elevation of the 1920s production hall is partially visible in the distance between intervening mature trees. The majority of this wide open view is of the derelict expanse of the Former Shredded Wheat Factory site, now cleared of most built form.

11.183 From the Network Rail footbridge the value of views for pedestrian receptors is considered **low**, given the degraded nature of the view.

11.184 For the future baseline, with the Site developed under the extant consent, the view will feature residential apartment blocks, framing views of Goodman Square. The consented development would introduce a high quality, mixed used development and an area of public realm replacing the current, largely derelict areas of industrial land.

Viewpoint 17: Wigsmore North

11.185 Receptors from Wigsmore North are vehicle users, pedestrians and cyclists travelling through the townscape, with the viewpoint approximately 400m to the south west of the Site boundary.

11.186 The highway network and associated infrastructure dominates the foreground view featuring railings, lighting columns, traffic lights and the road itself. The view down Osborn Way is framed by the existing multi storey car park and the Howard Shopping Centre. The pedestrian bridge, connecting the two buildings is elevated above Osborn Way and is visible in the distance. Beyond the bridge, there are partial to glimpsed views of the western elevation of the 1920s former Shredded Wheat factory production hall, within the North Side site, through the intervening structure of the footbridge and over the East Coast Mainline railway. The viewpoint and wireline assessment at **Appendix 11.3**, illustrate the Proposed Development would be screened as a result of intervening built form (Howard Centre) and vegetation, therefore this viewpoint is not being considered further as part of the assessment.

Viewpoint 18: Broadwater Road / Penn Way

11.187 Receptors from Broadwater Road and Penn Way include occupiers of residential properties (block 3 of The Mirage), vehicle users, pedestrians and cyclists, with the viewpoint approximately 250m, to the south of the Site boundary.

11.188 The view for vehicle users, pedestrians and cyclists is channelled and framed along the length of Broadwater Road by built form and vegetation. The 'Mirage' apartments dominate the foreground, framing the west side of the view, beyond which there are partial views towards the former Roche Products Factory Offices (Grade II listed), through intervening vegetation.

11.189 Residential receptors include properties along the northern façade of the 'Mirage' development (block 3) whose angle and orientation of view faces north towards the Site. These receptors experience partial views, through intervening vegetation, over the former Roche Products Factory Offices (Grade II listed) towards the tops of the 1920s silos (Grade II listed) and chimney within the North Side site. For the most part views are only likely to be available for upper storey residents.

11.190 Whilst the general value of views from Broadwater Road and Penn Way for vehicle users, cyclists and pedestrian receptors is considered **low**, the residential receptors within the Mirage development all have a proprietary interest in their view, therefore the value of their view is considered to be **high**.

11.191 For the future baseline, with the Site developed under the extant consent, the view will feature the perimeter apartment blocks within the South Side development, in distant views to the rear and above the former Roche products factory office (Grade II listed).

Viewpoints 19a and 19b: Hatfield House (1st Floor and Roof)

11.192 Receptors from Hatfield House include members of the public visiting the house and gardens. The house is also a private residence to Robert Gascoyne-Cecil, 7th Marquess of Salisbury and his family. Viewpoints 19a and 19b are taken from Hatfield House, with the viewpoint approximately 4.3km, to the south of the Site boundary.

11.193 Viewpoint 19a is taken from a first storey window on the west wing of Hatfield House, a 17th Century Jacobean Mansion, Grade I listed building set within a Grade I listed Registered Historic Park and Garden. Viewpoint 19b is taken from the roof of Hatfield House at the foot of the clock tower looking north. For both of these views, the receptors' foreground view is framed and channelled along the 'North Avenue' which consists of a lime and beech tree boulevard, towards the wider wooded parkland, which dominates the middle ground. The land slopes away from the house before rising in the far distance providing long distance views towards Welwyn Garden City. In the long distance the top half of the 1920s silos are visible within the North Side site, along with the stark white form of the Biopark building, their white facade and roofs contrasting with the surrounding vegetation. As viewpoint 19b is taken from the roof of Hatfield House, the field of view is much wider and the receptor, albeit private, experiences visual detractors in their foreground view, including the nearby roof and glazing associated with the Riding School Conference Centre and Hatfield Real Tennis Club.

11.194 Views are experienced by visitors and residential receptors from within a building and landscape of local and national importance designated a Grade I listed building set within a Grade I listed Registered Historic Park and Garden, featuring prominent views along North Avenue. Therefore, the value of these views is considered to be **very high.**

11.195 For the future baseline, with the Site developed under the extant consent, the view will feature the southern perimeter apartment blocks, forming a very small part of the view and visible in the long distance, to the rear and above the former Roche products factory office (Grade II listed).

Viewpoints 20a, 20b and 20c: Hatfield House (Southern Approach)

11.196 Receptors from Hatfield House include members of the public visiting the house and gardens. Viewpoints 20a, 20b and 20c are taken from along the 'Southern Approach' in the registered park and garden, with the viewpoints approximately 4.6km, to the south of the Site boundary. The viewpoints demonstrate the sequential experience when travelling northwards

towards Hatfield House on the southern approach. It is only viewpoint 20a (the southernmost of these three viewpoints) that is publicly accessible, at the start of the southern approach, as it forms part of the Hatfield House estate walk.

11.197 The 'Southern Approach' forms a gateway vista to the house and was once the original entrance. Whilst located in the long distance, the retained 1920's silos within the North Side site are visible from viewpoints 20a and 20b, however from 20c the silos become screened by Hatfield House. The Biopark is screened from this position by the chimneys of Hatfield House.

11.198 Views along the 'Southern Approach' are experienced by walkers (only viewpoint 20a) and visitors travelling north along the 'Southern Approach' towards Hatfield House, from a landscape of local and national importance designated a Grade I listed Registered Historic Park and Garden. Therefore, the value of these views is considered to be **very high.**

11.199 For the future baseline, with the Site developed under the extant consent, the view will feature the southern apartment blocks of Phase 1 (South Side), forming a very small part of the view and visible in the long distance, to the rear and above the existing trees that frame the view within the Hatfield House Registered Historic Park and Garden.

Viewpoints 21a, 21b and 21c: Hatfield House Parkland (Publicly accessible path)

11.200 Receptors from Hatfield House parkland include members of the public visiting and walking through the parkland. Viewpoints 21a, 21b and 21c are taken from a publicly accessible part of the parkland on an internal footpath and driveway that runs on a north-west to south-east axis, with the viewpoints approximately 4.3km, to the south of the Site boundary. The viewpoints demonstrate the sequential experience when travelling along this route in a north westerly direction.

11.201 Receptors experience partial to glimpsed sequential views, through intervening wooded vegetation, that include the top half of the retained 1920s silos within the North Side site and the Biopark building, both seen in the long distance, with their white facades and roofs contrasting with the surrounding vegetation.

11.202 Views are experienced by visitors and members of the public walking through the Hatfield House parkland, from a landscape of local and national importance designated a Grade I listed Registered Historic Park and Garden. Therefore, the value of these views is considered to be **very high.**

11.203 For the future baseline, with the Site developed under the extant consent, the view will feature partial glimpsed to filtered views in the long distance of the upper extents of the consented apartment blocks on both the South Side and the North Side sites, forming a very small part of the views and seen between breaks in intervening vegetation and in the setting of the wooded horizon.

Viewpoints 22a and 22b : Hatfield House Deer Park (Private area of parkland)

11.204 Viewpoints 22a and 22b are taken from the deer park within Hatfield House Registered Park and Garden, however this part of the parkland is not publicly accessible. The viewpoints are approximately 4.7km, to the south of the Site.

11.205 The viewpoints are from an elevated position on the edge of woodland block overlooking an agricultural field that dominates the foreground. The land slopes away from this location towards Hatfield House, visible to the left of the view, towards the wooded parkland estate, before rising in the far distance providing filtered and glimpsed long distance views across the wooded horizon towards Welwyn Garden City. Breaks in the wooded treed horizon provide the receptor with partial to glimpsed views, through the intervening vegetation, in the far distance of the top half of the retained 1920s silos within the North Side site. The white facade of the silos contrast with the surrounding vegetation but form a very small proportion of these views and are set against a wooded backdrop along the horizon.

11.206 Whilst these views are on private on land not publicly accessible by visitors and members of the public, it is a landscape of local and national importance designated a Grade I listed Registered Historic Park and Garden. Therefore, the value of these views is considered to be **very high.**

11.207 For the future baseline, with the Site developed under the extant consent, the view will feature partial glimpsed to filtered views in the long distance of the upper extents of the consented apartment blocks on both the South Side and the North Side sites, forming a very small part of the views and seen between breaks in intervening vegetation and in the setting of the wooded horizon.

Viewpoint 23: Essendon Public Footpath 5 (edge of Essendon Conservation Area)

11.208 Receptors from Essendon public footpath 5 include walkers and residential properties on West End Lane, whose properties back onto the surrounding farmland, with the viewpoint

approximately 5km, to the south east of the Site boundary. Whilst the residential properties are located within Essendon Conservation Area the public footpath is located on the edge outside the designated Conservation Area.

11.209 Walkers experience open views across gently undulating wooded pasture and parkland slopes leading towards the River Lea, framed by treed field boundaries and pockets of woodland, providing long distance views towards Welwyn Garden City. For a small handful of residential receptors, within Essendon Conservation Area whose properties back onto the fields, they are likely to experience from their upper storeys (less often occupied) filtered glimpsed views across the Lea valley towards Welwyn Garden City in the long distance.

11.210 Welwyn Garden City is set within a wooded horizon in the long distance with receptors experiencing partial to glimpsed views, a very small part of which includes the top half of the retained 1920s silos and chimney within the North Side site, the Biopark building and the Howard Centre. The white facade of the silos, chimney and Biopark contrast with the surrounding vegetation and are set against a wooded backdrop along the horizon.

11.211 The value of sequential views from this location for walkers is considered **medium**. The residential receptors discussed above, within properties backing onto the fields, on West End Lane, within Essendon Conservation Area, all have a proprietary interest in their view therefore the value of their view is considered to be **high**.

11.212 For the future baseline, with the Site developed under the extant consent, the view will feature partial glimpsed views in the long distance of the upper extents of the consented apartment blocks on both the South Side and the North Side sites, forming a very small part of the views and seen between breaks in intervening vegetation and within the setting of the wooded horizon.

Viewpoint 24: Junction of Essendon Public Footpaths 11 and 12

11.213 Receptors from Essendon public footpaths 11 and 12 include walkers heading in a northerly direction along a farm track, approximately 4.6km, to the south east of the Site boundary.

11.214 Walkers experience channelled framed views along the farm track, enclosed on either side by hedgerow field boundaries. The land slopes away from the viewpoint towards the river Lea, providing long distance views, over the hedgerow boundary, across the Lea Valley towards

Welwyn Garden City. As the receptor travels north along the public footpath the receptors' views become enclosed by the hedgerow field boundaries, restricting long distance views out. Large overhead pylons are visible crossing the view and forming visual detractors.

11.215 Welwyn Garden City is set within a wooded horizon in the long distance with receptors experiencing partial to glimpsed views, a very small part of which includes the top half of the retained 1920s silos and chimney within the North Side site, the Biopark building and the Howard Centre. The white facade of the silos, chimney and Biopark contrast with the surrounding vegetation and are set against a wooded backdrop along the horizon.

11.216 The view is from a public right of way within a landscape with no designations and of at most local importance. The public right of way and view is in close proximity to Hatfield House Registered Park and Garden designation and is located on the Hatfield House estate. Therefore, the value of this view is considered to be **medium.**

11.217 For the future baseline, with the Site developed under the extant consent, the view will feature partial glimpsed views in the long distance of the upper extents of the consented apartment blocks on both the South Side and the North Side sites, forming a very small part of the views and seen between breaks in intervening vegetation and within the setting of the wooded horizon.

Viewpoint 25: Campus West, Parkway

11.218 Receptors from this viewpoint include people utilising the public open space within The Campus and users of the Welwyn Garden City Town Centre (Route 2) heritage trail, with the viewpoint approximately 700m to the north west of the Site. This view is located with within the Welwyn Garden City Conservation Area.

11.219 The receptors' foreground view comprises formal public open space featuring stands of mature trees, planting and seating areas. This extends to the middle ground with filtered partial views of civic built form, which frames and encloses the Campus and the view. The upper extents of the 1920s silos within the North Side site are discernible in distant views, above built form and filtered by intervening vegetation. The enclosure created by the surrounding built form and vegetation, limits views towards the Site and views are, for the most part, screened. There is the potential for distant, partial, glimpsed views of the upper extents of the Proposed Development above civic built form and through intervening vegetation, however this will be viewed in the context of the consented former Shredded Wheat Factory site development.

11.220 The Campus within Welwyn Garden City town centre is a key area of public open space, experienced by the broader community including visitors and tourists, located within Welwyn Garden City Conservation Area. Therefore, value attached to this view is considered to be **high**.

11.221 For the future baseline, with the Site developed under the extant consent, the view will feature the upper limits of the apartment blocks on both the South Side and the North Side sites, in distant views above the existing civic built form and seen through intervening vegetation.

Viewpoint 26: Junction of Parkway and Church Road

11.222 Receptors from this viewpoint include people utilising the public open space along Parkway and Howardsgate and users of the Welwyn Garden City Town Centre (Route 1) heritage trail, with the viewpoint approximately 600m, to the west of the Site boundary. This view is located with within the Welwyn Garden City Conservation Area.

11.223 The receptors' foreground view features the Parkway linear formal public open space flanked by avenues of trees and formal hedgerow planting, beyond which is civic built form associated with Sainsbury which fronts onto Parkway and Church Road.

11.224 The combination of civic built form and vegetation in the foreground and bordering Church Road channel and frame views down towards additional built form on Fretherne Road. Whilst there is no intervisibility with the Site from this viewpoint location, due to the enclosure created by the surrounding built form, there is the potential for limited glimpsed views of the upper extents of the Proposed Development above built form on Fretherne Road.

11.225 Parkway and Church Road lie within the Welwyn Garden City Conservation Area and town centre - a key area of public open space, experienced by the broader community including visitors and tourists and users of the heritage trail. Therefore, the value attached to the view from these receptors is **high**.

11.226 For the future baseline, with the Site developed under the extant consent, the existing intervening civic built form and intervening vegetation within the foreground and near distance will for the most part screen views of the apartment blocks within the South Side and the North Side sites.

Viewpoint 27: Furzefield Road, Peartree Conservation Area

11.227 Receptors from Furzefield Road include occupiers of residential properties, vehicle users and pedestrians, with the viewpoint approximately 800m, to the south east of the Site boundary.

11.228 There is no intervisibility with the Site from this viewpoint location and the viewpoint and wireline assessment at **Appendix 11.3**, illustrate the Proposed Development would be screened as a result of intervening built form and vegetation, therefore this viewpoint is not being considered further as part of the assessment.

TOWNSCAPE CONTEXT

Key Townscape Design Principles

11.229 The design objectives and principles that led the evolution of the design of the extant consented development were:

- ensuring the prominence and monumentality of the original 1920s listed built form within the site remains as part of the design;
- following early discussions with Historic England the initial Development proposals were further developed to allow for the retention of, in addition to the original listed 1920s production hall, silos and grain house buildings, the original 1920s listed boiler house, previously proposed for demolition;
- preserving identified key views of the retained listed buildings within the Site;
- making the listed buildings a strong and distinctive focal point within the scheme;
- ensuring that the listed buildings remain as a key focal point, giving them the prominence and importance that they demand;
- respecting the setting of the original 1920 silos - including working with the Local Planning Authority and Historic England to ensure an appropriate relationship with the proposed buildings.
- maximising accessibility and prominence of community facilities within the Proposed Development, through careful and considered positioning;
- maximising current and future connectivity to surrounding residential neighbourhoods;
- high quality design: architecture and landscaping working together;

- appropriate car parking provision;
- ensuring a good level of daylight and sunlight to homes and open space;
- providing an appropriate quality and quantity of amenity space, including space which is publicly, communally and privately accessible;
- enhancing the pedestrian gateway into the site along Hydeway, on approach from the east and west;
- enhancing identified key views of the retained listed buildings; and
- introducing new streets to the proposal to the west of the Listed Buildings in order to enhance and frame views of these.

11.230 These design objectives and principles have been used to drive the design of the revised proposals for the South Side (Phase Two and Three), which are presented in this current application.

Building Heights

11.231 Buildings within the Proposed Development range from one to ten storeys in height with a maximum height parameter set at +119.950 AOD. In the context of the retained silos in the North Side site, the nearby BioPark (equivalent of eleven storeys), the Howard Centre and the redevelopment of Mercury House, these storey heights are of relative proportion. To assimilate the proposed building into the surrounding area and views, a range of design measures are proposed, from soft vertical landscapes to stepping the buildings to break up the building line and massing.

Key Enhancement Measures

11.232 Enhancement measures were incorporated within the design of the proposals for the extant consented development and the Proposed Development, seeking to improve the townscape attributes and visual amenity, over and above the development's baseline condition. These measures include:

- the redevelopment of the Site provides the opportunity to regenerate former industrial brownfield land by providing an inclusive, sustainable, mixed use development;
- retention, refurbishment and change of use to the Grade II Listed original 1920s silos, production hall, grain store and boiler house of the former Shredded Wheat Factory (part of North Side);

- the 1920s (Louis de Soissons designed) former Shredded Wheat Factory production hall would be revealed by providing an appropriate public realm setting for a more public appreciation of its architectural quality (part of North Side);
- the redevelopment of the Site acts as a catalyst in bridging the divide between the east and west of Welwyn Garden City as part of the public realm strategy;
- improvements to the legibility and quality of Hydeway and the existing Network Rail footbridge which provides primary east / west connectivity (part of North Side);
- community gardens and community play spaces throughout the Proposed Development, including informal and equipped play spaces;
- a community building located on the junction of the main thoroughfare of the existing footbridge with an entrance off a new public square (part of North Side);
- highway works, to include the widening of footways and the provision of cycleways to Broadwater Road;
- the lack of built form along the Site's eastern boundary currently creates a weak, inactive urban edge. The redevelopment of the Site provides the opportunity to introduce new built form along Broadwater Road which upon occupation would create an active, positive frontage with buildings orientated out onto the road;
- the Proposed Development offers a net gain in both publicly accessible open space and green infrastructure across the Site. A considerable amount of planting is introduced to the Site together with several publicly accessible and communal green spaces;
- a series of urban squares at the heart of the Proposed Development creating a new social focal point in the town (part of North Side);
- the landscape proposals for the South Side would introduce a rich mosaic and variety of green spaces as part of the planting strategy, delivering a high quality landscape setting to support sustainable settlement growth and increased biodiversity; and
- a landscape focused sustainable drainage system through the use of green and brown roofs and the introduction of soft landscaping.

IDENTIFICATION AND EVALUATION OF KEY EFFECTS

Construction

Effects on Townscape Character

11.233 Those parts of the study area which have been scoped out following the baseline assessment (LTCA 1, LTCA 7, LTCA 9, LTCA10, LTCA 11 and LTCA 13) are areas where effects would be **neutral** due to distance and / or the presence of intervening built form.

Area 2: Shire Park Business Area and Area 5: Peartree Residential Area

11.234 During construction these LTCA's would experience temporary adverse effects that would be indirect in nature. These character areas would experience a perceptible deterioration, through the introduction of tall on-site machinery including cranes, piling rigs and scaffolding that would feature on the skyline as visual detractors, in distant views.

11.235 The Shire Park Business Area LTCA is considered to be of **low value** and Peartree Residential Area is considered to be of **medium value.** Both LTCA's are considered to have a **medium** susceptibility as there is likely to be little reference within the LTCA to construction activities and the enclosure of the area means the receptors have a medium ability to accept the type of activities proposed, resulting in a **moderate** sensitivity.

11.236 Whilst there would be an effect to the perceptible qualities of the townscape character, at a local level, these effects would be temporary in nature and unlikely to influence the key characteristics of these LTCA. The magnitude of change would therefore be **small / medium** resulting in an **adverse effect** of **minor significance**. These effects would be no greater than those likely as a result of the implementation of the extant consented scheme.

Area 3: Broadwater Road Industrial Area (includes the Site)

11.237 The Site is located within this LTCA, therefore construction would result in the direct change of approximately 20% of this LTCA from a brownfield, industrial, part derelict townscape area to a construction site. Whilst this LTCA is already industrial in nature, featuring visual, physical and noise detractors (with construction activities present on the Phase One area to the south), additional construction works would further deteriorate the perceptual townscape quality.

The construction phase also introduces tall onsite machinery including cranes, piling rigs and scaffolding that would form visual detractors in views, influencing the townscape at a local level.

11.238 This LTCA is considered of **low - medium** value and **low** susceptibility as there is currently construction and demolition activity associated with the extant planning permission in both the South and North Sides, meaning the receptor has a high ability to accept the type of construction activities proposed, resulting in a **low** sensitivity.

11.239 During construction, it is considered those parts of the LTCA within the Site and directly adjacent, would experience a magnitude of change categorised as **medium**, resulting in an **adverse effect** of **moderate significance**. In the wider parts of the LTCA, the enclosure created by the intervening built form would limit the effect, therefore the magnitude of change would be **small / medium**, resulting in an **adverse effect** of **minor / moderate significance**. These effects would be no greater than those likely as a result of the implementation of the extant consented scheme.

Area 4: Peartree Modern Business and Industrial Area and Area 6: Broadwater Crescent Residential Area

11.240 The Site is in close proximity to these LTCA's, whose character is currently influenced by the existing demolition and construction activity associated with the extant planning permission across the former Shredded Wheat Factory site, on both the South and North Sides. The major construction activity associated with the former Shredded Wheat factory site has an obvious influence on the character and experience of these LTCA's. During construction on the Site, receptors would experience temporary adverse effects that would be indirect in nature, with a further deterioration in the perceptual quality of the townscape, due to the presence of tall machinery located within the Site, the hoarding on the Site boundary and the activity of machinery on-site and associated delivery vehicles off-site, all of which would form visual detractors just beyond the edge of these LTCA.

11.241 These LTCA are considered of **low** value, and also of **low** susceptibility due to the existing construction and demolition activities associated with the former Shredded Wheat factory site, with the scale and enclosure of the area providing them with a high ability to accept the type of activities proposed, resulting in a **low** sensitivity. During construction, it is considered that for those parts of LTCA 4 in close proximity to the Site's eastern boundary, the magnitude of change would be **medium**, resulting in an **adverse effect** of **moderate significance**. In the wider parts of LTCA 4 and the whole of LTCA 6, the enclosure created by the existing intervening

built form and surrounding vegetation, along with the influence of built form under construction within Phase One of the South Side, additional effects of the proposals would be limited, therefore the magnitude of change would be **small / medium**, resulting in an **adverse effect** of **minor / moderate significance**. These effects would be no greater than those likely as a result of the implementation of the extant consented scheme.

Area 8: Longcroft Lane Area

11.242 This LTCA is located in the near distance to the south-west of the Site separated by the East Coast Mainline Railway, within the Welwyn Garden City Conservation Area. During construction this LTCA would experience temporary, adverse effects that would be indirect in nature. There is currently major construction activity associated with the extant planning permission of the former Shredded Wheat Factory site, on both the South and North Sides. The receptor would experience a small perceptible deterioration, through the addition of tall onsite machinery including cranes, piling rigs and scaffolding that would form visual detractors just beyond the edge of the LTCA, glimpsed between and above built form and vegetation on the skyline in distant views.

11.243 This LTCA is considered to be of **medium** value, and also of **low** susceptibility as there are existing demolition and construction activities surrounding the area which, when combined with the enclosure of the area created by the built form and vegetation, means the receptor has a high ability to accept the type of activities proposed, resulting in a **moderate** sensitivity. There would be a perceptible deterioration in the perception of the LTCA's aesthetic qualities, influencing limited areas of the LTCA, and these effects would be temporary in nature, unlikely to influence its key characteristics. The magnitude of change would be **small / medium**, resulting in an **adverse effect** of **minor significance**. These effects would be no greater than those likely as a result of the implementation of the extant consented scheme.

Area 12: Parkway Retail Area and Area 14: The Campus

11.244 These LTCA are located in close proximity to the west of the Site, separated by the East Coast Mainline Railway, within the Welwyn Garden City Conservation Area. During construction these receptors would experience temporary, adverse effects that would be indirect in nature. There is currently major construction and demolition activity associated with the extant planning permission of the former Shredded Wheat Factory site, on both the South and North Sides. The receptor would experience a perceptible deterioration, through the introduction of additional tall

on-site machinery including cranes, piling rigs and scaffolding that would feature above built form on the skyline as visual detractors, in distant views.

11.245 These LTCA's are considered to be of **high** value, and also of **medium** susceptibility as, whilst there is some existing reference to demolition and construction activities on the edge of these LTCA's, the enclosure of the area by built form and vegetation means the receptor has a medium ability to accept the type of activities proposed, resulting in a **high** sensitivity.

11.246 There would be a perceptible deterioration of the townscape character's aesthetic qualities, influencing the townscape at a local level and these effects would be temporary in nature, considered to influence some of the key characteristics of the LTCAs. The magnitude of change would be **medium**, resulting in an **adverse effect** of **moderate significance**. These effects would be no greater than those likely as a result of the implementation of the extant consented scheme.

Effect on Land Use

11.247 The Site was most recently used for industrial purposes, featuring derelict factory buildings, most of which were cleared under the extant consent.

11.248 The land use within and immediately surrounding the Site is currently in a state of change, with full planning permission being granted in February 2019 to redevelop the former Shredded Wheat Factory site to accommodate up to 1,340 homes (ref:6/2018/0171/MAJ). As part of the extant consent work on the former Shredded Wheat Factory site is already underway for Phase One, directly to the south of the Site and on the North Side, the 1920's parts of the factory complex were retained as part of the extant planning permission, with all other built form subsequently removed.

11.249 The construction works would result in a direct, short term, temporary change to the Site's industrial land use, replacing it with a construction site featuring on-site machinery, storage of materials and construction activities. The Site's land use is considered to be of **low** value, and also of and **low** susceptibility due to recent demolition and current construction activities associated with the extant consent of the former Shredded Wheat factory site on both the South and North Sides, resulting in a **low** sensitivity.

11.250 During construction, the Site's land use would enter a transitional phase from its former industrial dereliction to the positive land use resulting from the Proposed Development. This

beneficial change during the construction phase is considered to be barely perceptible in land use terms i.e. **negligible** magnitude of change, resulting in a **negligible beneficial effect**. These effects would be no greater than those likely as a result of the implementation of the extant consented scheme.

Effect on Landscape

11.251 During construction a small proportion of the existing trees and vegetation of low to moderate amenity value would be permanently removed, whilst trees to be retained would be protected through the establishment of tree and hedgerow protection measures in accordance with British Standard (BS) 5837: 2012: '*Trees in relation to design, demolition and construction. Recommendations'* as described in the Arboricultural Implications Assessment (accompanying this planning application). The extent of vegetation loss on Site would be limited but would constitute an adverse effect.

11.252 The Site's landscape and vegetation is considered to be of **low** value and **medium** susceptibility as there are few landscape elements located on this brownfield site, all of which can be easily be replaced in the medium term, resulting in a **moderate** sensitivity. During construction, it is considered the magnitude of change would be **small**, resulting in an **adverse effect** of **minor significance**. These effects would be no greater than those likely as a result of the implementation of the extant consented scheme.

Visual Effects

Viewpoints 1, 2, 6, 10, 11, 12, 13, 14 and 16

11.253 During construction visual receptors directly adjacent to or in close proximity to the Site on Broadwater Road, Bridge Road and Hydeway - including vehicle users, cyclists, pedestrians, users of the Peartree Heritage Trail and receptors at Welwyn Garden City railway station - would experience full to partial, direct, foreground to middle ground views of the construction activities within the Site. During construction, a visually enclosed and negative edge would be introduced, in the form of Site hoarding along Broadwater Road, Hydeway and Phase One of the South Side area. Visually detracting features including tower cranes, piling rigs and scaffolding that would be visually prominent in close range views would also be present on the Site.

11.254 Phase One of the South Side is currently under construction therefore during construction of the Site receptors would experience full to partial, direct, foreground to near

distance views of the construction activities within the Site, with the North Side construction activity seen in the context and to the foreground and rear of these views depending on the viewpoint location. The construction phases of the Proposed Development would introduce additional visually detracting uncharacteristic features to the receptors foreground to near distance views, primarily tall onsite machinery including tower cranes, piling rigs and scaffolding however, these activities would be seen in the context of the construction activities and emerging built form on the North Side and activities would take place on the Site under the extant consent in any case.

11.255 For transient receptors (vehicle users and cyclists), views are considered of **low** value and **low** susceptibility, as appreciation of the view is not an important part of their journey, leading to a **low** sensitivity. Construction would result in a limited deterioration to the sequential view. The magnitude of change is considered **medium**, resulting in an **adverse effect** of **minor significance**.

11.256 Pedestrians on Broadwater Road and Bridge Road adjacent to the Site (Viewpoints 1, 1a, 2, 13, 13a, 13b & 14) and pedestrians on the network rail footbridge entering and travelling through the Site (Viewpoints 10, 11 & 16) experience views considered of **low** value. They are considered to have **medium** susceptibility, as they are travelling through the townscape, at a pace that allows for some appreciation of their surroundings, resulting in a **moderate** sensitivity. Construction works would result in an obvious deterioration to the sequential view, introducing discordant elements. The magnitude of change is considered **medium**, resulting in an **adverse effect** of **moderate significance**.

11.257 Commuters and passengers' views at Welwyn Garden City railway station are considered of **medium** value and **medium** susceptibility, as they are either waiting for or travelling through on a train and are likely to take time to experience views of their surroundings as part of the journey experience, resulting in a **moderate** sensitivity. Construction would result in an obvious deterioration to the stationary view, introducing discordant elements. The magnitude of change is considered **medium**, resulting in an **adverse effect** of **moderate significance**.

11.258 For users of the Peartree Heritage Trail, views are of **medium** value and are of **high** susceptibility (as the view of heritage assets are an important part of the experience), resulting in a **high** sensitivity. Construction would result in a major deterioration of their foreground and near distance sequential views from Broadwater Road and Bridge Road. The magnitude of

change is considered **medium**, resulting in an **adverse effect** of **moderate / substantial significance**.

11.259 All of these effects would be no greater than those likely as a result of the implementation of the extant consented scheme.

Viewpoints 3, 4, 5 and 18

11.260 During construction, visual receptors in the near distance to the east and south of the Site boundary, within the Peartree and Broadwater Crescent residential area (including vehicle users, cyclists, pedestrians and residential receptors), would experience distant partial to glimpsed views of construction activity. Due to the distance of the receptor from the Site and the intervening built form and vegetation, receptors would experience distant framed and channelled views of the taller onsite machinery including tower cranes, piling rigs and scaffolding that would feature on the skyline as uncharacteristic visual detractors in near distance views.

11.261 Phase One of the South Side is currently under construction therefore during construction of the Site receptors would experience distant glimpsed views of the construction activities within the Site on the skyline in the context of the North Side construction activity. The Proposed Development construction phases would introduce additional visually detracting uncharacteristic features to the receptors' distant views, primarily tall onsite machinery including tower cranes, piling rigs and scaffolding however, these activities would be obscured by emerging built form and activities on the North Side and Phase One (South Side) and activities would take place on the Site under the extant consent in any case.

11.262 For transient receptors including vehicle users and cyclists (Viewpoints 3, 4 & 18) views are considered of **low** value and **low** susceptibility, resulting in a **low** sensitivity. The appreciation of the view is not considered an important part of their journey, and construction would for the most part result in a barely perceptible deterioration to a small proportion of their distant sequential view. The magnitude of change is considered **small**, resulting in an **adverse effect** of **negligible significance.**

11.263 For pedestrians, views are considered of **low** value and **medium** susceptibility (Viewpoints 3, 4 & 18) travelling at a pace that allows for some appreciation of their surroundings, sensitivity would be **moderate**. Construction would result in a limited deterioration to their near distance sequential view. The magnitude of change is considered **small**, resulting in an **adverse effect** of **minor significance**.

11.264 Residential receptors (Viewpoints 3, 4, 5 & 18), have a proprietary interest in their views, however for the most part views are oblique, partial glimpsed and in the near distance. The value is considered **high** and the susceptibility **medium,** resulting in a **high** sensitivity. Construction would result in near distance, glimpsed, oblique views from their upper floors, introducing additional visual detractors on the skyline. These are rooms that are not generally inhabited for amenity purposes, and so the magnitude of change is considered **small**, resulting in an **adverse effect** of **minor / moderate significance**.

11.265 All of these effects would be no greater than those likely as a result of the implementation of the extant consented scheme.

Viewpoints 7, 8, 25 and 26

11.266 Visual receptors in the near distance to the west and north west of the Site, within the Welwyn Garden Conservation Area, include people utilising the public open space and users of the Town Centre Heritage Trail (Route 1 and 2) along Parkway, Howardsgate and the Campus. These views are experienced by a broader community, including visitors and tourists, located within the Welwyn Garden City Conservation Area and viewpoints 7 & 8 are recognised as a 'key view or vista'. During construction receptors would experience distant views of the taller onsite machinery including crane towers, piling rigs and scaffolding that would feature on the skyline, above existing built form within the Conservation Area, as uncharacteristic visual detractors in distant views.

11.267 Phase One of the South Side is currently under construction therefore during construction of the Site receptors would experience distant glimpsed views of the construction activities within the Site on the skyline in the context of the Phase 1 South Side construction activity. The Proposed Development construction phases would introduce additional visually detracting uncharacteristic features to the receptors' distant views, primarily tall onsite machinery including tower cranes, piling rigs and scaffolding and activities would take place on the Site under the extant consent in any case.

11.268 For pedestrians and users of the Welwyn Garden City Town Centre Heritage Trail, the value of the views is considered **high** and the susceptibility **high** as these receptors have an appreciation of their view and it is an important part of their experience, resulting in a **high** sensitivity. Construction activity would result in a temporary perceptible deterioration in near distance views, the magnitude of change is considered **medium**, resulting in an **adverse** effect

of **moderate significance**. These effects would be no greater than those likely as a result of the implementation of the extant consented scheme.

Viewpoint 9

11.269 Visual receptors in the middle distance to the north west of the Site, on Pentley Park (including vehicle users, cyclists, pedestrians and residential receptors), would experience distant partial to glimpsed views of construction activity. Due to the distance of the receptor from the Site and the intervening built form and vegetation, receptors would experience distant framed and channelled views of the taller onsite machinery including tower cranes, piling rigs and scaffolding that would feature on the skyline as uncharacteristic visual detractors in middle to long distance views.

11.270 Phase One of the South Side is currently under construction under the extant planning permission therefore during construction of the Site receptors would experience partial, glimpsed views of the construction activities within the Site in the context of the Phase One construction activity. The Proposed Development construction phases would introduce additional visually detracting uncharacteristic features to the receptors middle to long distance views, primarily tall onsite machinery including tower cranes, piling rigs and scaffolding.

11.271 For transient receptors including vehicle users and cyclists views are considered of **low** value and **low** susceptibility, resulting in a **low** sensitivity. The appreciation of the view is not considered an important part of their journey, and construction would for the most part result in a barely perceptible deterioration to a small proportion of their distant sequential view. The magnitude of change is considered **small**, resulting in an **adverse effect** of **negligible significance.**

11.272 Residential receptors have a proprietary interest in their views, however for the most part views are oblique, partial glimpsed and in the middle distance. The value is considered **high** and the susceptibility **low,** resulting in a **moderate** sensitivity. Construction would result in middle to long distance, glimpsed, oblique views from their upper floors, introducing additional visual detractors on the skyline. These are rooms that are not generally inhabited for amenity purposes, and so the magnitude of change is considered **small**, resulting in an **adverse effect** of **minor significance**.

11.273 All of these effects would be no greater than those likely as a result of the implementation of the extant consented scheme.

Viewpoint 15

11.274 Residential receptors on the boundary of the South Side include residents of the Mirage who face north, directly overlooking the South Side site.

11.275 Phase One of the South Side is currently under construction under the extant planning permission, therefore during construction of the Site, receptors would experience partial, glimpsed views of the construction activities within the Site to the rear of the Phase One construction activity. The Proposed Development construction phases would introduce additional visually detracting uncharacteristic features to the receptors' near distance views, primarily tall onsite machinery including tower cranes, piling rigs and scaffolding however, these activities would be obscured by emerging built form and activities on Phase One.

11.276 Residential receptors have a proprietary interest in their views, the value is considered **high**. The presence of existing construction activities on Phase One (South Side) results in a **low** level of susceptibility**,** resulting in a **medium** sensitivity. Construction would result in direct, temporary changes in the near distance views introducing additional discordant, uncharacteristic visual detractors on the skyline however, the magnitude of change beyond activities on Phase One (South Side) are considered **small**, resulting in an **adverse** effect of **minor significance**.

11.277 All of these effects would be no greater than those likely as a result of the implementation of the extant consented scheme.

Viewpoints 19a,19b, 20a, 20b, 20c, 21a, 21b, 21c, 22a and 22b

11.278 Visual receptors from Hatfield House and its Park and Gardens comprise visitors and tourists, with long distance views over approximately 4.3 to 4.7km to the south of the Site boundary.

11.279 During construction on the Site, receptors would experience a perceptible deterioration to a very small part of their current view, through the introduction of tall onsite machinery including tower cranes, piling rigs and scaffolding that would feature above existing built form and vegetation on the skyline as visual detractors, in long distance views. These activities would be seen alongside current implementation of the extant consent for Phase One (South Side), with limited or no increase in change to the view. These would take place on the Site under the extant consent in any case.

11.280 The value of views from Hatfield House and its Park and Garden are considered to be **very high**. The presence of construction activities on the Phase One South Side, implementing the extant consent, results in a **low** level of susceptibility, resulting in a **moderate** sensitivity. Construction works would introduce a barely perceptible influence of additional detracting visual elements to these long distance views, affecting a very small proportion of the overall view, the magnitude of change is considered **small**, resulting in an **adverse effect** of **negligible to minor significance**.

11.281 All of these effects would be no greater than those likely as a result of the implementation of the extant consented scheme.

Viewpoints 23 and 24

11.282 Visual receptors from these viewpoints comprise walkers on public rights of way on the edge of Essendon Conservation Area (viewpoint 23) and from West End (viewpoint 24) immediately to the east of Hatfield House and its Park and Gardens over approximately 4.6 to 5km to the south east of the Site boundary.

11.283 During construction on the Site, receptors would experience a small perceptible deterioration, through the introduction of tall onsite machinery including tower cranes, piling rigs and scaffolding that would feature above existing vegetation on the skyline as visual detractors, in long distance views.

11.284 Phase One of the South Side is currently under construction therefore during construction of the Site receptors would experience distant partial to glimpsed views of the construction activities within the Site on the skyline to the rear and in the context of the Phase One (South Side) construction activity. The South Side construction phases would introduce additional visually detracting uncharacteristic features that would form a very small part of these receptor's distant views, primarily tall onsite machinery including tower cranes, piling rigs and scaffolding however, these activities would be obscured by emerging built form and activities on Phase One (South Side) and activities would take place on the Site under the extant consent in any case.

11.285 Receptors views on the public footpaths (viewpoints 23 and 24) are considered of **medium** value and residential receptors (viewpoint 23) have a proprietary interest in their views, the value is considered **high**. Long distance views of construction activities on Phase One South Side, implementing the extant consent, results in a **low** level of susceptibility, resulting in

a **moderate** sensitivity for both receptors. Construction activities would introduce a barely perceptible influence of additional detracting visual elements in long distance views, affecting a very small proportion of the overall view, the magnitude of change is considered **small**, resulting in an **adverse effect** of **negligible to minor significance**.

Completed Development

Effects on Townscape Areas

11.286 Those parts of the wider study area which have been scoped out following the baseline assessment (LTCA 1, LTCA 7, LTCA 9, LTCA 10, LTCA 11 and LTCA 13) are areas where effects would be **neutral** due to distance and/or the presence of intervening built form.

Area 2: Shire Park Business Area

11.287 The Proposed Development would result in an indirect, barely perceptual change in distant views from the southern part of the LTCA, limited to the upper extents of the proposed residential blocks, seen in the context of the retained 1920's silos that lie within the North Side site. Whilst the Proposed Development would slightly improve the perceptual qualities of townscape character within the immediate setting of the Site, it is not considered to influence the key characteristics of this LTCA, the magnitude of change would be **negligible**, resulting in a **negligible** effect.

Area 3: Broadwater Road Industrial Area (includes the Site)

11.288 The Proposed Development would result in the direct removal of approximately 20% of this LTCA, changing it permanently from brownfield, part derelict townscape to a new, residential development. The Proposed Development would be in the context of the surrounding former Shredded Wheat factory site and the Extant Planning Permission of the South Side (Phase One) where the residential area has been implemented. The introduction of the residential development would continue to enhance the local townscape character, permanently changing the land use from its current derelict form, which overall is considered to improve the physical and perceptual townscape quality.

11.289 The Proposed Development is considered to make a positive contribution within the immediate setting of the LTCA, streetscene and former industrial area, creating a new character area within Welwyn Garden City, in line with the Welwyn Hatfield Borough Council aspiration as

part of the SPD for the Site. Therefore, it is considered at local level the magnitude of change is **small**, resulting in a **beneficial effect** of **minor significance**.

Area 4: Peartree Modern Business and Industrial Area

11.290 The Proposed Development would result in an indirect perceptual change to those parts of the LTCA directly adjacent to the Site's eastern boundary, through the introduction of a new residential development, featuring residential built form of one to ten storeys in height along Broadwater Road. Whilst the scale of the proposed built form along Broadwater Road would be higher than that previously occupying the land and within the surrounding context, the overall improvements to the existing industrial townscape and streetscene as a result of the Proposed Development are considered positive.

11.291 The Proposed Development would introduce additional residential built form, scale and activity along Broadwater Road, seen in the context of the completed Phase One residential area, directly adjacent to the LTCA western boundary, affecting its immediate setting, which at local level is considered to result in a **small** magnitude of change, resulting in a **beneficial effect** of **minor significance**.

Area 5: Peartree Residential Area

11.292 The Proposed Development would result in an indirect, barely perceptual change in distant views, from the northern part of the LTCA, limited to glimpsed views of the proposed residential apartments, due to the extent of intervening built form and vegetation within and surrounding the LTCA. Whilst there would be a barely perceptible deterioration of townscape character within the immediate setting of the Site, following the addition of built form on the skyline, it is not considered to influence the key characteristics of the area. Therefore, the magnitude of change would be **negligible**, resulting in a **negligible** effect.

Area 6: Broadwater Crescent Residential Area

11.293 For the most part, the Proposed Development would result in an indirect, barely perceptual change in distant views, from the LTCA. The proposed residential apartments would introduce additional built form on the skyline, in distant views, however it is not considered to influence the key characteristics of the townscape area.

11.294 The Proposed Development would introduce additional residential built form to the rear of the Phase One residential area (South Side), part of the extant planning permission associated with the former Shredded Wheat factory site, directly adjacent to the LTCA northern boundary. Whilst the scale of the proposed built form would be higher than Phase One (up to ten storeys high), the overall improvements to the existing townscape and streetscene as a result of the Proposed Development are considered positive.

11.295 For the most part, the Proposed Development would result in a barely perceptible change within the wider LTCA, which is considered a **negligible** magnitude of change, resulting in a **negligible** effect.

11.296 For those northern parts of the LTCA along Otto Road, directly adjacent to Phase One of the former Shredded Wheat site and in close proximity to the Site's southern boundary, the Proposed Development would introduce a new scale of built form, use and activity, complementing both the Phase One and the 'Mirage' residential developments, considered a **small** magnitude of change, resulting in a **beneficial effect** of **minor significance**.

Area 8: Longcroft Lane Area

11.297 The Proposed Development would result in an indirect change in distant views from the eastern parts of the LTCA, with glimpsed views of the upper extents of proposed residential apartments (due to the extent of intervening built form and vegetation within and surrounding the LTCA). Whilst there would be a slight influence on townscape character, through the addition of built form on the skyline, it is not considered to influence the key characteristics of the area and the magnitude of change would be **negligible**, resulting in a **negligible** effect.

Area 12: Parkway Retail Area

11.298 The Proposed Development would result in an indirect, barely perceptual change in distant views across the majority of the LTCA, limited to partial glimpses above existing built form on the edge of and beyond the LTCA, to the upper extent of residential blocks. This limited interface between the LCTA and the Proposed Development would result in a barely perceptible influence on townscape character, limited to a minor introduction of sensitively designed contemporary built form on the skyline, barely effecting the LTCA's sense of place. It is considered at local level the magnitude of change would be **small**, resulting in a **minor adverse** effect.

Area 14: The Campus

11.299 At completion there will be no direct physical change to the townscape character area itself as a result of the Proposed Development. It is likely there will be limited intervisibility along the character area's south eastern boundary towards the upper limits of the apartment blocks, with the implementation of the extant consented development on the North Side. As the Proposed Development results in a small perceptual change to a limited part of the character area, seen in the context of a town centre and civic setting, the magnitude of change is considered **low**, resulting in a **minor adverse** effect.

Effect on Land Use

11.300 As the Proposed Development would result in a direct, permanent, beneficial change to the Site's industrial land use, replacing it with a new residential development, the magnitude of change is considered **medium**, resulting in a **beneficial effect** of **minor / moderate significance**.

Effect on Landscape

11.301 The Proposed Development would introduce a matrix of planting typologies, including trees, hedgerow, native shrub planting, ornamental planting of benefit to wildlife, green roofs and soft vertical features, improving the overall landscape attributes within the Site over and above the baseline condition.

11.302 The Proposed Development would introduce areas of public open space, gardens, hardscape civic spaces and both formal and informal play spaces, improving the overall public access within the Site over and above the baseline condition.

11.303 The magnitude of change on open space and vegetation within the Site would be **medium**, resulting in a **beneficial effect** of **moderate significance**.

Visual Effects

Viewpoint 1 & 1a: Bridge Road (B195) Looking South East from the Railway Bridge

11.304 Receptors from this viewpoint comprise vehicle users, cyclists, pedestrians and users of the Peartree Heritage Trail located in close proximity, approximately c. 280 – 250m to the northwest of the Site boundary.

11.305 On completion, from viewpoint 1 receptors would experience sequential, oblique, partial near distance views of the extant consented development on the North Side, which introduces new built form on previously derelict industrial land that would positively alter the skyline and view composition. Block 12 of the Proposed Development would be barely perceptible in the context of and to the rear of the proposed residential apartment Blocks 2 & 3 implemented as part of the North Side extant consent and to the fore of Phase One (South Side) proposals.

11.306 As receptors move further east along Bridge Road (see alternative viewpoint 1a) the implementation of the proposed built form on the North Side as part of the extant consent and existing intervening vegetation would inhibit views internally towards the Site, the Proposed Development and the retained 1920's listed buildings.

11.307 For transient receptors including vehicle users and cyclists, the Proposed Development would result in a limited improvement to their sequential near distance view as they are more focussed on the route ahead rather than oblique views in the direction of the Site. The magnitude of change is considered **small**, resulting in a **beneficial effect** of **negligible significance**.

11.308 For pedestrian receptors, the Proposed Development would result in an aesthetic improvement, long term, to their sequential, near distance townscape view. Further east along Bridge Road (viewpoint 1a) the receptors view would become screened by existing vegetation and by the North Side proposals as part of the extant consent. The magnitude of change is considered **small,** resulting in a **beneficial effect** of **negligible / minor significance**.

11.309 For users of the Peartree Heritage Trail, the Proposed Development would result in an aesthetic improvement, long term, to their sequential, near distance townscape view. The Proposed Development would complement and be seen in the context of and to the rear of the proposed restoration works to the retained 1920's listed buildings under the extant consent. Further east along Bridge Road (viewpoint 1a) the North Side proposals as part of the extant consent would screen views internally towards retained 1920's listed buildings. Therefore, on balance the magnitude of change is considered **neutral**, resulting in a **neutral effect**.

Viewpoint 2: Broadwater Road (A1000) at the junction with Bridge Road (B195)

11.310 Receptors at the junction between Broadwater Road (A1000) and Bridge Road (B195) include vehicle users, cyclists and pedestrians, and users of the Peartree Trail, with the viewpoint approximately 200m, to the north-east of the Site boundary.

11.311 On completion receptors would experience sequential, oblique, partial near distance views of the Proposed Development particularly the upper storeys of Blocks 8 & 9 fronting onto Broadwater Road, adjacent to the Site's eastern boundary. The Proposed Development introduces new built form on previously derelict industrial land which, alongside the extant consented scheme on the North Side, would create a positive urban edge along Broadwater Road.

11.312 The Proposed Development would be seen in the context of and to the rear of the proposed residential apartment Blocks 6, 7 and 3 as part of the North Side extant consent. The implementation of the consented built form on the North Side would limit views of the Site and any views of the Proposed Development would be seen in the context and to the rear of the North Side consented residential development.

11.313 The Proposed Development would replace the unkempt, derelict, industrial view, in the near distance, with a positive streetscene, forming an attractive residential edge to Broadwater Road.

11.314 For transient receptors including vehicle users and cyclists, of **low** sensitivity, the Proposed Development would result in a limited improvement to a small proportion of their sequential near distance view. The magnitude of change is considered **small**, resulting in a **beneficial effect** of **negligible significance**.

11.315 For pedestrian receptors, of **medium** sensitivity, the Proposed Development would result in a long term, aesthetic improvement to a small proportion of their near distance, sequential townscape view. The magnitude of change is considered **small**, resulting in a **beneficial effect** of **negligible / minor significance**.

11.316 For users of the Peartree Heritage Trail, the Proposed Development would result in an aesthetic improvement, long term, to a small proportion of their near distance, sequential townscape view. The Proposed Development would complement and be seen in the context of and to the rear of the North Side proposals and restoration works to the retained 1920's listed

buildings under the extant consent, albeit views of the listed buildings would again be reduced to glimpses. Therefore, on balance the magnitude of change is considered **neutral**, resulting in a **neutral effect**.

Viewpoint 3: Hydeway Looking West

11.317 Receptors along Hydeway are occupiers of residential properties, vehicle users, pedestrians and cyclists, with the viewpoint approximately 250m, to the east of the Site boundary.

11.318 On completion of the Proposed Development, vehicle users, cyclists and pedestrian receptors on Hydeway would experience direct, glimpsed to partial channelled views of the upper storeys of the perimeter apartment blocks (Block 8 & 13) fronting Broadwater Road and Hydeway, through and above intervening vegetation and existing built form. Due to the oblique angle of view, residential receptors are likely to experience glimpsed views from upper floors of the perimeter apartment blocks, through intervening vegetation. The Proposed Development will be seen in the context and alongside the consented residential development as part of the North Side site. Existing views towards the former Shredded Wheat Factory 1920's silos and chimney would be screened in the long term by the intervening perimeter blocks proposed as part of the North Side extant consent.

11.319 For transient receptors including vehicle users and cyclists of **low** sensitivity and pedestrians of **moderate** sensitivity, the Proposed Development would positively enhance a small proportion of their sequential view. The magnitude of change is considered **small**, resulting in a **negligible beneficial effect** for vehicle users and cyclists and a **negligible / minor beneficial effect** for pedestrians.

11.320 For residential receptors of **high** sensitivity, the Proposed Development would positively enhance a small proportion of their oblique near distance view, the magnitude of change is considered **small**, resulting in a **beneficial effect** of **minor significance**.

Viewpoint 4: Knella Road / Peartree Lane, Peartree

11.321 This viewpoint represents residential receptors, vehicle users, cyclists and pedestrians within the Peartree Estate on Peartree Lane and Knella Road, with the viewpoint approximately 380m, to the south east of the Site boundary.

11.322 At completion, these receptors would experience near to middle distance, partial to glimpsed oblique views of the upper extents of Blocks 8 and glimpsed views during winter months of Block 9, above existing intervening built form and vegetation. The glimpsed view of the retained former Shredded Wheat Factory 1920's silos and chimney would be screened by the intervening perimeter blocks, of both the North Side extant scheme and the Proposed Development. The Proposed Development introduces additional residential built form to a small proportion of the existing distant view and would be integrated with existing large scale built form (offices at 29 Broadwater Road) and vegetation along the skyline, albeit using more sympathetic materials than those of the offices on the skyline.

11.323 For transient receptors including vehicle users and cyclists of **low** sensitivity and pedestrians of **moderate** sensitivity, the Proposed Development would result in a barely perceptible change in their indirect, oblique, sequential view. The magnitude of change is considered **negligible**, resulting in a **negligible beneficial effect.**

11.324 For residential receptors of **high** sensitivity, the Proposed Development would positively enhance a small proportion of their distant oblique view, the magnitude of change is considered **negligible** resulting in a **negligible beneficial effect**.

Viewpoint 5: Corals Mead, Broadwater Road

11.325 Receptors from this viewpoint comprise occupiers of residential properties in the near distance, approximately 380m to the southwest of the Site boundary.

11.326 At completion, these receptors would experience glimpsed views of the very upper extents of Blocks 8 & 9 in the near to middle distance, seen in the context of the more dominant built form of the BioPark in the foreground, resulting in a barely perceptible degree of change from the baseline. The implementation of the consented built form on the South Side Phase 1 would also inhibit views of the Proposed Development.

11.327 The scale and proximity of the Biopark to Corals Mead would continue to dominate and screen views to the majority of the Proposed Development.

11.328 For residential receptors of **high** sensitivity, the magnitude of change is considered **negligible** resulting in a **negligible adverse effect**.

Viewpoint 6: Welwyn Garden City Railway Station

11.329 Receptors from this viewpoint are commuters standing on the station platform and train passengers, with the viewpoint approximately 150m, to the west of the Site boundary.

11.330 The Proposed Development would introduce residential apartment blocks, adjacent and facing out to the railway, visible in the near distance, along the skyline. The western elevation of Block 13 of the Proposed Development and the upper extents of Block 8 would be visible alongside and seen in the context of the consented built form on the North Side site. The existing intervening infrastructure and built form including the pedestrian footbridge over the railway would inhibit views towards Blocks 12 and 9 within Phase 2 of the Proposed Development.

11.331 Whilst the North Side consented development results in the limited loss of views towards the retained 1920's listed buildings, the introduction of high quality built form, landscaping and the refurbishment of the listed built form represents an obvious positive visual change to the townscape view, to which the Proposed Development contributes.

11.332 For commuters and passengers of **moderate** sensitivity, as the Proposed Development would result in an obvious aesthetic improvement to a small proportion of their near distance view, the magnitude of change is considered **small / medium**, resulting in a **beneficial effect** of **moderate / minor significance**.

Viewpoint 7: Parkway Looking east along Howardsgate

11.333 Receptors from this viewpoint include people utilising the public open space along Parkway and Howardsgate and users of the Welwyn Garden City Town Centre (Route 1) heritage trail, with the viewpoint approximately 480m, to the west of the Site boundary.

11.334 On completion, receptors on Parkway looking east along Howardsgate would experience partial, distant views of the top of perimeter apartment Block 13, projecting above the 1990s built form of the Howard shopping centre, whilst views towards the former Shredded Wheat Factory chimney and silos would be retained as part of the North Side consented proposals. The majority of the Proposed Development blocks (Blocks 8, 9 and 12) would be screened by existing intervening built form (Howard Centre) and vegetation. The Proposed Development would introduce additional built form (Block 13) to a small proportion of a near to middle distance view, which would be sensitively designed to subtly integrate with the neo-Georgian architecture of the Howardsgate setting.

11.335 For pedestrians and users of the Welwyn Garden City Heritage Trail of **high** sensitivity, as the Proposed Development results in a limited change in a small proportion of a near to middle distance view, the magnitude of change is considered **small**, resulting in a **minor adverse effect**.

Viewpoint 8: The Campus, Parkway

11.336 Receptors from this viewpoint include people utilising the public open space within The Campus and users of the Welwyn Garden City Town Centre (Route 2) heritage trail, with the viewpoint approximately 650m to the north west of the Site.

11.337 On completion, receptors would experience distant glimpsed views of the upper limits of the apartment blocks, projecting above the existing civic built form through intervening vegetation. The size and scale of the visual change is considered to be very low, as for the most part, views towards the Proposed Development would be screened in summer and heavily filtered in winter by intervening vegetation and built form; the visual changes would form a minor component of distant views and would be seen in the context of existing civic built form in the foreground and the retained silos and chimney within the North Side site.

11.338 For pedestrians and users of the Welwyn Garden City Heritage Trail of **high** sensitivity, as the Proposed Development results in a barely perceptible change in their distant view, the magnitude of change is considered **negligible**, resulting in a **negligible adverse effect**. These effects would be no greater than those likely as a result of the implementation of the extant consented scheme.

Viewpoint 9: Pentley Park, Sherrards Park

11.339 Receptors from Pentley Park are occupiers of residential properties, vehicle users, pedestrians and cyclists, with the viewpoint approximately 1.25km, to the north west of the Site boundary.

11.340 On completion, pedestrian, vehicular and cyclist receptors, travelling south east along Pentley Park would experience a distant partial glimpsed view of the upper limits of apartment Block 8 within Phase 3 of the Proposed Development, projecting slightly above existing intervening vegetation on the skyline. Due to the oblique angle of the view, residential receptors are likely to experience this distant glimpsed view, largely in amongst intervening vegetation, however for the most part, views of the Proposed Development would be screened.

11.341 The size and scale of the visual change is considered to be very low, as for the most part, the enclosure created by the surrounding built form and vegetation, limits and screens views towards the Proposed Development; the visual changes would form a barely perceptible component of distant views and would be seen in the context of existing residential built form and to the rear of the retained silos and chimney within the North Side site.

11.342 For transient receptors including vehicle users, cyclists and pedestrians of **low** sensitivity, the Proposed Development would result in a barely perceptible change in their distant sequential view. The magnitude of change is considered **negligible**, resulting in an **adverse effect** of **negligible significance**.

11.343 For residential receptors of **high** sensitivity, as the Proposed Development would introduce additional residential built form to a very small proportion of their distant oblique view and any glimpsed views would be seen in the context and to the rear of the retained silos and chimney within the North Side site, the magnitude of change is considered **negligible**, resulting in an **adverse effect** of **negligible significance**.

11.344 These effects would be no greater than those likely as a result of the implementation of the extant consented scheme.

Viewpoint 10: Network Rail Footbridge – 1

11.345 Receptors from this viewpoint are pedestrians using the Network Rail footbridge, which connects the Howard Shopping Centre in the west to Hydeway in the east, with the viewpoint approximately 100m, to the west of the Site boundary.

11.346 On completion, receptors would experience sequential, framed views of the Proposed Development heading east along the Network Rail footbridge, of residential apartment Blocks 12, 13 and 8 directly adjacent to the Site's western boundary. The Proposed Development would introduce high quality, residential built form on previously derelict industrial land, which would positively alter the skyline and view composition. The Proposed Development would be seen in the context of the proposed residential apartment Blocks 2 & 3 as part of the North Side extant consented scheme. Whilst the extent of views towards the 1920s silos and chimney within the North Side site would reduce as a result of the extant consented scheme the appearance of the listed built form would improve as part of the proposed restoration works.

11.347 For pedestrians on the footbridge entering and travelling through the Site, of **moderate** sensitivity, as the Proposed Development would positively enhance the visual quality, experience and approach creating a welcoming, safe and visually inviting townscape, the magnitude of change is considered **medium**, resulting in a **beneficial effect** of **moderate significance**.

Viewpoint 11: Hydeway / Broadwater Road junction

11.348 Receptors from this viewpoint comprise vehicle users, cyclists and pedestrians in close proximity, approximately 20m to the east of the Site boundary.

11.349 On completion, receptors would experience direct views of the northern and eastern elevations of perimeter apartment Blocks 8 and 13 in Phase 3 of the Proposed Development, along Broadwater Road and Hydeway. Views towards Blocks 12 and 9 within Phase 2 of the Proposed Development would be screened due to the angle of view and intervening built form. The Proposed Development would be seen in the context of and alongside Blocks 7, 2 and 1 on the opposite side of Hydeway as part of the consented North Side proposals. The North Side consented proposals would screen views of the 1920s listed buildings from this position.

11.350 The baseline view of derelict industrial land would be replaced with residential apartment blocks which would add an active and positive urban edge and street scene along Broadwater Road and Hydeway. Broadwater Road and Hydeway would feature an improved streetscene with street trees and ornamental planting and new surface treatments.

11.351 For transient receptors including vehicle users and cyclists, of **low** sensitivity, the Proposed Development would result in a limited improvement to their sequential view. The magnitude of change is considered **low / medium**, resulting in a **beneficial effect** of **minor significance**.

11.352 For pedestrian receptors, of **moderate** sensitivity, the Proposed Development would positively enhance the townscape visual quality, experience and approach along Hydeway, through the Site, creating a welcoming, safe and visually inviting townscape on a popular, well used, pedestrian route. The magnitude of change is considered **medium** resulting in a **beneficial effect** of **moderate significance**.

Viewpoint 12: Osborn Way footbridge

11.353 Receptors from this viewpoint comprise pedestrians walking between the multi storey car park and the Howard Shopping Centre, approximately 270m, to the north west of the Site boundary.

11.354 On completion, receptors are likely to experience indirect, partial to glimpsed near distance views of the upper extents of Block 8 of the Proposed Development beyond the railway line and through intervening existing vegetation and built form. The Proposed Development would introduce additional residential built form to a very small proportion of the skyline, visible in the near distance, in the context of and to the rear of the retained silos and chimney and proposed built form as part of the consented North Side site.

11.355 For pedestrians on Osborn Way, of **moderate** sensitivity, as the Proposed Development would result in a limited change in a very small proportion of a near distance view, through the introduction of new built form; when balanced with the long term, positive improvements the Proposed Development would make to the visual amenity of the receptor's sequential townscape view, the magnitude of change is considered **negligible**, resulting in a **beneficial effect** of **negligible significance**.

Viewpoint 13: Bridge Road (B195) Looking South

11.356 Receptors from this viewpoint comprise vehicle users, cyclists, pedestrians and users of the Peartree Heritage Trail, located approximately 250m to the north of the Site boundary.

11.357 On completion, views towards the Proposed Development would for the most part be screened by the North Side extant consented proposals, featuring residential apartment blocks 3, 6 and 7 facing out onto Bridge Road. There is the potential for sequential, oblique, glimpsed views internally into the North Side towards the Proposed Development (Block13) due to deliberate breaks in the proposed built form within the consented North Side site, when viewed from various locations along this kinetic route (Bridge Road – see alternative viewpoint 13a).

11.358 For transient receptors including vehicle users and cyclists, of **low** sensitivity and pedestrians of **moderate** sensitivity the Proposed Development would result in a barely perceptible improvement to their sequential view as they are more focussed on the route ahead rather than oblique views in the direction of the Site. The magnitude of change is considered **negligible** resulting in a **beneficial effect** of **negligible significance**.

11.359 For users of the Peartree Heritage Trail, whose attention is focused on the heritage features, the Proposed Development would result in a barely perceptible influence on their sequential view. The Proposed Development would be visible in the context and to the rear of the North Side consented proposals to refurbish and repurpose the 1920s listed buildings, which until recently were screened by the former Shredded Wheat factory buildings, now demolished. Therefore, on balance the magnitude of change is considered **neutral**, resulting in a **neutral effect**.

Viewpoint 14: Broadwater Road / Mercury House / Albany Place

11.360 Receptors from this viewpoint comprise vehicle users, cyclists, pedestrians and users of the Peartree Heritage Trail located in close proximity, approximately 120m to the north east of the Site boundary.

11.361 On completion receptors would experience sequential, oblique, partial near distance views of Blocks 8 & 9 of the Proposed Development fronting onto Broadwater Road, adjacent to the Site's eastern boundary. The Proposed Development introduces new built form on previously derelict industrial land, that would create a positive urban edge along Broadwater Road. The Proposed Development would be seen in the context and slightly to the rear of Blocks 6 and 7 as part of the North Side extant consented proposals.

11.362 The Proposed Development introduces residential apartment blocks facing out onto Broadwater Road, which changes the composition of the near distance view, albeit is in keeping with the adjacent extant consented developments of Phase One South Side and North Side. The proposed built form and public realm improvements would introduce an active, permeated, positive streetscene and urban edge along Broadwater Road.

11.363 For transient receptors including vehicle users and cyclists, of **low** sensitivity, the Proposed Development would result in a limited improvement to a small proportion of their sequential near distance view. The magnitude of change is considered **small**, resulting in a **beneficial effect** of **negligible significance**.

11.364 For pedestrian receptors, of **medium** sensitivity, the Proposed Development would result in a long term, aesthetic improvement to a small proportion of their near distance, sequential townscape view. The magnitude of change is considered **small**, resulting in a **beneficial effect** of **negligible / minor significance**.

11.365 For users of the Peartree Heritage Trail, the Proposed Development would result in an aesthetic improvement, long term, to a small proportion of their near distance, sequential townscape view. The Proposed Development would complement and be seen in the context of and to the rear of the North Side proposals and restoration works to the retained 1920's listed buildings under the extant consent. Therefore, on balance the magnitude of change is considered **neutral**, resulting in a **neutral effect**.

Viewpoint 15: Otto Road / Southern Site Boundary

11.366 Otto Road is a private road which forms part of the recently completed Taylor Wimpey residential development, referred to as the 'Mirage', and receptors include residents of block 4, with the viewpoint approximately 80m, to the south of the Site boundary, located beyond Phase One of the South Side extant consented scheme.

11.367 With the South Side Phase One developed under the extant consent, the view will feature residential blocks 10 and 11 in the foreground, framing views along the central park space (The Weave) towards further residential apartments associated with the Proposed Development (Blocks 12 and 13). Views would be channelled and framed by the Proposed Development along The Weave towards the former Shredded Wheat Factory 1920s silos, albeit the extent of silos visible would be reduced due to Block 13 of the Proposed Development. The Proposed Development would be seen to the rear and in the context of the consented development, through breaks in the consented built form.

11.368 For residential receptors of **high** sensitivity, the magnitude of change is considered **small / medium**, due to the addition of the proposed built form restricting a proportion of their near distance view. These views would be seen in the context and to the rear of the Phase 1 South Side proposals which dominates the foreground, resulting in an **adverse effect** of **minor significance**.

Viewpoint 16: Network Rail Footbridge – 2

11.369 Receptors from this viewpoint are pedestrians using the Network Rail footbridge, directly adjacent to the western Site boundary, where it enters the North Side site along Hydeway.

11.370 On completion, receptors would experience sequential, framed views of the Proposed Development heading east along the Network Rail footbridge, of residential apartment Blocks 13 and 12 directly adjacent to the Site's western boundary. The Proposed Development would

introduce high quality, residential built form on previously derelict industrial land, which would positively alter the skyline and view composition. The Proposed Development would be seen to the rear and in the context of the proposed residential blocks as part of the North Side extant consent. The North Side consented development will feature residential apartment blocks, framing views of Goodman Square, a new public open space, which would include the backdrop of the retained 1920s silos, boiler house, grain house and chimney (refurbished and repurposed to form a new Art Hub) and beyond to the production hall of the Grade II Listed former Shredded Wheat Factory. The Proposed Development would not alter the setting of these consented enhancements.

11.371 For pedestrians on the footbridge entering and travelling through the Site, of **moderate** sensitivity, as the Proposed Development would positively contribute to the overall enhancements in visual quality, experience and approach creating a welcoming and visually inviting townscape, the magnitude of change is considered **small / medium**, resulting in a **beneficial effect** of **minor / moderate significance**.

Viewpoint 18: Broadwater Road / Penn Way

11.372 Receptors from Broadwater Road and Penn Way include occupiers of residential properties (block 3 of The Mirage), vehicle users, pedestrians and cyclists, with the viewpoint approximately 250m, to the south of the Site boundary.

11.373 On completion, near distance views for transient receptors along Broadwater Road towards the Site would be replaced with views towards the Phase One (South Side) consented scheme and residential perimeter buildings. The new residential built form would be taller than existing and be visible in the near distance to the rear and above the former Roche products factory Office (Grade II listed). The extant consented South Side (Phase One) perimeter blocks along Broadwater Road will, for the most part, restrict and screen views to the Proposed Development and any partial views towards Blocks 8 and 9 fronting onto Broadwater Road would be seen to the rear of Phase One and in the context of the North Side consented proposals.

11.374 The Proposed Development introduces residential apartment blocks facing out onto Broadwater Road, which changes the composition of the near distance view, albeit is in keeping with the adjacent extant consented developments of Phase One South Side and North Side. The proposed built form and public realm improvements would introduce an active, permeated,

positive streetscene and urban edge along Broadwater Road, with the scale of built form rising gradually from Phase 1 to the gateway on Hydeway.

11.375 Views from the 'Mirage' residential apartments are considered to be comprised of the upper floors, on those apartments facing north, who would experience distant partial views, between intervening built form and vegetation towards the upper limits of the proposed residential apartment blocks, albeit largely screened by the built form of Phase One. The resident's views towards the former Shredded Wheat Factory 1920s silos and chimney would be maintained in the distance above and to the rear of the proposed residential built form and vegetation.

11.376 For transient receptors including vehicle users and cyclists of **low** sensitivity and pedestrians of **moderate** sensitivity, the Proposed Development would positively enhance a very small proportion of a near distance sequential view along Broadwater Road. Any partial to glimpsed views would be seen to the rear and in the context of the Phase One South Side and North Side extant consented development. The magnitude of change is considered **negligible**, resulting in a **negligible beneficial effect.**

11.377 For residential receptors of **high** sensitivity, as the Proposed Development would introduce additional residential built form to a very small proportion of their distant view and any partial to glimpsed views would be to the rear and in the context of the Phase One South Side and North Side extant consented development, the magnitude of change is considered **negligible**, resulting in an **adverse effect** of **negligible significance**.

Viewpoint 19a to 19b: Hatfield House (1st Floor and Roof)

11.378 Receptors from Hatfield House include members of the public visiting the house and gardens. Viewpoints 19a and 19b are taken from Hatfield House, with the viewpoints approximately 4.3km, to the south of the Site boundary. Depending on their location receptors currently catch glimpses of the top of the former Shredded Wheat Factory silos within the North Side site, seen in the long distance through intervening vegetation, albeit forming a very small part of the overall view.

11.379 On completion, receptors are likely to experience long distance partial glimpsed views of the upper storeys of the proposed residential built form within the Proposed Development, which would be largely screened by intervening vegetation and the extant consented Phase One South Side development.

11.380 The Proposed Development would introduce additional built form to a very small proportion of these long distance views; seen in the context of the North Side consented development and integrated with existing tall built form, within Welwyn Garden City, below the skyline including the retained 1920's silos (North Side), the Howard Centre, Welwyn Garden City Central Library on The Campus and Rosanne House on Parkway.

11.381 The proposed architectural detailing and design quality will be secured for Phase Two by detailed planning drawings and elevations and for Phase Three (Outline) via a Design Code which ensure that the proposals integrate subtly within the existing context of Welwyn Garden City and that the proposed increase in height does not dominate the skyline.

11.382 For receptors of Hatfield House, of **moderate** sensitivity, as the Proposed Development introduces barely perceptible elements of residential built form at a very long distance with Welwyn Garden City in the background, forming a very small proportion of their distant view and seen in the context of the South and North Side extant consented development, the magnitude of change is considered **negligible**, resulting in an **adverse effect** of **negligible significance**.

Viewpoints 20a, 20b and 20c: Hatfield House (Southern Approach)

11.383 Receptors from Hatfield House include members of the public visiting the house and gardens. Viewpoints 20a, 20b and 20c are taken from the top of the 'Southern Approach' in the registered park and garden, with the viewpoints approximately 4.6km, to the south of the Site boundary. The viewpoints demonstrate the sequential experience when travelling northwards towards Hatfield House on the southern approach. It is only viewpoint 20a that is publicly accessible, at the start of the southern approach, as it forms part of the Hatfield House estate walk.

11.384 On completion, receptors are likely to experience long distance partial to glimpsed sequential views of the upper storeys of the residential built form of the Proposed Development, which for the most part would be screened by intervening vegetation and the extant consented Phase One South Side development. The visible extent of the Proposed Development would reduce as the receptor travels north along the Southern Approach towards Hatfield House, due to the sloping landform (see viewpoint 20b and 20c). By viewpoint 20c Hatfield House restricts views of the silos and the Proposed Development is largely screened by intervening vegetation and Hatfield House.

11.385 The Proposed Development would introduce additional built form to a very small proportion of the view and seen in the long distance, set against a wooded backdrop of the horizon and intervening vegetation within the foreground, to the side of Hatfield House. The Proposed Development would be seen in the context of the South and North Side extant consented development. For Viewpoints 20a and 20b the Proposed Development would be viewed in the context of existing tall built form within Welwyn Garden City, in the long distance below the skyline, including the retained 1920's silos and chimney (North Side), the Howard Centre, Welwyn Garden City Central Library.

11.386 The Proposed Development would result in a reduction in the extent of 1920s silos and chimney visible within the North Side site (viewpoints 20a and 20b), however with these features being painted white and contrasting with the surrounding vegetation, this is seen as an improvement to the long distance elements in the view. The proposed architectural detailing and design quality will be secured for Phase Two by detailed planning drawings and elevations and for Phase Three (Outline) via a Design Code which ensures that the proposals would lie subtly within the skyline, the wooded horizon and the existing context of Welwyn Garden City and that the proposed increase in height does not dominate the skyline.

11.387 For receptors travelling along the Southern Approach, of **moderate** sensitivity, as the Proposed Development introduces barely perceptible and sensitively designed elements of built form to a very small part of this view towards Welwyn Garden City, seen from a long distance and in the context of the extant consented development to the North and South Side, the magnitude of change is considered **negligible**, resulting in an **adverse effect** of **negligible significance**.

Viewpoints 21a, 21b and 21c: Hatfield House Parkland (Publicly accessible path)

11.388 Receptors from Hatfield House parkland include members of the public visiting and walking through the parkland. Viewpoints 21a, 21b and 21c are taken from a publicly accessible part of the parkland on an internal footpath and driveway that runs on a north-west to south-east axis, with the viewpoints approximately 4.3km, to the south of the Site boundary. The viewpoints demonstrate the sequential experience when travelling along this route in a north westerly direction.

11.389 On completion, receptors are likely to experience long distance partial to glimpsed sequential views of the upper storeys of the proposed residential built form within the Proposed

Development, largely screened by intervening vegetation and seen in the context of the extant consented Phase One South Side development.

11.390 The extent of the Proposed Development visible along the skyline would reduce as receptors travels north / north west, behind the dense wooded vegetation framing the view, part of the Hatfield House Park and Garden. By viewpoint 21c the Proposed Development, for the most part, would be screened by the layers of intervening vegetation (see viewpoint 21c). In the long term the juvenile woodland (Jubilee Wood) located in the foreground of viewpoint 21b would reach maturity, screening views of the Proposed Development.

11.391 The Proposed Development would introduce additional built form to a very small proportion of a long distance view, set between layers of wooded vegetation in the middle distance with a wooded backdrop along the horizon. The Proposed Development would be seen to the rear of the Phase One South Side consented proposals, in the context of the North Side consented development and of existing tall built form within Welwyn Garden City, including the retained 1920's silos and chimney (North Side) and the Biopark.

11.392 The proposed architectural detailing and design quality will be secured for Phase Two by detailed planning drawings and elevations and for Phase Three (Outline) via a Design Code which ensure that the proposals integrate subtly within the existing context of Welwyn Garden City and that the proposed increase in height does not dominate the skyline.

11.393 For receptors travelling through the Hatfield House Parkland, of **moderate** sensitivity, as the Proposed Development introduces glimpses of residential built form to a very small proportion of this view, seen in the long distance and set within other built form in Welwyn Garden City, the magnitude of change is considered **negligible**, resulting in an **adverse effect** of **negligible significance**.

Viewpoints 22a and 22b : Hatfield House Deer Park (Private area of parkland)

11.394 Viewpoints 22a and 22b are taken from the deer park within Hatfield House Registered Park and Garden, however this part of the parkland is not publicly accessible. The viewpoints are approximately 4.7km, to the south of the Site.

11.395 On completion, receptors are likely to experience occasional partial to filtered glimpsed views of the upper storeys of the proposed residential built form in the long distance, largely

screened by the layers of intervening vegetation and to the rear of the extant consented Phase One South Side development.

11.396 The Proposed Development would introduce additional built form to a very small proportion of a long distance view, set between layers of wooded vegetation in the near to middle distance and within a wooded backdrop along the horizon. The Proposed Development would be seen to the rear of Phase One and in the context of the North Side consented development and the context of existing tall built form within Welwyn Garden City, in long distance views along the skyline, including the retained 1920's silos and chimney (North Side) and the Biopark.

11.397 The proposed architectural detailing and design quality will be secured for Phase Two by detailed planning drawings and elevations and for Phase Three (Outline) via a Design Code which ensures that the proposals would lie subtly within the skyline, the wooded horizon and the existing context of Welwyn Garden City and that the proposed increase in height does not dominate the skyline.

11.398 For receptors within the Deer Park, of **moderate** sensitivity, as the Proposed Development introduces barely perceptible elements of residential built form within a long distance view towards Welwyn Garden City, to a very small proportion of their distant view and any partial to glimpsed views would be seen to the rear of Phase One and in the context of the North Side extant consented development, the magnitude of change is considered **negligible**, resulting in an **adverse effect** of **negligible significance**.

Viewpoint 23: Essendon Public Footpath 5 (edge of Essendon Conservation Area)

11.399 Receptors from viewpoint 23 include walkers on Essendon public footpath 5 and residential properties on West End Lane, within Essendon Conservation Area, whose properties back onto the surrounding farmland, with the viewpoint approximately 5km, to the south east of the Site boundary.

11.400 On completion, walker receptors are likely to experience long distance partial to glimpsed views of the upper storeys of the proposed residential built form within the Proposed Development, largely screened by the layers of intervening vegetation and seen in the context of Phase One and the North Side consented developments. For residential receptors (circa 12 properties), on West End Lane within Essendon Conservation Area, whose properties back onto the fields, they are likely to experience, long distance, glimpsed filtered views from their upper storeys of the proposed residential built form within the Proposed Development.

11.401 The Proposed Development would introduce additional built form to a very small proportion of a long distance view, set between layers of wooded vegetation in the near to middle distance and in the far distance as a wooded backdrop along the horizon. The Proposed Development would be seen in the context of existing tall built form within Welwyn Garden City, in long distance views along the skyline, including the Biopark and the Howard Centre.

11.402 The Proposed Development would result in the loss of views towards the 1920s silos and chimney within the North Side site, however with the silos and chimney being painted white and contrasting with the wooded horizon, this is seen as an improvement to the long distance view. The proposed architectural detailing and design quality will be secured for Phase Two by detailed planning drawings and elevations and for Phase Three (Outline) via a Design Code which ensures that the proposals would lie subtly within the skyline, the wooded horizon and the existing context of Welwyn Garden City and that the proposed increase in height does not dominate the skyline.

11.403 For walker receptors of **moderate** sensitivity, as the Proposed Development introduces barely perceptible elements of residential built form within a long distance view towards Welwyn Garden City, to a very small proportion of their distant view and any partial to glimpsed views would be seen in the context of Phase One and the North Side extant consented development, the magnitude of change is considered **negligible**, resulting in an **adverse effect** of **negligible significance**.

11.404 For residential receptors of **high** sensitivity, as the Proposed Development would introduce additional residential built form to a very small proportion of their distant view and any glimpsed filtered views would be in the context of Phase One and the North Side extant consented development, the magnitude of change is considered **negligible**, resulting in an **adverse effect** of **negligible significance**.

Viewpoint 24: Junction of Essendon Public Footpaths 11 and 12

11.405 Receptors from Essendon public footpath 11 and 12 include walkers heading in a northerly direction along a track, approximately 4.6km, to the south east of the Site boundary.

11.406 On completion, walkers are likely to experience long distance, sequential partial to glimpsed channelled views of the upper storeys of the proposed residential built form within the Proposed Development, largely screened by the layers of intervening vegetation within the Lea Valley and seen in the context of Phase One and the North Side consented development. As

receptors travel north along the footpath, the extent of the Proposed Development visible below the skyline would reduce and eventually become screened by hedgerow field boundaries, framing and restricting views out.

11.407 The Proposed Development would introduce additional built form to a very small proportion of a long distance view, set between layers of wooded vegetation in the distance as a wooded backdrop along the horizon. The Proposed Development would be seen in the context of existing tall built form within Welwyn Garden City, in long distance views below the skyline, including the Biopark, Welwyn Garden City Central Library and The Howard Centre as well as the large overhead pylons which form visual detractors in the view.

11.408 The Proposed Development would result in the loss of views towards the 1920s silos within the North Side site, however with the silos and chimney painted white and contrasting with the wooded horizon, this is seen as an improvement to the long distance view. The proposed architectural detailing and design quality will be secured for Phase Two by detailed planning drawings and elevations and for Phase Three (Outline) via a Design Code which ensures that the proposals would lie subtly within the skyline, the wooded horizon and the existing context of Welwyn Garden City and that the proposed increase in height does not dominate the skyline.

11.409 For walker receptors of **moderate** sensitivity, as the Proposed Development introduces barely perceptible elements of residential built form within a long distance sequential view towards Welwyn Garden City, to a very small proportion of their distant view, for a limited period whilst travelling along the footpath and any partial to glimpsed views would be seen in the context of Phase 1 and the North Side extant consented development, the magnitude of change is considered **negligible**, resulting in an **adverse effect** of **negligible significance**.

Viewpoint 25: Campus West, Parkway

11.410 Receptors from this viewpoint include people utilising the public open space within The Campus and users of the Welwyn Garden City Town Centre (Route 2) heritage trail, with the viewpoint approximately 700m to the north west of the Site. This view is located with within Welwyn Garden City Conservation Area.

11.411 On completion, receptors would experience distant filtered views of the upper limits of the apartment blocks, above the existing civic built form through intervening vegetation. The size and scale of the visual change is considered to be very low, as for the most part, views

towards the Proposed Development would be screened by intervening vegetation and built form. The visual changes would form a minor component of distant views and would be seen in the context of existing civic built form in the foreground and in the context of the consented development on the North Side.

11.412 For pedestrians and users of the Welwyn Garden City Heritage Trail of **high** sensitivity, as the Proposed Development results in a barely perceptible change in their distant view, the magnitude of change is considered **negligible**, resulting in a **negligible adverse effect**.

Viewpoint 26: Junction of Parkway and Church Road

11.413 Receptors from this viewpoint include people utilising the public open space along Parkway and Howardsgate and users of the Welwyn Garden City Town Centre (Route 1) heritage trail, with the viewpoint approximately 600m, to the west of the Site boundary. This view is located within the Welwyn Garden City Conservation Area.

11.414 On completion, receptors would experience distant filtered views of the upper limits of apartment block 12, in the distance behind and largely screened by existing civic built form through intervening vegetation. The size and scale of the visual change is considered to be very low, as for the most part, views towards the Proposed Development would be screened by intervening vegetation and built form in the foreground; the visual changes would form a very minor component of distant views and would be seen in the context of existing civic built form in the foreground. This would be the case for most views from the Conservation Area, if there are any views at all.

11.415 For pedestrians and users of the Welwyn Garden City Heritage Trail of **high** sensitivity, as the Proposed Development results in a barely perceptible change in their distant view, affecting a very small proportion of their overall view, the magnitude of change is considered **negligible**, resulting in a **negligible adverse effect**.

ASSESSMENT OF CUMULATIVE EFFECTS

Approach to Cumulative Assessment

11.416 Cumulative effects are the additional changes caused by the Proposed Development in conjunction with other similar developments, or the combined effect of developments taken together. GLVIA3 addresses cumulative landscape and visual effects separately.

11.417 Cumulative landscape effects are defined as:

"…effects that can impact on either the physical fabric or character of the landscape, or any special values attached to it"

11.418 A significant cumulative effect on landscape character usually occurs when the addition of the Proposed Development results in significant or near significant landscape character effects that overlap with the significant or near significant landscape character effects generated from another development.

11.419 Cumulative visual effects are defined as:

"…effects that can be caused by combined visibility, which 'occurs where the observer is able to see two or more developments from one viewpoint' and / or sequential effects which 'occur when the observer has to move to another viewpoint to see different developments'"

11.420 A significant cumulative visual effect usually occurs where the addition of the Proposed Development results in a significant or near significant visual effect that coincides in combination with significant or near significant visual effects from another development in the view. In some cases, the new development itself may not be visually significant but may raise the overall magnitude of impact from built development, when combined with other schemes, to a significant level of effect.

11.421 With sequential views, the distance between significant views of different schemes and the mode of transport will affect the professional judgment on whether these effects are cumulatively significant or not.

11.422 In this TVIA, the assessment of cumulative effects focuses primarily on the **additional** effects of the Proposed Development under consideration.

11.423 It should be noted that the cumulative effect reported is not the sum of the effects for each project. A potential cumulative effect arises when the effect of the whole may be considered to be greater than the sum of the two parts, where the two developments in combination may result in an effect of greater significance. The cumulative assessment defines this additional effect.

11.424 Chapter 3 of this ES identifies projects that have been considered in relation to potential cumulative effects. For the purposes of this assessment the schemes are referred to as the North Side (Wheat Quarter ref: 6/2021/0181/MAJ) including South Side extant consented scheme, 29 Broadwater Road, 37 Broadwater Road, Rank Xerox site, Pall Mall Distribution Site, Mercury House, Accord House, Former Argos Depot, Land east of Bessemer Road, 51 Bridge Road East, 73 Bridge Road East and Biopark Broadwater (Broadwater Gardens).

11.425 The North Side (Wheat Quarter) is also promoting revised redevelopment proposals for its land, as identified in Chapter 3.

11.426 The Former Shredded Wheat Factory Site – South Side Phase One extant consented scheme is being implemented and is currently in the early stages of construction. Phase One of the South Side is assessed as a cumulative development in conjunction with the North Side.

Cumulative Effects on Townscape Character

11.427 There would be no cumulative effects on the following LTCA's: 1, 5, 6, 7, 8, 9, 10, 11, 12, 13 and 14 as effects would be **neutral** due to distance and the presence of intervening built form.

11.428 The works to land east of Bessemer Road are now complete with the new Aldi foodstore introducing new commercial elements into LTCA 3, open to the public and considered as part of the baseline assessed above. Therefore, there would be no cumulative effects as a result of the Proposed Development.

11.429 The Rank Xerox site, 51 Bridge Road East and 73 Bridge Road East are located within LTCA 2 and would introduce medium scale residential development on former commercial property sites. The Proposed Development would result in a barely perceptible change to the LTCA and there would be a **negligible** magnitude of change on the immediate setting of the LTCA. Construction activities would result in a **negligible adverse** cumulative effect should all developments be constructed at the same time. At completion the Proposed Development

would have a **minor beneficial** significance of effect on the setting of LTCA 2 and cumulatively effects at completion would be **negligible beneficial** due to the overall improvement of LTCA's 2 and 3 at Year 15.

11.430 The former Argos Depot, Pall Mall distribution site, Biopark (Broadwater Gardens) and North Side (Wheat Quarter) proposed development 2021 (ref: 6/2021/0181/MAJ) are all located within LTCA 3. The former Argos Direct distribution depot on Bridge Road has recently been redeveloped to include two industrial buildings for commercial uses, located directly adjacent to the North Side site. The Pall Mall distribution site is located adjacent to the South Side Site and forms part of the Broadwater Road West allocation site, mixed use provision, however there are currently no proposals in the planning system. The Biopark referred to as Broadwater Gardens is located immediately to the south west of the Site adjacent to the railway. The proposals include the demolition of the existing Biopark building and construction of 289 residential units, community hub, with public realm and open space featuring six apartment blocks ranging from two to nine storeys and townhouses of two to three storeys. The North Side (Wheat Quarter) is also promoting emerging revised redevelopment for its land, through an increase in residential units, arrangement and massing of built form and an increase in the proposed storey heights compared to the extant consented scheme.

11.431 Whilst the redevelopment of the former Argos Direct distribution depot is now complete, the Biopark (Broadwater Gardens) and the North Side (Wheat Quarter) revised redevelopment are currently going through planning. If works on Biopark (Broadwater Gardens) and the North Side (Wheat Quarter) were ongoing in LTCA 3 at the same time as the Proposed Development, there would be the potential for these construction activities to combine and increase their influence on LTCA 3, with the potential to result in a temporary **minor adverse** cumulative effect.

11.432 Mercury House (1 Broadwater Road), Accord House, 29 Broadwater Road and 37 Broadwater Road are all located within LTCA 4. Mercury House is directly adjacent to the North Side site on Broadwater Road and has recently been extended to provide a 3-storey side extension, a fourth floor roof extension and a roof garden for residential use, directly overlooking the North Side site. Accord House is to the rear of Mercury House on Bridge Road where proposals include the removal of the roof and the addition of three new floors, to form five storey residential accommodation. 37 Broadwater Road is to the south of the Site directly adjacent to the 'Mirage' apartments where proposals include the construction of 4 storey residential apartments on a former car park. 29 Broadwater Road is directly adjacent to the Site on Broadwater Road where proposals include the redevelopment of a former office block into four storey residential flat accommodation.

11.433 Whilst Mercury House (1 Broadwater Road) is now in occupation, Accord House, 29 Broadwater Road and 37 Broadwater Road are currently under construction. If works on Accord House, 29 and 37 Broadwater Road were ongoing in LTCA 4 at the same time as the Proposed Development, there would be the potential for these construction activities to combine and increase their influence on LTCA 4, with the potential to result in a **negligible to minor adverse** cumulative effect.

11.434 The completed redevelopment of Mercury House and proposed works to Accord House and 29 and 37 Broadwater Road would be complementary to the Proposed Development and a beneficial improvement in the immediate setting of LTCA's 3 and 4. On completion the Proposed Development would result in a **beneficial** effect of **minor** significance on LTCA 4 and cumulatively would result in a **minor beneficial** effect at Year 0 and Year 15.

Cumulative Effects on Visual Amenity

11.435 There would either be no views of the cumulative schemes or the combined views would be barely perceptible from **Viewpoints 1A, 9, 12, 13, 17, 19A, 20B, 20C, 21B, 21C, 22A and 22B,** therefore there would be no cumulative effects from these locations.

11.436 For **Viewpoints 1 and 6,** if the redevelopment of the North Side (Wheat Quarter) proposed development 2021 and Biopark (Broadwater Gardens) were ongoing at the same time as the Proposed Development, there would be the potential for these construction activities to combine and increase their visual influence on transient receptors along Bridge Road travelling east and receptors at Welwyn and Hatfield railway station. As receptors move further east along Bridge Road (see alternative **viewpoint 1a**) the implementation of the proposed built form on the North Side (both extant and 2021 proposals) and existing intervening vegetation would inhibit views internally towards the Site and the Proposed Development. For **Viewpoints 10** and **16** the angle and orientation of the view is focused on the North Side site, with the Proposed Development a small proportion of the near distance view and views of the South Site extant scheme and the Biopark (Broadwater Gardens) out of view.

11.437 Construction works would result in a limited deterioration to the sequential view to transient receptors, cumulatively resulting in additional visual detractors, fronting and adjacent to the railway line. Therefore, construction activities would result in a **minor adverse effect** to receptors from viewpoints 1 and 6 and **negligible to minor adverse** for receptors from viewpoints 10 and 16. These effects would be largely as anticipated for the extant consented development across the whole of the former Shredded Wheat factory site.

11.438 The completion of North Side (Wheat Quarter) proposed development 2021 and Biopark (Broadwater Gardens) in combination with the Proposed Development and the extant consented South Side perimeter blocks would introduce additional high quality built form positively fronting on Welwyn Garden City Railway and Bridge Road. The cumulative schemes would positively change a townscape view that currently features derelict industry, derelict land and the detracting built form of the Biopark, by introducing additional residential built form of a similar scale to the Proposed Development.

11.439 For commuters and transient receptors (**viewpoints 1 and 6**) the cumulative visual change of the North Side (Wheat Quarter) proposed development 2021 and Biopark (Broadwater Gardens), in combination with the Proposed Development and the extant consented South Side, would result in an obvious aesthetic improvement to a large proportion of their near distance view, resulting in a **minor beneficial effect** due to the improvement to the receptors view. For transient receptors from viewpoints 10 and 16 the Proposed Development would introduce additional residential built form to a small proportion of their near distance view and any partial to glimpsed views would be seen in the context of the North Side (Wheat Quarter) proposed development 2021, resulting in a **minor beneficial effect.** Again, these effects remain largely as anticipated for the extant consented scheme.

11.440 The redevelopment at Mercury House is completed and due to the angle of **Viewpoint 2** focused towards the North Side site, views of the full extent of the proposed extension to Mercury House and Accord House to the rear would be limited from **Viewpoint 2**. For **Viewpoints 2 and 14** if the redevelopment of North Side (Wheat Quarter) proposed development 2021 were ongoing at the same time as the Proposed Development, there would be the potential for these construction activities to combine and increase their visual influence on transient receptors along Broadwater Road. Construction activities would result in additional visual detractors, albeit set behind the North Side (Wheat Quarter) proposed development and so would have limited cumulative influence. Therefore, construction activities would result in a **negligible effect.**

11.441 At completion the North Side (Wheat Quarter) cumulative scheme would dominate the foreground view and the Proposed Development would be barely perceptible, in the near distance, to the rear along Broadwater Road, with the Proposed Development contributing in a similar manner to the extant consented scheme. This would result in a **very low** cumulative impact of a **negligible to neutral effect.**

11.442 For **Viewpoints 4 and 5** if the redevelopment and construction work at 29, 37 Broadwater Road, North Side (Wheat Quarter) 2021 proposals and the Biopark (Broadwater Gardens) were ongoing at the same time as the Proposed Development, there would be the potential for these construction activities to combine and increase their visual influence on transient and residential receptors from viewpoints 4 and 5. Construction activities for the cumulative schemes would have a greater influence on these views, with the Proposed Development barely perceptible in the distant background, or screened by the cumulative schemes – as is the case with 29 Broadwater Road (viewpoint 4) and the Biopark (Broadwater Gardens from viewpoint 5). Construction activities would result in a **negligible to neutral** cumulative effect should all developments be constructed at the same time.

11.443 The proposed storey heights of the residential developments at 29 and 37 Broadwater Road is four storeys, with the North Side (Wheat Quarter) 2021 proposals rising up to ten storeys and the Biopark (Broadwater Gardens) between seven and nine storeys. Based on these storey heights there is the potential for residential receptors from **Viewpoints 4 and 5** to experience glimpsed oblique views of the upper storeys of the Proposed Development in combination with the cumulative schemes, primarily in the winter, to a small proportion of their distant view.

11.444 At completion of the Proposed Development the cumulative schemes would rise up behind existing residential built form in a similar nature to the existing built form on 29 Broadwater Road and the Biopark, with the Proposed Development contributing in a similar manner to the extant consented scheme. This would result in a **very low** cumulative impact of a **negligible adverse to neutral effect.**

11.445 For **viewpoints 7 and 8** if the redevelopment and construction work at North Side (Wheat Quarter) 2021 were ongoing at the same time as the Proposed Development, there would be the potential for these construction activities to combine and increase their visual influence on a small proportion of the receptors near to middle distance. Construction activities would result in a **negligible adverse** cumulative effect should developments be constructed at the same time.

11.446 At completion of the Proposed Development and the North Side (Wheat Quarter) 2021 cumulative scheme there would be additional built form to a small proportion of a near to middle distance view, which would be visible to the rear of existing civic built form and the Howard Centre, sensitively designed to subtly integrate with the neo-Georgian architecture of the Howardsgate setting. This would result in a **low** cumulative impact of a **negligible adverse effect.**

11.447 For **Viewpoint 18** if the redevelopment of 29 and 37 Broadwater Road and North Side (Wheat Quarter) 2021 were ongoing at the same time as the Proposed Development, there would be the potential for these construction activities to combine and increase their visual influence on transient and residential receptors along Broadwater Road travelling north and residents whose orientation of view faces north. Construction activities would result in additional visual detractors, albeit set behind the extant consented South Side scheme and so would have limited cumulative influence. Therefore, construction activities would result in a **negligible to minor adverse effect.**

11.448 Due to the angle of **Viewpoint 18** focused towards the Site, the Proposed Development and the North Side site along Broadwater Road, views of the full extent of the proposed development to the Biopark (Broadwater Gardens) would be at the most oblique and to the rear of the Mirage, views would be limited from **Viewpoint 18**.

11.449 The completion of 29 and 37 Broadwater Road and North Side (Wheat Quarter) 2021 proposals in combination with the Proposed Development and the extant consented South Side perimeter blocks would introduce additional residential built form, positively fronting onto Broadwater Road, complementing the recently completed 'Mirage' and Birkin Court residential developments and creating a positive and enhanced residential streetscene.

11.450 For residential and transient receptors from **Viewpoint 18,** the Proposed Development would introduce additional residential built form to a very small proportion of their distant view and any partial to glimpsed views would be seen to the rear and in the context of the South Side extant consented development, resulting in a **negligible effect.** Cumulatively due to the introduction of additional residential built form along 29 and 37 Broadwater Road, to the receptors near distance view, on land previously brownfield, car parking and offices results in a **negligible beneficial effect** due to the improvements to the receptors view along Broadwater Road.

11.451 For **Viewpoint 15,** 29 Broadwater Road would sit to the right and the rear separated from the context of the Proposed Development by the extant consented scheme, with the North Side (Wheat Quarter) 2021 proposals, primarily the retained and refurbished silos, seen in the distance beyond the new parkland of the 'Weave' to the rear of the Proposed Development.

11.452 If the redevelopment and construction work at 29 Broadwater Road, the North Side (Wheat Quarter) 2021 proposals and South Side extant scheme were ongoing at the same time as the Proposed Development, there would be the potential for these construction activities to

combine and increase their visual influence on residential receptors from the 'Mirage' who face north, albeit with this view dominated by development on the South Side extant scheme (Phase One). Construction activities would result in a **negligible adverse** cumulative effect should all developments be constructed at the same time, albeit this would be the case for the extant consented scheme across the entire North and South Side of the Former Shredded Wheat factory site.

11.453 For residential receptors from **Viewpoint 15** with the Site developed under the extant consent, the view will be dominated by residential blocks of the extant consented South Side Phase One in the foreground, with development at 29 Broadwater Road to the right of the view and the (Wheat Quarter) 2021 proposals in the distance beyond the extant consented scheme and the Proposed Development. This would result in a **negligible effect** due to the introduction of additional residential built form to a small proportion of their view, seen in the context and to the rear of the South Side consented Phase One development at Year 0 and Year 15.

11.454 For **viewpoints 19B, 20A, 21A, 23 and 24** from Hatfield House Registered Park and Garden, Essendon and Essendon public footpath 11 and 12, if the redevelopment and construction work at the North Side (Wheat Quarter) 2021 and Biopark (Broadwater Gardens) were ongoing at the same time as the Proposed Development, there would be the potential for these construction activities to combine and increase their visual influence on a very small proportion of the receptors long distance view, resulting in a **neutral to negligible adverse** cumulative effect should developments be constructed at the same time.

11.455 The completion of the North Side (Wheat Quarter) 2021 proposals and the Biopark (Broadwater Gardens) in combination with the Proposed Development and the extant consented South Side perimeter blocks would introduce additional residential built form to a very small proportion of a long distance view, set between layers of wooded vegetation in the distance as a wooded backdrop along the horizon.

11.456 The cumulative schemes and the Proposed Development would be seen in the context of existing tall built form within Welwyn Garden City. The Biopark (Broadwater Gardens) proposals would replace current views of the large Biopark building, which is painted white and currently contrasts with the wooded horizon. This would be an improvement to the long distance view. The proposed architectural detailing and design quality will be secured for Phase Two by detailed planning drawings and elevations and for Phase Three (Outline) via a Design Code which ensure that the proposals integrate subtly within the existing context of Welwyn Garden City and that the proposed increase in height does not dominate the skyline.

11.457 This would result in a **very low** cumulative impact with a **negligible effect.**

11.458 It is therefore considered that the cumulative schemes will have no significant cumulative adverse effects on townscape character associated with the Proposed Development upon completion. There would be a beneficial cumulative effect on visual receptors at Welwyn Garden City railway station and transient receptors on Bridge Road (**viewpoints 1 and 6)** as the visual change of the North Side (Wheat Quarter) proposed development 2021 and Biopark (Broadwater Gardens) in combination with the Proposed Development and the extant consented South Side would result in an obvious aesthetic improvement to a large proportion of their near distance view, due to the improvement to the receptors townscape view.

Inter-Relationship Effects

11.459 There are inter-relationships with Chapter 15: Heritage, as identified in the chapter. No other inter-relationships with other topics are identified.

ENHANCEMENT, MITIGATION AND RESIDUAL EFFECTS

Construction

11.460 Site hoarding would be erected around the Site during construction. The Arboricultural Implications Assessment that accompanies this application sets out the measures that would be undertaken to protect the retained trees on-site from damage during construction, in accordance with BS5837:2012. These could be secured through an appropriately worded planning condition. However, the likely residual effects of the Proposed Development during construction remain as detailed earlier in this Chapter.

Completed Development

11.461 The likely effects of the Proposed Development have been considered and adjusted throughout the design process, through design evolution, as part of an iterative process to reduce the potential for significant adverse effects and maximise beneficial enhancements. The principles of the architectural and landscape layout, height, extent and massing, along with the detailed aspects of the Proposed Development have also been considered during the design process and therefore no further mitigation is considered necessary. The likely residual effects of the Proposed Development, once completed, therefore, remain as detailed earlier in this Chapter.

SUMMARY

11.462 The Site is located on the eastern edge of Welwyn Garden City town centre, separated by the East Coast Mainline railway. The Site is located within the industrial zone of Welwyn Garden City on the grounds of the former Shredded Wheat factory. The adjacent North Side site contains Grade II Listed buildings of the former Shredded Wheat factory, of which the silos and production hall form a visual landmark and contribute to the surrounding townscape character, provide a sense of place and form some of the oldest industrial development within Welwyn Garden City.

11.463 Full planning permission to redevelop the former Shredded Wheat Factory (North and South Sides) to accommodate up to 1,340 homes in a mix of tenures and a range of non-residential uses (ref: 6/2018/0171/MAJ) was granted in February 2019 and remains extant ('Extant Planning Permission'). This planning permission is being implemented following the start of works for Phase One (South Side). The wider site also benefits from a previous outline planning permission for a mixed use development (N6/2015/0294/PP) which was granted on 18th August 2017, together with an associated Listed Building Consent (N6/2015/0293/LB) and planning permission for footbridge improvements (6/2016/0457/FULL).

11.464 Due to the decline in industry and manufacturing over the last century the Site has fallen into disrepair and dereliction, affecting the quality of the Site and immediate townscape setting. All but the 1920s parts of the former shredded wheat factory buildings have been demolished under the extant consent, with restoration and re-purposing works to the retained 1920s listed buildings requiring completion (North Side).

11.465 The majority of views into the Site are from roads, railway station and pedestrian routes adjacent to, or in very close proximity to the Site. Opportunities for views of the Site from a distance of greater than a few hundred metres are limited to the tops of the silos on the North Side, as for the most part the Site is visually screened by layers of existing intervening built form and vegetation. Long distance views, through intervening vegetation towards the tops of the silos and chimney, are currently experienced by receptors visiting Hatfield House and Gardens (a Registered Historic Park and Garden and Grade I listed building).

11.466 During construction, there would inevitably be a visual intrusion to the local townscape and views from locations close to the Site as a result primarily of large construction plant and machinery, including tower cranes, and the presence of partially completed built form of the Proposed Development (as is the case for implementation of the extant consent). However,

this situation is unavoidable for the redevelopment of the Site and would only be temporary in nature.

11.467 A small proportion of existing trees and vegetation would be removed during construction but this would also be offset by the significant amount of landscaping incorporated as part of the Proposed Development. Once new planting has established, the landscape proposals would increase the vegetation coverage, diversity and amenity value within the Site.

11.468 The design of the Proposed Development is based on extensive consultation with Welwyn Hatfield Borough Council, Historic England and many other statutory and non-statutory stakeholders as part of the extant consented scheme and subsequent consultation as part of this current application. This extensive consultation has informed a sensitive and considered architectural design response for the Proposed Development that integrates sympathetically within the surrounding context, whilst maximising the height and capacity of the development.

11.469 The Proposed Development would regenerate a parcel of former industrial, brownfield, derelict land of low townscape quality that contains valued Grade II Listed buildings. The Proposed Development would introduce new high quality built form and enhance the sense of place.

11.470 The Proposed Development would introduce play provision, new public realm, green open space and highway improvements. These result in the integration of the Proposed Development in the wider setting of Welwyn Garden City.

11.471 The design of the Proposed Development in its wider context was assessed using 27 different viewpoints, which were selected in consultation with Welwyn Hatfield Borough Council and Historic England as part of the application process for the extant consented scheme and additional consultations as part of the current application.

11.472 For pedestrians in the immediate area of the Site, on Broadwater Road and on the Network Rail footbridge into the Site, the Proposed Development would positively enhance the visual quality, experience and approach creating a welcoming, safe and visually inviting townscape. People using Welwyn Garden City railway station would also experience an improvement to their views towards the Site.

11.473 For users of the Peartree Heritage Trail in close proximity to the Site the Proposed Development would result in the reduction of their sequential view of the 1920s Listed Buildings

within the North Side as they travel along the trail (as is the case for the extant consented scheme). However, framed views of the retained 1920s Listed Buildings would be opened up at key points through deliberate breaks in the proposed apartment blocks and stepping of built form.

11.474 From the near distance there would be partial to glimpsed views of the upper storeys of the additional built form of the Proposed Development but generally these would not result in a significant change to these views. Similarly, visitors and tourists to Hatfield House with long distance views towards the Site would experience nominal views of the Proposed Development, seen in the context of the extant consent being implemented on the North Side and Phase One on the South Side, resulting in a reduction in the visible extent of the silos following recent demolition of the 1930s section and partial screening of the retained silos by the Proposed Development. Careful attention has been paid to prevent the Proposed Development from breaking the skyline in key views from Hatfield House or its approach. Overall, this would not be a significant change to the view of Welwyn Garden City from this location.

Table 11.6: Townscape and Visual Effects Summary Table

Potential Effect	Nature of Effect (Permanent or Temporary)	Significance	Mitigation/ Enhancement Measures	Residual Effects
Views of construction activities influencing townscape character and visual amenity, predominantly affecting LCTA and people in close proximity to the Site.	Temporary	Negligible Adverse to Minor Adverse for most receptors. Minor Adverse to Moderate / Substantial Adverse for the closest receptors to the Proposed Development	Protect vegetation to be retained in accordance with BS5837:2012. Manage lighting.	Negligible Adverse to Minor Adverse for most receptors. Minor Adverse to Moderate Adverse for the closest receptors to the Proposed Development
Views of the Proposed Development on completion	Permanent	Neutral to Moderate Beneficial for most receptors adjacent and/or close proximity to the Proposed Development Negligible to Minor Adverse for views from The Campus and Parkway. Negligible to Minor Adverse for directly adjacent residential receptors to south. Negligible Adverse for views from Hatfield House and Registered Park and Garden.	None	No Change

REFERENCES

Ref 11.1 National Planning Policy Framework. 2019.

Ref 11.2 Welwyn Hatfield District Plan. 2005.

Ref 11.3 Broadwater Road West, Supplementary Planning Document. 2008. Welwyn Hatfield Borough Council.

Ref 11.4 Welwyn Garden City Conservation Area Appraisal. 2007. Welwyn Hatfield Borough Council.

Ref 11.5 Peartree Conservation Area Character Appraisal and Management Plan. 2019. Welwyn Hatfield Borough Council

Ref 11.6 Draft Local Plan Proposed Submission. 2016. Welwyn Hatfield Borough Council

Ref 11.7 Guidelines for Landscape and Visual Impact Assessment, Third Edition. 2013. Landscape Institute and the Institute of Environmental Management & Assessment.

Ref 11.8 Guidelines for Landscape and Visual Impact Assessment, Third Edition. 2013. Statement of Clarification 1/13. Landscape Institute.

Ref 11.9 Landscape Institute Technical Advice Note, Visual Representation of Development Proposals, Technical Guidance Note 06/19. 2019. Landscape Institute.

Ref 11.10 British Standard 5837: 2012: Trees in relation to design, demolition and construction. Recommendations.

Ref 11.11 Landscape Character Assessment. 2014. Natural England

12 ECOLOGY AND NATURE CONSERVATION

INTRODUCTION

12.1 This chapter presents an assessment of the likely significant effects of the Proposed Development on ecology resources at the Site.

12.2 A description of the methods used for the assessment and a description of the relevant baseline conditions of the Site is provided. An assessment of the likely significant effects of the Proposed Development during the demolition and construction works and once the Proposed Development is completed and operational is then presented.

ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

Assessment Methodology

12.3 The ecological assessment was undertaken in accordance with the 'Guidelines for Ecological Impact Assessment in the United Kingdom (Ref. 12.1) published by the Chartered Institute of Ecology and Environmental Management (CIEEM) (hereafter referred to as the CIEEM Guidelines). The guidelines present an approach to valuing features that includes professional judgement based on current best practice, available guidance and information together with advice from other experts.

12.4 A suite of ecological assessment have been undertaken at the Site over an extended period. The most recent assessment was undertaken in December 2020. The findings of the Ecological Assessment Reports have been used to inform the assessment of the likely significant effects of the Proposed Development presented within this chapter. The supporting reports include:

- an Ecological Assessment Report prepared by Bradley Murphy Design Limited (BMD) undertaken 2020 (Ref 12.4), presented in **Appendix 12.1**:
- an Ecological Verification Report prepared by Bradley Murphy Design Limited (BMD) undertaken 2017 (Ref 12.3), presented in **Appendix 12.2**; and
- an Ecological Assessment Report prepared by Bradley Murphy Design Limited (BMD) in February 2015 (Ref. 12.2), presented in **Appendix 12.3**.

Evaluation of the Ecological Value of the Site

12.5 The CIEEM Guidelines recommend that the values of ecological resources or features are defined within a geographical context with the following frames of reference recommended:

- international and European;
- national;
- regional;
- local authority-wide area (e.g. county, district); and
- local.

12.6 Consideration of impacts at all scales was undertaken and ecological features were assessed as 'of ecological value' within the above frames of reference. Any features deemed to be of lower than local value were assigned a value of 'Site only' or, if minimal / very limited ecological value: 'negligible' value. The determination of value for each ecological feature was assessed with reference to the CIEEM guidance as detailed below.

Designated Sites

12.7 Certain sites are assigned a geographic frame of reference through designations such as:

- internationally important sites such as Special Areas of Conservation (SACs), Special Protection Areas (SPAs) and Ramsar Sites;
- nationally important sites such as SSSIs and National Nature Reserves (NNRs); and
- regional / county designated sites such as Local Nature Reserves (LNRs) and non-statutory designated sites.

12.8 Where a specific site has multiple designations, it is the designation of highest value that is considered with regard to the assessment.

Habitats

12.9 Habitat evaluation was measured against known criteria where available, e.g. The Hedgerows Regulations 1997. However, the majority of habitats and features were assessed on an individual basis against factors such as extent, species composition, biodiversity,

naturalness, age, rarity and quality. The necessary effort / time required to restore habitats or features in question was also an important consideration, for example in the case of mature trees and woodlands.

12.10 Where appropriate, potential habitat value contributed to the valuation of habitats, for example: if an important habitat type was currently in a degraded condition. Special regard was given to 'Priority Habitats' which are listed as priorities for conservation in accordance with Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006 and habitats included within local Biodiversity Action Plans.

Species

12.11 Species value assessment was based on distribution, status, historical trends, rarity, and population sizes. Rarity may apply across a specific geographic frame of reference and particular regard was given to species for which the population in question represented a large proportion of the total within a wide geographical context. Special consideration was also given to UK Priority Species (listed in accordance with Section 41 of the NERC Act 2006) and species included within local Biodiversity Action Plans.

12.12 All species are evaluated on the same basis, regardless of statutory protection. It should be noted that even when a species is protected under EU and UK law e.g. great crested newt, the presence of a small population on a site within a region where the species is widespread is unlikely to be assessed at a value greater than district level importance

Other Considerations

12.13 Some habitats, features, or species of otherwise intrinsically negligible biodiversity value may perform an ecologically important function nonetheless. For example, habitats acting as buffers to more valuable areas and linear features functioning as navigation aids to the migration and dispersal of valuable species.

Identification and Assessment of Impacts

12.14 The CIEEM guidelines state that the assessment of impacts should be undertaken in relation to the collated baseline conditions within the zone of influence that they are anticipated to occur. As recommended good practice by the CIEEM guidelines, impacts (direct results of the Proposed Development, e.g. habitat loss) and effects (results of impacts, e.g. less nesting

opportunities for birds as a result of habitat loss) were assessed both with and without mitigation measures. The identification and assessment of impacts included potential impacts on each ecological feature determined as important (i.e. of greater than negligible ecological value). Potential impacts were considered from all phases of the Proposed Development: demolition / site clearance, construction and operation. Direct, indirect, secondary and cumulative impacts were considered against whether or not impacts and their effects are permanent, temporary, reversible, irreversible, beneficial or adverse.

Determining Significance

12.15 Significant impacts / effects were determined, in accordance with the CIEEM (2018) guidelines, which states that significant effects *encompass impacts on structure and function of defined sites and ecosystems"*. Impacts / effects can therefore be considered significant at varying geographical scales of relevance. For example, a loss of one tree may not be significant at the national level, but could be considered significant at a local level in view of local policies for no net loss of trees.

12.16 It also should be noted that a significant effect for an ecological feature may not necessarily coincide with the geographical context at which that feature is valued; for example, an effect on a species of national importance, such as the loss of breeding habitat for one pair of house sparrow, may not be of national significance.

12.17 Significant impacts and effects were assessed in the context of the predicted baseline conditions within the relevant zones of influence during the lifetime of the Proposed Development.

12.18 The nature of the identified impacts on each assessed feature is characterised. This is considered, along with available research, judgement about the sensitivity of the feature affected, and professional judgement about how the impact is likely to affect the designated site, habitat, or species conservation status. Where it is concluded that an effect would be likely to reduce the viability or integrity of an assessed feature, it is described as significant. The degree of significance of the effect takes into account the geographic context of the feature's importance and the degree to which its interest is judged to be affected.

12.19 After the specification of additional mitigation, the residual effects are then assessed for their significance in the context of national and local planning policy and guidance. Significant effects are defined in the CIEEM guidance as follows: "*A significant effect is an effect that is*

sufficiently important to require assessment and reporting so that the decision maker is adequately informed of the environmental consequences of permitting a project. A significant effect is a positive or negative ecological effect that should be given weight in judging whether to authorise a project."

12.20 The guidance further states *that "a significant effect does not necessarily equate to an effect so severe that consent for the project should be refused planning permission. For example, many projects with significant negative ecological effects have been lawfully permitted following EIA procedures."*

Summary

12.21 In summary, potential impacts and effects were assessed for all important ecological features with reference to the following characteristics on a case-by-case basis:

- significance;
- adverse, beneficial or neutral;
- extent;
- magnitude;
- duration;
- timing;
- frequency; and
- reversibility.

Assumptions and Limitations

12.22 Internal access was not gained for all of the temporary construction compound in 2020 (to inform the 2020 report: Ref. 12.4). Nonetheless, the majority of the buildings could be adequately inspected, such that this element of the bat survey work is considered sufficiently robust.

12.23 Any limitations with regard to the ecological field work have been identified in the relevant supporting baseline reports. While some limitations were identified, none were considered to be significant to such a level that it may affect the interpretation of results and appropriate assessment of the anticipated impacts. The baseline data has largely been gathered by BMD and as such the assessment is based on the data collated which is considered to be robust and undertaken at the appropriate time of year.

12.24 The historical data and updated surveys undertaken to inform this assessment have covered the entire Site and have also considered adjacent land, where possible. Where full access to adjacent habitats has not been feasible then assumptions have been made with regard to their ecological character and importance based on other information available such as use of up to date aerial imagery.

Scope of the Assessment

12.25 Ecological input has been provided into the Environmental Impact Assessment Scoping Report (Ref. 12.5) which was presented to the LPA for scoping opinion. A summary of the ecological input to this Scoping Report is provided below.

12.26 No statutory or non-statutory sites of nature conservation importance are contained within the Site. All such sites within the surrounding area are removed from the Site and sufficiently separated by existing urban development so as to preclude significant direct or indirect impacts from the Proposed Development.

12.27 The Site is dominated by habitats of typically negligible inherent ecological value such as buildings, bare ground and hardstanding. However, a number of semi-mature trees and a mosaic of habitats such as ephemeral / short-perennial and scrub are present, which are considered to be of up to limited local value.

12.28 In terms of fauna, the Site is of generally limited value; nonetheless a single pair of peregrine falcon *Falco peregrinus* has been recorded nesting adjacent to the Site in spring 2014 (not re-recorded in 2017, however recorded breeding in 2020 on the retained silo feature to the north of the Site). Additionally, limited suitability for roosting bats is present within a small number of trees within the Site. A small population of slow-worm *Anguis fragilis* were translocated in 2014 from an adjacent site and habitats within the Site are suitable for nesting birds and mammals such as hedgehog *Erinaceus europaeus* and fox *Vulpes vulpes*.

12.29 Consequently, the following ecological features will be addressed within this section, with all other ecological features having been scoped out:

- long-term change in habitat value at the Site once the Proposed Development is completed and operational;
- roosting bats;
- peregrine falcon;

- other nesting birds;
- other mammals;
- slow-worms; and
- non-native invasive plants.

Zone of Influence

12.30 Zones of influence are designed to aid in the assessment of impacts. For the Site, and in line with CIEEM Guidelines, the zones of influence have been determined on a case-by case basis for each ecological feature included within the ecological assessments. Zones of influence and their justifications are outlined in Table 12.1.

Table 12.1 – Zones of Influence

Ecological Feature	Zone of Influence	Justification
Habitats	Site boundary	The habitats within the Site are largely of negligible ecological value with discrete habitats / features being of value at the Site and of limited value at the local level.
Roosting Bats	3 km	The core sustenance zone for UK bats (averaged across all UK species) is 3 km (Ref. 12.6). This is also the core sustenance zone for the bat species which is most likely to utilise roosting features within the Application Site: common pipistrelle *Pipistrellus pipistrellus*.
Peregrine Falcon	4.1 km with a core sensitive zone of 1 km	The Nearest Neighbour Distance (NND), which can be approximated as breeding territory size, of nesting peregrine falcons in England is estimated to be between 3.6 – 4.1 km in various habitats types (Ref. 12.7). Most territories are at least 1 km apart, even in high density areas (Ref. 12.8). Peregrines tend to keep their territory each year and offspring will often inherit territories (Ref. 12.9).
Other Nesting Birds	Site boundary	The Application Site is not known or likely to support any notable assemblages of nesting birds (with the exception of peregrine falcon).
Hedgehog	150 m	Hedgehog is a UK Priority Species which is susceptible to habitat fragmentation and shows a tendency to remain within a consistent home range of up to 32 ha (Ref. 12.10) at relatively high densities within urban areas of approximately 36.5 ha^{-1} (Ref. 12.11). A 32 ha area is more than sufficiently covered by considering the hedgehog zone of influence as a 150 m radius around the Site.

Other Mammals	Site boundary	Other mammals for which the Site presents opportunities include common, wide-ranging species such as fox and small rodents. These are of negligible ecological value and readily exist within and disperse throughout urban landscapes.
Slow-worm	Suitable habitat within the site and 267 m beyond	Slow-worm do not form territories and populations sizes / distribution is driven by available resources. Therefore, the zone of influence has been determined based on professional judgement pertaining to the species taking account of estimated dispersal distances. Research (e.g. Ref. 12.12; Ref. 12.13) has shown slow-worms to disperse up to 267 m within a year and have home ranges of up to 1000 m^2.
Invasive Plants	Site boundary	Invasive plants within the Site do not lie adjacent to the Site boundaries. As such, it is highly unlikely that they would colonise beyond the Site boundary in the near future without human interference. Nonetheless, extant permissions within the Application Site involve the use of machinery which has potential to spread vegetative fragments and thus potentially aid in dispersal throughout the Site. Consequently, the zone of influence for invasive species is considered to be the Site boundary.

LEGISLATION, PLANNING POLICY AND GUIDANCE

Legislation

The Conservation of Habitats and Species regulations 2017 (as amended)

12.31 This legislation is one of the pieces of domestic law that transposes the land and marine aspects of Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (EC Habitats Directive) and certain elements of the Wild Birds Directive (2009/147/EC) into national law in respect of England and Wales. The Regulations provide for the designation and protection of a National Sites Network (NSN), the protection of priority species (formerly known as 'European protected species'), and the adaptation of planning and other controls for the protection of sites within the NSN. Under the Regulations, competent authorities i.e. any Minister, Government department, public body, or person holding public office, have a general duty, in the exercise of any of their functions, to have regard to this legislation.

Wildlife and Countryside Act 1981 (as amended)

12.32 This is the primary legislation in the UK which protects animals, plants and certain habitats. It has numerous parts and supplementary lists and schedules, many of which have been amended since publication. As well as affording protection to certain species and habitats, the Wildlife and Countryside Act 1981 (as amended) also prohibits the release or allowed escape of non-native or invasive species of animal (listed in Part I of Schedule 9 of the Act). The planting or induced spread in the wild of invasive plant species (listed in Part II of Schedule 9 of the Act) is also prohibited under the Wildlife and Countryside Act 1981 (as amended).

The Natural Environment and Rural Communities Act (2006)

12.33 Section 40 of this Act places a duty to conserve biodiversity on public authorities to have regard to conserving biodiversity when carrying out their normal functions (including making planning decisions) with particular regard to the Convention on Biological Diversity (CBD) 1992. This includes restoring or enhancing habitats and populations. Under this Act, the local planning authority can seek to minimise impacts on biodiversity and provide net gains.

12.34 Section 41 of the Act details the requirements of identifying habitats and species of principal importance. The Priority Habitats and Priority Species (over 900 species) listed in accordance with Section 41 are derived from the species and habitats initially listed in the UK

Biodiversity Action Plan (BAP) in response to the UK government signing the 1992 Convention on Biological Diversity (CBD) in Rio de Janeiro. The lists were subsequently revised in 2007. In 2012 the UK BAP was succeeded by the 'UK Post-2010 Biodiversity Framework' in response to the CBDs 'Strategic Plan for Biodiversity 2011-2020' (2010) and the launch of the 'EU Biodiversity Strategy, (EUBS)' (2011).

12.35 Priority Habitats and Priority Species are those considered to be of principal importance for the purpose of conserving biodiversity. Steps must be taken (and promoted to others) that are reasonably practicable to further the conservation of the listed species and habitats. A number of species included on the list have greater protection under other legislation such as that Wildlife and Countryside Act 1981 (as amended). Other species, such as the hedgehog *Erinaceus europaeus* and common toad *Bufo bufo*, do not have this extra level of protection. Therefore, these species are a material consideration during planning applications but not legally protected in the same way as those listed in other legislatives, such as the Wildlife and Countryside Act 1981 (as amended) or European legislation.

The Countryside and Rights of Way Act (2000)

12.36 This Act provides for public access on foot to certain types of land, amends the law relating to public rights of way, increases measures for the management and protection of Sites of Special Scientific Interest (SSSIs), strengthens wildlife enforcement legislation and provides for management of Areas of Outstanding Natural Beauty (AONB).

The Protection of Badgers Act (1992)

12.37 This legislation protects badgers *Meles meles* and their setts and makes it illegal to kill, injure or take badgers or to interfere with a badger sett.

The Wild Mammals (Protection) Act (1996)

12.38 This Act makes provision for the protection of wild mammals from certain cruel acts and unnecessary suffering.

National Policy

12.39 The National Planning Policy Framework (NPPF) 2019 sets out the Government's planning policies for England and how these are expected to be applied. At the heart of the

NPPF is the presumption in favour of sustainable development; all developments that accord with the development plan should be approved without delay.

12.40 Circular 06/2005 provides further guidance in respect of statutory obligations for biodiversity and geological conservation and their impact within the planning system.

12.41 Relevant sections of the NPPF which relate to ecology include:

> "*170. Planning policies and decisions should contribute to and enhance the natural and local environment by;*
>
> *a) protecting and enhancing valued landscapes, sites of biodiversity or geological value and soils (in a manner commensurate with their statutory status or identified quality in the development plan);*
>
> *b) recognising the intrinsic character and beauty of the countryside, and the wider benefits from natural capital and ecosystem services – including the economic and other benefits of the best and most versatile agricultural land, and of trees and woodland;*
>
> *c) maintaining the character of the undeveloped coast, while improving public access to it where appropriate;*
>
> *d) minimising impacts on and providing net gains for biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures;*
>
> *e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans; and*
>
> *f) remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate.*

175. When determining planning applications, local planning authorities should apply the following principles:

a) if significant harm to biodiversity resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused;

b) development on land within or outside a Site of Special Scientific Interest, and which is likely to have an adverse effect on it (either individually or in combination with other developments), should not normally be permitted.

The only exception is where the benefits of the development in the location proposed clearly outweigh both its likely impact on the features of the site that make it of special scientific interest, and any broader impacts on the national network of Sites of Special Scientific Interest;

c) development resulting in the loss or deterioration of irreplaceable habitats (such as ancient woodland and ancient or veteran trees) should be refused, unless there are wholly exceptional reasons and a suitable compensation strategy exists; and

d) development whose primary objective is to conserve or enhance biodiversity should be supported; while opportunities to incorporate biodiversity improvements in and around developments should be encouraged, especially where this can secure measurable net gains for biodiversity."

12.42 The above approach encapsulates the 'mitigation hierarchy' described in British Standard 42020:2013 (Ref. 12.14), which involves the following step-wise process:

- **Avoidance** – avoiding adverse effects through good design;
- **Mitigation** – where is it unavoidable, mitigation measures should be employed to minimise adverse effects;
- **Compensation** – where residual effects remain after mitigation it may be necessary to provide compensation to offset any harm; and
- **Enhancement** – planning decisions often present the opportunity to deliver benefits for biodiversity, which can also be explored alongside the above measures to resolve potential adverse effects.

12.43 The measures for avoidance, mitigation, compensation and enhancement should be proportionate to the predicted degree of risk to biodiversity and to the nature and scale of the proposed development (Ref. 12.14).

Local Policy

Welwyn Hatfield District Plan (2005)

12.44 The Welwyn Hatfield District Plan was adopted in 2005. A number of policies contained within it have been 'saved' until it is replaced by a Local Development Framework. Of these saved policies, a number are of relevance to ecological considerations of the Proposed Development, these are outlined below.

12.45 **R1 – Maximising the Use of Previously Developed Land**. Saved Policy R1 reads: *"in order to make the best use of land in the district, the council will require development to take place on land which has previously been used for developed"*.

12.46 **R11 - Biodiversity and Development**. Saved Policy R11 reads: *"All new development will be required to demonstrate how it would contribute positively to the biodiversity of the site by;*

i) the retention and enhancement of the natural features of the site;
ii) the promotion of natural areas and wildlife corridors where appropriate as part of the design;
iii) the translocation of habitats where necessary, where it can be demonstrated that the habitat or species concerned cannot be successfully accommodated within the development;
iv) the use of local native species in planting in accordance with Policy D8 Landscaping;
v) helping meet priorities / targets set out in the Local Biodiversity Action Plan".

12.47 **R17 – Trees, Woodlands and Hedgerows**. Saved Policy R17 reads: *"The council will seek the protection and retention of existing trees, hedgerows and woodland by the use of planning conditions, section 106 agreements, hedgerow retention notices and tree preservation orders where applicable. New development will be required to incorporate wherever appropriate new planting with locally native species and should be in accordance with Policy D8 Landscaping."*

12.48 **R20 – Light Pollution** Saved Policy R20 reads: *"In order to minimise light pollution, external lighting scheme proposals, including floodlighting, will only be approved where it can be demonstrated that all of the following criteria can be satisfied:*

vi) the scheme proposed is the minimum needed for security and operational purposes or to enhance the external appearance of the building to be illuminated;
vii) glare and light spillage are minimised;
viii) the amenity of residential areas is not adversely affected;
ix) the visual character of historic buildings and conservation areas are not adversely affected;
x) there would be no adverse impact on the character or openness of the countryside and green belt;
xi) there would be no adverse effects on ecology and the natural environment including wildlife; and
xii) There would be no dazzling or distraction of drivers using nearby roads."

12.49 **PD8 – Landscaping**. Saved Policy D8 is of primary relevance to landscaping but is also of some relevance to ecology with regards to the following: *"The retention and enhancement of existing key landscape features such as trees and shrubs, ponds and watercourses will be expected where feasible; where this is not possible, replacement planting should be carried out."*

12.50 Other biodiversity-focused policies pertain to designated sites of nature conservation importance and as such are not relevant to the current application (see Sections 11.22 and 11.25).

Welwyn Hatfield Draft Local Plan (2017)

12.51 The Welwyn Hatfield Local Plan will *"shape the future of development"* in the towns and villages of Welwyn Hatfield District up to 2032. The plan was submitted for examination on the 15th May 2017. A number of policies within the submitted plan are of relevance to ecological considerations for Ecological Impact Assessment of the Proposed Development, these are outlined below.

12.52 **SP1 – Delivering Sustainable Development**. This over-arching policy contains a number of principles of sustainable development, of which the following is of relevance to

ecology: *"…the provision of green infrastructure and sustainable drainage systems (SUDs)* [are incorporated into the design and construction of new development]*"*.

12.53 **SP11 – Protection and Enhancement of Critical Environmental Assets**. This policy sets out the strategic approach to protecting and enhancing critical environmental assets within the borough through the planning process. SP11 promotes *"development that would secure positive improvements to and ensure the long-term conservation of ecological and heritage assets"*. The policy then outlines a similar hierarchical system to that of BS42020:2013 (Ref. 12.14) of limiting adverse ecological impacts of development proposals: *Avoid*, *Reduce*, *Remediate*, *Compensate*.

12.54 **SP12 – Green Infrastructure**. This policy encourages the creation of high quality, multi-functional green space within development proposals; ensuring beneficial results for biodiversity is one of the positive aims of such green space.

12.55 **SADM16 – Ecology and Landscape**. SADM16 reads: *"proposals will be expected to maintain, protect and wherever possible enhance biodiversity, the structure and function of ecological networks and the status of water bodies"… "[proposals that would result in the loss of]…habitats, species and ecological assets of local importance…will be refused unless the mitigation hierarchy has been fully implemented to avoid, reduce and remediate and compensate direct and indirect adverse impacts".*

12.56 **SP17 - SDS3 and SDS4: Broadwater Road West**. SP17 relates to mixed use developments at Broadwater Road West which include the land contained within the Site. SP17 states that the development within this land will incorporate open space in accordance with the Broadwater Road West Supplementary Planning Document. The Policy gives no specific detail for green space provision but does provide rough spatial locations, including a weaving section bisecting the southern half of the site.

<u>Broadwater Road West Supplementary Planning Document (2008)</u>

12.57 The Supplementary Planning Documents (SPDs) are a suite of planning guidance produced by Welwyn Hatfield Council to support and expand upon policies contained within the adopted District Plan. The Broadwater Road West SPD was adopted in December 2008, contains the parcel of land that the Site comprises and outlines a number of factors with key relevance to ecology. The SPD outlines the council's vision for the land which includes the vision *"to enhance biodiversity"*, it further notes that the north-western portion of the Site

comprises largely undisturbed habitat which is unusual for a town centre. The SPD also recommends that landscaping incorporates native trees species and that multi-functional green space could incorporate sustainable drainage methods which will benefit biodiversity.

Hertfordshire Biodiversity Action Plan (BAP) (2006)

12.58 Produced in 1998 and updated and relaunched in 2006, the Hertfordshire Biodiversity Action Plan (BAP) sets out a 50 year vision for the wildlife and natural habitats of Hertfordshire.

12.59 Of the Hertfordshire Local BAP Habitats listed within the plan, only one (Urban) is considered present within the Site. The Habitat Action Plan (HAP) for urban habitats is detailed below.

12.60 **Urban Habitats – Objective 2, Action UR/A/2.7**: increasing the biodiversity of urban greenspaces and promoting biodiversity gain in all appropriate developments. To be achieved through the planning process, seeking to integrate biodiversity or green gain (e.g. through green roofs, green walls, appropriate landscaping, nest boxes and roost boxes) within proposals.

12.61 The adjacent site to the north has supported the Local BAP species slow-worm in the past and has the potential to support a number of Local BAP species, including: pipistrelle *Pipistrellus* sp., hedgehog and a number of bird species. A number of Local BAP species have specific Species Action Plans (SAPs); however, none of the species known to be present within the Site have a detailed SAP within the Hertfordshire BAP. Ecological enhancements in respect of stag beetle *Lucanus cervus* (Local BAP species) are included within the Proposed Development. The SAP for stag beetle is detailed below.

12.62 **Stag Beetle – Objective 22.6.2/SB4**: *"seek to maintain and enhance conditions [for stag beetle Lucanus cervus] through positive management, including the retention of dead wood"*.

BASELINE CONDITIONS

Habitats

12.63 A detailed description of the habitats present at the Site is presented within the Ecological Assessment Report at **Appendix 12.1**. Table 12.2 presents a summary of these habitat types identified, with locations of habitats shown in the Ecological Assessment Report (**Appendix 12.1**).

Table 12.2 – Summary of Ecological Value of Habitat Types on the Site.

Habitat	Summary Description	Habitat Value
Buildings	There are two main building structures at the Application Site. A substation and temporary construction compound.	Negligible
Hardstanding	Sporadic in areas of the Site and also present when associated with the temporary construction compound. Largely devoid of vegetation except for limited colonising scrub and tall ruderal species in cracks.	Negligible
Scattered and continuous scrub	Areas of dense scrub are present to the east and north of the Site and scattered scrub is present in the northeast corner of the Application Site with bramble scrub encroachment around the eastern boundary. Scattered scrub also forms the understory of the area of trees in the east of the Application Site.	Negligible-
Bare ground with scattered ephemeral/ short perennial	Large areas of bare re-colonising ground are present across the Application Site, which are largely situated at the centre of the Application Site. A large area in the west of the Site is bare ground however in the east of the Site there is bare ground with scattered ephemeral/ short perennial. These are confined to the northeast of the Site and have areas devoid of vegetation with smaller patches of colonising vegetation present. A number of small, linear strips of hard standing that been colonised by mosses are also present at the Application Site.	Negligible
Trees	Few trees are present within the Application Site comprising a mixture of immature (I) and semi-mature (SM) native and non-native species. No notable, over-mature / veteran tree species are present.	SM: Application Site I: Negligible
Miscellaneous habitats / features	Numerous piles of vegetation / earth / log / demolition/ rubbish/ rubble are present at the Application Site.	Negligible

Habitat	Summary Description	Habitat Value
Invasive plants	Variants of cotoneaster *Cotoneaster* sp. are present within the eastern and western portion of the Application Site in the areas of dense scrub.	Detrimental

Roosting Bats

12.64 No records of bats within the Site were identified during the data search and no evidence of roosting bats was recorded within any of the buildings present at the Site. The external building inspections indicated that these buildings provide **negligible** potential for roosting bats.

12.65 Previously, four trees on Site had been identified as having Bat Conservation Trust (BCT) 2012 category 1 / 2 (equivalent to 'moderate' in 2016 BCT guidelines) potential to support roosting bats. These trees were not re-surveyed in 2017 due to restricted access, however, the trees were still present and it was assumed that no significant changes took place to result in the need to reclassify these trees. A survey in 2020 allowed access to the Site in full and identified some changes to the classification based on current condition.

12.66 Six trees at the Site's western boundary have features with suitability to support roosting bats as described in Table 12.3 and shown in **Appendix 12.1**. However, no evidence of any use of the suitable bat roosting features associated with these trees was recorded. As such, all six trees are considered to provide no more than sub-optimal opportunities for roosting bats, i.e. suitable to support a single, or at best, a small number of bats in a roost of low ecological value over the summer months.

Table 12.3 – Trees Within the Site with Suitability for Roosting Bats.

Tree ID (Plan 3 of **Appendix 12.1**)	**Species**	**Age Class**	**Notes**	**BCT Category (Ref. 12.5)**
T1	European beech *Fagus sylvatica*	Semi-mature	Broken limb creating potential cavities/crevices, low potential. No signs of bats identified.	Low
T2	Cherry *Prunus*	Semi-mature	Ivy covered trunks/branches and small broken limbs, low potential.	Low

Tree ID (Plan 3 of **Appendix 12.1**)	Species	Age Class	Notes	BCT Category (Ref. 12.5)
	sp.		No signs of bats identified.	
T3	Poplar *Populus sp*	Semi-mature	woodpecker hole, low potential. No signs of bats identified.	Low
T4	Beech *Fagus sylvatica*	Semi-mature	broken limb and peeling bark leading to potential cavities/crevices. No signs of bats identified.	Low
T5	small leaved lime *Tilia cordata*	Semi - mature	Knot holes, low potential. No signs of bats identified.	Low
T6	Poplar *Populus* sp.	Semi – mature	Thick ivy cover on the trunk/branches, low potential. No signs of bats identified.	Low

12.67 None of the remaining trees present within the Site, or immediately adjacent to the Site support features with elevated suitability for roosting bats, and therefore are considered to be of **negligible suitability** for roosting bats.

12.68 Overall, the Site is considered to be of value at the **Site level** with regard to bats.

Peregrine Falcon

12.69 A peregrine pair have successfully breed on the silo's, located to the north of the Site within the North Side of the former Shredded Wheat Factory site, in 2020. Historically, peregrine have successfully breed on the silo's as detailed in the 2015 report (Ref 12.2) with appropriate mitigation implemented to facilitate the demolition of nearby buildings. The temporary nesting

tower installed on the Site is no longer present with the replacement nest for that feature now installed on the retained Silo building to the north of the Site on the adjacent land.

12.70 As such, the Site is currently considered to be of value at the **Site level** with regard to peregrine falcons due to lack of nesting features and foraging habitat.

Other Birds

12.71 Scrub and trees are present within the Site and are considered to provide some opportunities to common species of nesting birds and all semi-natural habitats within the Site present foraging opportunities. Numerous similar nesting and foraging opportunities are abundant within the local area and no notable species were observed during the survey work undertaken at the Site with the exception of house sparrow *Passer domesticus* and starling *Sturnus vulgaris* which, although Red-listed and Priority Species, remain common within both a local and national context. Consequently, the Site is considered to be of no more than value at the **Site level** for other birds.

Other Mammals

12.72 No evidence of any protected, rare or notable mammal species was recorded within the Site. Common and widespread mammals such as fox and grey squirrel *Sciurus carolinensis* are known to utilise the Site; such species are of typically inherent negligible ecological value. Nonetheless, the Site has some suitably for hedgehog (UK priority species) and records exist within the vicinity of the Site for this species. Consequently, the Site is considered to be of value at the **Site level** for other mammals.

Slow-worm

12.73 Presence / likely absence surveys in 2014 identified a small population of slow-worm within the north-western portion of the adjacent site to the north of the Site. These were subsequently translocated to the adjacent railway cutting as a facilitative mitigation measure for the adjacent site.

12.74 There is limited connectivity between the Site and the railway cutting. The habitats within the Site are generally unsuitable for reptiles due to recent disturbances and isolation from core habitat areas. However there are limited areas of potential reptile habitat along the western boundary. Generally the size of the suitable habitat areas and more suitable habitat elsewhere

means it is considered that slow-worm are likely absent from the Site. Therefore the Site is considered to be of **negligible** value to slow-worm.

Invasive Plants

12.75 Cotoneaster variants are present at the Site. As invasive and non-native species listed on Schedule 9 Part I of the Wildlife and Countryside Act 1981 (as amended), these are considered to be **detrimental** to ecology at the **Site level**.

IDENTIFICATION AND EVALUATION OF KEY EFFECTS

Roosting Bats

12.76 The trees identified as having potential bat roosting features are proposed to be retained.

12.77 As the six trees identified as having potential roosting features are due to be retained there is no residual loss of potential bat roosting features.

12.78 However, in the absence of mitigation measures, the removal of vegetation in close proximity to potential roosting features could result in indirect impacts. Further still, overnight light spill from site lighting onto retained trees could disturb roosting bats in the event that they are present within these trees and potentially lead to roost site abandonment. As such, the likely effect of the loss of potential bat roosting opportunities during construction would be **adverse** and of **significance at the Site level**.

12.79 Consequently, mitigation and compensation methods are required, see Section 'Enhancement, Mitigation and Residual Effects' below.

Peregrine Falcons

12.80 Peregrine falcons are breeding on the retained silo to the north of the Site. The silo is located outside of the Site boundary and will be retained within the Proposed Development so the long-term viability of the nesting site will remain in the locality.

12.81 Nonetheless, construction phase works (comprising construction of new buildings) would take place in close proximity to the nesting area with regard to the northern extents of the Site. In the absence of mitigation measures, this could result in disturbance to nesting peregrine falcons should these works fall within the nesting season; this would also breach wildlife legislation. The potential effect of this impact would be nest abandonment for that year and potentially subsequent years which would be **adverse** and of **significance** at the **County level**.

12.82 Consequently, mitigation and compensation methods are required with regards to nesting peregrines, see Section 'Enhancement, Mitigation and Residual Effects' below.

Other Nesting Birds

12.83 The Site is not considered likely to support notable breeding assemblages of birds above the Site level context. Furthermore, the species of birds likely to be supported by the Site are well-adapted to urban environments and, therefore, resilient to disturbance from sources such as noise and light typically associated with urban environments. As such, any impacts from disturbance during site clearance or construction works would be **insignificant**. Some disturbance would be anticipated to result from construction and demolition works as these are not necessarily typical of urban environments that birds would be accustomed to; nonetheless, these impacts would still be of **low significance**.

12.84 Nonetheless, in the absence of mitigation measures, the clearance of vegetation would result in loss of nesting habitat for a number of common and widespread bird species. Should these works fall within the bird nesting season, this could also involve the destruction of active nests and the killing and injury of young birds and eggs; this would be in contravention of wildlife legislation. The effect of this impact would be a loss of nesting habitat and a temporary reduction in local population size of common and widespread bird species, potentially including Priority Species such as house sparrow and starling. Given the small size of the Site and the abundance of similar nesting opportunities within the surrounding area, it is unlikely that the Site supports a significantly notable population of nesting birds within the local context. Consequently, the effect of vegetation clearance would be **adverse** and of **significance at the Site level** only.

12.85 As such, mitigation and compensation methods are required with regards to nesting birds, see Section 'Enhancement, Mitigation and Residual Effects' below.

Other Mammals and Reptiles

12.86 In the absence of mitigation measures, clearance and construction works could result in killing and injury of small mammals that are unlikely to disperse quickly such as hedgehog. Additionally, the clearance of vegetation will comprise a loss of foraging and sheltering habitat for mammals or other species such and reptiles (considered to be low risk). The unnecessary killing of wild mammals and reptiles would represent a contravention of wildlife legislation. Given the small size of the Site and the typically high densities of hedgehog and fox within urban areas, as well as the largely unsuitable habitat for reptiles, it is unlikely that it supports a significantly notable population of wild fauna within a local context. Consequently, the effect of clearance works would be **adverse** and of **significance at the Site level** only.

12.87 As such, mitigation and compensation methods are required with regards to other mammals and a precautionary approach is required for reptiles, see Section 'Enhancement, Mitigation and Residual Effects' below.

Invasive Plants

12.88 In the absence of mitigation measures to prevent the spread of invasive plants such as cotoneaster variants, potential impacts with regard to invasive plants could comprise spread beyond the Site boundary via vehicular or human vectors. This would have an **adverse** effect of at least **local significance**.

12.89 As such, mitigation and compensation methods are required with regards to invasive plants, see Section 'Enhancement, Mitigation and Residual Effects' below.

ASSESSMENT OF CUMULATIVE EFFECTS

12.90 This section seeks to identify the cumulative effects of the Proposed Development in conjunction with other schemes in the locality.

12.91 All potential impacts and effects described above will be sufficiently mitigated and compensated for within the Site such as to have no net adverse impact on biodiversity or conservation objectives of individual species / groups (see Section 'Enhancement, Mitigation and Residual Effects' below). As such, no adverse cumulative effects are anticipated to be contributed to by the Proposed Development.

12.92 Committed developments in the vicinity of the Site, as detailed in Chapter 3: Environmental Impact Assessment Methodology have been considered with regards to potential cumulative in-combination effects.

12.93 There are two key cumulative developments within the immediate vicinity which are Former Shredded Wheat Factory Site – North Side and Former Shredded Wheat Factory Site – South Side (Phase 1).

Former Shredded Wheat Factory Site – North Side

12.94 Both the Extant Planning Permission and revised proposals for the North Side have been considered within the cumulative assessment.

12.95 The North Side site is situated immediately to the north of the Site. The cumulative effects are considered to be ecologically beneficial overall due to increased net gain biodiversity and as such they will not have an adverse ecological impact on the Site.

12.96 The North Side site development (relating to both extant and the revised proposals) is likely to result in impacts to nesting birds due to loss of habitats and disturbance to peregrine falcons recorded on the North Side site. As such, prior to mitigation these additional losses in combination with those of the Site would be considered long-term minor adverse overall. The North Side site proposals are appropriately mitigating for habitat losses through habitat retention and creation, as well as a mitigation strategy for peregrine falcons to ensure a long-term breeding site remains on the retained silo feature. As such overall effects would likely be minimised.

12.97 The effects on peregrine falcons have been negated by the provision of a mitigation strategy. As such overall effects on the peregrine falcons are considered to be minimised.

12.98 Any ecological constraints within the applications are considered to be self-contained within the sites. As such, with appropriate mitigation and enhancement implemented the in combination effects of the proposals on the North Side site and the Proposed Development would be considered to be **long-term beneficial overall.**

Former Shredded Wheat Factory Site – South Side Phase 1

12.99 The Extant Planning Permission for Phase 1 of the South Side site has been implemented, however, the works are only in the early stages of construction.

12.100 The South Side Phase 1 site is situated immediately to the south of the Site. The cumulative effects are considered to be ecologically beneficial due to biodiversity gains through new landscaped area and as such no adverse ecological impact on the Site is anticipated at this stage. Any ecological constraints within the applications are considered to be self-contained within the sites. As such, the in combination effects of the proposals on the South Side Phase 1 site with those of the Proposed Development would be considered to be **long-term beneficial** overall.

12.101 There are seven nearby applications relevant to this cumulative assessment which include:

- Rank Xerox Ltd, Bessemer Road, Welwyn Garden City, AL7 1HE;
- Pall Mall Distribution Site;
- Mercury House, 1 Broadwater Road, Welwyn Garden City, AL7 3BQ;
- Former Argos Direct Distribution Depot, 1 Bessemer Road, Welwyn Garden City, AL7 1HF;
- Land East of Bessemer Road;
- 51 Bridge Road East Welwyn Garden City AL7 1JR; and
- BioPark Broadwater Road Welwyn Garden City AL7 3AX.

Rank Xerox Ltd, Bessemer Road, Welwyn Garden City, AL7 1HE

12.102 The Rand Xerox site is located approximately 375 m north of the Proposed Development and is therefore considered distant from the Site. The scheme does not impact on the important ecological features identified in this assessment. As such, providing the ecological mitigation and compensation required for the Rank Xerox Ltd site is implemented in full, there is not considered to be any negative cumulative effects on the important ecological features identified at the Site. Furthermore the site is situated 375m north of Site and as such is considered to be sufficiently distant from the Site that in combination effects are unlikely. Consequently, it is considered that there will be no cumulative effects arising from this site in combination with the effects arising from the Proposed Development.

Pall Mall Distribution Site

12.103 The Pall Mall Distribution site is for a mixed use provision as part of the Broadwater Road West site. This site is adjacent to the western boundary of the Site. There appear to be no specific ecology details available for this scheme. As such, at this stage it is considered that there will be no cumulative effects arising from this site in combination with the effects arising from the Proposed Development

Mercury House, 1 Broadwater Road, Welwyn Garden City, AL7 3BQ

12.104 The Mercury House application is a change of use from B1(a) office to C3 residential, construction of roof and side extensions, creation of 43 residential apartments and cycle storage compound. The site includes a large office building, associated parking and hardstanding, very limited vegetation with the occasional bordering shrub. Most of the bordering vegetation appears to be outside the site boundary. A Preliminary Ecological Assessment or Phase 1

Habitat Survey was not necessary in this instance due to the lack of semi-natural vegetation on site.

12.105 No ecological constraints were identified other than a precautionary approach to roosting bat suitability. It is considered that all potential impacts and effects on potential bats will be sufficiently mitigated and compensated for within the site such as to have no net adverse impact on biodiversity or conservation objectives of individual species / groups. Furthermore, the Mercury House site is located approximately 150 m northeast of the Site. As such, no adverse cumulative effects are anticipated arising from the proposals on this site in combination with the effects of the Proposed Development. Consequently, it is considered that there will be no cumulative effects arising from this site in combination with the effects from the Proposed Development.

Former Argos Direct Distribution Depot, 1 Bessemer Road, Welwyn Garden City, AL7 1HF

12.106 This application is the erection of two industrial/distribution buildings comprising a mix of commercial uses: Unit 3 (sui generis builders merchant for the display, sale, storage of building, timber and plumbing supplies, plant and tool hire including outside display and storage); Unit 4 (Class A1 bulky goods retail warehouse) and Units 5 to 8 (Class B1(c), B2 and B8 with trade counters and ancillary showrooms, and sui generis tile merchants) including access and servicing arrangements, car parking, landscaping and associated works.

12.107 The site comprises made ground of little intrinsic ecological value and there are few ecological constraints. A precautionary approach was recommended to mitigate the insignificant ecological value identified on site for foraging and limited nesting for breeding birds. It is considered that all potential impacts and effects on potential bats will be sufficiently mitigated and compensated for within the site such as to have no net adverse impact on biodiversity or conservation objectives of individual species / groups. Furthermore, the site is situated 220 m north of the Site and as such is considered to be sufficiently distant from the Site that cumulative effects are unlikely. Consequently, it is considered that there will be no cumulative effects arising from this site in combination with the effects arising from the Proposed Development.

Land East of Bessemer Road, Welwyn Garden City

12.108 The application comprises the regeneration of the site to provide a new retail Aldi food store (A1) with associated parking, servicing and landscaping. The site is situated 270 m north

of Proposed Development and as such is considered to be sufficiently distant from the Site to not result in adverse cumulative effects.

12.109 No ecological constraints were highlighted in the planning documents and the proposed landscaping plans are considered to be long-term beneficial. Consequently, it is considered that there will be no cumulative effects arising from this site in combination with the effects arising from the Proposed Development.

51 Bridge Road East, Welwyn Garden City, AL7 1JR

12.110 This application comprises the erection of 54 residential flats with associated access, car parking, amenity space and landscaping involving the demolition of existing office building (B1). . The scheme does not impact on the important ecological features identified in this assessment. Furthermore the site is situated 450m to the east of the Site, as such is considered to be sufficiently distant from the Site to not result in adverse cumulative effects.

12.111 As such, providing the ecological mitigation and compensation required for the site is implemented in full, there is not considered to be any negative cumulative effects on the important ecological features identified at the Site. Consequently, it is considered that there will be no cumulative effects arising from this site in combination with the effects arising from the Proposed Development.

BioPark, Broadwater Road, Welwyn Garden City, AL7 3AX

12.112 The application is for the redevelopment of the BioPark site into 289 residential units with associated community hub, public realm and open space, landscaping, access, associated car and cycle parking, refuse and recycling storage and supporting infrastructure. The site is located approximately 170 m southwest of the Site.

12.113 The site held comparatively limited value for wildlife and provided no evidence or potential for protected and notable species. No ecological constraints were highlighted in the planning documents and the proposed landscaping plans which provide ecological enhancements are considered to be long-term beneficial**.** Consequently, it is considered that there will be no cumulative effects arising from this site in combination with the effects arising from the Proposed Development.

Inter-Relationship Effects

12.114 There are no inter-relationships with other topics identified.

ENHANCEMENT, MITIGATION AND RESIDUAL EFFECTS

Changes to on-site Habitat Value

12.115 The majority of habitats / features within the Site are of negligible value as these are common habitats within a local and national context and can easily be re-created or restored. The semi-mature trees are of value within the context of the Site.

12.116 The majority of existing trees forming the western boundary of the Site are to be retained as part of the proposals. This area, and other locations within the Site would be supplemented with new tree planting including native species and fruiting trees. Once established, these trees would provide suitable nesting habitat for common bird species and foraging opportunities for bats and birds.

12.117 New habitat that would be provided within the Proposed Development includes:

- Grassland and shrub planting;
- Living roofs and rooftop garden areas;
- Wildlife features such as nest and shelter boxes;
- Plants of known value to pollinating invertebrates; and
- Native tree and shrub species including fruit-bearing species.

12.118 Incorporation of these new habitats would replace negligible habitat types and provide a number of ecological enhancements such as new habitat types , enhanced foraging opportunities for bats, birds and invertebrates and an increase in native biodiversity. Retained features would also be enhanced.

12.119 As such, the changes to on-site habitat value after mitigation and enhancement measures are completed will have a **beneficial effect, significant** at the **local level** that will be **permanent**.

12.120 The incorporation of these habitat enhancements and creation of new habitats would contribute positively to saved policies **R11, R17** and **R8** of the Welwyn Hatfield District Plan;

policies **SP1, SP11, SP12** and **SADM16** of the Welwyn Hatfield Local Plan; and **Objective 2 , Action UR/A/2.7** of the Hertfordshire BAP (2006).

Roosting Bats

Construction Phase Impacts 1: Loss, Damage or Obstruction to Roosting Features

12.121 During the construction phase, works to trees could result in damage, destruction and obstruction to suitable roosting features. In order to minimise the risk of killing or injuring bats, a detailed mitigation strategy would be put in place to safeguard roosting bats in the event that they are present. Detailed mitigation measures can be secured by planning condition and are summarised below.

12.122 All six trees with bat potential roosting features are proposed to be retained. However, if any trees are identified as having to be removed a further detailed inspection of the trees requiring removal prior to felling would be undertaken. Should this inspection also produce negative results then a watching brief during sensitive vegetation removal would be carried out. In the unlikely event that bats are encountered during tree removal, these works would immediately cease, and a suitably qualified ecologist would provide advice.

12.123 Provided these mitigation and compensation measures are implemented, adverse impacts on bats would be **insignificant** and **temporary** (given that replacement roosting features are proposed below).

Construction Phase Impacts 2: Light Spill

12.124 In order to minimise the effect of disturbance from light on roosting bats that may be present in trees on Site, adjacent to the Site or in close proximity off site, construction site lighting should avoid overnight light spill onto these trees. Detailed construction lighting requirements can be secured by planning condition or construction management plan or similar.

12.125 Provided these mitigation measures are implemented, the adverse effect of light spill would be **insignificant** and **temporary**.

12.126 Implementation of these mitigation measures will comply with saved policy **R20** of the Welwyn Hatfield District Plan.

Operation Impacts 1: Loss, Obstruction or Damage to Roosting Features

12.127 The indirect impact to or loss of potential roosting features would be compensated by the provision of a number of bat boxes on retained and proposed trees and the incorporation of bat roosting features (such as bat bricks or bat tubes) into the proposed buildings. The exact number, type and location of provisioned bat roosting features can be secured by planning condition.

12.128 Provided these avoidance and compensation measures are implemented, the adverse residual effect of loss of potential roosting features would be **insignificant and temporary**. Conversely, it is anticipated that the provision of targeted roosting features would represent an increase in opportunities provided to roosting bats by the Site and thus comprise a **beneficial** residual effect for roosting bats that is **permanent** and **significant at the Site level**.

12.129 The incorporation of a number of bat roost features within the Proposed Development will contribute positively to policies **SP11** and **SADM16** of the Welwyn Hatfield Local Plan.

Operational Impacts 2: Light Spill

12.130 In order to minimise the effect of disturbance from light on roosting bats, detailed lighting requirements will be secured by planning condition a lighting scheme to avoid overnight light spill onto retained and the final locations of any bat boxes and built in bat features. .

12.131 Provided this mitigation measure is implemented, the adverse residual impact of light spill would be **insignificant**.

12.132 Implementation of these mitigation measures will comply with saved policy **R20** of the Welwyn Hatfield District Plan.

Peregrine Falcon

Construction Phase Impacts

12.133 As part of the Scheme design, suitable nesting opportunities will be restored and maintained in perpetuity at the silos within the adjacent site. A suitably experienced and qualified ecologist will provide advice during the construction programme to ensure that nesting peregrine falcon are not disturbed by nearby works along the northern boundary of the Proposed

Development during the breeding season. Detailed design specification can be secured via planning condition.

12.134 Consequently, the adverse impact of disturbance on peregrine falcon would be **insignificant**.

Operational Phase Impacts

12.135 In accordance with the original peregrine falcon mitigation strategy for the full Shredded Wheat Factory Site, suitable nesting opportunities (nest box and ledge) will be retained and maintained in perpetuity for peregrine falcon atop the retained silo structures on the adjacent site. The nesting opportunities will be sited away from possible sources of disturbance such as lighting and windows. This mitigation will be incorporated into the design of the North Side site.

12.136 As such, nesting opportunities will be retained for peregrine falcon in the North Side site such that residual effects are considered to be **neutral**.

Other Nesting Birds

Construction Impact: Site Clearance During the Nesting Season

12.137 Potential breaches of wildlife legislation with regards to nesting birds have been avoided through the scheme design as much as possible via retention of the majority of boundary-associated trees and scrub areas which provide bird nesting potential. Impacts on nesting birds could be avoided by undertaking clearance works outside of the bird nesting season (March – August inclusive). Where this is not possible, vegetation that is suitable for nesting birds will be subjected to a pre-works check no more than 48 hours prior to works commencing. Any active nests identified will be cordoned off and safeguarded on a case-by-case basis and remain in place until the nests are no longer active.

12.138 These avoidance and mitigation measures will ensure that the impacts on nesting birds of the construction phase would be **insignificant**.

Operational Impact: Loss of Suitable Nesting Habitat

12.139 The loss of suitable nesting habitat will be avoided, where possible, through the retention of boundary trees. Where unavoidable, the loss of suitable nesting habitat would be

compensated by newly planted trees and shrubs under the landscape proposals and the provision of a number of nest boxes on retained and proposed trees and the incorporation of bird nesting features (such as nest boxes and bricks) into the proposed buildings. The newly-proposed buildings themselves will also provide nesting opportunities for birds. The exact number, type and location of provisioned bird nesting features can be secured by planning condition and will target local notable / Priority Species.

12.140 Provided these avoidance and compensation measures are implemented, the adverse residual effect of loss of suitable nesting habitat would be **insignificant and temporary**. Conversely, it is anticipated that the provision of replacement nesting opportunities would represent an increase in opportunities provided to nesting birds by the Site and thus be a **beneficial** residual effect for birds that is **permanent** and **significant at the Site level**.

12.141 Provision of a variety of nesting opportunities for birds will contribute positively to policies **SP11** and **SADM16** of the Welwyn Hatfield Local Plan and saved policy **R11** of the Welwyn Hatfield District Plan.

Other Mammals and Reptiles

Construction Impacts: Potential for Killing and Injury

12.142 In order to avoid the potential for killing and injury of other mammals and as a precaution for reptiles, clearance works should take place outside of winter months when mammals and reptiles are active and capable of dispersing away from danger. Should clearance works be undertaken during winter, these will need to avoid breaking soft ground beneath vegetation and any brash or rubble piles will need to be dismantled under ecological supervision. In the unlikely event that reptiles are encountered during these works, works would immediately cease and a suitably qualified ecologist would provide advice. During construction, a number of measures will be implemented to safeguard wild mammals and reptiles should they enter or utilise the Site during works (e.g. providing a means of escape from pits and trenches and storing chemicals securely). Measures will also be implemented to discourage certain wild mammals and reptiles from entering the Site (e.g. avoiding storage of easily excavated mounds and litter). A detailed ecological mitigation strategy can be secured via a planning condition.

12.143 Provided these avoidance and mitigation measures are implemented, the effects of clearance and construction works at the Site on other mammals would be **insignificant**.

Operational Impacts: Loss of Suitable Habitat

12.144 Loss of suitable foraging and sheltering habitat for wild mammals and reptiles has been avoided where possible through the Proposed Development by retaining boundary trees and associated habitats. Where unavoidable, the loss of suitable habitat would be compensated by the provision of suitable green space habitats under the landscape proposals and the installation of a number of hedgehog domes / boxes within retained green space. Exact provision and specification of hedgehog domes / boxes can be secured via planning condition.

12.145 As such, it is considered that the residual effect of loss of suitable habitat would be **insignificant and temporary**. On the contrary, it is anticipated that the provision of ecologically-sensitively managed green space and new habitats will represent an increase in foraging opportunities provided to mammals such as hedgehog within the Site and thus comprise a **beneficial** residual effect that is **permanent** and **significant at the Site level**.

12.146 Provision of new foraging and sheltering opportunities would contribute positively to policies **SP1** and **SP11** of the Welwyn Hatfield Local Plan saved policies **R11, SP12** and **SADM16** of the Welwyn Hatfield District Plan and **Objective 2, Action UR/A/2/7** of the Hertfordshire BAP (2006).

Invasive Plants

12.147 Invasive plants should be eradicated from the Site. This should be completed by and under the advice or a suitably qualified specialist company. An eradication strategy to avoid spread of invasive species as a result of the Proposed Development can be secured via planning condition.

12.148 Eradication of invasive plants at the Site will avoid spreading invasive species via vehicular and human vectors. Additionally, as a feature of detrimental ecological value, the removal of invasive plants will represent a **significant beneficial** effect at the **Site level**.

Other Enhancements

12.149 The Proposed Development also presents the opportunity to secure a number of net gains for wildlife via the provision of additional ecological enhancements. Additional enhancements proposed at the Site include insect sheltering structures such as insect hotels and houses. These sheltering structures will benefit valuable invertebrate assemblages such

as solitary bees, especially in conjunction with planting of high pollen / nectar flowering areas. The exact number and location of these enhancements can be secured via planning condition.

12.150 The residual effect of these additional ecological enhancements will be **beneficial** and **significant at the Site level**.

SUMMARY

12.151 The ecological baseline value and likely significant effects resulting from the Proposed Development were assessed in accordance with guidelines published by CIEEM and national and local planning policy and guidance. An ecological assessment of the Site was undertaken in 2015 and subsequently updated in 2017 and 2020.

12.152 The Site is dominated by bare ground/re-colonising, areas of ephemeral / short perennial and hardstanding with trees (which are located primarily at the western boundary). Scattered scrub and dense scrub habitat is also present within the north-east and eastern areas of the Site. The Site currently contains limited ecological interest with habitats that are recently disturbed and largely of negligible or limited local ecological value.

12.153 Six trees are suitable for roosting bats. All trees considered to have bat potential are proposed to be retained. If there were to be removal of the trees with bat roost potential, pre-works checks and watching briefs would be employed. In the unlikely event that bats are encountered during these works, works would immediately cease and a suitably qualified ecologist would provide advice. This would ensure that no harm would come to any bats that may be roosting within the trees.

12.154 A single pair of peregrine falcon have bred in 2020, using the retained silo on the adjacent site. The silo walkway structure that was used for the nesting site would be retained within the adjacent site. To avoid disturbance of these birds during demolition and construction of the Site appropriate mitigation measures will be implemented at construction stage to minimise disturbances to peregrine falcons informed by ongoing specialist advice for the Site. A permanent nesting box / ledge is required to be installed as part of the renovation work on the retained silo as part of the North Side proposals, ensuring a long-term nesting opportunity for peregrine falcons on the adjacent site.

12.155 Other mammals, reptiles (low risk) and nesting birds within the Site will be safeguarded during clearance and construction works through the implementation of standard avoidance and mitigation measures. Long-term, opportunities for these groups, including hedgehog, will be maintained and enhanced at the Site through the provision of suitable habitat and sheltering / nesting opportunities such as hedgehog domes and bird boxes.

12.156 The majority of existing trees forming the western boundary of the Site are to be retained as part of the proposals. Invasive plants at the Site such as cotoneaster will be eradicated as

part of the Proposed Development. These areas, and other locations within the Site will be supplemented with new tree planting, including native trees of local provenance and known value to wildlife.

12.157 The ecological value of the Site would be improved as a result of habitat creation and ecological enhancement measures such as wildflower/grassland planting, provision of bird and bat nesting and roosting opportunities, provision of hedgehog sheltering opportunities and the creation of garden/shrub areas within the scheme design.

12.158 A summary of the ecological impacts and effects assessed during this chapter is provided in **Table 12.4**.

Table 12.4: Ecology Summary Table

Potential Effect	Nature of Effect (Permanent or Temporary)	Significance	Mitigation/ Enhancement Measures	Residual Effects
Construction phase: killing or injury of roosting bats (if present) as a result of loss, damage or destruction to bat roosting features.	Permanent	Major adverse with site significance	Implementation of a mitigation strategy centred around a pre-works check and supervised soft-felling to safeguard roosting bats in the unlikely event they are present.	None
Construction phase: disturbance of roosting bats (if present) within on-site trees from construction lighting.	Temporary	Minor adverse with Application Site significance	Construction scheme will avoid excessive overnight light spill onto on-site trees with suitability for roosting bats.	Insignificant
Construction phase: disturbance of nesting peregrine falcon on adjacent site.	Temporary	Major adverse with county significance	Mitigation and avoidance of disturbance to active nests (see relevant sections).	Insignificant
Construction phase: damage / removal of active birds' nests or killing of eggs and young during site clearance.	Permanent	Minor adverse with Application Site significance	Retention of suitable trees / scrub where practicable and adoption of standard avoidance measures where clearance of suitable nesting habitat is avoided during bird nesting season or subject to a pre-works check.	Insignificant
Construction phase: killing and injury of wild mammals and reptiles during site clearance and construction.	Permanent	Minor adverse with Site significance	Safeguarding of wild mammals and reptiles during site clearance and construction works through supervised and sensitive working methods.	Insignificant

Potential Effect	Nature of Effect (Permanent or Temporary)	Significance	Mitigation/ Enhancement Measures	Residual Effects
Spreading of invasive plant species via vehicular and human vectors.	Permanent	Major adverse with Site Significance	Eradication of invasive plant species from the Application Site prior to risk of spreading.	Minor beneficial and permanent with Application Site significance
Operational phase: loss of roosting opportunities for bats.	Permanent	Minor adverse with Application Site significance	Provision of roosting opportunities such as bat boxes on retained / proposed trees and bat roosting features such as bat bricks incorporated into proposed buildings as compensation and enhancement.	Beneficial and permanent with Site significance
Operational phase: disturbance of roosting bats (if present) within on-site trees from proposed lighting.	Permanent	Minor adverse with Local Significance	Lighting scheme design will avoid excessive overnight light spill onto on-site trees with suitability for roosting bats and also any installed bat boxes, built in bat roost features.	Insignificant
Operational phase: disturbance of nesting peregrine falcon on adjacent site	Permanent	Major adverse with County Significance	Implementation of bespoke peregrine falcon mitigation scheme which will ensure, through sensitive design of retained nesting site, that disturbance from light and windows will not impact nesting peregrine falcon.	Neutral
Operational phase: loss of nesting opportunities for birds.	Permanent	Minor adverse with Application Site significance	Provision of new nesting opportunities for birds comprise nest boxes and incorporated nesting features within proposed buildings. Additional opportunities provided by proposed landscape planting once mature.	Minor beneficial and permanent with Site significance
Operational phase: loss of habitat for wild mammals and reptiles.	Permanent	Minor adverse with Application Site significance	Provision of additional foraging opportunities within suitable habitat as part of landscape proposals. Provision of additional sheltering opportunities such as hedgehog domes.	Minor beneficial and permanent with Site significance

Potential Effect	Nature of Effect (Permanent or Temporary)	Significance	Mitigation/ Enhancement Measures	Residual Effects
Changes to habitat value on site.	Permanent	Moderate beneficial	Retention of habitats of elevated ecological value. Provision of new native trees and scrub under landscape proposals alongside grasslands and formation of new habitat types for the Application Site.. Ongoing ecologically-sensitive management.	Moderate beneficial and permanent with local significance

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13 WATER QUALITY, HYDROLOGY AND FLOOD RISK

INTRODUCTION

13.1 This chapter assesses the likely significant effects of the Proposed Development on the environment with regard to water quality, hydrology and flood risk. It describes the methods used to assess the effects; the baseline conditions currently existing at the Site and the surrounding area; the mitigation measures required to prevent, reduce or offset any significant negative effects; and the likely residual effects after these measures have been adopted. This chapter assesses the impact of the construction and operational phases of the Proposed Development on surface and groundwater quality. It also considers the impacts with regards to the risk of flooding, drainage and infrastructure capacity.

ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

Baseline Data

13.2 The study area is defined as that generally within a 2 km radius of the Site, although a number of issues are considered at a greater distance or at the river catchment level, where necessary. The assessment of effects encompasses surface water and groundwater quality, surface water and groundwater resources (in terms of water quantity), drainage and flood risk.

13.3 The assessment has been undertaken in accordance with the National Planning Practice Guidance (PPG) on EIA (Ref. 13.1) and has involved review of the following sources of baseline data:

- review of the Phase 1 Environmental Assessment by Delta-Simons (refer to Chapter 14 - Soils, Geology and Contaminated Land) and the Groundsure Review report (refer to **Appendix 14.1**) for the Site and up to a 2 km radius; providing data on surface water and groundwater discharged and abstractions, river quality, baseline hydrology, groundwater vulnerability and pollution incidents;
- review of Factual and Interpretative Geotechnical report by Delta-Simons (refer to Chapter 14 - Soils, Geology and Contaminated Land);review of Environment Agency (EA) data records on groundwater Source Protection Zones (SPZs), chemical and biological river quality, ecological status, groundwater quantity and quality and the location of indicative floodplain;

- review of the planning policy framework to identify specific plans and policies relating to the protection of the aquatic environment;
- review of the Welwyn Hatfield Borough Council (WHBC) Strategic Flood Risk Assessment (SFRA) and accompanying reports; and
- review of the accompanying FRA and Drainage Strategy relating to the Proposed Development (refer to **Appendix 13.1**).

13.4 The assessment methodology has been entirely desk-based. Recent data on local river quality has been acquired from the EA, therefore, water sampling was not considered necessary.

Assessment and Evaluation of Effects

13.5 The assessment of effects has involved the following general approach:

- the sensitivity or importance of aquatic receptors has been established on the basis of their use, proximity to the Site, existing quality or resource value and consideration of potential pollutant pathways (refer to Table 13.1);
- evaluation of the magnitude of the potential changes in water quantity and quality and assessment of the sensitivity of the aquatic environment to the predicted changes (refer to Table 13.2);
- the potential effects have been given a significance of Negligible or Minor, Moderate or Major Adverse or Beneficial based on the matrix in Table 13.3; and
- where any predicted effects are Minor, Moderate or Major Adverse, these are considered significant and, therefore, mitigation measures have been incorporated to eliminate or reduce the effects to an acceptable level. The residual effects (post-mitigation) are discussed in the final subsection of this chapter.

Table 13.1: Definition of Receptor Sensitivity

Receptor Sensitivity	Receptor Type	Sensitivity Details
High	Surface Water	• WFD catchment classification of 'High' or 'Good' • No pathway constraints to this receptor
	Groundwater	• Principal Aquifer • Groundwater Source Protection Zone (SPZ) Zone I
	Flood Risk and Drainage	• Flood Zone 3a or 3b (high flood risk) • Critical drainage or flood storage areas
	Water Resources and Infrastructure	• Area of major known water stress/foul sewerage capacity issues
Medium	Surface Water	• WFD catchment classification of 'Moderate'
	Groundwater	• Secondary A or B Aquifer • Groundwater SPZs Zone II or III • Areas of potential historic contamination
	Flood Risk and Drainage	• Flood Zone 2 (medium flood risk) • Problem (but not critical) drainage area
	Water Resources and Infrastructure	• Area of known water stress/foul sewerage capacity issues
Low	Surface Water	• WFD catchment classification of 'Poor' or 'Bad'
	Groundwater	• Unproductive Strata, i.e. Non-Aquifer • Not located on groundwater SPZ
	Flood Risk and Drainage	• Flood Zone 1 (low flood risk) • No known drainage or flooding problems
	Water Resources and Infrastructure	• Area of no known water stress/foul sewerage capacity issues

Table 13.2: Methodology for Assessing Magnitude

Magnitude of Effect	Criteria for Assessing Effect
Major	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.
Moderate	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.
Minor	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.
Negligible	Very little change from baseline conditions. Change barely distinguishable, approximating to a 'no change' situation.

Table 13.3: Effect-Significance Matrix

Magnitude	Sensitivity*		
	High	Medium	Low
Major	Major	Moderate to Major	Minor to Moderate
Moderate	Moderate to Major	Minor to Moderate	Minor
Minor	Minor to Moderate	Minor	Negligible to Minor
Negligible	Negligible	Negligible	Negligible

13.6 In EIA terms, those effects that are not classified as negligible are considered to be significant. Any effect that is classified as negligible is considered to have no effect on the receptor and therefore is not significant.

Limitations and Assumptions

13.7 When referring to the data from the Groundsure Enviro Insight reports within this chapter, the distances and directions are quoted directly. These are based on reference points within the Site and, therefore, it is possible that some of the data location are at a different distance and/or direction form the closest part of the Site boundary. The study area is defined as that generally within a 2 km radius of the Site; however, some data provided by the

Groundsure Reports has a smaller information radius. The radius is stated in the assessment, where relevant.

13.8 The residential element of the Proposed Development is assumed to have an operational lifetime of 100 years. The assessment of construction phase effects is based on the indicative construction methodology and phasing for the Proposed Development.

13.9 The assessment of operational phase effects is based on the maximum parameters of the detailed elements of the Proposed Development as described in Chapter 5 (The Proposed Development).

LEGISLATION, PLANNING POLICY AND GUIDANCE

13.10 The following subsection provides a summary of relevant planning policy at a National, Regional and Local level as well as key environmental legislation. These planning policies and legislation form the basis of planning decision-making in relation to water quality, hydrology and flood risk.

National Planning Policy

National Planning Policy Framework (NPPF) 2019

13.11 The NPPF (Ref. 13.2) sets out the Government's planning policies for England and how these are expected to be applied. At the heart of the NPPF is the presumption in favour of sustainable development.

13.12 The principles of policy relevant to water resources and flood risk are provided in Section 10 'Meeting the challenge of climate change, flooding and coastal change' and Section 11 'Conserving and enhancing the natural environment' and, combined with the associated Planning Practice Guidance (PPG), form the current policy at the national level.

Local Planning Policy

Welwyn Hatfield District Plan (2005)

13.13 The Welwyn Hatfield District Plan was adopted in 2005. A number of policies contained within it have been 'saved' until it is replaced by a Local Development Framework. Of these saved policies, a number are of relevance to ecological considerations of the Proposed Development, these are outlined below.

Welwyn Hatfield Draft Local Plan (2017)

13.14 The Welwyn Hatfield Local Plan will "shape the future of development" in the towns and villages of Welwyn Hatfield District up to 2032. The plan was submitted for examination on the 15th May 2017. .

13.15 The Local Plan sets out a vision for the borough and, from this, a number of objectives have been identified. Strategic and non-strategic policies, including development allocation

policies, have been designed in order to achieve the objectives and the following policies are considered relevant to this technical chapter and the Proposed Development:

- SP10 – Sustainable Design and Construction: "*Development needs to be responsive and resilient to environmental risks and climate change, and seek to protect and enhance other aspects of the natural environment";*
- SP11 – Protection and Enhancement of Critical Environmental Assets: "*This policy sets out the strategic approach to protecting and enhancing the borough's critical environmental assets within the planning process"*;
- SP12 – Strategic Green Infrastructure: *"The Council will plan positively for the creation, protection, enhancement and management of networks of green infrastructure, which includes parks, open spaces, playing fields, river corridors and woodlands";* and
- SP17 – Mixed use development site at Broadwater Road West (site SDS3 north and SDS4 west): "*An allocation for mixed use development of around 1,020 dwellings, in addition to those already on site, and at least 17,650 square metres of Class B1 employment floorspace in addition to that already provided on site*".

Legislative Context

13.16 A summary of key relevant UK water legislation is provided below:

- Environmental Protection Act (1990) (Ref. 13.4): sets out a range of provisions for environmental protection, including integrated pollution control for dangerous substances;
- Water Resources Act (1991) (Ref. 13.5): consolidated previous water legislation with regard to both the quality and quantity of water resources;
- Environment Act (1995) (Ref. 13.6): established a new body (the Environment Agency (EA) with responsibility for environmental protection and enforcement of legislation. This Act introduced measures to enhance protection of the environment including further powers for the prevention of water pollution;
- Water Industry Act (1999) (Ref. 13.7): consolidated previous legislation relating to water supply and the provision of sewerage services;
- Anti-Pollution Works Regulations (1999) (Ref. 13.8): provides powers to the EA to stop any activity (e.g. construction) that is giving or is likely to give rise to environmental pollution or to adequately enforce pollution control measures;
- Control of Pollution (Oil Storage) (England) Regulations (2001) (Ref. 13.9): Imposes general requirements for preventing pollution of controlled waters from

oil storage, particularly fixed tanks or mobile bowsers. Makes contravention a criminal offence;

- Water Act (2003) (Ref. 13.10): extends the provisions of the Water Resources Act (1991) and the Environment Act (1995) with regard to abstractions and discharges, water conservation and pollution control;
- Water Environment (Water Framework Directive) (WFD) (England and Wales) Regulations (2003) (Ref. 13.11): requires the development and implementation of a new strategic framework for the management of the water environment and establishes a common approach to protecting and settling environmental objectives for groundwater and surface waters; and
- Flood and Water Management Act (2010) (Ref. 13.12): makes provisions about the management of risks in connection with flooding and coastal erosion.

BASELINE CONDITIONS

Surface Water Quality

Hydrological Features

13.17 From a review of EA and Ordnance Survey mapping, the closest 'main river' is the Mimram River located approximately 1.7 km to the north of the Site. There are no other 'main rivers' or open-channel ordinary watercourses that have been identified within a 2 km radius of the Site.

Water Quality

13.18 Since the introduction of the WFD, the EA assigns a classification for water bodies on the basis of their 'ecological status', which encompasses chemical, biological and ecological assessment parameters. For catchment purposes, the Site lies within the 'Mimram (Codecote Bottom to Lee) Catchment' which was classified as having a 'Moderate' ecological status in 2016 with the objective of 'Good' by 2021.

Designations, Abstractions and Discharges

13.19 According to the EA, the Site lies within a Nitrate Vulnerable Zone (NVZ). However, the Site does not lie within a surface water safeguard zone for drinking water.

13.20 According to the Groundsure Review report (refer to **Appendix 14.1**), there are no surface water abstraction licences within 1 km of the Site.

13.21 The Groundsure Review report identifies no licensed surface water discharge consents within 500 m radius of the Site. There are no records of any Red List Discharge Consents (potentially harmful discharges to controlled waters) within 500 m of the Site.

Pollution Incidents

13.22 The Groundsure Review report (refer to **Appendix 14.1**) identifies one recorded national pollution incident within 500 m of the Site. This incident occurred in October 2002 approximately 184 m east of the Site and involved heavy metal pollution. The incident was classified as Category 4 (no impact) on hydrology.

Sensitivity

13.23 In accordance with Table 13.1, the hydrology of the Site is considered to be of **Medium Sensitivity**. The Site falls within the 'Mimram (Codecote Bottom to Lee) Catchment' which was classified as having a 'Moderate' ecological status in 2016.

Hydrogeology and Groundwater Quality

Groundwater Quality

13.24 As reported on the British Geological Survey (BGS) online Geology of Britain Viewer as well as the Groundsure reports, the majority of the Site is underlain by the superficial geology of the Kesgrave Catchment Subgroup comprising sand and gravel. Areas in the north-western part of the Site and along the southern boundary are underlain by the superficial geology of the Lowesoft Formation, comprising diamicton.

13.25 According to the EA, the Kesgrave catchment Subgroup is classified as Secondary A aquifer. Secondary A Aquifers are defined as "*permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers*".

13.26 The Lowestoft Formation superficial geology is classified as undifferentiated Secondary Aquifer by the EA. Undifferentiated Secondary Aquifers are "*assigned in cases where it has not been possible to attribute either category A or B to a rock type*."

13.27 According to BGS, the Site is further underlain by the bedrock geology of the Lewes Nodular Chalk Formation and Seaford Chalk Formation (undifferentiated), comprising chalk. This bedrock geology is classified as Principal Aquifer by the EA. Principal Aquifers are defined as "*layers of rock or drift deposits that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale*."

Designations, Abstractions and Discharges

13.28 The Site does not lie within a groundwater safeguard zone for drinking water or a groundwater NVZ.

13.29 Groundwater Source Protection Zones (SPZs) are provided by the EA which "*show the risk of contamination from any activities that might cause pollution in the area"*. The Groundsure Enviro Insight reports and the EA data identify that the Site is located within a Total Catchment (Zone 3) groundwater SPZ; however, there are no groundwater abstraction licences for potable supply within 2 km of the Site.

13.30 According to the Groundsure Review report, there are no records of groundwater abstraction licences within the Site boundary. However, there is one recorded groundwater abstraction licence within 1 km of the study area. This abstraction comprises two grouped boreholes located approximately 97 m south of the Site and is for a maximum daily volume of 1,364 m^3 for use as process water.

13.31 The Groundsure report identifies one licensed groundwater discharge consent within 500 m radius of the Site. This discharge consent is located approximately 346 m north of the Site and was for a miscellaneous discharge of mine/groundwater. The consent expired in 1996.

Pollution Incidents

13.32 The Groundsure report identifies no recorded pollution incidents to groundwater within 500 m of the Site.

13.33 The report identifies a number of potentially historical land uses within the Site boundary. The land use for the Site has consisted of industrial and manufacturing use since 1938. The 1938 map shows the land uses include a cereals manufacturing factory, chimneys, tanks, unspecified tanks, film studios, sawmills, electric heaters manufacturing and unspecified manufacturing.

13.34 From 1960 to 1994, the land uses include unspecified works, unspecified factories and chimneys. The 1971 map shows a biscuit factory located on the Site. An unspecified commercial/industrial use was shown on the 1986 map and unspecified tanks were shown on the maps between 1986 and 1993. An electrical substation was shown on the 1993 map of the Site.

13.35 The land use also includes rail infrastructure from 1898 to 1994 with the earliest land use in 1898 as a railway. Railway sidings are located on the Site between 1928 to 1992. A railway building and coal yard was located on the Site on the 1960 map and a freight terminal was located on the Site on the 1986 map.

13.36 A Phase 1 Environmental Assessment was undertaken by Delta-Simons in January 2015 at the Site in the context of the approved outline planning application (refer to Chapter 14 – Soils, Geology and Contaminated Land).

13.37 The Phase 1 investigation identified "*significant solvent (VOC) contamination of the groundwater in the underlying chalk aquifer and localised soil contamination associated with the former tanks farm*".

13.38 Remediation of groundwater at the Site has taken place and resulted in a significant reduction in dissolved phase contaminant concentrations in the groundwater.

13.39 The pollution linkages range from low to medium risk and it is recommended that additional investigations of the shallow soils, ground gas and soil vapour monitoring are completed (refer to Chapter 14 – Soils, Geology and Contaminated Land).

Sensitivity

13.40 The Site is located on a Principal Aquifer and is within an SPZ Zone 3; therefore, the hydrogeology is considered to be of **High Sensitivity**.

Flood Risk and Drainage

Flood Risk

13.41 The EA's flood map for planning shows that the Site lies entirely within Flood Zone 1 (low risk). Land located within Flood Zone 3 (high risk) is located approximately 1.7 km to the north. It is therefore concluded that the Site would remain in Flood Zone 1 for its operational lifetime (assumed to be 100 years).

13.42 According to the EA's surface water flood map, there is a very low risk of surface flooding to the majority of the Site, defined by the EA as having an annual chance of flooding of less than 0.1%. An area near the northern boundary and other isolated areas have up to a high risk of surface water flooding, defined by the EA as having an annual chance greater than 3.3%. The medium and high-risk surface water flood risk extents are comparably limited and are not considered to pose a significant risk to the Site.

13.43 A review of the Welwyn Hatfield Council Strategic Flood Risk Assessment (SFRA; JBA, 2016) has identified that the Site is potentially at risk from sewer flooding. Sewer flooding can

be associated with surface water flooding and occurs when the sewers are overwhelmed by heavy rainfall, become blocked or are of inadequate capacity. The Site is located within the postcode area of AL73 and this has 19 records of internal flooding of property and 32 records of external flooding according to Thames Water DG5 register.

13.44 The Delta-Simons Geotechnical Report (2015) indicated groundwater levels of between 21.23 and 22.62 m below ground level (mbgl) and, as a result, the Site is not considered to be at risk of groundwater flooding. According to the Phase 1 Environmental Assessment report (Delta-Simons 2015), groundwater has been recorded between 20 m and 26 m bgl. According to the Groundsure report, a BGS groundwater flooding susceptibility area falls within 50 m of the boundary of the Site.

13.45 According to the FRA (refer to **Appendix 13.1**), the risk of flooding from reservoirs is considered to be low.

Existing Drainage

13.46 The Site is a brownfield site formerly comprising industrial and manufacturing uses and rail infrastructure. Currently, any surface water runoff generated within the Site is dealt with via the existing drainage infrastructure associated with the Site which discharges to the Thames Water public sewer via a number of lateral drains in Broadwater Road and Bridge Road at an unrestricted rate.

13.47 A reduction to greenfield runoff rates for the 1, 30 and 100 year return periods was agreed with Thames Water for the previous application. The proposed surface water drainage strategy has been designed to accommodate the 1 in 100 year rainfall event including a 40% allowance for climate change.

13.48 The Site has been divided into two sub-catchment areas and each area has a separate proposed discharge point to the Thames Water surface water sewer. A high level overflow has been included between the Phase 2 and 3 systems. The SuDS features will include attenuation tanks, permeable paving, infiltration and surface level attenuation features throughout the Site.

Sensitivity

13.49 The Site is located within Flood Zone 1 (low risk) and the Site is potentially at risk from surface water and sewer flooding. There are no other significant sources of flooding within the Site or surrounding area according to the SFRA or EA maps.

13.50 The Site itself has no known drainage problems and due to its location in Flood Zone 1 is considered to be of **Low Sensitivity**.

Water Resources and Infrastructure

Water Resources

13.51 The BGS borehole scan indicates that there is one borehole record within the Site and 11 borehole records have been identified within 250 m of the Site boundary. The data indicate relatively deep groundwater within the area as the most recent borehole record on Site (BGS Ref: TL21SW11) indicates groundwater at a depth of 22.42 m depth below datum (mbd). The boleholes surrounding the Site indicate similar groundwater levels except for the boreholes to the north-west of the Site which indicated that no groundwater was encountered due to the superficial geology of clay.

13.52 As well as this, the Delta-Simons Geotechnical Report (2015) (refer to Chapter 14 – Soils, Geology and Contaminated Land), involved drilling boreholes to a maximum depth of 30.0 at 16 locations. Groundwater was encountered at levels of between 21.23 m and 22.62 mbgl.

13.53 There are no potable water abstractions within close proximity to the Site; however, as the Site is located in SPZ3 over a Principal Aquifer, it confirms that the groundwater resources in the area are used for drinking water supply.

Foul Water

13.54 Consultation was undertaken with Thames Water in June 2020 with regards to discharge of foul water to the Thames Water public sewer (refer to **Appendix 13.2**). Thames Water indicated that the existing wastewater infrastructure only has sufficient capacity for the first 310 properties of the Proposed Development and that appropriate mitigation will be needed following planning approval to accommodate the total foul flow from the Proposed Development.

13.55 Private on-site drainage has been identified in the previous FRA for the outline planning application, consisting of separate foul and surface water systems serving the existing commercial buildings. No storage tanks or flow control devices were found, indicating that the existing drainage discharges at unrestricted rates.

Network Infrastructure

13.56 On review of Thames Water asset plans, there are no publicly adopted drainage assets shown within the Proposed Development site boundary.

Sensitivity

13.57 Consultation with Thames Water has confirmed that local foul drainage infrastructure does not have capacity to accept the proposed flows from the Proposed Development and mitigation will be required. Therefore, infrastructure improvements to the existing foul sewer network may be necessary. For the purposes of this assessment, foul drainage and mains water supply have been classified as **High Sensitivity**.

IDENTIFICATION AND EVALUATION OF KEY EFFECTS

13.58 As the Site is located in Flood Zone 1 (low risk), flooding from rivers or the sea is not considered to be a significant effect and is therefore not included in the assessment of likely construction and operational effects.

Construction Phase

13.59 There are three potentially significant effects on water quality and hydrology during the construction phase of the Proposed Development, these are as follows:

- potential remobilisation of contamination that may already be present at the Site;
- potential contamination from general construction related activities; and
- potential interruption of groundwater flows, giving rise to an elevated risk of groundwater flooding and/or effects on baseflow to local water bodies.

13.60 For the purpose of this assessment, the potential effects identified during the construction phase are considered to be temporary in nature and of relevance at the local level only.

Potential Remobilisation of Contamination that may already be Present at the Site

13.61 As established within the baseline section of this chapter, the Site has a number of potentially contaminative historical land uses. The Ground Investigation Report (refer to **Appendix 14.1**) concluded that there is localised soil contamination associated with the former tank farm in the Polycell Factory. Widespread or significant contamination has not been identified elsewhere on the Site, though a further investigation is needed to provide coverage of previously un-investigated areas and remediation works have been undertaken to remove contaminated soils for on-site remediation.

13.62 Construction works would disturb the ground at the Site which could cause the remobilisation of any existing contaminants present in the shallow soils. The main construction works that could disturb the underlying strata are localised site levelling, excavations for foundations, services and construction of drainage routes and associated features.

13.63 Therefore, the effect magnitude of remobilising contamination during construction is considered to be Minor. Prior to mitigation, the effect significance of the remobilising of

contaminants arising during construction-related activities is considered to be **Minor to Moderate Adverse** for groundwater and **Minor Adverse** for surface water.

Potential Contamination from General Construction Related Activities

13.64 The operation of construction vehicles and general construction activities could give rise to the potential for groundwater to become contaminated with hydrocarbons, silt and other construction materials. This may in turn lead to a contamination event should the Site drainage be allowed to enter existing drainage infrastructure or the ground untreated.

13.65 The Proposed Development will be constructed in a number of phases. Referring to Table 13.2, the effect magnitude of contamination arising from general construction activities is considered to be Minor. Prior to mitigation, the effect significance of contamination arising from general construction activities is considered to be **Minor to Moderate Adverse** for groundwater and **Minor Adverse** for surface water.

Potential Interruption of Groundwater Flows

13.66 Records from the Geotechnical Report and the Phase 1 Environmental Assessment report undertaken by Delta-Simons in 2015 indicate that groundwater depths lie between 20 m and 26mbgl.

13.67 The Geotechnical Report (refer to Chapter 14 – Soils, Geology and Contaminated Land) identifies that the Made Ground and Lowestoft Foundation are considered too variable, weak and compressible for conventional shallow foundations given the expected foundation loads. Therefore, the foundations may need to extend down to the Upper Chalk Formation.

13.68 However, as groundwater depths are recorded at 20mbgl and deeper, it is considered likely that even if the piles intercept the underlying groundwater, they would not give rise to an increase in groundwater flood risk, due to the depth of the underlying groundwater. The impact on groundwater interruption is therefore considered to be **Negligible** and no mitigation is considered necessary.

Operational Phase

13.69 There are four potential significant effects on water quality and hydrology during the operational phase of the Proposed Development;

- the control of surface water runoff taking climate change predictions into account;
- potential contamination of local surface waters and/or groundwater from the routine Site drainage or accidental spills;
- water demand and the effect on the availability of local water resources; and
- foul drainage and the effect on local surface waters and/or groundwaters.

13.70 For the purpose of this assessment, the potential effects identified during the operational phase are considered to be long-term in nature (i.e. for the duration of the operational phase of the Proposed Development) and of relevance at a local level, unless stated otherwise.

Control of Surface Water Runoff

13.71 As indicated within the FRA (refer to **Appendix 13.1**), the risk of surface water flooding within the Site ranges from very low to high, therefore the drainage strategy is required to reduce the risk of surface water flooding. The existing site is brownfield and therefore the surface water runoff rates from the Site are required to be improved. The existing drainage strategy discharges to the Thames Water public sewer via a number of lateral drains in Broadwater Road and Bridge Road, at an unrestricted rate. The Proposed Development would result in a similar percentage of hardstanding compared to the former use and therefore runoff rates (prior to mitigation) would be largely unchanged.

13.72 The effect magnitude of the control of surface water runoff taking climate change into account during the operational phase is considered to be Negligible prior to mitigation and the effect significance is **Negligible**.

Contamination of Surface Water and/or Groundwater from the Routine Site Drainage

13.73 The proposed drainage strategy could have the potential to contaminate surface water and/or groundwater from a number of sources. The majority of the Site will be utilised for residential development and, as such, the typical range of potential contaminants will be limited to hydrocarbons and vehicle-related oils and lubricants, as well as small quantities of general household chemicals. Employment areas, commercial areas, significant road infrastructure and other associated development have a wider range of potential contaminants which would also likely be stored and transported in higher volumes, but these uses are not proposed at the Site.

13.74 The effect magnitude is considered to be Minor. Prior to mitigation, the risk of contamination from the routine Site drainage is considered to be **Minor Adverse** for surface water and **Minor** to **Moderate Adverse** for groundwater.

Water Demand

13.75 There is likely to be an increase in water demand as a result of the Proposed Development.

13.76 The effect magnitude of increased water demand from the Proposed Development is considered to be Minor. Prior to mitigation, the increase in water demand arising from the Proposed Development is **Minor** to **Moderate Adverse**.

Foul Drainage Demand

13.77 The foul drainage demand is expected to significantly increase as a result of the Proposed Development. Thames Water have confirmed that the foul sewerage system does not have the capacity to accommodate the needs of the Proposed Development (refer to **Appendix 13.2**). Appropriate mitigation will need to be implemented by Thames Water. This will be confirmed following planning approval.

13.78 The effect magnitude of increased foul drainage demand from the Proposed Development is therefore considered to be Moderate. Prior to mitigation, the effect significance is considered to be **Minor** to **Moderate Adverse**.

ASSESSMENT OF CUMULATIVE EFFECTS

13.79 The committed developments described in Chapter 3 have been considered within the assessment of cumulative effects.

13.80 All committed major developments in the area surrounding the Proposed Development will have to satisfy the requirements for the control of surface runoff within the NPPF PPG, i.e. discharge at the current greenfield runoff rate or the provision of a betterment in runoff rates post-development. Therefore, the cumulative effect of other local developments should result in a net positive effect through reducing overall flood risk in the area.

13.81 In terms of water quality, new or committed developments will also have to incorporate appropriate pollution control measures to protect the underlying groundwater and/or local

surface waters through planning conditions enforced by the Local Authority and/or discharge consents enforced by the EA.

13.82 The cumulative effects of new development on water resources and foul drainage provision are managed at the regional level by the appropriate water companies in consultation with statutory bodies such as the Local Planning Authorities and the EA. The cumulative effect of increases in mains water and foul drainage demand have to be offset by sustainable design and water efficiency measures and infrastructure contributions for sewage treatment works, where necessary. These measures should collectively ensure that the cumulative effects on regional water resources and treatment performance are controlled to an acceptable level.

Inter-Relationship Effects

13.83 There are inter-relationships identified between this topic and Chapter 14: Soils, Geology and Contaminated Land. The effects of potential soil contamination have the potential to cause significant surface water and groundwater effects, this has been considered in the assessment presented.

13.84 An inter-relationship has also been identified between flood risk and climate change with regard to future flood extents and predicted impacts of increased rainfall intensity on sustainable drainage design. This has been considered within the assessment and within the Flood Risk and Drainage Strategy.

ENHANCEMENT, MITIGATION AND RESIDUAL EFFECTS

13.85 The following subsections set out the mitigation measures that would be implemented to eliminate potential environmental effects and reduce these to an acceptable level.

Construction Phase

Potential Remobilisation of Contamination that may already be Present at the Site

13.86 Although the Phase 1 Environmental Assessment has concluded that the remediation scheme has been successful in removing the primary sources of the soil contamination, it is recommended that further assessment is undertaken at the Site to provide coverage of previously un-investigated areas. This further investigation can be completed at the detailed design stage.

13.87 Should this further contamination assessment identify that contaminated soils are present elsewhere on the Site, it is recommended that a remediation/removal strategy is prepared and agreed with the Council before construction works begin to ensure that garden and public open space areas have suitably clean subsoil/topsoil. This will ensure that any significant pollution linkages are eliminated or minimised to an acceptable level with appropriate remediation and control measures in place.

13.88 With these mitigation measures in place, it is considered that the residual effect would be **Negligible**.

Potential Contamination from General Construction Related Activities

13.89 Construction vehicles will be properly maintained to reduce the risk of hydrocarbon contamination and will only be active when required. Construction materials will be stored, handled and managed with regard to the sensitivity of the local aquatic environment and thus the risk of accidental spillage or release will be minimised.

13.90 The construction drainage system will be designed and managed to comply with BS6031:2009 'The British Standard Code of Practice for Earthworks' (Ref. 13.13), which details methods that should be considered for the general control of drainage on construction sites. Further advice is contained within the British Standard Code of Practice for Foundations (BS8004: 2015) (Ref. 13.14).

13.91 These mitigation measures have been incorporated into a Construction Environmental Management Plan (CEMP) as set out in Chapter 6 (Development Programme and Construction), which sets out measures for the control of the Site drainage, reducing the risk of accidental spillages and the storage and handling of materials.

13.92 With these mitigation measures in place, it is considered that the residual effects would be **Negligible**.

Operational Phase

Control of Surface Water Runoff

13.93 The drainage strategy (**Appendix 13.1**) proposes to control surface water runoff via a range of SuDS features, reducing site discharge to greenfield rates for the 1, 10 and 30 year event.

13.94 The strategy involves discharging runoff from the Proposed Development into a range of SuDS features such as attenuation tanks, permeable paving, ponds and other surface level attenuation features. The Site has been divided into two sub-catchment areas and each area has a separate proposed discharge point to the Thames Water surface water sewer. The strategy ensures that all designs are for the 1 in 100-year flood event with a 40% allowance for climate change.

13.95 The implementation of the drainage strategy for the Site would ensure that the surface water runoff rates would be reduced significantly compared to the existing rates, for the operational lifetime of the Proposed Development.

13.96 With these mitigation measures in place, it is considered that the residual effects would be **Minor Beneficial**.

Contamination of Surface Water and/or Groundwater from the Routine Site Drainage

13.97 The proposed drainage strategy is included within the FRA (**Appendix 13.1**) and will ensure that all runoff from the Site will receive an appropriate level of treatment in accordance with the SuDS Manual (Ref. 13.15).

13.98 Table 26.2 of the SuDS Manual sets out pollution hazard indices for different land use classifications including residential roofs, commercial roofs, commercial areas and sites with

heavy pollution. For each land use, a pollution hazard index is outlined for Total Suspended Solids (TSS), metals and hydrocarbons. Mitigation indices are given to SuDS components for discharges to surface water and groundwater, which in total should exceed the pollution hazard indices.

13.99 The EA previously responded to the FRA and drainage strategy submitted for a previous application (the response dated 6th May 2016). The EA concluded that they have no objection to the drainage strategy; however, they do state that no infiltration of surface water drainage into the ground is permitted other than for those parts of the Site where it has been demonstrated that there is no risk to controlled waters. As the historical soil and groundwater contamination in the Site has been remediated, the risk to controlled waters is considered to be low.

13.100 The use of the SuDS techniques for pollution control will ensure that the surface water discharge from the Proposed Development will be of a sufficient quality in accordance with latest guidance.

13.101 With these mitigation measures in place, it is considered that the residual effect would be **Negligible**.

Water Demand

13.102 It is anticipated that any increase in water demand will be reduced as far as possible by the incorporation of appropriate water-saving devices, where practicable. The buildings will be designed to maximise water efficiency.

13.103 With these mitigation measures in place, it is considered that the residual effect would be **Minor Adverse**.

Foul Drainage Demand

13.104 Consultation with Thames Water has confirmed that the foul sewerage system does not have the capacity to accommodate the needs of the Proposed Development. Appropriate mitigation will need to be implemented by Thames Water. This will be confirmed following planning approval.

13.105 With these mitigation measures in place, it is considered that the residual effect would be **Minor Adverse**.

SUMMARY

13.106 From reviewing the baseline conditions within and surrounding the Site, groundwater and foul drainage and mains water supply are considered to be the key receptors in terms of the Proposed Development. For groundwater, this is due to the Site being situated on a Principal Aquifer and within an SPZ Zone 3. For foul drainage and mains water supply, the high sensitivity classification is due to the local drainage infrastructure not having the capacity for the Proposed Development without mitigation and consultation with Thames Water is ongoing. Surface water is considered to be medium sensitivity as the Site is located within the 'Mimram' catchment which has a 'Moderate' ecological status. Flood risk and drainage are considered to be low sensitivity receptors as the Site is located in Flood Zone 1 and is not in a critical drainage area.

13.107 The key effect during the construction phase is the potential for the remobilisation of contaminants at the Site. However, with suitable mitigation measures, the residual effect is considered to be **Negligible**.

13.108 Water demand and foul demand are considered to be the key potential effects during the operational phase of the Proposed Development. However, with suitable mitigation measures put in place, the residual effects are considered to be **Minor Adverse** for water demand and foul demand.

13.109 The Proposed Development will include Sustainable Drainage Systems (SuDS), as detailed within the Flood Risk Assessment and Drainage Strategy report. The system seeks to reduce the rate of surface water runoff in accordance with local policy. This runoff rate would be lower than the current natural rate of surface water runoff during extreme events.

13.110 In conclusion, given the location and nature of the receptors, the overall environmental effect of the Proposed Development in relation to water resources and flood risk following mitigation measures is considered to be **Negligible** to **Minor Adverse**. All residual effects are Negligible with the exception of surface water drainage (Minor Beneficial) and water/foul demand (Minor Adverse).

Table 13.4: Water Quality and Hydrology Summary Table

Phase	Potential Effect	Nature of Effect (Permanent or Temporary)	Significance	Mitigation/ Enhancement Measures	Residual Effects
Construction	Potential remobilisation of contamination	Temporary	Groundwater- Minor to Moderate Adverse Surface water- Minor adverse	• Further ground investigation works • Potential for remediation/removal of topsoil as required	Negligible
	Potential groundwater contamination from general construction-related activities	Temporary	Minor to Moderate Adverse	• Construction materials and vehicle properly maintained in compliance with BS6031:2009 • Preparation of a CEMP	Negligible
	Potential interruption of groundwater flows	Permanent	Negligible	• Piling construction is not considered to increase the risk of groundwater flooding so mitigation is not required	Negligible
Operational	Control of surface water runoff	Permanent	Negligible	• Compliance with the SuDS drainage strategy within the FRA to provide a reduction in runoff rates	Minor Beneficial
	Potential contamination of surface water or groundwater from the routine Site drainage	Permanent	Groundwater- Minor to Moderate Adverse Surface Water- Minor Adverse	• Compliance with drainage strategy • Infiltration features located in areas where there is no risk to controlled waters	Negligible
	Water demand	Permanent	Minor to Moderate Adverse	• Incorporation of water-saving devices, where possible	Minor Adverse
	Foul demand	Permanent	Minor to Moderate Adverse	• Further consultation with Thames Water and mitigation measures put in place	Minor Adverse

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Ref 13.4: Environmental Protection Act 1990 (c. 43). London: Her Majesty's Stationery Office.

Ref 13.5: Water Resources Act 1991 (c. 57). London: Her Majesty's Stationery Office.

Ref 13.6: Environment Act 1995 (c. 25). London: Her Majesty's Stationery Office.

Ref 13.7: Water Industry Act 1999 (c. 9). London: Her Majesty's Stationery Office.

Ref 13.8: Anti-Pollution Works Regulations S.I. 1999 No. 1006. London: Her Majesty's Stationery Office.

Ref 13.9: Control of Pollution (Oil Storage) (England) Regulations S.I. 2001 No. 2954. London: Her Majesty's Stationery Office.

Ref 13.10: Water Act 2003 (c. 37). London: Her Majesty's Stationery Office.

Ref 13.11: Water Environment (Water Framework Directive) (England and Wales) Regulations S.I. 2003 No. 3242. London: Her Majesty's Stationery Office.

Ref 13.12: Flood and Water Management Act 2010 (c. 29). London: Her Majesty's Stationery Office.

Ref 13.13: BS6031:2009, The British Standard Code of Practice for Earthworks, (2009). British Standards Institute.

Ref 13.14: BS8004:2015, The British Standard Code of Practice for Foundations, (2015) British Standard Institute.

Ref 13.15: The SuDS Manual (C753), (2007), CIRIA

14 SOILS, GEOLOGY AND CONTAMINATED LAND

INTRODUCTION

14.1 This chapter discusses the historical and current use of the Site with respect to contaminated land and the underlying geology and hydrogeology. It details the objectives, methodology and findings of both a desk-based environmental review and intrusive site investigation and considers the potential impacts of disturbance of the soils on the Site associated with the Proposed Development. This chapter includes an assessment of the potential contamination risks to groundwater, surface water and vegetation and the potential contamination risk to future users of the Site and workers during demolition and construction works. It also considers the effects of potential contamination on buried concrete and underground structures and the integrity of structures from dissolution features once the Proposed Development is complete.

14.2 It is important to note that the presented assessment is based on the current Site conditions at the ES submission date i.e. post the demolition phase and partial completion of Phase One. Phase One Blocks 10 and 11 (Planning ref: 6/2018/0171/MAJ) was granted permission in February 2019 and remains extant. The extant planning permission was granted following consideration of the environmental impacts of the development and relevant cumulative developments presented within a single Environmental Impact Assessment for the whole site. This Phase, although not considered part of this assessment, will be referred to throughout the chapter as contaminated land has been addressed as a site-wide issue.

ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

Assessment Methodology

14.3 The assessment of contaminated soils in the UK follows a risk-based approach and is structured in a tiered manner. As well as having a systematic approach to collecting the data it is also necessary to adopt recognised techniques and standards in assessing them and particularly regarding environmental risk assessment.

14.4 An assessment of baseline conditions has been undertaken based on the findings of a desk-based study (Phase I Assessment). The methodology employed in completing the desk-based review of the Site and surroundings involved the following:

- a Site walkover by an experienced environmental consultant to provide an assessment of current site activities and the site's environmental setting;
- a review of available historic maps to determine the land-use history in the context of potentially contaminative activities;
- a review of environmental data relating to the Site and its surroundings using a proprietary third-party environmental database;
- a detailed review of previous environmental data relating to the Site (i.e. earlier phases of environmental assessment both desk-study and field-based);
- desk-based assessment of site geology, hydrogeology and hydrology from published mapping and web-based sources to determine the Site's environmental setting and sensitivity;
- a web-based search of the Environment Agency (EA) website and other freely available sources of information to identify any potential issues relating to the Site;
- review of the internet-based MAGIC environmental mapping service, a web-based interactive service which maps governmental environmental information; and
- provision of a qualitative contaminated land risk assessment based on Source-Pathway-Receptor as per current best practice guidance i.e. the Land Contamination: Risk Management (LCRM) Guidance (Ref. 14.1).

Development of a Conceptual Site Model

14.5 Information from the data sources identified above enable the identification of potential pollution sources and pathways for pollutants to migrate from the source areas to potential

receptors (*i.e.* humans, ecosystems, buildings, *etc.*). Based on this information a Conceptual Site Model (CSM) has been formed for the Site and its proposed end use. The CSM is based on the risk assessment principles of source, pathway and receptor connecting to form a pollutant linkage.

14.6 LCRM (Ref. 14.1) provides a technical framework for applying a risk management process when dealing with contaminated land. The process involves identifying, making decisions on, and taking appropriate action to deal with land contamination in a way that is consistent with Government policies and legislation.

14.7 *The Contaminated Land (England) Regulations 2006* (SI 2006/1380) as amended by *The Contaminated Land (England) (Amendment) Regulations 2012* (SI 2012/263) and accompanying DEFRA Contaminated Land Statutory Guidance (Ref. 14.2) describes a risk assessment methodology in terms of 'significant pollutants' and 'significant pollutant linkages' within a 'contaminant-pathway-receptor' conceptual model. For land to be determined as ‘contaminated’ in a regulatory sense, and therefore requiring remediation (or a change to less sensitive use), all three elements (contaminant-pathway-receptor) of a significant pollutant linkage must be present.

Assessment of Significant Effects

14.8 There are no published qualitative criteria for assessing the likely significant effects from ground conditions and contamination. Significance criteria have therefore been developed using the criteria outlined, published guidance on contaminated land and professional judgement.

14.9 An adverse effect (with respect of ground contamination) relies on the presence of a source, pathway and receptor pollutant linkage. The significance of the effect depends on the value of the resource, the sensitivity of the receptor and the ways in which the Proposed Development can provide a pathway to the receptor. The significance of an effect also partly depends on the timescales involved, i.e. short, medium or long term and the extent of the area affected.

14.10 Environmental receptors can demonstrate different sensitivities to changes in their environment. It is also recognised that environmental impacts can operate over a range of geographical areas and therefore a geographical scale should be considered in the scale/magnitude of the effect, as well as the receptor. The sensitivity of the receptor also

considers the long or short-term exposure of the receptor. For this assessment sensitivity is determined (via professional judgement) as outlined within Table 14.1.

Table 14.1: Criteria for assessing sensitivity of a receptor

Sensitivity	Description
High	Land to be in use for residential purposes with plant uptake (i.e. private gardens). Construction workers (not defined in Part IIA; however relevant in the context of a human receptor during the development process). On-site maintenance works with increased potential for direct contact with areas of contamination (if present) / working in confined spaces; e.g. to install / repair underground services. Principal aquifer, which may be used for public water supply. Source Protection Zone I – Inner Protection Zone and Zone II – Outer Protection Zone. Surface watercourse located on or adjacent to land under assessment. Watercourse with a high-water quality classification. Land located in or directly within the immediate catchment area of an ecologically sensitive area, e.g. Special Protection Area (SPA)/Site of Scientific Interest (SSSI)/Ramsar Site, etc. Buildings: World Heritage Site or Conservation Area
Medium	Land to be in use for residential purposes (without plant uptake). Off-site land in current residential usage and with potential for consumption of home grown produce. Land to be used for agricultural arable usage or livestock. Third party utilities. Secondary aquifer, which is not used for public water supply. Source Protection Zone III – Total Catchment Area. Surface watercourse located less than 250 m from the Site (however not located on or adjacent to the Site). Watercourse with a medium water quality classification. Not located in an ecologically sensitive area however located within its wider catchment. Buildings: Area of Historic Character
Low	Land to be in use for commercial/industrial purposes. Off-site commercial land usage. Members of the public accessing the Site for relatively short periods (*e.g.* dog walkers, bird watchers). Unproductive strata. Groundwater not used for public water supply. Surface watercourse located more than 250 m from the Site. Watercourse with a poor water quality classification. Not located in an ecologically sensitive area or its wider catchment. Buildings of replaceable or local value only.

14.11 The magnitude of potential impacts during both construction and operation of the Proposed Development has been assessed using professional judgement. The magnitude (scale of change) is determined by considering the degree of deviation from the baseline conditions and whether this is likely to result in any exceedances of statutory objectives or

changes in suitable uses of the receptor. For this assessment magnitude is outlined within Table 14.2.

Table 14.2: Magnitude of impact

Sensitivity	Adverse Impacts	Beneficial Impacts
High	Substantial environmental risk to sensitive receptors requiring extensive remedial works.	Substantial reduction in environmental risk to sensitive receptors. Substantial improvement in ground conditions.
Medium	Moderate environmental risk to sensitive environmental receptors requiring monitoring and localised remedial works.	Moderate reduction in environmental risk to sensitive environmental receptors. Moderate improvements in ground conditions.
Low	Minor environmental risk to sensitive environmental receptors requiring no remedial work (or no additional remedial work if remedial works are ongoing).	Minor reduction in environmental risk to sensitive environmental receptors. Minor improvements in ground conditions.
Negligible	Residual risk considered to be so minor to sensitive receptors that it would not be detectable. No appreciable change in environmental risk to sensitive environmental receptors.	

14.12 Where a potential impact is identified, the significance of the impact and level of contamination risk is determined by considering the sensitivity and type of receptor, the temporal nature of the impact and the geographic scope of the impact upon receptors as outlined within Table 14.3.

Table 14.3: Nature of environmental impacts

Impact	Nature of Change	Geographical	Timescale	Frequency
Beneficial Negligible/Neutral Adverse	Temporary Reversible Permanent	Localised Site-wide District Regional National Trans-national	Short-term Medium-term Long-term	Frequent Infrequent Rare

14.13 The potential effects have been classified, prior to mitigation, as minor, moderate or major (either “Adverse”, “Neutral/Negligible” or “Beneficial”). Where the predicted effects are significant (substantial), mitigation measures have been incorporated to eliminate or reduce the effects to an acceptable level. The significance criteria are outlined in Table 14.4 and are described in Table 14.5.

Table 14.4: Significance Criteria for Ground Conditions and Contamination Assessment

Sensitivity of Receptor	Magnitude of Effect			
	High	**Medium**	**Low**	**Negligible**
High	Major	Moderate/Major	Moderate	Minor
Medium	Moderate/Major	Moderate	Minor/Moderate	Negligible/Minor
Low	Moderate	Minor/Moderate	Negligible/Minor	Negligible

Table 14.5: Criteria for assessing significance

Significance	Description
Major Adverse	Significant environmental risk to a sensitive environmental receptor, and/or humans (construction workers and end users) requiring extensive mitigation works. For example, substantial widespread permanent reduction in quality of potable groundwater and/or surface water resource, substantial and permanent impact on ecosystems (plant and animal numbers) and/or substantial long-term effect on human health.
Moderate Adverse	Local environmental risk to a sensitive environmental receptors, and/or humans (construction workers and/or end users) requiring monitoring and local mitigation work. For example, substantial short-term/moderate long-term reduction in quality of groundwater and/or surface water resource, substantial short-term/moderate long-term effect on ecosystems and/or human health.
Minor Adverse	Temporary and minor environmental risk to a sensitive environmental receptor, for example minor local reduction in groundwater and/or surface water quality, minor local impact on ecosystems. Effects are reversible. Minor effect on human health.
Negligible	No appreciable environmental risk to a sensitive environmental receptor and/or human health. Any minor adverse effects are reversible.
Minor Beneficial	Minor reduction in environmental risk to humans or a sensitive environmental receptor. For example, minor local improvement in groundwater and/or surface water quality, minor local improvement in impact on ecosystems and minor improvement in human health effects.
Moderate Beneficial	Moderate reduction in environmental risk to humans or a sensitive environmental receptor. Moderate improvement in groundwater and/or surface water quality, moderate improvement in ecosystems effects and moderate improvement in human health effects.
Major Beneficial	Substantial reduction in environmental risk to humans or a sensitive environmental receptor. Substantial widespread improvement in quality of potable groundwater and/or surface water resource, major improvement in impact on ecosystems and major improvement on human health effects.

14.14 As previously detailed EIA is a process that identifies the likely significant environmental effects (both beneficial and adverse) of a Proposed Development. The process aims to prevent, reduce and mitigate any adverse significant environmental effects, where these are identified. Significant effects are considered material to the decision process. Based on the above,

residual effects of moderate and major scale may be considered significant (as shown by the shaded cells outlined within Table 14.4).

14.15 Any impacts of minor significance or lower are not considered to be significant and as such it will not be necessary to always propose mitigation methods. Impacts of moderate or higher significance will be deemed to be potentially significant and will require, where possible, mitigation methods to be adopted.

Assumptions and Limitations

14.16 The assessment presented in this chapter is based primarily on information presented in earlier Dames and Moore and Delta-Simons site investigation reports combined with the recently conducted Earth & Marine Environmental Consultants Limited (EAME) Phase I and Phase II assessments.

14.17 The existing status with respect to ground conditions and contamination are presented within this chapter as the baseline conditions. It is considered unlikely that the existing conditions will deteriorate in the short term (during the proposed construction period) or longer term (once the Proposed Development would be completed). The baseline conditions presented are therefore representative of future conditions in the absence of the Proposed Development (*i.e.* without Development proceeding). It is important to note that the presented information is post the demolition and site clearance phase which was completed between 2017 and 2018.

LEGISLATION, PLANNING POLICY AND GUIDANCE

National Policy

14.18 The National Planning Policy Framework (February 2019) (Ref. 14.3) sets out the Government's planning policies for England and how these are expected to be applied. The National Planning Policy Framework (NPPF) constitutes guidance for local planning authorities and decision-takers both in drawing up plans and as a material consideration in determining applications. Fundamental to the NPPF is a presumption in favour of sustainable development.

14.19 The NPPF states that in order "to prevent unacceptable risks from pollution and land instability, planning policies and decisions should ensure that new development is appropriate for its location. The effects (including cumulative effects) of pollution on health, the natural environment or general amenity, and the potential sensitivity of the area or proposed development to adverse effects from pollution, should be considered. Where a site is affected by contamination or land stability issues, responsibility for securing a safe development rests with the developer and/or landowner".

14.20 Planning policies and decisions should also ensure that:

- "the site is suitable for its new use taking account of ground conditions and land instability, including from natural hazards or former activities such as mining, pollution arising from previous uses and any proposals for mitigation including land remediation or impacts on the natural environment arising from that remediation";
- "after remediation, as a minimum, land should not be capable of being determined as contaminated land under Part IIA of the *Environmental Protection Act 1990*"; and
- "adequate site investigation information, prepared by a competent person, is presented".

14.21 The NPPF specifies that the minimum information that should be provided by an applicant is the report of a desk study and site reconnaissance.

14.22 The planning process can influence how contaminated sites are managed through planning policy and development control. In terms of the latter, planning conditions often require detailed site assessment or, in some cases, the restoration of a site to render it suitable for its proposed new use.

National Legislation

14.23 Part 2A of the *Environmental Protection Act 1990* ("Part 2A") provides the legislative framework for the Contaminated Land regime in England, Wales and Scotland. It provides for Contaminated Land to be identified and dealt with in a risk-based manner. *The Contaminated Land (England) Regulations 2006* (SI 2006/1380) set out provisions for procedural matters under Part 2A. The 2006 regulations were modified with the introduction of *The Contaminated Land (England) (Amendment) Regulations 2012*, (SI 2012/263) which came into force on 6th April 2012. This includes an amendment to Regulation 3(c) to take account of the updated definition of "controlled waters" in Section 78A(9) of the *Environmental Protection Act 1990*.

14.24 Section 78A(2) of Part 2A of the EPA 1990 defines contaminated land as "land which appears to the local authority in whose area it is situated to be in such a condition, by reason of substances in, on or under the land, that:

- significant harm is being caused or there is a significant possibility of such harm being caused; or
- pollution of controlled waters is being, or is likely to be caused".

14.25 The implementation of Section 86 of *The Water Act 2003* on 6th April 2012 by *The Water Act 2003 (Commencement No. 11) Order 2012* (SI 2012/264) modifies the definition of contaminated land to also include land where there is "significant possibility of significant pollution of controlled waters".

Local Policy

14.26 The Welwyn Hatfield District Plan was adopted in 2005. Several policies have been 'saved' until it is replaced by a Local Development Framework. Three of the saved policies are R1 (Maximising the Use of Previously Developed Land), R7 (Protection of Ground and Surface Water) and R2 (Contaminated Land). The specific policy objectives are:

- R1 – In order to make the best use of land in the district, the Council will require development to take place on land which has been previously used or developed. Development will only be permitted on 'greenfield' land where it can be demonstrated that no suitable opportunities exist on previously used or developed land.
- R2 – The Council will encourage proposals for the development and reuse of land which is or may be contaminated. On such sites, applications must be

accompanied by a full survey of the level of contamination and proposals for remediation measures. In considering whether planning permission should be granted, the Council will need to be satisfied that there will be no unacceptable risk to health or the environment arising from the remedial works or the proposed use of the site in relation to the type of contamination.

- R7 – Planning permission will not be granted for development which poses a threat to the quality of both surface and/or groundwater. Where proposals are acceptable the use of sustainable drainage systems will be encouraged, dependent on local site and underlying groundwater considerations.

14.27 The Welwyn Hatfield Local Plan (2017) will "shape the future of development" of the towns and villages within Welwyn Hatfield District up to 2032. The plan was submitted for examination in May 2017. A single policy statement within the submitted plan is of relevance to contaminated land and the Proposed Development, as outlined below:

- **SADM18 Environmental Pollution (Contaminated land and soil pollution)** – Planning applications for proposals on land formerly used for industrial, commercial or utilities purposes, or land which is considered to be contaminated or potentially contaminated, must be accompanied by a preliminary Contaminated Land Risk Assessment. Proposals which, by their nature, risk contributing to soil and water pollution will be required to demonstrate how this risk will be avoided or mitigated to an acceptable level.

14.28 Local authorities are required to publish an annual Brownfield Land Register. These list all of the brownfield (previously developed) sites within an area, where larger than 0.25 hectares or with a capacity of 5 or more dwellings, which in the opinion of the local authority would be suitable for development and have a prospect of coming forward within a 15-year period. The Register is prepared in accordance with the *Town and Country Planning (Brownfield Land Register) Regulations 2017*.

14.29 Welwyn Hatfield Borough Council's Contaminated Land Strategy (Fourth Edition, March 2013) has been developed and implemented. Under the *Environmental Protection Act 1990* the Council are legally obliged to inspect the land in the Borough that may be contaminated and pose unacceptable risk to public health and the wider environment. The Strategy has been designed to ensure that the Council meets its legal duties.

Guidance

14.30 Defra Contaminated Land Statutory Guidance published in April 2012 (Ref. 14.2) provides for a four-category test which is intended to clarify when land does or does not need to be remediated, where Category 1 is deemed as being high risk and Category 4 as being low risk.

14.31 "Significant harm" is defined in the Guidance on risk-based criteria and must be the result of a significant "pollutant linkage". The presence of a pollutant linkage relies on the Source-Pathway-Receptor concept, where all three factors must be present and potentially or linked for a potential risk to exist. An initial assessment of pollutant linkage can be made qualitatively (*i.e.* through identifying these factors) and may be assessed using qualitative risk assessment models.

14.32 Land Contamination: Risk Management (LCRM) guidance (Ref. 14.1) identifies the risk management framework to be followed when dealing with land affected by contamination in England.

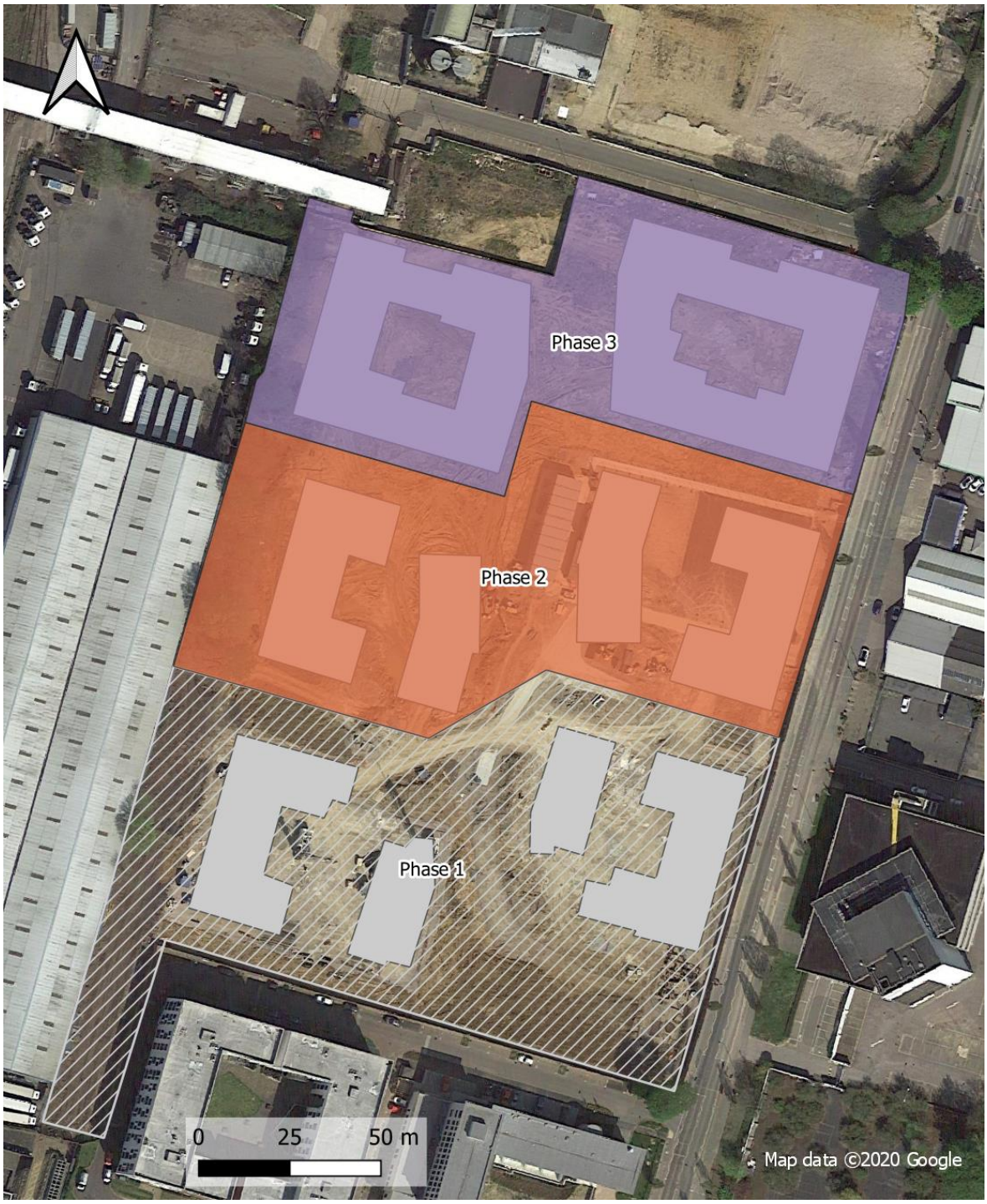
14.33 Further guidance documents relevant to the assessment of contaminated land are provided by various statutory and non-statutory bodies and are referenced where applicable.

BASELINE CONDITIONS

14.34 The Site is accessed via Hydeway off Broadwater Road (A1000) and is located centrally within the town of Welwyn Garden City at National Grid Reference (NGR) TL 24127 12706. The land is relatively flat and lies at an elevation of between 84 and 85 metres above ordnance datum (AOD) (Figure 14.1).

Figure 14.1: Proposed Development boundary (Phase 2 and Phase 3)

ColladoCollins Architects (2021). Design and Access Statement, Section 6.1 Phasing, February 2021



14.35 The Site has been cleared of all above ground structures, buildings and hardstanding areas as part of the earlier phase of works and Phase One construction activities have already started.

Photograph 14.1: View from pedestrian railway bridge (prior to demolition, December 2017)

Photograph 14.2: View of site (prior to clearance in June 2017)

14.36 The following current uses were identified surrounding the Proposed Development site:

- NORTH – Hydeway beyond which is the Wheat Quarter development site.
- EAST – Broadwater Road (A1000) beyond which are commercial premises and offices.
- SOUTH – Phase One development area beyond which is the historic Roche Products facility (Grade II listed) which is now an extensive residential development.

- WEST – P.W Gates Distribution Ltd warehouse (southern hub) beyond which are railway lines (East Coast Mainline) associated with Welwyn Garden City station and car parking.

14.37 As part of the environmental assessment historical maps, photographs and previous assessments were obtained and reviewed by EAME to determine the historical development of the Site and surrounding area. The Site has been divided into the following zones.

Zone S01 – Cereal Partners Facility (South of Hydeway) and Zone S02 – Historic Suchard Chocolate (confectionary)

14.38 The area immediately south of Hydeway was occupied by two buildings understood to have been a warehouse for the storage of raw materials and packaging products (known as the Cromac building) and a Cereal Partners research and development laboratory. A maintenance warehouse and associated storage yard was also understood to have been in this area. Potential asbestos containing materials (PACMs) in the form of corrugated asbestos cement sheets were noted within the buildings. The asbestos containing materials (ACMs) were removed from the building during Q4-2017. The area included an historic above ground storage tank (AST) and a former substation.

14.39 Other historic users of this area have included Unity Heating (Young, Osmond and Young), Artotex Engineering (1929) and a plastics engineering works. The area to the south was occupied by Suchard Chocolate and used as a confectionary storage warehouse. The Site was operated by Suchard as a regional distribution unit and offices until closure in the mid-1970s.

Zone S03 – Historic Polycell factory

14.40 The Polycell factory most recently produced a range of DIY products including Polyfilla and associated products, wallpaper adhesives and paint cleaning fluids. The primary operations carried out on-Site involved mixing raw materials and packaging of products. There were two principal areas of production; the Polyfilla powder and paste area and the liquids area. The Polyfilla and paste area was used primarily to produce dry products and some liquid pastes and was in the southwestern corner of the Site. Associated with this area was the wastewater tank for receiving the washing water from the paste lines. The warehouse was adjacent to the powders and paste building and was used for storage of all products on-Site.

14.41 The liquids area located at the northern end of the factory was used to produce paint strippers and brush cleaners. Associated with the liquids area was the solvent tank farm comprising of 13 underground storage tanks (USTs) (6 in use when the Site was last operational and 7 redundant tanks) and one AST. Naphtha, white spirit and methanol were stored in the 6 operational 4,000-gallon USTs (tanks 7 & 8, 5 & 6 and 3 & 4 respectively) and dichloromethane was stored in the 6,250-gallon AST (tank 14). The 7 redundant tanks had volumes ranging from 1,500 to 6,000 gallons and were used to store white spirit, derv, IPA, naphtha, turps and methanol. A fuel oil UST was also located in the northeast of the Polycell area.

14.42 Other facilities included the boiler room, located in the centre of the Site with three heavy fuel oil ASTs in the adjacent room. The administration building, and goods warehouse were both located near the gatehouse at the front of the factory on Broadwater Road. In the eastern corner of the Site, it was reported that two USTs were used historically for diesel and petrol. It is reported that these tanks were cleaned, decommissioned and infilled with concrete in the late 1970s.

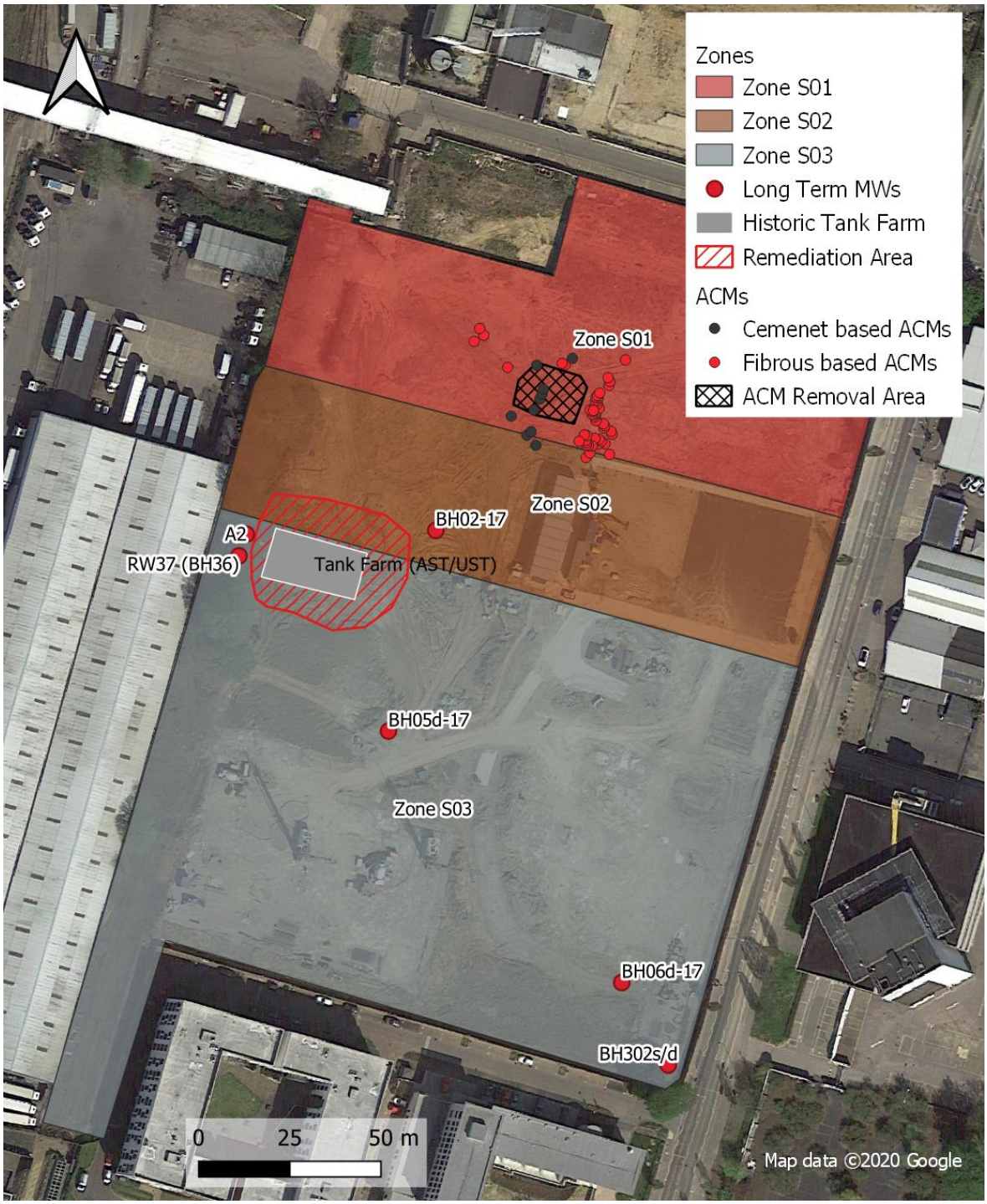
14.43 The Polycell Site formerly held a waste management license to dispose of industrial effluent from wastewater treatment to a soakaway, understood to be located adjacent to the tank farm area.

14.44 Other historic users of this area have included Kelacoma (Later Mouldrite Ltd) (1929 – 1930) and Welwyn (film) Studios Ltd (1928 – 1950).

14.45 The Zones S01 to S03, the historic UST farm and surrounding remediation area are outlined within Figure 14.2.

Figure 14.2: Site Zoning (based on historic activities) and key target areas

Map data ©2020 Google



14.46 The ES chapter makes extensive use of information collected via various parties over the last 23 years, this includes the following key reports:

- Delta-Simons (2015). Phase I Environmental Assessment, Former Shredded Wheat Factory, Broadwater Road, Welwyn Garden City For Spen Hill

Developments Ltd, Delta-Simons Project No. 2342.17 V2. This document is already available on the planning portal (Planning Ref. N6/2015/0294/PP) **(Appendix 14.1).**

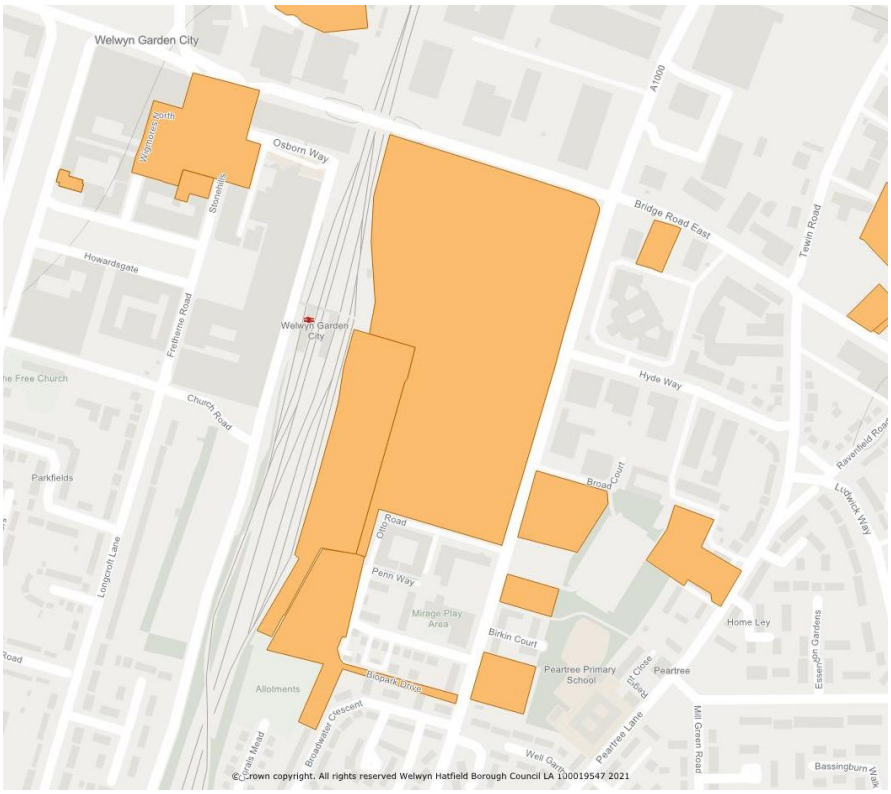
- Delta-Simons (2015). Factual and Interpretative Geotechnical Report, Former Shredded Wheat Factory, Broadwater, Road, Welwyn Garden City, AL7 3AX, For Spen Hill Developments Ltd, Delta-Simons Project No. 2342.18_G V2, Issued: January 2015. This document is already available on the planning portal (Planning Ref. N6/2015/0294/PP) **(Appendix 14.2).**
- EAME (2018). Environmental Assessment (Southern Area), Broadwater Road Site, Welwyn Garden City, AL8 6UN, UK. On behalf of: Wheat Quarter Limited, Project Reference: 016-1512, Revision: REV 01, Date: September 2018. This document is already available on the planning portal (Planning Ref. 6/2018/2503/COND) **(Appendix 14.3).**
- EAME (2018). Remediation Strategy (Southern Area), Broadwater Road Site, Welwyn Garden City, AL8 6UN, UK, On behalf of: Wheat Quarter Limited, Project Reference: 016-1512, Revision: REV 01, Date: September 2018. This document is already available on the planning portal (Planning Ref. 6/2018/2503/COND) **(Appendix 14.4).**
- EAME (2018). Remediation Verification and Long-term Monitoring Plan (Southern Area), Broadwater Road Site, Welwyn Garden City, AL8 6UN, UK, On behalf of: Wheat Quarter Limited and Metropolitan Thames Valley Housing, Project Reference: 016-1512,Revision: REV 02, Date: November 2018. This document is already available on the planning portal (Planning Ref. 6/2018/2503/COND) **(Appendix 14.5).**
- John F Hunt (2019). Factual Datasets and Observations relating to the 12-Month Post Remediation Groundwater Monitoring Works at Former Shredded Wheat, Welwyn Garden City (Southern Site), Ref: 17909/SH/Oct19/006 DRAFT, 25 October 2019 **(Appendix 14.6)**
- Curtins Consulting Limited (2019). Former Shredded Wheat Factory - Phase 2, Phase 2 Ground Investigation Report, Curtins Ref: 067358.100-CUR-00-XX-RP-GE-00002, Revision: 00, Issue Date: 15 May 2019 **(Appendix 14.7).**
- EAME (2020). Long-term Groundwater Monitoring – Round 1 (October 2020), Metropolitan Thames Valley Housing (MTVH), Broadwater Road (South Site), Welwyn Garden City, AL8 6UN, UK, October 2020. This document has previously been submitted to the WHBC planning department and the Environment Agency **(Appendix 14.8).**

14.47 As stated, all reports detailed above are provided within **Appendix 14.1 to Appendix 14.8** or are available on the WHBC planning portal.

14.48 WHBC maintains a brownfield land register (Ref. 14.5) that includes the Proposed Development site. The Site reference is WGC104b.

Figure 14.3: WHBC brownfield register

https://gis.welhat.gov.uk/CommunityMaps



Geology

14.49 The geology of the Site has been established from British Geological Survey (BGS) mapping, Dames and Moore intrusive investigations (1998-2000), Delta-Simons intrusive investigations (2003-2016), EAME intrusive investigations (2017-2018) and J F Hunt remedial activities (2018). The results of all previous investigations are summarised within the EAME Phase I Contaminated Land Assessment provided in **Appendix 14.3.**

14.50 The relevant British Geological Survey (BGS) 1:50,000 map of the area (Sheet 239, Hertford, drift, 1:50,000, 1996) shows the Site is directly underlain by:

- Superficial deposits – The northern part of the Site is underlain by Kesgrave Catchment Subgroup (Sand and Gravel) and the southern area by Boulder Clay (Lowestoft Formation – Diamicton).
- Bedrock deposits – The entire Site is underlain by Lewes Nodular Chalk Formation and Seaford Chalk Formation (undifferentiated).

14.51 A summary of the encountered geology at the Site is provided within Table 14.6.

Table 14.6: Site geology

Stratum	Area	Depth Range	Description
Made Ground (mostly hardstanding)	Across northern and southern areas	Ground to 0.4 m below ground level (bgl) (proven by Delta-Simons assessment)	Tarmacadam, concrete, reinforced concrete. All hardstanding was removed during the initial site clearance processes.
Made Ground	Across all areas	0.30 m to 3.5 m bgl (proven by Delta-Simons assessment)	Variable inconsistent stratum. Clay, silty sand, gravelly clay or gravelly sand, gravel, bricks, ash, slag, concrete, flint. Rare brick cobbles.
Lowestoft Formation and the Kesgrave Catchment Subgroup	Across all areas	3.20 m to 18.0 m bgl (proven by Delta-Simons assessment)	Variable sometimes inconsistent strata across the Site. Lowestoft – Typically comprised layers of orange and brown and light brown sandy gravelly clay with sand and gravel in varying fractions. Locally encountered as clayey sandy gravel and clayey gravelly sand. Kesgrave Catchment Subgroup – Typically comprised orange brown sandy gravel and gravelly sand. Gravel of flint.
Lewes Nodular Chalk Formation and Seaford Chalk Formation (Undifferentiated)	Across all areas	Proven to maximum depth of 30.0 m bgl (proven by Delta-Simons assessment)	Predominantly recovered as structureless chalk composed of slightly gravelly silt (Grade Dm.). Grade Dc structureless chalk was encountered locally between 17.1 m and 20.0 m bgl.

14.52 The Site is not located within a coal mining affected area (Ref. 14.4) or within the 'Chalk Mine Buffer' of 'Chalk Mine Zone' according to Welwyn Hatfield Borough Council (WHBC) mapping (Ref. 14.5).

14.53 According to Public Health England (PHE) all parts of the Site (1km grid square) are in the lowest band of radon potential i.e. Less than 1 % of homes above the Action Level (Ref. 14.6).

14.54 According to Delta-Simons there are 35 Natural Cavities recorded within 1km of the Site (11 within 250 metres of the Site), all refer to sinkholes or solution pipes. The closest entry (a sinkhole) is located approximately 40 metres south of the Site (no further details are available with respect to these features) **(Appendix 14.2).**

14.55 The 2015 Delta-Simons geotechnical assessment **(Appendix 14.2)** identified mixed soils with low density in borehole location BH407 (located in the former Polycell factory area, adjacent to the former tank farm) from 13.80 m to 17.10 m bgl with possible voiding between 14.8 m to 16.0 m bgl. The evidence observed in borehole locations BH407 was described by Delta-Simons as likely to be caused by dissolution features which are described in CIRIA C574. Delta-Simons state that evidence of the existing development in the surrounding area does not suggest that dissolution features represent a significant risk to overall land stability but are at least likely to affect localised areas. Delta-Simons state that it is unlikely that borehole BH407 encountered the only dissolution features, or the worst case of loose ground within the Site.

Hydrogeology

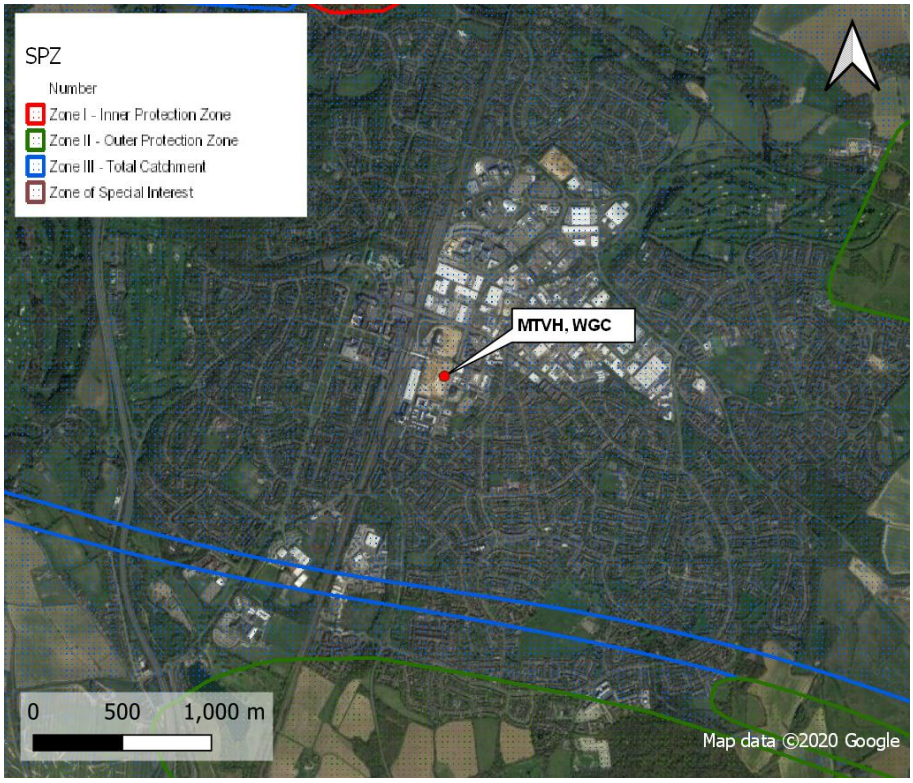
14.56 As detailed in the Delta-Simons Phase 1 Environmental Assessment report **(Appendix 14.1)** and according to the Environment Agency's aquifer designation maps, the geological sequence underlying the Site is classified as follows:

- Made Ground (Unproductive Strata) – No specific hydrogeological significance although localised perched water may be present within made ground although not often encountered during previous site investigations.
- Kesgrave Catchment Subgroup (Secondary A Aquifer) – Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers.
- Lowestoft Formation (Unproductive Strata) – Rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow.
- Chalk Group (Principal Aquifer) – High intergranular and / or fracture permeability, usually providing a high level of water storage. May support water supply and / or river base flow at a strategic scale.

14.57 The Site is in Zone 3 (Total Catchment) of a groundwater source protection zone (SPZ) (Figure 14.4). There are no potable water abstractions within close proximity to the Site; however, as the Site is located in SPZ, it confirms that the groundwater resources in the area are used for drinking water supply.

Figure 14.4: Source Protection Zones

https://environment.data.gov.uk/spatialdata/source-protection-zones-merged/wms



14.58 The BGS website indicates that there is one borehole record associated with the Site and 11 borehole records within 250 m of the Site boundary. The data indicates relatively deep groundwater within the area as the most recent borehole record on Site (BGS Ref: TL21SW11) indicates groundwater at a depth of 22.42 m depth below datum (mbd). The boreholes surrounding the Site indicate similar groundwater levels except for the boreholes to the northwest of the Site which indicated that no groundwater was encountered due to the superficial geology of clay.

14.59 Information obtained from the Delta-Simons reports indicates that the (long-term) resting groundwater levels recorded in all investigation in the chalk aquifer were recorded between 20.0 m and 26.0 m bgl. Similar groundwater levels were reported during the most recent EAME and J F Hunt remedial works.

14.60 According to the Delta-Simons Phase 1 Environmental Assessment report **(Appendix 14.1)**, the nearest current licensed groundwater abstraction is located approximately 1.3 km northwest of the Site and used for golf course irrigation.

14.61 Groundwater abstractions for 'chemical – process water' are also recorded approximately 100 m south of the Site on the former Roche Products Ltd site. However, as this area has been recently redeveloped with residential properties it is considered likely that this abstraction is no longer active. In addition, a further abstraction 340m North of the Site, used by Rank Xerox Ltd for miscellaneous industrial processing is listed as revoked, lapsed or cancelled.

Hydrology

14.62 There are no surface water features located on the Site. The nearest surface watercourse is located approximately 320 m north of the Site. The nearest mainline surface watercourses to the Site are the River Mimram (1.75 km north) and the River Lee (1.76 km south southwest) (Figure 14.5).

Figure 14.5: Mainline Rivers

https://catalogue.ceh.ac.uk/maps/a78c90a2-8da4-4f0a-9c6a-c1d1a4a3c2b0

14.63 Information provided within the Envirocheck report included with the Delta-Simons Phase 1 Environmental Assessment report **(Appendix 14.1)** indicates that there are no licensed abstraction points from surface water within 1 km of the Site.

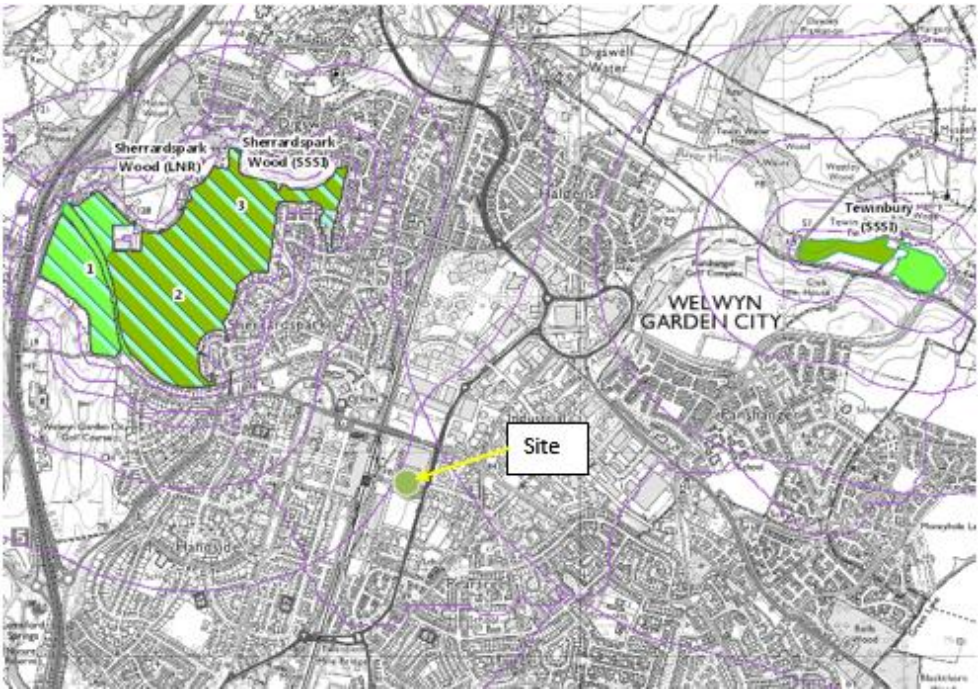
14.64 According to the EA flood mapping the Site is within Flood Zone I (low risk) and is not at risk of flooding from rivers. Parts of the Site are predicted to be at risk of surface water flooding (Ref 13.7). It is important to note that flooding from surface water is difficult to predict as rainfall location and volume are difficult to forecast. In addition, local features can greatly affect the chance and severity of flooding. Further details are outlined within Chapter 1 (Hydrology).

Ecological Receptors

14.65 The MAGIC website which is managed by the Department for Environment, Food and Rural Affairs (Defra), was queried (Ref. 14.8) to locate Sites of Special Scientific Interest (SSSI), Special Protection Areas (SPAs), Special Areas of Conservation (SACs), Ramsar Sites, National Nature Reserves (NNR), Areas of Outstanding Natural Beauty (AONB), National Parks and Local Nature Reserves (LNR) within 1-km of the Site. The closest designated site is the Sherrard Spark Wood SSSI, located c.940 metres to northwest of the Site (Figure 14.6). A full assessment of ecological and nature conservation impacts is outlined within Chapter 12.

Figure 14.6: Environmental landscape and ecological designations

https://magic.defra.gov.uk/magicmap.aspx

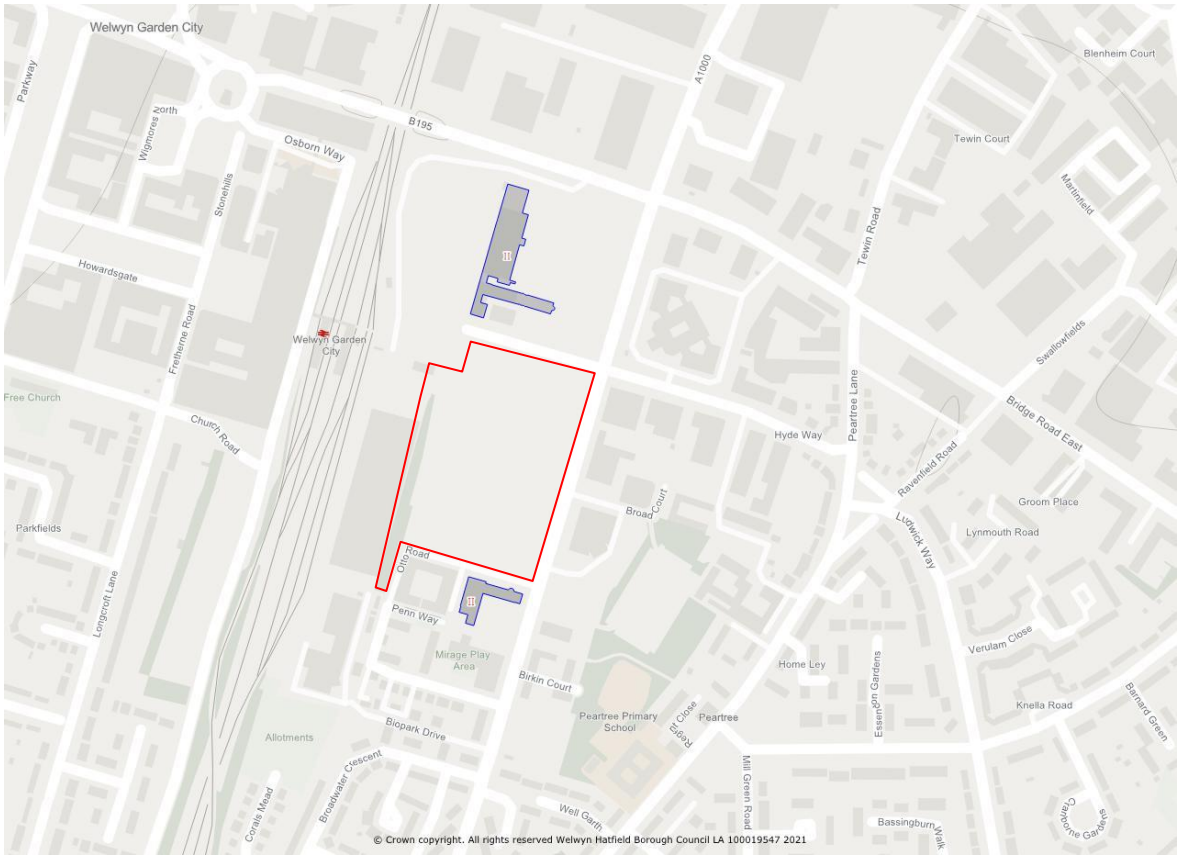


Protected Buildings

14.66 Both the MAGIC (Ref. 14.8) Historic England (Ref. 14.9) and Welwyn Hatfield Borough Council (Ref. 14.5) websites were queried to locate Scheduled Monuments, World Heritage Sites and Listed Buildings within 1-km of the Site. There is one listing associated with the Wheat Quarter site i.e. The Nabisco Shredded Wheat Factory, Reference1101084, Grade II, Legacy UID158251 (Figure 14.7) and there is a single listed property immediately adjacent to the southern boundary of the Phase One development i.e. an Office Block (Buildings 1 to 4) To Roche Products Factory, Reference1348142, Grade II, Legacy UID158234.

Figure 14.7: Listed Buildings

https://gis.welhat.gov.uk/CommunityMaps/



14.67 The edge of the Welwyn Garden City conservation area is located 140 metres west of the Site. There are no Tree Preservation Orders (TPOs) related to the Site.

Significance of the Environmental Setting

14.68 The significance of the environmental setting is considered by EAME to be as follows:

- **Groundwater [HIGH SENSITIVITY]** – The Site is partially located on a Secondary A Aquifer and a Secondary (Undifferentiated) Aquifer (superficial deposits) and underlain by a Principal Aquifer (bedrock). The site is in the Total Catchment (Zone 3) of an SPZ. 13.57. According to the Delta-Simons Phase 1 Environmental Assessment report **(Appendix 14.1),** the nearest current licensed groundwater abstraction is located approximately 1.3 km northwest of the Site and used for golf course irrigation.
- **Surface Water [LOW SENSITIVITY]** – The nearest mainline surface watercourse to the Site is the River Mimram (1.75 km north) and the River Lee (1.76 km south southwest).
- **Flood Risk [LOW SENSITIVITY]** – The site is not located in area at risk of flooding due to Rivers. Parts of the Site are predicted to be at risk of surface water flooding.
- **Ecological Sensitive Areas [LOW SENSITIVITY]** – The closest designated site is the Sherrard Spark Wood SSSI, located c.940 metres to northwest of the Site.
- **Protected Buildings and Structures [MODERATE SENSITIVITY]** – There is one listing associated with the Wheat Quarter site i.e. The Nabisco Shredded Wheat Factory, Reference 1101084, Grade II, and one property immediately adjacent to the southern boundary of the Phase 1 development i.e. Office Block (Buildings 1 to 4) to Roche Products Factory, Reference 1348142, Grade II.
- **Residential Areas [HIGH SENSITIVITY]** – With respect to residential properties the Site is in a highly sensitive area (i.e. residential receptors are currently located adjacent to the southern boundary of the Phase 1 area).

Environmental Licenses and Permits

14.69 According to the Envirocheck report included within the Delta-Simons Phase 1 Environmental Assessment **(Appendix 14.1)**, a registered landfill and waste treatment site, dated 1979, relating to a soakaway for aqueous effluent waste and industrial effluent treatment sludge is recorded on the Site associated with the former Polycell Product Ltd facility. The maximum input rate is listed as less than 10,000 tonnes per year.

14.70 The following licenses and permits are recorded in the area surrounding the Site:

- one discharge consent (expired) was located 330 m north of the Site;
- one environmental permit (former Integrated Pollution Prevention and Control permit) relating to a lead recovery process operated by British Lead Mills Ltd 190m East of the Site. The former Roche Products Ltd facility to the South of the Site was previously permitted for the manufacture and use of organic chemicals;
- the nearest former Local Authority Pollution Prevention and Control environmental permit sites relate to dry cleaners located 210m west and 260m north west and a petrol filling station 230m east of the Site;
- the nearest pollution incident to 'Controlled Waters' relates to a category 3 – Minor pollution incident associated with the release of unknown chemicals approximately 230m northeast of the Site in 1991;
- the nearest landfill to the Site is located approximately 1-km south and is dated 1965. The waste types accepted are not specified. The nearest waste facility is a vehicle depollution facility located approximately 350m northeast of the Site. A former waste transfer (with treatment) facility is recorded on the Xerox site approximately 25 m north of the Site and a former waste solvent storage facility is recorded on the Roche site approximately 100 m south of the Site;
- the nearest petrol filling station is located approximately 230m east of the Site; and
- other listed facilities near the Site include: garage services, MOT testing centres, pharmaceutical manufacturers & distributors, sheet metal works and laboratories.

Principal Sources of Contamination Identified at the Site

14.71 The principal sources of contamination identified at the Site in the historical review provided in the Delta-Simons Phase 1 Environmental Assessment report **(Appendix 14.1)** are recorded as former above and below ground solvent and fuel tanks (i.e. the tank farm indicated in Figure 14.2), Polycell liquids production area and boiler houses.

14.72 Potential off-Site sources of significant contamination are recorded as a former chemical and pharmaceutical works to the south of the Site and an engineering works and iron foundry to the north and northeast, however these are not considered by Delta-Simons to pose a significant risk to the Site.

14.73 Several phases of investigation, dating back to 1998, have been completed at the Site by Dames and Moore and Delta-Simons which identified significant volatile organic compound (VOC) solvent contamination of the groundwater in the underlying chalk aquifer and localised soil contamination, considered to be associated with the former tank farm in the Polycell factory part of the Site (Zone S03). Detailed descriptions of the numerous phases of investigation undertaken at the Site by Dames and Moore and Delta-Simons are provided in the Delta-Simons Phase 1 Environmental Assessment report presented as **Appendix 14.1**. However, a summary of the main findings is provided below:

- the key contaminants were recorded to comprise 'White Spirit' characterised by a mix of light end aliphatic hydrocarbons, dichloromethane, naphthalene, ethylbenzene and xylenes. Non-aqueous phase liquid (NAPL) free product was identified on the surface of the groundwater at a depth of approximately 22 m below ground level (bgl) within the chalk.
- elevated concentrations of total petroleum hydrocarbons (TPH) and volatile organic compounds (VOC) were identified within shallow made ground around the periphery of the tank farm. The contamination is considered by Delta-Simons to have been caused by leakages from the pipework associated with the tank farm, or from the USTs/AST themselves.
- elevated concentrations of TPH, semi-volatile organic compounds (SVOCs) and VOC at depth within the chalk aquifer, in the direction of the identified groundwater flow (primarily to the southeast) are considered by Delta-Simons to be associated with the free product on the surface of the groundwater and relate to a smear zone caused by fluctuations in the height of the water table.
- groundwater monitoring undertaken by Delta-Simons prior to remediation works identified that the dissolved contamination was reaching the boundaries of the Site and investigation on the adjacent former Shredded Wheat Factory area of the Site to the north identified deep groundwater contamination in a few boreholes, which has been identified as originating from the tank farm in the Polycell factory part of the Site.
- ACMs were identified in the current and former Site buildings and fragments were identified on the Site surface around the demolished buildings in the south of the Site. Lagged pipes with asbestos warning labels were identified within below ground ducts in the south of the Site.

14.74 Widespread, or significant contamination has not been identified elsewhere at the Site by Delta Simons. However, they concluded that further site investigation would be required prior

to redevelopment to confirm that the remainder of the Site is suitable for its intended use. These additional works were undertaken by EAME in 2017/2018. **(Appendix 14.3).**

Remediation Works 2008 - 2013

14.75 To address the identified groundwater contamination at the Site, a long-term strategy was agreed between the landowner and the Regulators (Environment Agency and Welwyn Hatfield Borough Council) to undertake a voluntary remediation scheme to reduce the environmental risks and liabilities.

14.76 A remediation strategy and monitoring programme was devised following a detailed quantitative risk assessment (DQRA) completed by Delta-Simons in December 2005. The main objective was to remove the major source of contamination present at the Site, comprising the tank farm and surrounding impacted shallow soils and the free product on the groundwater at depth beneath the tank farm to prevent the continued contamination of groundwater from the source area. The secondary objective of the remediation programme was to remediate the dissolve phase groundwater contamination to the derived remedial targets, to minimise the effect on the wider groundwater environment.

14.77 The remediation scheme comprised a combination of techniques to remove the source of the contamination and address the dissolved phase contamination plume across the wider Site. These included:

- Tank pull and soil excavation – completed September/ October 2008;
- Excavation validation – completed October 2008;
- On-Site ex-situ biopile remediation – completed July 2009;
- Pump and Treat groundwater remediation/ Free product recovery – completed January 2011;
- Soil vapour extraction – completed January 2011;
- Oxygen releasing compound injection – completed early January 2011; and
- Monitored natural attenuation (MNA) – October 2008 to September 2015.

14.78 Details of the various phases of remediation undertaken at the Site are provided below. A summary is also provided in the Delta-Simons Phase 1 Environmental Assessment report included as **Appendix 14.1.**

Tank Pull and Soil Excavation Phase

14.79 The tank pull and soil excavation phase of the remediation works was undertaken between September and October 2008. Thirteen tanks were found to be present below a concrete surface in two separate tank farms. The Western tank farm contained five tanks of various capacities in a relatively poor condition. Significant visible hydrocarbon contamination was noted within the base and at the sides of the tank farm. The Eastern tank farm contained eight tanks of equal capacity and of more recent construction and better condition. Visible hydrocarbon contamination was also less apparent in the base and at the sides.

14.80 The tanks were removed from the Site for recycling by a specialist sub-contractor. Prior to removal the tanks were degassed and confirmed to be free of liquid contents. Following removal, the concrete bases were broken out and removed for disposal at an appropriate facility. Surrounding impacted soils were excavated to a depth of approximately 3 m with an area of approximately 30 m by 30 m. Localised highly impacted areas were excavated to a depth of approximately 4.5 m bgl. The most significant contamination was noted around former pipework runs and the former off-set filling point.

14.81 Contaminated soils were run through an Allu screening bucket prior to being transferred to biopiles to promote bioremediation.

14.82 Following excavation of the contaminated soils to the required depth, verification sampling was carried out by Delta-Simons at the base and sides of the excavation to confirm that the source had been effectively removed. A total of 62 soil samples were collected and submitted for analysis of speciated TPH and VOC.

Excavation Verification Analysis

14.83 The excavation verification sample analysis results were compared to Site-specific remedial target values (RTVs) derived for the protection of groundwater and Human Health for the key contaminants. In addition, the results were compared to generic screening criteria for the protection of Human Health for all contaminants in the context of a proposed residential end-use (without private gardens).

14.84 None of the target contaminant concentrations were above the Site-specific remedial target values for groundwater. Exceedances of the Site-specific remedial target values for the protection of Human Health were recorded in 8 of the 62 validation samples. However, as the samples were taken from the base and sides of the excavation (at approximately 2m to 3m

depth) which was subsequently backfilled to original levels, the comparison to the screening values is for information only.

Biopile Remediation Verification Analysis

14.85 Composite samples were taken by Delta-Simons from each of the six biopiles. Remedial target values protective of human health and groundwater at the Site boundary were derived using Scotland and Northern Ireland Forum for Environmental Research guidance and the Environment Agency's 'Methodology for the Derivation of Remedial Targets for Soil and Groundwater to Protect Water Resources' respectively.

14.86 The results demonstrated that concentrations of VOC and 'light end' speciated TPH typically ranged from less than the laboratory limit of detection to negligible. Slightly elevated levels of 'mid – heavy end' speciated TPH concentrations were identified, however none of the composite samples exceeded the derived values for the protection of Human Health or Groundwater.

14.87 Two composite samples were collected and submitted for waste classification (WAC) analysis. Testing confirmed that the bioremediation of the excavated soil has been successful in reducing contaminants down to concentrations which are below inert threshold limits for disposal to landfill.

Groundwater Remediation

14.88 The groundwater remediation system was installed by the remediation contractor, Eneotech Ltd and comprised a modular 'pump and treat' system including separation, aeration and activated carbon filtration.

14.89 A network of 40 No. 100mm diameter remediation wells were installed in the source area to abstract the contaminated groundwater and re-inject treated water. The remediation wells were installed to a depth of 30mbgl on a 7 to 10m grid, the majority of which were located within the footprint of the tank farm, whilst a number were placed outside this area up and down gradient of the source area.

14.90 During the remediation borehole drilling works significant VOC concentrations were recorded using field instruments throughout the boulder clay and upper chalk deposits. The decision was then taken that a Soil Vapour Extraction (SVE) module would need to be added to the remediation plant to remove product smeared through the unsaturated zone below the tank

farm. The SVE module removed adsorbed and free phase solvent contamination within the vadose and smear zones. Due to the high volatility of the free product, it was calculated that 70 tonnes of hydrocarbons were removed in the gas phase. The bulk of the contamination was removed between March and November 2009, with negligible recovery from August 2010 indicating that the remediation scheme had reached steady state and further operation of the plant was no longer required.

14.91 The final stage of the groundwater remediation works comprised the injection of Oxygen Releasing Compound (ORC) into the groundwater in early 2011 to raise dissolved oxygen levels within the aquifer and promote the biodegradation of the contaminants.

Groundwater Monitoring (Monitored Natural Attenuation)

14.92 An ongoing groundwater monitoring programme was implemented by Delta-Simons to assess the effectiveness of the active remediation phase and long-term remediation through MNA based on the following schedule:

- monthly monitoring between October 2008 and March 2009;
- quarterly monitoring between June 2009 and September 2013; and
- six monthly until monitoring completion in September 2015.

14.93 Groundwater samples are collected from up to 22 monitoring wells across the Site during each monitoring visit, with samples submitted for analysis for speciated TPH, VOC and naphthalene:

- Speciated TPH – TPH contamination at the Site has significantly reduced since the remediation programme commenced in September 2008. The average concentrations show a clear declining trend in the source area and down gradient TPH concentrations;
- VOC & Naphthalene – Groundwater samples were submitted for VOC analysis comprising a suite of approximately 55 compounds, as of September 2013, 21 of these compounds remained identifiable in the groundwater at the Site. In addition, naphthalene, a semi volatile polycyclic aromatic hydrocarbon (PAH), is also included within the groundwater analysis suite. Concentrations of the identified VOC concentrations have reduced significantly over time, dissolved phase concentrations as of September 2013 were typically 90 – 99% lower than the previously identified maximum concentrations. Although the VOC results often show a large variance between each round, the overall results show an

overall declining trend over time. The monitoring wells at the edge of the plume show generally low, but more variable concentrations over time with a less clear overall trend.

Remediation Findings and Conclusions (2015)

14.94 The results show that the source removal and ex-situ soil remediation have proven to be successful in removing the bulk of the soil contamination source near the Polycell tank farm and treating the contaminated soils.

14.95 The active groundwater remediation phase was successful in removing free product from the groundwater, with free product not recorded on the groundwater table from March 2010 to the reporting of the Delta-Simons Phase 1 Environmental Assessment report in December 2013. In addition, the soil vapour extraction system removed approximately 70 tonnes of volatile compounds from the soils beneath the former tank farm.

14.96 The results of the ongoing monitoring programme indicate that the groundwater remediation scheme has been effective in significantly reducing the dissolved phase hydrocarbon and VOC contamination within the source zone. It is noted however that although contamination levels within the groundwater beneath the former tank farm remain significantly elevated, the identified concentrations are below the 2005 derived remedial target values.

14.97 The results continue to show that concentrations of contaminants within the monitoring wells down hydraulic gradient of the source area are showing an overall declining trend, whereas monitoring wells to the South of the main plume show highly variable, but generally reduced concentrations.

Environmental Site Assessment Works 2017 - 2018

14.98 To address one of the current planning requirements i.e. N6/2015/0294/PP – Planning Condition No. 1 *("A site investigation scheme, based on the submitted phase 1 Environmental Assessment (Delta-Simons ref 2342.17 V2) to provide information for a detailed assessment of the risk to all receptors that may be affected, including those off site"*) a proposed scope of works was submitted to and approved by WHBC on 7th November 2017 (Planning Ref. 6/2017/2142/COND). It is important to note that the following discussion also includes monitoring wells within the Phase One area as the investigation encompassed the entire site (i.e. Phase One to Phase Three areas).

14.99 The works involved the following:

- Assessment of all historic wells to ascertain suitability for continued groundwater monitoring purposes followed by the collection of 22 groundwater samples using a low flow sampling technique.
- Excavation of 6 new boreholes to a maximum of 40 m bgl followed by the collection of 6 groundwater samples using a low flow sampling technique .
- Excavation of 24 locations using a windowless sampling technique to a maximum depth of 5 m bgl.
- Analysis of 51 soil samples for a wide range of determinands aligned to the site history.
- Five rounds of ground gas monitoring from nine installed locations.

14.100 Limited evidence of shallow soil contamination was identified. The only exceedences of the stated screening values related to Arsenic (3 samples), Beryllium (4 samples) and 1,2,4-Trimethylbenzene (1 sample).

14.101 The site investigation works completed along with data from the subsequent laboratory analysis suggested that residual petroleum hydrocarbon contamination was present (at depth) in the soils and groundwater beneath the former tank farm/remediation area.

14.102 The groundwater beneath the Site is present within the Lewes Nodular and Seaford Chalk Formations. Appraisal of groundwater monitoring data suggests that two groundwater units are present beneath the Site; an upper unit within the more weathered 'putty' chalk and a deeper unit within the Principal Chalk Aquifer. The data also suggests that there is a downward head gradient between the shallow and deeper groundwater within the chalk. This is not uncommon in the chalk where the 'putty chalk' acts a leaky confining layer between shallow groundwater contained in the putty chalk itself and the deeper groundwater within the Principal Chalk Aquifer. Based on the monitoring data groundwater flow in the chalk is interpreted to be to the south east.

14.103 Concentrations of petroleum hydrocarbons have been recorded above relevant water quality standards and, on this basis, a detailed hydrogeological quantitative risk assessment has been undertaken. Based on the petroleum hydrocarbon contaminant characteristics key risk drivers were identified for assessment using bespoke EA approved modelling packages (RTW & ConSim v 2.5).

14.104 The results of the risk assessment suggest that there is potential for impacts on off-site groundwater quality from residual groundwater contamination. However, the empirical site data demonstrates a clear reduction in petroleum hydrocarbon concentrations down hydraulic gradient.

14.105 Notwithstanding the empirical site data, based on the recorded elevated concentrations of petroleum hydrocarbons in groundwater and the sensitivity of the Principal Chalk Aquifer it was considered that remedial actions would be required in the form of environmental betterment. Any remedial actions will need to take into consideration current best practice guidance, including the principals of sustainable remediation.

14.106 The full results of the investigation are provided within **Appendix 14.3.**

Remediation Strategy 2018

14.107 In-light of the EAME site investigation a formal Remediation Options Appraisal, Remediation Strategy, and Verification Plan was developed and agreed with the EA.

14.108 Based upon the review of options, the optimal remedial strategy is a degree of intense targeted intervention using a combination of pump and treat and chemical injection now followed by longer term monitoring, where natural biochemical processes will take place. The proposed remediation methodology and key stages are outlined below. All works are to be undertaken and co-ordinated by John F Hunts who have extensive experience of and competence in groundwater remedial works and have experience of such in the chalk aquifer that is the subject of this remedial programme. The specific stages were:

- Stage 1 – Pre-trials (Basic Pump and Vac-Ex Trials) – This will comprise the provision of basic groundwater pumping trials and vac-ex trials to inform zone delineation works and define remediation parameters. The installed equipment will include base loading pneumatic pumps, air-lines, discharge hoses, rotron air movers, knock-out pots, carbon drum filters, ancillary pipework and compressor. In other words, the installations will serve both as monitoring or data gathering wells and abstraction points. During this stage all pumped groundwater will be stored within IBCs until full-scale groundwater treatment is started.
- Stage 2 – Pre-Commencement Works – This involves the production of health and safety documentation i.e. risk assessment/method statement/CoSHH assessment for the main phase of works. During this process deployment of

Mobile Plant Permit (MPP) to undertake the remediation and application for consent to discharge to foul sewer from Thames Water will be obtained.

- Stage 3 – Installation of the Remediation Borehole Injection Grid – The strategy assumes approximately a 6-metre grid pattern over an area of 30 metre x 12 metre (360 m2) to coincide with the original source area (tank farm). Eighteen (18) x boreholes will be required in total to achieve this configuration. This assumes utilisation of existing borehole BH01-17 as one of the remediation boreholes therefore a total of 17 new additional boreholes will be excavated. Initially 5 of the boreholes will be utilised for delineation & remediation (drilled to a depth of circa 30m depth), with the remaining 12 new boreholes drilled to a depth of circa 28m (these will be remediation only boreholes). All drilling will be undertaken using a Sonic Drilling Rig. All abstracted water will be temporarily stored within above ground water tanks prior to testing and eventual sewer releases (in-line with the prevailing discharge consent). After the drilling the boreholes and the necessary well infrastructure installation, one round of groundwater monitoring will be undertaken from the delineation/remediation borehole grid (required to determine reagent dosing concentrations/flow rates). The monitoring will also include selected EAME and historic boreholes. A maximum of 28 samples shall be obtained and analysed for TPHCWG, target SVOCs, target VOC and key MNA parameters.
- Stage 4 - Main Remediation Works – To initially mobilise any persistent non-aqueous phase liquid (NAPL) a gross source removal activity will be undertaken through the pressurized injection of proprietary reagents via the installed pipework array. After the injection process, a Pump & Treat (P&T) System/Hydraulic Containment & Recirculation (limited capacity) process is to be undertaken. The equipment proposed will include a Water Treatment Plant, settlement tanks, oil-water interceptor, sand filters, granular activated carbon (GAC) filters, borehole pumps/hoses, pipework and manifold. Two proprietary reagent injection campaigns have been included within the programme each followed by a P&T process to remove the mobilised pollutants and breakdown products. Where required spent GAC will be disposed of (off-site) or regenerated.
- Stage 5 – Decommissioning of the Boreholes – All 18 x boreholes utilised during the remediation process will be subject to decommissioning in-line with Environment Agency Guidance 4, 5 when no longer required for monitored natural attenuation.

14.109 The full document is provided within **Appendix 14.4.**

Remediation and Verification 2018

14.110 The agreed remediation strategy was implemented between 5th June 2018 and 17th September 2018.

14.111 One of the key observations from the 2018 remediation was that, although a NAPL was clearly present (or could be created by pumping the groundwater down and creating a local cone of depression), at times up to 300mm thick, this reduced to trace levels at the end of the remedial programme in all monitoring wells. The total volume of recovered NAPL, however, was very low. This means that the total mass of NAPL in the area is also very low.

14.112 Moreover, when considering the NAPL thickness and presence against groundwater level, it appears that the NAPL only becomes evident at certain groundwater depths. These limited response zones for NAPL suggest that rather than there being an extensive pool of NAPL resting on the groundwater contiguously over a wide area, the NAPL is instead sat in discrete lenses in the chalk that only manifest themselves in groundwater when the water table passes through those zones.

14.113 The 2018 remedial programme removed several kg of dissolved phase hydrocarbons and up to 50 litres of free phase NAPL. Furthermore, at the onset of the remedial programme the maximum observed NAPL thickness was 50mm, by the end of the remediation programme the NAPL was effectively absent.

14.114 Whist residual contamination remains deep below the site surface and thus periodically in contact with the groundwater, we believe that there is little opportunity to achieve further sustainable removal of this material i.e. the site conditions are very challenging in terms of the depth of contamination, groundwater flow characteristics and fragmented/sporadic nature of the residual NAPL.

14.115 It was concluded that the residual contamination was not prejudicial to the development objectives as the conditions do not pose a threat to site users and infrastructure and will not be exacerbated by the implementation of the development proposals.

14.116 The remediation, verification and monitoring plan is provided in **Appendix 14.5**.

14.117 After the remediation J F Hunt undertook a 12-month groundwater monitoring programme which was submitted to the EA for approval **(Appendix 14.6).**

14.118 The EA recommended discharge of planning condition 23 (Remediation Groundwater Monitoring) (Planning Ref. N6/2015/0294/PP and 6/2019/3208/COND) on 24 January 2020.

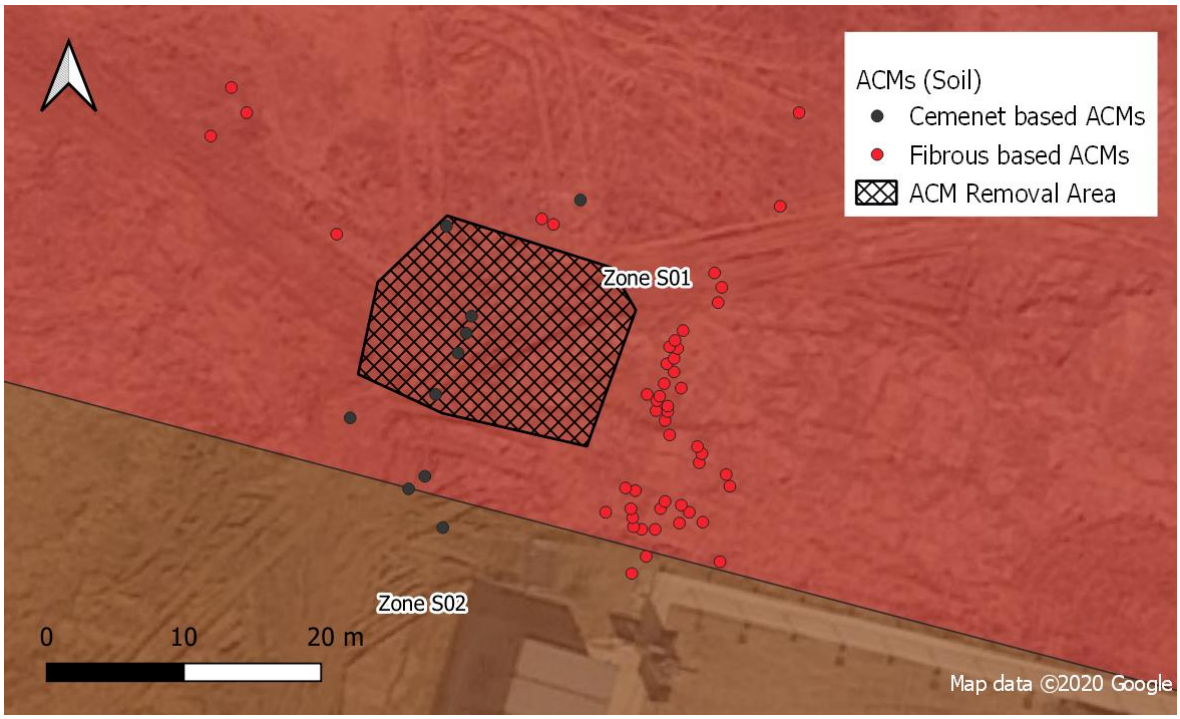
ACM Removal (Soils)

14.119 Localised asbestos containing materials (ACMs) were identified at the Site in the soils in one area beneath the concrete slab during the initial demolition/site-turn-over works (Figure 14.8). The materials were identified as Pipe Insulation (Hard-set) and Asbestos Insulating Board (AIB).

14.120 A Method Statement and Risk Assessment for the removal of these materials was produced by Omega Environmental Services Ltd (Ref. Risk Assessment & Method Statement For The Safe Removal Of Asbestos Containing Materials, Job Number: H179). The removal project was started on 19/11/2018 and was completed on 17/12/2018.

Figure 14.8: ACM removal area

Map data ©2020 Google



14.121 All works were undertaken to ensure compliance with the *Control of Asbestos Regulations 2012* including extensive personnel and environmental monitoring by HFS Environmental Ltd.

14.122 All waste was stored within a 35-cu yd enclosed rolonof before removal as hazardous waste (EWC 17-06-01) under consignment note Ref. OMEGAE/71917, (4,000 kg).

Phase 2 and Phase 3 Geoenvironmental Investigation

14.123 In December 2018, Curtins were instructed by Metropolitan Thames Valley Housing (MTVH) to undertake a Supplementary Ground Investigation Report at Former Shredded Wheat Factory, Welwyn Garden City. The Supplementary Ground Investigation has been undertaken in support of the redevelopment of the Site for six multi-storey residential accommodation blocks with areas of open space, roadways and parking spaces.

14.124 As the remediation planning conditions were discharged by the earlier EAME/J F Hunt works the Curtins investigation was to enable refinement of the design i.e. structural, civil and landscape elements of the Proposed Development.

14.125 The site investigation fieldworks were undertaken in March and April February 2019 by Harrison Group Ltd monitored by a Curtins Engineer. The investigation comprised the following: cable percussive boreholes, machine excavated trial pits, cone penetration testing, window sample boreholes, piling monitoring wells, in-situ geotechnical testing together with the logging and representative sampling of the site soils for environmental and geotechnical testing.

14.126 In general, the revealed ground model was consistent with the recorded geological succession and recent turnover of site soils. Made Ground comprising either Topsoil, demolition material or re-worked superficial deposits extended to 1.80m bgl to 4.80 m bgl. Thereafter either Lowestoft Formation or Kesgrave Catchment were encountered initially fine (soft and firm clays) and coarse-grained soils (gravels), respectively to depths of circa 9.80m bgl to 14.40m bgl. Thereafter bedrock of the Lewes Nodular and Seaford Chalk was encountered initially comprising low density Dm grade chalk to depths of predominately between 17.0m to 24.0m bgl with medium density Dc grade chalk (inferred from SPT values) thereafter (base not encountered).

14.127 The recommendations from the further works included:

- the production of a grouting specification to mitigate the localised dissolution features present within the north-western corner of Block 12 as identified as part of Delta Simons (BH407) and EAME investigation (Z5).
- importation of ‘clean’ Topsoil to form 450mm of cover within soft landscaping covering the shortfall of existing material.

- Production of a Materials Management Plan (MMP) combined with a Developer's Method Statement detailing the requirements for importation of material (Topsoil and fill to the southern area) required to obtain necessary site levels and environmental measures for construction phase to ensure the current planning conditions (environmental) are suitability discharged.
- given the results of the geotechnical testing undertaken on re-worked superficial soils, it is recommended that an earthworks strategy up to depths of 2.0m bgl is undertaken predominately comprising the re-compaction of shallow soils to form suitable platform levels and support required piling matt for each of the proposed blocks.

14.128 The report is provided within **Appendix 14.7.**

Long Term Monitoring 2020 - onwards

14.129 The Remediation Verification and Monitoring Plan **(Appendix 14.5)** also included a Long-term Monitoring Plan which was agreed with the EA.

14.130 The plan outlined the monitoring of seven strategic monitoring wells to be monitored every 6 months for a period of 18 months. A delay to the long-term monitoring plan occurred due to COVID-19 and it was agreed, with the EA, that a six-month deferent was appropriate. The first round of the monitoring was undertaken in October 2020.

14.131 The conclusions (from this first round of monitoring) were the conditions were largely as previously described subsequent to the completion of the remediation activities **(Appendix 14.8).**

14.132 The remaining monitoring rounds will be undertaken in April 2021 and October 2021. After that date the monitoring wells will be maintained and protected within landscaped areas or areas of hardstanding.

IDENTIFICATION AND EVALUATION OF KEY EFFECTS

14.133 This section considers the potential effects of the Proposed Development, both during the construction and operational phases.

14.134 The regime for contaminated land was set out in Part 2A (ss.78A-78YC) of the *Environmental Protection Act 1990* (EPA), as inserted by S.57 of *The Environment Act 1995* and came into effect in England on the 1st April 2000 as '*The Contaminated Land (England) Regulations 2000* (SI 2000/227)'. These regulations were subsequently revoked through the provision of '*The Contaminated Land (England) Regulations 2006* (SI 2006/1380)', which came into force on 4th August 2006, and consolidated the previous regulations and amendments. The 2006 regulations were modified with the introduction of *The Contaminated Land (England) (Amendment) Regulations 2012*, which came into force on 6th April 2012. Under Part 2A of the EPA Section 78A(2), "contaminated land" is defined as "land which appears… to be in such a condition, by reason of substances in, on or under the land, that –

- significant harm is being caused or there is a significant possibility of such harm being caused; or
- pollution of controlled waters (including streams, lakes and groundwater) is being, or is likely to be caused.

14.135 Based on the above factors, an initial qualitative assessment of the presence of potential pollutant linkages can be undertaken. The results of the Qualitative Risk Assessment are outlined within **Appendix 14.3** and are in-line with CIRIA guidance C552 (Ref. 14.10).

Demolition and Construction

<u>Effects on Human Health from Ground Contamination, Vapours and Ground Gas</u>

14.136 Earthworks would primarily involve the excavation drainage systems, piling and the breaking up of any remaining existing structures, floor slabs and hardstanding. Whilst remediation works have been undertaken within the area of the former Polycell tank farm there is a potential for a degree of residual soil and groundwater contamination to be present and earthworks have the potential to disturb and expose demolition and construction workers to this, particularly during excavation activities. In addition, there is a potential for contamination hot spots to be present in areas of the Site not yet investigated, although the likelihood of this is low as the site was subject to a 2-metre turn over during the demolition phase. Demolition and construction workers could potentially be exposed to any such contamination during earthworks.

14.137 The investigations at the Site have not identified significantly elevated concentrations or flows of ground gases. There nevertheless remains the potential for ground gas (generated from made ground soils or organic soils beneath the Site) to accumulate in poorly ventilated confined spaces, thereby posing a risk to demolition and construction workers. In addition, previous investigation at the Site has highlighted the potential for residual contamination within the soils to generate vapour, particularly around the former (remediated) Polycell tank farm, but potentially locally across the Site, which could also migrate into confined spaces, thereby posing a risk to demolition and construction workers. However, all previous works *e.g.* intrusive investigations and Soil Vapour Surveys suggest the likelihood is low.

14.138 A refurbishment/demolition asbestos survey of all buildings and ducts was undertaken prior to demolition and site clearance. All ACMs were subject to licensed removal before site hand-over to MTVH.

14.139 Localised asbestos containing materials (ACMs) were identified at the Site in the soils in one area beneath the concrete slab during the initial demolition/site-turn-over works (Figure 14.8). ACMs pose a potential risk to demolition and construction works and the public through inhalation pathways.

14.140 All demolition and construction workers would be subject to mandatory health and safety requirements under the Construction (Design and Management) (CDM) Regulations 2015 (SI 2015/51) and the Control of Substances Hazardous to Health (COSHH) Regulations 2002 (SI 2002/2677) (as amended). Groundworkers should be made aware of the possibility of encountering contaminated soils and asbestos in made ground through toolbox talks. Safe working procedures should be implemented, good standards of personal hygiene should be observed and appropriate levels of personal protective equipment (PPE) and respiratory protective equipment (RPE), provided and utilised, thereby minimising the risk of exposure to potentially contaminated soils, dust, ACMs, vapour, ground gases and groundwater. Controls would be noted within a formal Construction Environmental Management Plan (CEMP).

14.141 Adherence to these legislative requirements would significantly reduce the health and safety risk posed to demolition and construction workers to a low level. Therefore, the likely effect would be insignificant.

14.142 In the event of exposing soils and stockpiling demolition and construction waste arisings (including excavated materials), dust could be generated during dry and windy conditions. Under these conditions, surrounding residents and the public could temporarily be exposed to

potentially contaminated dust or asbestos fibres. In the absence of mitigation, the effect is likely to be temporary, local, adverse and of minor significance.

Effects of Contamination on Controlled Waters

14.143 Existing buildings have been demolished and areas of hardstanding at ground level have been broken out to accommodate the Proposed Development, allowing increased rainwater and surface run-off infiltration to the subsurface. This could potentially mobilise localised areas of contamination not identified during previous phases of Site investigation which could then migrate vertically into the underlying Principal aquifer. However, it is recognised that when considered in the context of the known contamination associated with the former Polycell tank farm, the potential effects associated with unknown contamination are likely to be relatively minor.

14.144 To facilitate construction, it is anticipated that new sources of contamination would be introduced and stored on the Site in the form, for example, of diesel fuel, oils, chemicals and other construction materials. As a result, there would be a risk of leakages or spillages directly or indirectly into the ground thus impacting the underlying Principal Chalk aquifer.

14.145 Piled foundations at the Site are likely to be founded within the underlying Principal Chalk bedrock aquifer identified from depths of between 8.4 m and 16.6 m bgl, proven to a maximum depth of 30.0 m bgl. Consequently, piling has the potential to create a preferential pathway for the lateral and vertical migration of contaminants into the Principal Chalk aquifer.

14.146 Overall, the likely effects of demolition and construction on the quality of groundwater is temporary, local, adverse and of minor significance.

14.147 The closest surface water body to the Site is located approximately 320 m north of the Site. Given the distance from the Site it is not considered to be a sensitive receptor and, as such, no effect on surface water is likely.

Effects on Human Health from Ground Dissolution

14.148 Previous investigation at the Site has identified localised dissolution features. Ground dissolution occurs when water passing through rocks that are susceptible to erosion (e.g. chalk) produces underground cavities and cave systems. These cavities reduce support to the ground above and can cause localised collapse of the overlying rocks and deposits. In their Factual and Interpretative Geotechnical Report **(Appendix 14.1**), Delta-Simons state that unaffected

existing development in the surrounding area indicates that dissolution features do not represent a significant risk to overall land stability but are at least likely to affect localised areas. Consequently, it is considered that ground dissolution represents a potential risk of localised subsidence/ground collapse (though this is considered unlikely). Consequently, in the absence of mitigation, effects are likely to be temporary, localised, adverse and of minor significance.

Completed Development

Effects on Human Health from Ground Contamination, Vapours and Ground Gas

14.149 Much of the Proposed Development will be comprised of either building footprint or hardstanding surfacing (roads, pavements, etc.) which would form a barrier between occupants and users of the Site and any contamination that may be present. The current proposals also include green space (e.g. shared gardens, amenity grassland, raised bed allotments etc.) and play space. As the allotments are proposed as raised beds it is highly unlikely that any residual contaminants would be taken up by vegetables and fruit plants and ingested. In-line with the latest Curtins assessment **(Appendix 14.7)**, following the turnover of site soils, the current risk to future site users is considered Low, with the recommendation of 450 mm of Topsoil (consisting of existing material – western boundary and importation of topsoil material) is placed within soft landscaping areas. This is to protect future site users from any remaining (localised) ACMs within re-worked soils as part of the enabling works.

14.150 Consequently, in the absence of mitigation, the potential for long-term exposure to contaminated soils by future occupants is considered possible albeit localised in nature. In the absence of mitigation, the effects of ground contamination on human health are long-term, Site-wide, adverse and of moderate significance.

14.151 Previous investigations have highlighted the potential (although low) for residual contamination within the soils at the Site to generate vapours, particularly near the former Polycell tank farm area. These vapours could potentially migrate into buildings at the Site, thereby posing a risk to future occupants, Site users/ visitors and sub-surface maintenance workers. In the absence of mitigation, the effects of vapour on human health are long-term, Site-wide, adverse and of minor significance.

14.152 Investigations at the Site have not identified significantly elevated concentrations or flows of ground gases. There remains a potential (though of limited significance) for ground gas (generated from made ground soils or organic soils beneath the Site) and volatile contaminants (such as hydrocarbons) to accumulate in buildings, thereby posing a risk to future occupants

and Site users through asphyxiation or explosion. The risk to future occupants and Site users is long-term, Site-wide, adverse and of minor significance.

Effects of Contamination on Controlled Waters

14.153 The Proposed Development does not include land uses likely to give rise to significant contamination. Any hazardous materials kept on the Site would be stored and maintained in accordance with relevant legislation which aims to reduce contamination risks. Whilst accidental spillages cannot be ruled out (for example, from the storage of hazardous materials and/or fuel spillages, the Development would be predominantly buildings and drained hardcover which would prevent most of the rainwater and surface run-off infiltration into the ground. The drainage system would be designed to avoid the discharge of any fuels or oils that have entered the system into the underlying groundwater.

14.154 The nearest surface water course to the Site is located approximately 320 m north of the Site. The distance of the water course from the Site and the lack of significant contamination sources associated with the Proposed Development once completed is such that water quality is unlikely to be affected.

14.155 Taking the above into account, the likely effect of the Proposed Development on Controlled Waters once completed is insignificant.

Effects on Human Health and Property from Ground Dissolution

14.156 The potential for localised instability associated with ground dissolution cannot be discounted. Instability could potentially affect the structural integrity of the Proposed Development which could subsequently have a significant effect on the human health of occupants, Site users or sub-surface maintenance workers. Consequently, in the absence of mitigation, effects are long-term, local, adverse and of moderate significance.

Effects on Buried Structures and Services from Ground Contamination.

14.157 Buried structures and services associate with the Proposed Development would be suitably designed for the ground conditions at the Site to ensure that the integrity of the materials is maintained. This may include a requirement for sulphate resistant concrete and/or Water Regulations Advisory Scheme (WRAS) approved barrier water supply pipes (Ref. 14.11 and Ref. 14.12). Consequently, in the absence of mitigation, effects are long-term, Site-wide, adverse and of minor significance.

Effects on Vegetation from Ground Contamination

14.158 Areas of soft landscaping within the Proposed Development would be constructed using existing material (from the western boundary) and importation of clean imported soils. Therefore, an effective barrier would exist between any residual contamination at the Site and areas of vegetation. Consequently, in the absence of mitigation, effects are long-term, local, adverse and of minor significance.

ASSESSMENT OF CUMULATIVE EFFECTS

14.159 The cumulative schemes considered within the assessment are outlined within Chapter 3. This list also includes additional cumulative schemes identified in the Scoping Opinion by WHBC. The most significant scheme is the neighbouring development *i.e.* the Former Shredded Wheat Factory Site – North Side.

14.160 Effects relating to ground conditions and contamination are typically site-specific. As such, it is considered highly unlikely that any nearby committed developments have the potential to give rise to effects that could interact with those arising from the Proposed Development.

14.161 Furthermore, as with the Proposed Development, the potential for contamination and associated risks and effects would be identified by the applicants to ensure that each development would be 'suitable for use' in accordance with the requirements of Part IIA of the *Environmental Protection Act, 1990* and associated planning conditions. All demolition and construction activities would also be controlled and managed via the implementation of both relevant legislative requirements and best practice guidance to minimise contamination risks and effects to the environment to acceptable levels. The likely demolition and construction related cumulative ground conditions and contamination effects would therefore be insignificant.

Inter-Relationship Effects

14.162 There are inter-relationships identified between this topic and Chapter 12: Water Quality, Hydrology and Flood Risk. The effects of soils contamination have the potential to cause surface water and groundwater quality effects, this has been taken into account in the assessments.

ENHANCEMENT, MITIGATION AND RESIDUAL EFFECTS

Demolition and Construction

Effects on Human Health from Ground Contamination, Vapours and Ground Gas

14.163 The site characterisation and required remediation works have been completed in-line with current best practice guidance (Ref 14.1, Ref. 14.13 and Ref. 14.14) and the associated planning conditions discharged.

14.164 During the construction phase, a Construction Environmental Management Plan (CEMP) would be implemented which would include the following precautions to minimise the exposure of Site workers and the public to potentially harmful substances:

- adherence to the Control of Substances Hazardous to Health Regulations 2002 (as amended) and the Construction Design and Management Regulations 2015;
- adherence to current best practice standards for working on contaminated sites such as CIRIA C132 (Ref. 14.15) and HSE HS(G)66 **(Ref. 14.16**);
- the requirement for all Site workers to wear and utilise appropriate and well maintained Personal Protective Equipment (PPE) and, where necessary Respiratory Protective Equipment (RPE);
- the provision of adequate welfare facilities and procedures to enable Site workers to wash and change;
- the erection of appropriate hoardings around the works;
- the use of dust suppression techniques;
- the provision of wheel washing facilities for vehicles leaving the Site;
- the regular cleaning of Site access roads;
- the avoidance of stockpiling any contaminated materials but where this is not possible, the covering of stockpiled material on the Site and of materials being transported to and from the Site;
- removal of all excavated material in line with relevant legislation. For example, any excavated material to be removed off-Site, would be subject to chemical testing and a hazard assessment. Waste Acceptance Criteria (WAC) tests (Ref. 14.7) would be carried out, as necessary to classify the waste. Waste would need to be transported, treated and disposed of in accordance with *The Waste (England and Wales) Regulations 2011*.

14.165 WAC testing would be required to confirm the disposal classification prior to disposal. Any Made Ground would likely be classified as either 'hazardous' or 'non-hazardous'. The natural soils would be expected to be classified as inert.

14.166 Following the classification of excavation wastes, the options available for the waste would be considered in the context of the waste hierarchy:

- On-site reuse (with or without prior treatment);
- Off-site reuse (with or without prior treatment), e.g. use of waste in construction at a site exempt from the requirement to hold an environmental permit; and
- Off-site disposal (with or without prior treatment), i.e. landfill.

14.167 A formal Materials Management Pan (MMP) shall be developed combined with appropriate method statements, detailing the requirements for internal soil movements, placement and importation of material required to obtain necessary site levels. Where required, the developer will make appropriate use of the CL:AIRE Definition of Waste: Code of Practice (Ref. 14.8).

14.168 All waste transfer documentation shall be maintained by the Principal Contractor for the required statutory period (i.e. two years for general waste and three years for hazardous waste).

14.169 The risk of harm to human health during demolition/construction works from ground contamination would be low. Therefore, the likely residual effect on human health during the demolition and construction works would be minor beneficial.

Contamination of Controlled Waters

14.170 The site characterisation and required remediation works have been completed in-line with current best practice guidance (Ref 14.1, Ref. 14.13 and Ref. 14.14) and the associated planning conditions discharged. Long-term groundwater monitoring will continue into the construction phase in-line with the agreed strategy.

14.171 A Foundation Works Risk Assessment (FWRA) should be prepared in consultation with the Environment Agency (Ref. 14.19) to minimise contamination risks in relation to the underlying Principal Aquifer. This should include formal development of a Piling Monitoring Programme and Mitigation Strategy including use of EA approved trigger values.

14.172 Based on the Curtins assessment and underlying SPT results it is recommended that piled foundations are advanced into sufficient (<2m thick) uniform bedrock strata that, in general, corresponds with the medium density chalk deposits underlying the site encountered at depths of between 20.00m to 24.00 m bgl. Further design details are outlined within **Appendix 14.7.**

14.173 The following measures would be included within the CEMP and implemented to minimise the potential risk to Controlled Waters during demolition and construction:

- the provision of adequate drainage to manage surface water run-off and minimise contaminated water reaching the ground;
- the handling and storage of any potential hazardous liquids / materials in accordance with relevant legislation and Environment Agency Pollution Prevention Guidance;
- the use of appropriately tanked and bunded storage areas for fuels, oils and other chemicals; and
- procedures for the management of materials, spillage and spill clean-up, use of best practice construction methods and monitoring.

14.174 No underground storage tanks will be used during the construction phase. Any liquids such as degreasers, oils or diesel required as part of the construction works will be stored in above ground tanks and located on designated areas of hardstanding. In accordance with the *Control of Pollution (Oil Storage) (England) Regulations 2001*, any tanks storing more than 200 litres of oil will have secondary bunding. Bunding will be specified having a minimum capacity of 'not less than 110% of the container's storage capacity or, if there is more than one container within the system, of not less than 110% of the largest container's storage capacity or 25% of their aggregate storage capacity, whichever is the greater'.

14.175 During construction, dewatering of groundwater from excavations is possible (though unlikely). Should dewatering be necessary, care will be taken to ensure the quality of this water is sufficiently high to allow discharge into the municipal sewer. Prior to the construction phase, discussions will be held with the local water company to ascertain if such disposal would be possible. Alternatively, if the quality of the groundwater is unsuitable for discharge to sewer, collection and off-site disposal to a suitably licensed waste facility will be undertaken.

14.176 Establishment of an appropriate piling methodology and implementation and adherence to a CEMP would ensure that the introduction of new contaminant sources is minimised as far as possible and consequently the likely residual effect on the quality of the groundwater as a result of the demolition and construction phase is considered to be minor beneficial.

Effects on Human Health from Ground Dissolution Features

14.177 Curtins noted that CPT149 located within Block 12 adjacent to two previously identified dissolution features (Z5 and BH407), identified potential 'soft spots' from circa 4.0m to 12.00m bgl and as such, it is likely that such dissolution features are primarily limited to this north-western region of Block 12. Consequently, it is recommended that this area is grouted prior to the adoption of pile foundations within this area. A grouting specification will be developed to mitigate localised dissolution features.

14.178 Where potential dissolution features are identified, design and construction mitigation and/or remediation would be implemented as necessary to ensure that risks to future demolition and construction personnel are minimised. As such, the likely residual effects of ground dissolution on future demolition and construction personnel are insignificant.

Completed Development

Effects on Human Health from Ground Contamination, Vapour and Ground Gas

14.179 The site characterisation and required remediation works have been completed in-line with current best practice guidance (Ref 14.1, Ref. 14.13 and Ref. 14.14) and the associated planning conditions discharged.

14.180 In general, based on the current condition of the shallow site soils (uncompacted reworked superficial soils), Made Ground predominately greater than 1 m across the site and the required piled foundation solution, a suspended floor slab is recommended for most of the development. In addition, ground gas protection measures are not considered a requirement.

14.181 Following the turnover of site soils, the current risk to future site users is considered Low, with Curtins Consulting Limited recommending 450mm of Topsoil (consisting of existing material – western boundary and importation of Topsoil material) within soft landscaping areas. The Proposed Design standards and requirements are outlined within **Appendix 14.7.** Taking this into account, the likely residual effect of ground contamination on future occupants, Site visitors and sub-surface maintenance workers would be insignificant.

Contamination of Controlled Waters

14.182 No specific mitigation measures are required (post piling). The six long-term monitoring wells are to be incorporated into the Proposed Development design within areas of hardstanding

or landscaping. The likely residual effects of the Development on Controlled Waters (once completed) are insignificant.

Effects on Human Health and Property from Ground Dissolution

14.183 The chosen pile design would consider the presence of potential dissolution features, which may include design and construction mitigations, spanning affected areas following discovery and capping, pre-pile probing, grouting, and use of different factors of safety and engineering redundancy. No specific mitigation measures are required (post implementation of the agreed grouting scheme).

14.184 Taking the above mitigation into consideration it is considered that risks associated with ground dissolution would be mitigated as far as practicable and consequently the likely residual effect on future occupants, Site visitors and sub-surface maintenance workers would be insignificant.

Effects Buried Structures and Services from Ground Contamination.

14.185 No mitigation measures are required. The residual effects of the Proposed Development on buried structures and services once completed are insignificant.

Likely Effects to Vegetation from Ground Contamination

14.186 No mitigation measures are required. The residual effect of the Proposed Development on vegetation once completed is insignificant.

SUMMARY

14.187 An assessment of ground conditions and contamination has been undertaken using the findings of a desk-based study and intrusive site investigation undertaken at the Site over many years.

14.188 The various phases of site investigation identified significant contamination of the groundwater underlying the Site and localised soil contamination around the former Polycell Factory tank farm. Remediation measures were therefore used to address this former source of contamination and groundwater testing has established that levels of contamination have significantly decreased within the groundwater as a result. Widespread, or significant contamination has not been identified elsewhere on the Site.

14.189 A Foundation Works Risk Assessment (FWRA) should be prepared in consultation with the Environment Agency to establish the appropriate piling methodology to minimise groundwater risks. In addition, several measures for good site management have been recommended to minimise exposure of workers and the public to potentially harmful substances during demolition and construction.

14.190 In addition to the specific remediation measures (already implemented), the provision of building footprint and hardstanding across most of the Site and the provision of clean topsoil in areas of soft landscaping would result in a very low risk of harm to human health and the wider environment following completion of the Proposed Development.

14.191 The overall effect of the scheme is generally positive and will bring about effective land remediation and will minimise further leaching/mobilisation of residual soil and groundwater contamination located at depth.

Table 14.7: Soils, Geology and Contaminated Land Summary Table

Potential Effect	Nature of Effect (Permanent or Temporary)	Significance	Mitigation/ Enhancement Measures	Residual Effects
Demolition & Construction Effects on human health from ground contamination, vapours and ground gas	Temporary Local	Minor Adverse	Site investigation and remediation Construction Environmental Management Plan (CEMP)	Minor beneficial
Demolition & Construction Contamination of controlled waters (Principal Aquifer)	Temporary Local	Minor Adverse	Site investigation and remediation CEMP Foundation Works Risk Assessment (FWRA)	Minor beneficial
Demolition & Construction Effects on human health and property from ground dissolution	Temporary Local	Minor Adverse	Site investigation and remedial action CEMP Risk assessment	Negligible
Completed development Effects on human health from ground contamination, vapours and ground gas	Permanent Site-wide	Minor Adverse	Site investigation and remediation Use of engineering design (barriers and clean break layers)	Negligible
Completed development Contamination of controlled waters (principal aquifer)	Permanent Site-wide	Insignificant	No specific mitigation measures are required	Negligible
Completed development Effects on human health and property from ground dissolution	Permanent Local	Moderate Adverse	Site investigation Risk assessment Engineering measures (capping, pre-pile probing, grouting, and use of different factors of safety and engineering redundancy)	Negligible
Completed development Effects on Buried Structures and Services from Ground Contamination	Permanent Site-wide	Minor Adverse	Site investigation and remediation Selection of appropriate construction materials and water pipes	Negligible
Completed development Effects on Vegetation from Ground Contamination	Permanent Site-wide	Minor Adverse	Site investigation and remediation Use of engineering design (barriers and clean break layers)	Negligible

GLOSSARY OF TERMS

ACM	Asbestos Containing Material
AOD	Above Ordnance Datum
AONB	Areas of Outstanding Natural Beauty
AST	Above-ground Storage Tank
BGS	British Geological Society
BRE	Building Research Establishment
CDM	Construction Design and Management
COMAH	Control of Major Accident Hazards
COSHH	Control of Substances Hazardous to Health
CEMP	Construction Environmental Management Plan
CIRIA	Construction Industry Research and Information Association
CLR	Contaminated Land Report
CSM	Conceptual Site Model
DEFRA	Department for the Environment, Food and Rural Affairs
DQRA	Detailed Quantitative Risk Assessment
EA	Environment Agency
EAME	Earth & Marine Environmental Limited
EIA	Environmental Impact Assessment
EPR	Environmental Permitting Regulations
EPA	Environmental Protection Act
FWRA	Foundation Works Risk Assessment
FRA	Flood Risk Assessment
HSE	Health and Safety Executive
IBC	Intermediate Bulk Container
IPPC	Integrated Pollution Prevention and Control
LNR	Local Nature Reserve
MNA	Monitored natural attenuation
NAPL	Non-aqueous phase liquid
NBN	National Biodiversity Network
NGR	National Grid Reference
NNR	National Nature Reserve
NPPF	National Planning Policy Framework
NVZ	Nitrate Vulnerable Zone
ORC	Oxygen Releasing Compound
PACM	Potential Asbestos Containing Material

PAH	Polycyclic aromatic hydrocarbon
PHE	Public Health England
PPC	Pollution Prevention and Control
PPE	Personal Protective Equipment
PPG	Pollution Prevention Guidance
PPS	Planning Policy Statement
QRA	quantitative risk assessment
RPE	Respiratory Protective Equipment
RTV	Remedial Target Value
SAC	Special Areas of Conservation
SNCI	Site of Nature Conservation Importance
SPA	Special Protection Areas
SPZ	Source Protection Zone
SSSI	Sites of Special Scientific Interest
SVE	Soil Vapour Extraction
SVOC	Semi-Volatile Organic Compound
TPH	Total Petroleum Hydrocarbons
TPO	Tree Preservation Order
UST	Underground Storage Tank
VOC	Volatile Organic Compound
WAC	Waste Acceptance Criteria
WFD	Water Framework Directive
WHBC	Welwyn Hatfield Borough Council
WML	Waste Management Licence

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Ref. 14.14: British Standards (2015). BS 5930:2015+A1:2020 Code of practice for ground investigations.

Ref. 14.15: Construction Industry Research and Information Association (CIRIA) (1996), CIRIA report C132, A Guide for Safe Working on Contaminated Sites.

Ref. 14.16: Health and Safety Executive (HSE) (1991), HS(G)66 Protection of Workers and the General Public during Development of Contaminated Land.

Ref. 14.17: Environment Agency (2021). Guidance on the classification and assessment of

Waste (1st Edition v1.1.GB), Technical Guidance WM3 [online] available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/948735/Waste_classification_technical_guidance_WM3.pdf

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15 CULTURAL HERITAGE

INTRODUCTION

15.1 This chapter presents the assessment of effects of the Proposed Development on built heritage assets. It should be read in conjunction with the standalone Heritage Statement, produced by Citydesigner to support the application. The Heritage Statement can be found in **Appendix 15.1** and sets out in detail the following:

- Citydesigner's methodology for assessment of heritage impacts;
- a general record of the historical development of the site and the surrounding area;
- a description of the existing site and its townscape context;
- an assessment of the effects on heritage assets and their settings, with reference to relevant verified views; and
- the conclusions of the study.

15.2 The Heritage Statement also includes three appendices. Appendix A contains the full listing descriptions, extracted from the Historic England database, of the heritage assets assessed. Appendix B includes verified views of the Proposed Development from Hatfield House Park, West End and Essendon Conservation Area zoomed at 600% of the size they are presented at in **Appendix 11.3**: 'Viewpoints Sheets and Wireline Assessment' of the ES, to better illustrate the effects on heritage assets. Appendix C sets out the visualiser's, Vista3D, method statement for producing the verified views.

15.3 The methodology developed by Citydesigner to assess the likely effects of the Proposed Development on heritage assets is set out in detail in chapter 2.0 of **Appendix 15.1**: 'Heritage Statement'. It takes into account relevant legislation, national and local planning policy and guidance relating to heritage assets. It also covers the following topics: EIA scoping; defining the study area; design quality and its relevance to assessments; establishing the baseline conditions; heritage assessment – baseline; assessment of effects on heritage receptors; demolition and construction effects; mitigation and enhancement through design; assumptions and limitations; professional standpoint of the author; photography in AVR production and assessment; using an original copy of this document. It has not been repeated in this chapter.

15.4 The Heritage Statement provides the final assessment of the effects of the Proposed Development on the setting of nearby heritage assets, in accordance with planning policy and guidance. Particular regard has been given to the setting of the Welwyn Garden City

Conservation Area, the Grade I listed Hatfield House and the Grade I registered Hatfield House Park. The assessments were informed by the visual assessment of verified views undertaken as part of the townscape and visual assessment. They were also informed by the baseline information and the evaluation of heritage assets contained within the Heritage Statement.

15.5 For the purposes of the heritage assessment, the illustrative design of the outline component of the application has been taken into account as the design quality is an important consideration and is secured via the Design Code. The consultancy considered the complete illustrative design, including detailed architectural drawings submitted as part of the application and the rendered photorealistic AVRs produced by Vista 3D, which are based on these. They are set out in ColladoCollins' 'Design and Access Statement' and 'Design Code – Phase 3 – Blocks 8 & 13' documents submitted with this application and in **Appendix 11.3**: 'Viewpoints Sheets and Wireline Assessment' of the ES. The maximum parameter envelope of the outline scheme is 800mm higher than the illustrative scheme. This does not alter the likely residual effects in the Heritage Statement. The AVR for view 22B from Hatfield House Park's Deer Park is considered based on the maximum parameter diagram in chapter 6.0 of the Heritage Statement, in order to illustrate the above.

BASELINE CONDITIONS

Overview of Heritage Assets the setting of which may be affected by the Proposed Development

15.6 The Site is not located within a conservation area, however the Welwyn Garden City Conservation Area, covering the town centre, is located to the west of the Site beyond the East Coast Mainline railway lines. The Peartree Conservation Area is also in close proximity, south of Site. The Essendon Historic Core Conservation Area, located 5.4km south-east of the Site, has also been considered in the Heritage Statement following consultation with Gascoyne Cecil Estates.

15.7 There are no listed buildings within the Site. The Grade II listed former Shredded Wheat Factory is located alongside Hydeway, directly north of the Site. The Grade II listed former office block of the Roche Factory lies to the south of the Site. Several listed buildings of importance lie approximately 4km to the south of the Site, including many in the Old Town of Hatfield and principally Hatfield House, which is Grade I listed. Although Hatfield House is a significant distance away from the Site, the elevation of the Proposed Development brings this asset into consideration.

15.8 The Heritage Statement also takes into consideration the Grade I registered Hatfield House Park, as it has a visual relationship with the Site.

15.9 WHBC does not maintain a list of non-designated heritage receptors and therefore none have been independently assessed in the Heritage Statement. The assessments of effects on conservation areas, however, have taken into account all buildings that contribute to their character and appearance, including buildings of architectural or historic value. The Welwyn Garden City Conservation Area Appraisal identifies a number of key unlisted buildings within its boundary, which fall under one or more of the following criteria: a) age, b) authenticity, c) architectural significance, d) local technological significance or innovation, e) historic significance, and f) townscape significance. The key unlisted buildings likely to be affected by the Proposed Development are referred to in chapter 6.0 of the Heritage Statement, in the consideration of two views from within the boundary of the conservation area (views 7 and 8).

15.10 In chapter 5.0 of the Heritage Statement, the aforementioned heritage assets have been mapped and their history, significance, baseline characteristics, and character and appearance have been described in detail. In the commentary for each heritage asset, which is accompanied

by a photograph of the asset, the consultancy have established *whether* and to *what degree* the setting of the heritage assets contributes to their significance.

LEGISLATION, PLANNING POLICY AND GUIDANCE

15.11 The local planning authority (as decision-maker) is expected to take account of the statutory requirements set out in the Planning (Listed Buildings and Conservation Areas) Act 1990 (as amended).

15.12 The Heritage Statement also considers the following national and local planning policy and guidance:

- Ministry of Housing, Communities & Local Government (MHCLG), National Planning Policy Framework (NPPF), 2019;
- MHCLG, Planning Practice Guidance (NPPG), On-line Resource, 2014, regularly updated;
- MHCLG, National Design Guide, 2019;
- Historic England (HE), Historic Environment Good Practice Advice in Planning (GPA), Note 2: Managing Significance in Decision-Taking in the Historic Environment, 2015;
- HE, Historic Environment GPA, Note 3: The Setting of Heritage Assets, Second Edition, 2017;
- HE, Historic Environment GPA, Note 4: Tall Buildings, 2015 and Second Edition Consultation Draft, 2020;
- HE Advice Note 1: Conservation Area Appraisal, Designation and Management, 2019;
- HE Advice Note 12: Statements of Heritage Significance: Analysing Significance in Heritage Assets, 2019;
- Welwyn Hatfield Borough Council (WHBC), Saved Policies of the Welwyn Hatfield District Plan, 2005;
- WHBC, Draft Local Plan, 2016;
- WHBC, Broadwater Road West, Supplementary Planning Document, 2008; and
- Place Services for WHBC, Hatfield, Heritage Assessment, February 2019.

15.13 The assessment of the Proposed Development against relevant policy and guidance is included at the end of chapter 5.0 of the Heritage Statement.

IDENTIFICATION AND EVALUATION OF KEY EFFECTS

Likely Significant Effects

Demolition and Construction

15.14 Demolition and construction effects are considered temporary and short-term. They would typically be adverse in terms of townscape and visual receptors, as the Proposed Development is erected behind scaffolding and with the visible use of heavy machinery. Though temporary, construction effects could also be potentially significant, especially for people (visual receptors) who live or work in the area of the Site.

15.15 In the case of heritage assets, the effects due to demolition and construction are temporary and will not result in an effect on their significance or special interest. This is because their significance arises from their intrinsic architectural or artistic and historic value. These works may however be visible within the settings of heritage assets, which could be considered adverse. These effects will be experienced visually and are therefore covered as part of the visual effects during demolition and construction in Chapter 11 'Townscape and Visual Amenity' of the ES, prepared by Bradley Murphy Design. This approach is in line with HE's guidance as set out in GPA Note 3.

Completed Development

Likely Effect on the Significance of the Welwyn Garden City Conservation Area

15.16 Although the Proposed Development would be visible from within the conservation area, this visibility would add to the existing development that forms the skyline without causing harm to the setting or significance of the conservation area, since this existing skyline is neither formed of contributing buildings or the visibility of the Proposed Development would be so slight as to not be significant. This is described further in chapter 6.0 of the Heritage Statement, where the assessment of the effect of the Proposed Development on the setting of the conservation area is set out, alongside two verified views taken from within its boundaries (Views 7 and 8). There would, therefore, be **no effect** on the conservation area's significance. Further views from within the conservation area have been described and assessed in visual and townscape terms in Chapter 11 'Townscape and Visual Amenity' of the ES.

Likely Effect on the Significance of the Peartree Conservation Area

15.17 Owing to the distance from the Site to the Peartree Conservation Area, the Proposed Development would not affect views from within the conservation area and would not harm its setting. There would be **no effect** on the conservation area's setting or its character and appearance.

Likely Effect on the Significance of the Essendon Historic Core Conservation Area

15.18 The Proposed Development would not be visible from within the boundaries of Essendon Historic Core Conservation Area. Distant views of the proposals would be glimpsed from the public footpath, to the north-west and outside the conservation area, as illustrated in the rendered AVR prepared by the visualisers, Vista 3D, for View 23 (see Appendix B of the Heritage Statement). Limited visibility screened by vegetation may be possible from within the rear gardens of private properties on the north side of West End Lane that form the north-western boundary of the conservation area. A number of these properties are Grade II listed. Even with this very limited visibility, there would be **no effect** on the significance of the conservation area.

Likely Effect on the Significance of the Grade II listed former Shredded Wheat Factory

15.19 Since the existing setting is in a parlous state, not becoming of the asset but with the prospect of defined development under Council policy, the opportunity exists for a new setting to enhance the significance of the retained Shredded Wheat Factory buildings. This would be achieved with an architectural language that complements the retained Shredded Wheat factory buildings and enhances their setting.

15.20 The proposed change to the setting of the listed building, compared to the existing wasteland, is a significant enhancement. The significance of the former Shredded Wheat factory buildings is to be made accessible to the public and is, therefore, better revealed within a new townscape that has the heritage asset as its centre piece. In the 'extant planning permission', the Shredded Wheat factory forms the focal point for the development in both the North and South Sides. This focal point is reinforced by the 'weave' in the South Side, a central green route that leads to the factory buildings and the associated public realm. The landscaped 'weave' is maintained in the Proposed Development for Phases Two and Three successfully linked with the consented Phase One. The verified View 15 prepared by the visualisers, Vista 3D, and included in **Appendix 11.3**: 'Viewpoints Sheets and Wireline Assessment' of the ES, shows the vista created by the 'weave' through the length of the development site from south to

north. The silos feature in this view to the north, framed within the vista by the buildings of the consented Phase One of the South Side to the east and the proposed buildings for Phases Two and Three to the west. This spatial response combined with contrasting materials within the architecture, ensures that the silos are highly visible from the south. This represents a significant improvement from the former setting, which historically comprised a relatively dense footprint of industrial buildings that dominated the site.

15.21 Within the view from the railway station platform to the west (View 6 in **Appendix 11.3** of the ES) the former Shredded Wheat factory buildings can be glimpsed between the buildings of the 'extant planning permission' in the North Side. The high quality architecture of the proposed Phases Two and Three of the South Side would be visible directly to the south. Closer to the Site, within View 10 from the Network Rail footbridge (included in **Appendix 11.3** of the ES), the factory buildings would be mostly obscured by the new setting represented by the 'extant planning permission' in the North Side. This is due to the strong north-south axis of the masterplan for both the North and South Sides. The massing proposed for Phases Two and Three of the South Side would step up along the railway lines, responding to the massing consented on the North Side and taking into consideration distant views of the silos.

15.22 View 7 from the Welwyn Garden City Conservation Area (included in chapter 6.0 of the Heritage Statement) shows the visibility of the silos from Howardsgate. As described in chapter 3.0 of the Heritage Statement, the building of the Howard Centre in 1990 blocked views of the listed building from the conservation area and views of the industrial area in general, allowing only glimpses to be seen. This was not the original intention of Louis De Soissons's plan, which included a smaller scale railway station at the eastern end of Howardsgate, enabling the visibility of the industrial zone above the station from Howardsgate. The Proposed Development of Phases Two and Three would not affect the limited visibility of the silos from Howardsgate, which would remain. In views from the Campus, the taller element of the proposed Phase Three would only marginally be seen in conjunction with the listed silos, as can be seen in View 8 in chapter 6.0 of the Heritage Statement. However, it would be de minimis and visually separated from the silos through the use of contrasting materials.

15.23 In some of the long distance views from Hatfield House and Hatfield House Park, there would be a minor further reduction in visibility of the silos compared to the extant consented scheme. This change would not harm the significance of the silos as there is no significant historical architectural link between these heritage assets.

15.24 While some of the proposed buildings are of a similar height to the listed silos, they are positioned well away from them and, owing to the form of their upper parts, they are recessive

forms (scalloped) compared to the silos which are expressive forms (convex). The silos are also white and stand out as special in their central location, whereas the Proposed Development is subdued in colour and part of a general townscape. These steps of proximity, architectural form, and contrast in colour visually separate the proposed development from the listed silos, ensuring that the silos will always be the dominant feature. The immediate setting of the listed former Shredded Wheat factory would be enhanced by the Proposed Development, which has been spatially arranged to allow the listed building to be the centre-piece of the wider masterplan. This enhancement of the setting would **better reveal the significance** of the factory buildings to the large number of people that will occupy and visit this site.

Likely Effect on the Significance of the Grade II listed Office Block (Buildings 1-4) to Roche Products Factory

15.25 The setting of the Roche building has substantially changed over time and part of that setting is the now cleared Site. The extant consent of Phase One South Side is located directly south of the Site, in close proximity to the Roche building, to north of Otto Road. The Proposed Development would not alter the building's relationship to Broadwater Road and therefore would have **no effect** on the significance of this listed building.

Likely Effect on the Significance of the Grade I listed Hatfield House

15.26 The Grade I listed Hatfield House is of the highest significance and it has been at the forefront of the design team's concerns from the start of the development of the new scheme. The effect of the Proposed Development on the setting of Hatfield House is twofold: 1) it serves to reduce the distracting effect of the white painted listed silos in views from the southern approach leading to an enhancement of the setting; and 2) it provides a greater level of visible built form in the view, which is of a subdued nature as a result of the choice of materials.

15.27 Harm would occur to an aspect of significance of the Grade I listed Hatfield House. That aspect of significance concerns its setting at certain points along the southern approach, where one is only aware of the House in its green landscape. That aspect of significance is already harmed by the former Shredded Wheat factory's silos and would have been more so harmed before the extensions to the original silos were removed. Nonetheless, it is still harmful to the setting. Both the 'extant planning permission' and the Proposed Development would add to this harm, but, by virtue of the subtle use of materials proposed and their colour, would, at the same time, also reduce the harm caused by the silos. As illustrated in the verified View 20C (included in chapter 6.0), the Proposed Development would cover some of the silos with a townscape of softer, earthy hues. It must be remembered that this view is kinetic and begins, at the far end

with the skyline of Welwyn providing the animated silhouette of the House with an urban backdrop (see figure 5.22). As this subsides by moving northward, the silos appear and distract to the right of the House (figure 5.20), but with the Proposed Development in place, would much less so. This would lead to a very low level of **'less than substantial harm'**, particularly when all factors have been taken into account. An assessment of the effect on the setting of Hatfield House, drawing on the verified Views 19B and 20C prepared by Vista3D is set out in chapter 6.0. Additional views set in out in Appendix B of this report further illustrate the effect.

Likely Effect on the Significance of the Grade I Registered Hatfield House Park

15.28 Areas within the Grade I registered Hatfield House Park currently enjoy views of the Welwyn skyline. The Proposed Development would constitute a slight increase in visibility. Through the use of darker tones to the materiality, the effect of the Proposed Development on the setting of the registered Park would be mitigated. There would be **no effect** on the significance of the registered park. A number of verified views from Hatfield House Park have been studied by Vista 3D. An assessment of the effect on the setting, drawing on viewpoints 19B, 20C and 22B is set out in chapter 6.0 of the Heritage Statement. Additional views set out in Appendix B of the Heritage Statement further illustrate the effect.

ASSESSMENT OF CUMULATIVE EFFECTS

15.29 In addition to an assessment of the heritage effects of the Proposed Development in isolation, the Heritage Statement also considers the effects of the Proposed Development when assessed in combination with other cumulative developments. Cumulative developments include committed schemes i.e. development currently under construction and developments with planning consent; and emerging schemes, i.e. developments submitted for planning permission. The cumulative schemes considered as part of the EIA were agreed with WHBC in advance through the EIA scoping process.

15.30 Of the cumulative schemes identified through the EIA scoping process, the 'extant planning permission' for the Former Shredded Wheat Factory Site - North Side and Phase One of the South Side, and the 2021 revised development proposals for the North Side (Wheat Quarter) are relevant for the Heritage Statement. As these schemes are directly adjacent to the Site, the Proposed Development would, in most cases, be experienced in conjunction with them. Neither the 'extant planning permission' nor the 2021 revised development proposals for the North Side are sufficiently visible beyond the application scheme for there to be a cumulative effect any different than the effect of the Proposed Development when considered in isolation.

Inter-Relationship Effects

15.31 There are inter-relationships with Chapter 11: 'Townscape and Visual Amenity', as identified earlier in this chapter. No other inter-relationships with other topics are identified.

ENHANCEMENT, MITIGATION AND RESIDUAL EFFECTS

Completed Development

15.32 The process of design development allows potentially harmful effects on the setting of heritage assets to be reduced as far as possible or eliminated. In proposing a substantial object in the townscape, it is incumbent on the design team to develop a design which will be a delight to see from all directions. This is part of the normal iterative design process and the skill of the designer ensures that mitigation need not be 'added on' later. Hence, for the purpose of the Heritage Statement, the mitigation is considered to be embedded in the design. No additional mitigation is required. The effects on the significance of heritage assets are, therefore, considered after mitigation has been implemented.

SUMMARY

15.33 The likely effects of the Proposed Development on built heritage have been assessed. The assessment has been carried out in accordance with the legislation, policy and guidance provided at a national and local level.

15.34 The Site is directly south of the former Shredded Wheat Factory, which is Grade II listed. It was used for industrial use in the late 1960s and in the early 2000s it still had a relatively intensive footprint with large scale blocks and medium density industrial buildings prevalent. The Site and the land to its north and south have now been cleared for development.

15.35 The significance of the Grade II listed former Shredded Wheat Factory and the contribution of its setting to this significance has been assessed. The proposed building layout and landscaping ensures that visual links to the former Shredded Wheat Factory are maintained. The Proposed Development would better reveal the significance of the heritage asset and enhance its immediate setting. There would be a minor further reduction in visibility of the silos compared to the 'extant consented scheme' in some of the long distance views from Hatfield House and Hatfield House Park. However, this change would not harm the significance of the silos as there is no significant historical architectural link between these two heritage assets. The assessments also conclude that the change in the setting of the Grade II listed Roche Factory Building, south of the Site, would have no effect on the significance of the heritage asset.

15.36 The effect of the Proposed Development on the setting of the Welwyn Garden City Conservation Area from two important viewpoints (views 7 and 8) has been assessed. In both views the Proposed Development would add to the existing development that forms the skyline without causing harm to the setting or significance of the conservation area, since this existing skyline is neither formed of contributing buildings or the visibility of the Proposed Development would be slight as to not be significant. Owing to the distance from the site to the Peartree Conservation Area, the Proposed Development would have no effect on its setting or its character and appearance. Distant views of the Proposed Development would be glimpsed from the public footpath, to the north-west and outside the Essendon Historic Core Conservation Area. The visibility of the proposals would be limited to the rear gardens of private properties that fall within the conservation area. There would, therefore, be no effect on the conservation area's significance.

15.37 The effects of the Proposed Development on the setting of the Grade I listed Hatfield House and Grade I registered Hatfield House Park has been assessed alongside key AVRs that accompany the application. The Proposed Development serves to reduce the distracting effect

of the white painted listed silos in views from the southern approach of the Grade I listed Hatfield House, leading to an enhancement of the setting. It provides a greater level of visible built form in the view, which is of a subdued nature as a result of the choice of materials. This would lead to a very low level of 'less than substantial harm' to the significance of the Grade I listed House. With regard to the effects on the setting of the Grade I registered Hatfield House Park, the assessment concludes that the Proposed Development would be a new form of development that would be predominantly contained within the urban landscape of Welwyn Garden City. There would be no effect on the significance of the registered park.

15.38 The outcome of the assessments indicates that two significant effects in ES terms were recorded. They relate to the enhancement of the setting of the Grade II listed former Shredded Wheat Factory, which would better reveal the significance of the listed building; and to the lowest level of 'less than substantial harm' on the significance of the Grade I listed Hatfield House. The consultancy believes that, in accordance with paragraph 196 of the NPPF, the public benefits proposed with the Proposed Development, including the illustrated high quality of the proposed architecture, sensitively accounting for relevant heritage settings, outweigh the very low level of harm caused.

16 SOCIO-ECONOMICS

INTRODUCTION

16.1 This chapter assesses the likely significant impacts of the Proposed Development on the environment with regard to Socio-economics. It also describes the methods used to assess the impacts; the baseline conditions currently existing at the Site and in the surrounding area; the mitigation measures required to prevent, reduce or offset any significant adverse effects; and the likely residual impacts after these measures have been adopted.

16.2 A Health Impact Assessment (HIA) has also been prepared as a standalone report outside the ES in accordance with the EIA Scoping Opinion.

ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

Assessment Methodology

16.3 There are no published standards or technical guidelines that set out a preferred methodology for assessing the likely socio-economic effects of a development. However, there are a series of commonly used methodologies to quantify economic effects both during the construction of a development and following its completion. Other established qualitative techniques are frequently adopted to assess the social effects of a development. The following section outlines the approach used to conduct this assessment. Where possible, the likely significant socio-economic effects are quantified, but where this is not possible, a qualitative assessment is provided using professional judgement.

Establishing Baseline Conditions

16.4 The baseline socio-economic conditions have been established through the interpretation of national recognised research and survey information, including:

- 2011 Census data;
- ONS population projections (2018-based);
- NOMIS Labour Market Profile (2020);
- Department of Communities and Local Government Indices of Deprivation (2019);
- WHBC Housing, Homelessness and Rough Sleeping Strategy (2019);
- WHBC Strategic Housing Market Assessment Update, 2019-2024;

- Department for Education School Capacity data, 2018-2019;
- Hertfordshire County Council school place projections (2020); and
- NHS data on registered GP patients (2020).

16.5 The study area was determined based on the consideration of the Proposed Development, location of the Site and at the spatial extent appropriate to the geographical area. The local study area was considered to be within Welwyn Garden City.

16.6 For comparison purposes and to understand the wider context of the baseline conditions reviewed, the following additional geographic scopes have been considered where appropriate:

- Lower Layer Super Output Area (LSOA): Welwyn Hatfield 007A
- Site Ward: Peartree;
- Borough: Welwyn Hatfield;
- Regional: East of England; and
- National: averages for England or Great Britain depending on data availability to provide context.

Assessment of Likely Socio-economic Effects

16.7 The assessment of likely Socio-economics effects has been developed using a combination of quantitative and qualitative evaluation. This includes calculation of employment generation, additional local spend, child and population yield, school and healthcare facility capacity and open space provision. Qualitative evaluations of effects such as crime prevention are also provided.

16.8 A detailed description of how construction employment was assessed is provided below.

Construction: Employment Generation

16.9 The first step in estimating job creation during construction was to calculate gross direct job years. This was done by dividing the total estimated construction cost by £59,166 which is the estimated gross output per construction worker. Estimated gross output per construction worker was calculated from East of England construction employment numbers (the average for the 12 months including and preceding June 2017) (Ref. 16.1) and the East of England's construction industry output (all work, over the 12 months including and preceding June 2017) (Ref. 16.2). 'Job years' were then converted into Full Time Equivalent (FTE) posts whereby one permanent FTE job equates to 10 person-years of employment.

Significance Criteria

16.10 As there are no formalised technical guidance or criteria available to assess the significance of socio-economic effects, likely effects are assessed by considering the following factors, using professional judgement:

- Sensitivity of the receptors; and
- Magnitude of the effect.

16.11 The Sensitivity of the receptors takes into account the geographical extent, considering the appropriate policy / administrative boundary or geographical area of influence within which an effect occurs. This is defined in Table 16.1 below:

Table 16.1 Sensitivity of Receptors Sensitivity Definition

Sensitivity	Definition
High	Where the individual receptor is defined as being one of the following: Of international or national importance; A business for which loss of employment or closure would be deemed a nationally important issue (for example a strategic business or major employer); Individuals or groups experiencing the loss of access to a social or economic resource; A resource that is scarce and not easily re-provided within an accessible distance.
Medium	Where the individual receptor is defined as being one of the following: Of regional importance; A business for which loss of employment or closure would be deemed a regionally important issue; Individuals or groups experiencing restriction of access to a social or economic resource; A resource for which an alternative is available within an accessible distance. This level of sensitivity could also be applied where the loss of employment or closure of multiple small businesses within an area could be deemed a regionally important issue.
Low	Where the individual receptor is defined as being one of the following: Of local importance; A business for which loss of employment or closure would be deemed a locally important issue; A resource for which several alternatives are available within an accessible distance.

16.12 The magnitude of an effect also takes into account the duration of the activity that affects a resource or receptor, which is considered either as short-term (typically those associated with the construction period of 1-5 years), medium term (5-10 years) or long-term (typically those

associated with the completed Development of over 10 years). This is defined in Table 16.2 below:

Table 16.2 Proposed Magnitude Criteria

Magnitude of Effect	Definition
High	An impact that will be very severe/beneficial or very likely to affect large numbers of people, businesses or groups usually anticipated at a regional level, and/or will continue beyond the Project construction period and effectively constitutes a permanent, long-term impact (over 10 years) on baseline conditions.
Medium	An impact that will be likely to affect a moderate number of people, businesses or groups in the adjacent local authority areas, and/or will continue beyond the Project life, constituting an effect on baseline conditions for a medium-term (5- 10 years) to long-term (over 10 years) duration.
Low	An impact that may affect a small number of people, businesses or groups in the local area and does not extend beyond the life of the Project thereby not affecting baseline conditions over more than a short-term (1-5 years) or medium-term (5-10 years) duration.
Very Low	An impact that is temporary in nature and is unlikely to measurably affect the well-being of people or economic resources.

16.13 Taking the sensitivity and magnitude criteria into account, Table 16.3 sets out proposals for determining the likely significance of impact. For insignificant effects, the Proposed Development would result in no perceptible change to, or a variation within normal baseline conditions, of a socio-economic resource or receptor.

16.14 With regard to receptors deemed to be of high sensitivity and where the magnitude of effect is likely to be low or very low, the significance of impact would be considered on a case by case basis, for example, should the Proposed Development result in a short, small or highly localised change to a socio-economic resource or receptor this could be classified as not significant depending on the receptor; hence the table shows either a minor or negligible level of significance for these categories.

Table 16.3 Proposals for Determining Significance of Impact

Magnitude	Sensitivity		
	High	**Medium**	**Low**
High	Major Adverse or Beneficial Significant	Major Adverse or Beneficial Significant	Minor Adverse or Beneficial Not Significant
Medium	Major Adverse or Beneficial Significant	Moderate Adverse or Beneficial Significant	Minor Adverse or Beneficial Not Significant
Low	Minor Adverse or Beneficial/ Negligible Not Significant	Negligible Not Significant	Negligible Not Significant
Very Low	Minor Adverse or Beneficial/ Negligible Not Significant	Negligible Not Significant	Negligible Not Significant

Assumptions and Limitations

16.15 A standard estimated build cost of £2,100 per m^2 has been used to calculate the estimated job creation during construction. This is consistent with the approach taken in the Extant Planning Permission ES.

16.16 The establishment of baseline conditions uses data from the most recent 2011 Census, which was published on 16 July 2012 (Ref. 16.6), as well as 2020 mid-year estimations published by the Office of National Statistics. This has been supplemented with recent mid-year annual estimates where these were available, as well as other data sources where appropriate.

16.17 Except where specifically stated, the existing conditions with respect to socio-economics are presented within this chapter as the baseline conditions. It is considered unlikely that the existing conditions will change significantly in the short term (during the proposed construction period) or longer term (once the Proposed Development would be completed). The baseline conditions presented are therefore representative of future conditions in the absence of the Proposed Development (i.e. without Development proceeding).

LEGISLATION, PLANNING POLICY AND GUIDANCE

National

16.18 The current National Planning Policy Framework (NPPF) (Ref. 16.7) was published in February 2019 which replaces the previous NPPF which was published in March 2012. The NPPF sets out the Government's planning policies for England and how they are expected to be applied. It sets out a framework which aims to achieve sustainable development throughout the planning system with three overarching objectives – economic, social and environmental.

16.19 At the heart of the NPPF is a *'presumption in favour of sustainable development'*.

16.20 The NPPF sets out how to deliver sustainable development under 13 subheadings. Of these subheadings, the following are the most relevant for the potential social and economic impacts of the Proposed Development:

> *1. Developing a sufficient supply of homes: This objective states that local planning authorities should establish a housing requirement figure for their area, understand the availability of land in the area, and ensure that the supply and delivery of housing is maintained.*
>
> *2. Building a strong, competitive economy: This objective sets out the need for planning policies to identify opportunities for local investment and seek to address potential barriers to investment, including poor environments or a lack of housing. It states that local planning authorities should encourage sustainable economic growth and enable the development of accessible local services and community facilities.*
>
> *4. Promoting health and safe communities: This objective states that planning policies need to create new places that encourage social interaction and provide safe and accessible environments. Policies should also enable and support healthy lifestyles.*

Local

Welwyn Hatfield District Plan, 2005

16.21 The adopted District Plan contains the following policies relevant to this assessment:

Policy D9: Access and Design for People with Disabilities states that development should be designed to be accessible for disabled people, prams and pushchairs and temporarily disabled people.

Policy IM2 - Planning Obligations requires developments to provide and secure funding for the infrastructure, services and facilities which are directly related to it through on-site provision or off-site improvements in order to mitigate impacts on the existing community.

Policy H7 – Affordable Housing requires developments of 25 units or more, to include the provision of affordable housing to meet the needs of local people. This should be a minimum of 30% of on-site provision.

Policy H8 - Dwelling Type and Tenure requires new residential developments to incorporate a range of dwelling types and sizes.

Policy OS3 - Play Space and Informal Open Space Provision in New Residential Development states that:

'Substantial new residential development (of 0.4 hectares or above) will be expected to make a contribution to the provision of children's play space and informal open space, where the increased demands generated by the new households cannot be met by current levels of provision.'

'Contributions will take the form of the direct provision of facilities on site or, where appropriate, the payment of a commuted sum by the developer to facilitate the provision of a facility elsewhere.'

Policy CLT 11 - Library Services identifies that all major developments which place additional demands on the existing library services and facilities will be required to make an appropriate contribution to the provision of new or enhanced libraries in the district.

Welwyn Hatfield Borough Council Emerging Local Plan, 2017

16.22 A revised Local Plan was submitted for examination on 15th May 2017 (Ref. 16.8). The emerging plan contains the following policies relevant to Socio-economics:

Policy SP3 - Settlement Strategy and Green Belt boundaries states:

'New development will be located in and around the two towns of Welwyn Garden City and Hatfield where accessibility to transport networks and public transport is good and the greatest potential exists to maximise accessibility to job opportunities, shops, services and other facilities, and to create new neighbourhoods with supporting infrastructure.'

Policy SP7 - Type and Mix of Housing states:

'Should seek to deliver a wide choice of homes and help create inclusive and mixed communities, identifying the size, type and tenure of housing that is likely to be required. A mix of housing will therefore need to be provided over the plan period to reflect demographic trends and the needs of different groups in the community.'

Policy SP8 – The Local Economy states:

'The Council will support economic prosperity, encourage inward investment and the creation of a range jobs.'

Policy SADM7 - New community services and facilities and losses of community services and facilities states:

'The Council will support the provision of new community services and facilities in accordance with appropriate standards and in appropriate locations which are convenient to the communities they serve and accessible by a range of sustainable transport modes, including walking, cycling and public transport, and buildings that are inclusive, accessible, flexible and sited to maximise shared use of the facility.' and

'Developments that result in additional need for community facilities will be required to contribute towards enhancing existing facilities, or provide/ contribute towards new facilities.'

Policy SP9 – Place Making and High Quality Design sets out the following aims for public open spaces and creating safe and secure developments:

'Proposals provide an appropriate amount of public open space that is well sited and designed to help create and enhance a sense of place. Public open spaces are coherent, attractive, multi-functional, safe, inclusive and utilise high quality soft and hard landscaping. Public open spaces promote health and wellbeing, with play and leisure spaces well located and attractively designed to encourage their use.'

'*The design of buildings and boundary treatments create a sense of safety and security that is consistent with achieving active, welcoming, legible and permeable places. Building entrances and public spaces are appropriately sited, designed and lit in order to maximise natural surveillance and a sense of safety.'*

Welwyn Hatfield Housing, Homelessness and Rough Sleeping Strategy, 2019

16.23 This strategy sets out Welwyn Hatfield's vision, aims and objectives for housing within the borough (Ref. 16.9). The council have identified five key aims:

- Deliver more housing to meet the needs of local people including affordable housing;
- Make the best use of housing in the borough;
- Meet the housing needs of older and vulnerable people;
- Improve access to and maintain standards in the rented sector; and
- To prevent and relieve homelessness.

BASELINE CONDITIONS

16.24 The following factors will be considered to establish the baseline conditions for the Site:

- Population;
- The population health profile;
- Local economy and employment;
- Deprivation;
- Housing;
- Local health care facilities;
- Local education provision;
- Crime;
- Open, amenity and play space provision; and
- Community facilities provision.

Population

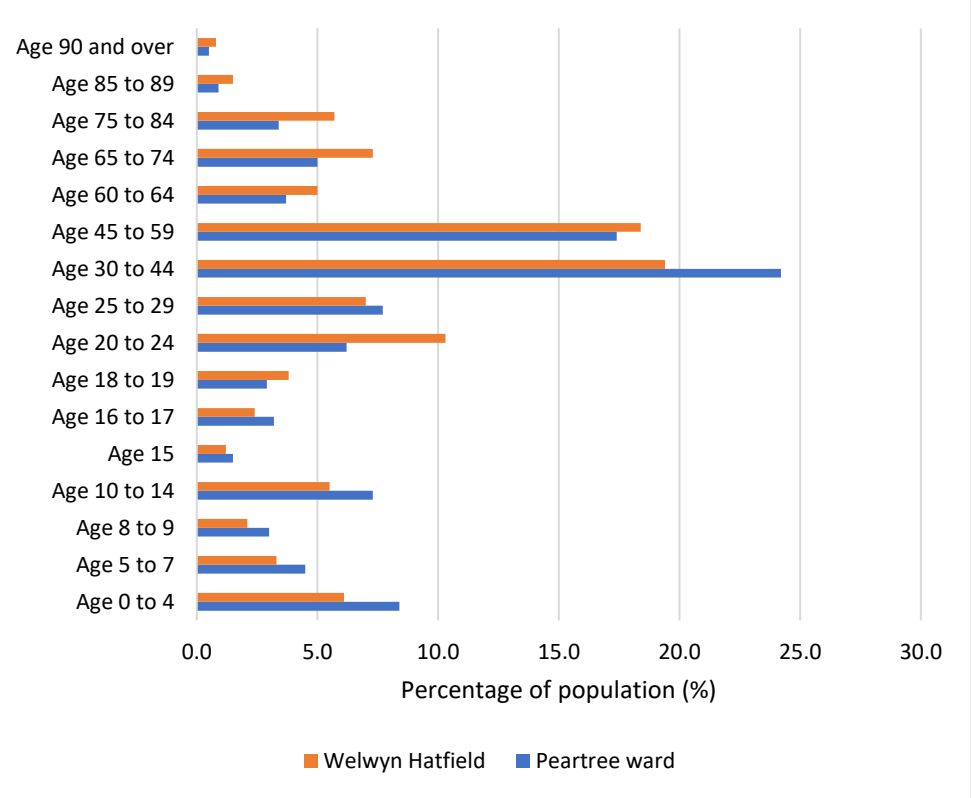
Age and Gender

16.25 According to the 2011 Census (Ref. 16.10), Welwyn Hatfield has a total population of 110,535. Of this, 49.2% are males and 50.8% are females (Ref. 16.11). Within Peartree ward,

there is a total population of 7,922 residents (Ref. 16.12) and the proportion of males and females is 47.8% males and 52.2% females (Ref. 16.13).

16.26 The median age of residents in Welwyn Hatfield is 36. The greatest proportion of residents are within the 45 to 59 age bracket, equating to 19.4% of residents, which is closely followed by the 30 to 44 age bracket, equating to 18.4% of residents. Within Peartree ward, a higher proportion of residents are aged 30 to 44 years, equating to 24.2% of residents, and 17.4% of residents are aged 45 to 59 years. The median age of Peartree ward is 34 and Peartree ward also has a higher proportion of residents aged 0-4 and 10-14 years but a lower proportion of residents aged 65 and above. The figure below shows the age structure of Welwyn Hatfield and Peartree ward.

Figure 16.1 Age Structure of Welwyn Hatfield and Peartree ward, 2011 Census



Ethnicity

16.27 According to the 2011 Census, with Welwyn Hatfield Borough 84.1% of residents are White and the second largest group is Asian/ Asian British comprising 7.9% of residents (Ref. 16.14). Within Peartree ward, 86.7% of residents are classified as White, 4.8% are

Black/African/Caribbean/Black British and 4.6% of residents are Asian/ Asian British (Ref. 16.15). The figures below show the ethnicity of the borough and ward.

Figure 16.2 Ethnicity of Welwyn Hatfield, 2011 Census

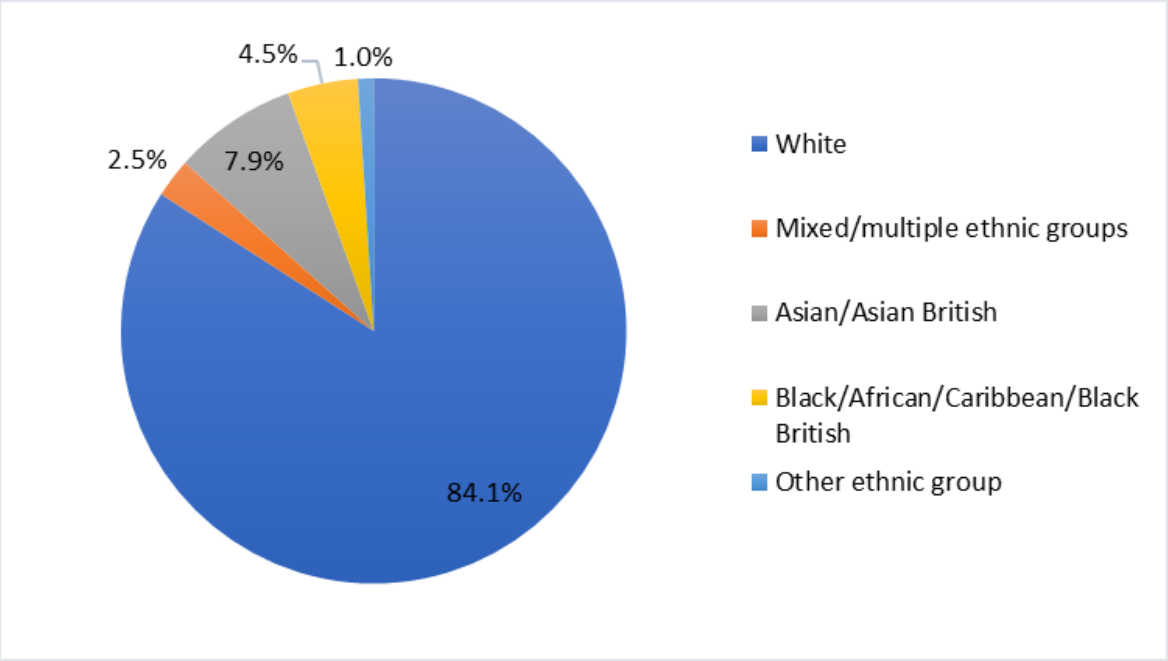
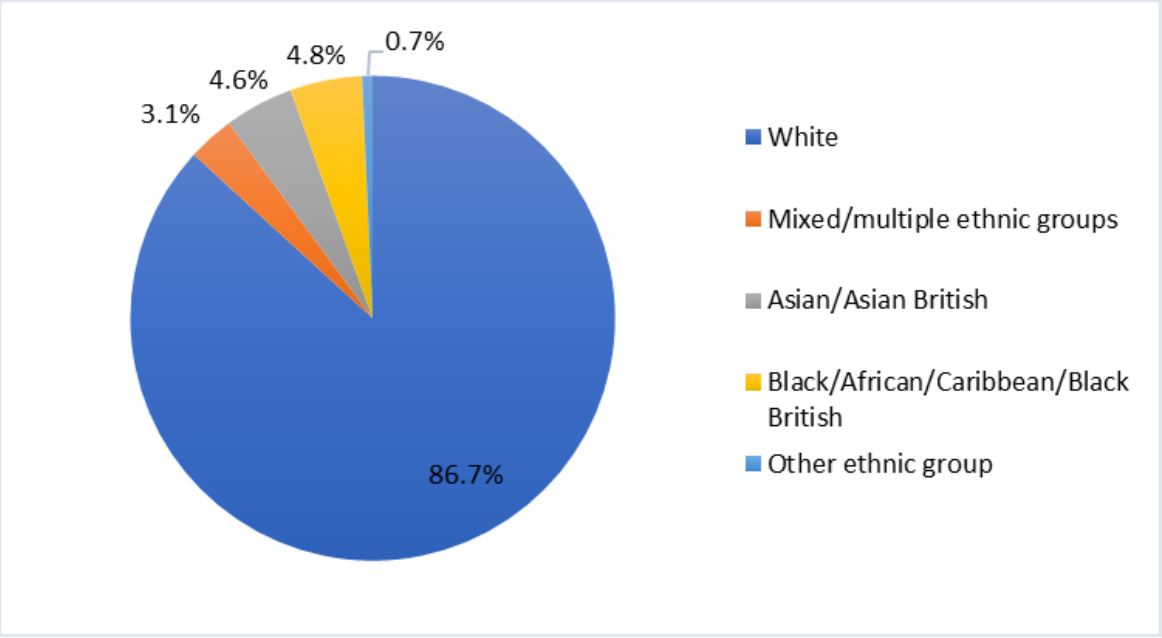


Figure 16.3 Ethnicity of Peartree ward, 2011 Census



Migration

16.28 According to the 2011 Census, 82.8% of residents in Welwyn Hatfield were born in the UK (Ref. 16.16). This is a large proportion of its population but is slightly lower than in Peartree ward, the east of England and England. In addition, a slightly higher proportion of residents in Welwyn Hatfield have lived in the UK for two years or less or two to five years when compared to other spatial scales. A detailed breakdown of the length of residence by area can be viewed in Table 16.4.

Table 16.4 Residence in the UK, 2011 Census

Residence in the UK	Peartree Ward	Welwyn Hatfield	East	England
Born in the UK	87.2%	82.8%	89.0%	86.2%
Less than 2 years	1.3%	3.4%	1.5%	1.8%
2 years or more but less than 5 years	2.3%	3.2%	1.8%	2.2%
5 years or more but less than 10 years	3.5%	3.6%	2.3%	2.9%
10 years or more	5.7%	7.0%	5.4%	7.0%

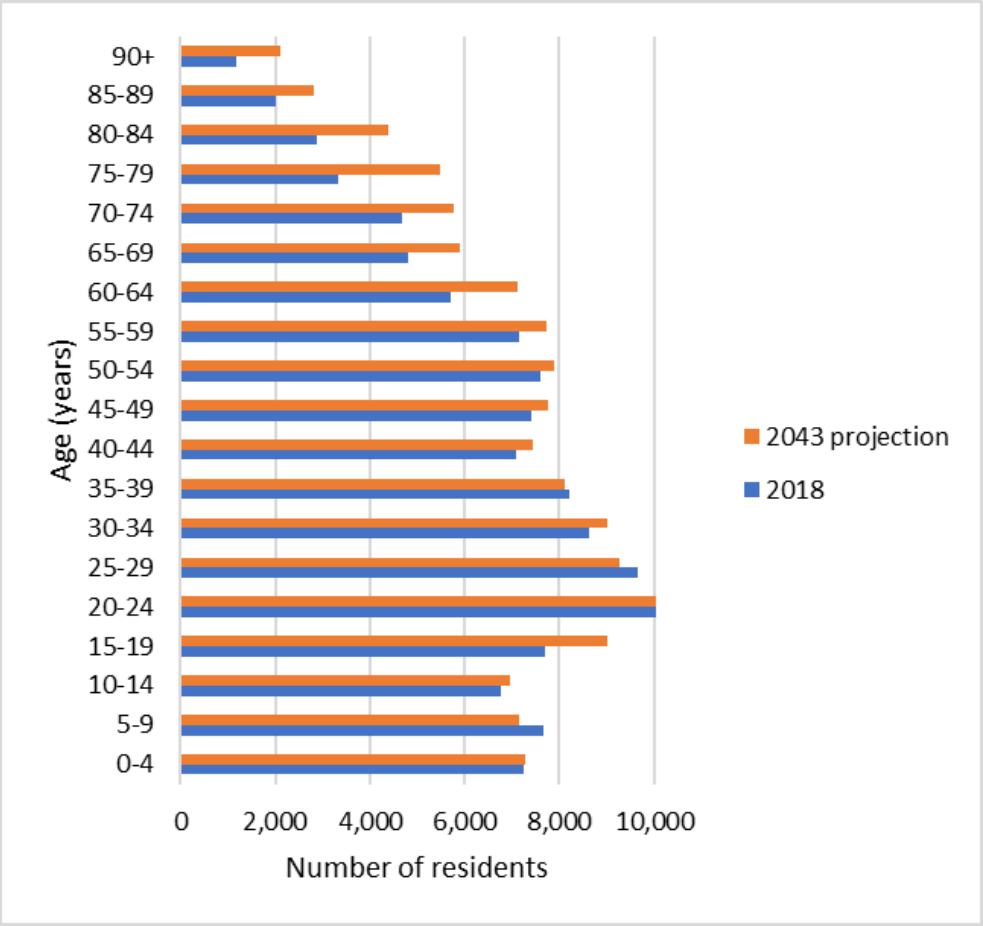
Population Forecasts

16.29 Population change comprises the difference between birth rates and death rates, and the effects of internal and international migration.

16.30 Population forecasts for Welwyn Hatfield show that between 2018 and 2043, it is expected to increase by approximately 11,700 persons, from 122,700 to 134,600 (Ref. 16.17). This is equivalent to a 9.6% population increase. This change is anticipated to be largely driven by the older age brackets, particularly those aged 60 years and above where a 40.2% increase in the number of residents is predicted. The younger age groups generally have a far less significant population change although a 17.2% increase in the number of residents aged 15 to 19 is predicted.

16.31 By 2043, 19.6% of the total residents within Welwyn Hatfield are predicted to be aged 65 and above. The population projections for Welwyn Hatfield between 2018 and 2043 by age bracket are shown in the figure below.

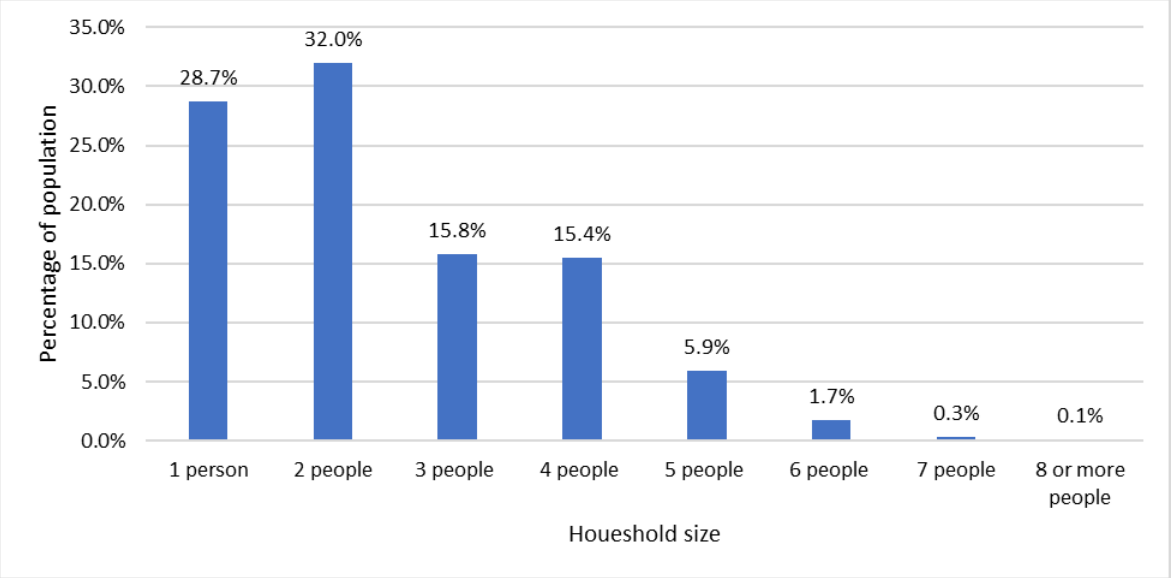
Figure 16.4 Population projections for Welwyn Hatfield, ONS 2018



Households

16.32 Within Welwyn Hatfield, the majority of households are occupied by two persons, 32.7% of the population, followed by households occupied by one person, approximately 28.7% of the population (Ref. 16.18). The figure below demonstrates this.

Figure 16.5 Household Size in Welwyn Hatfield, 2011 Census



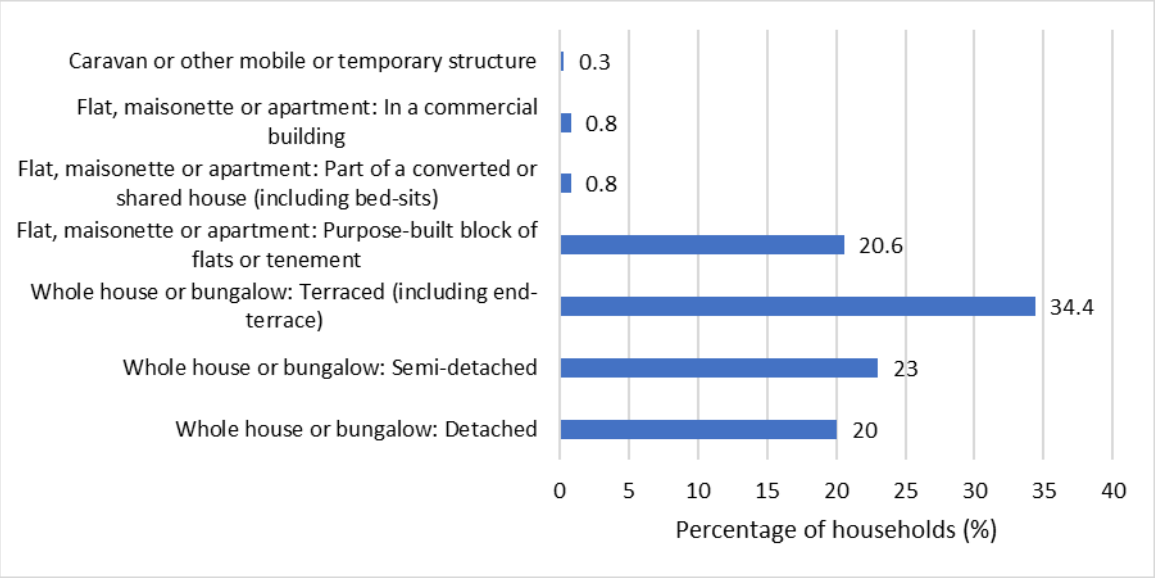
16.33 The 2011 Census revealed that there are 45,531 dwellings in Welwyn Hatfield. Of these, 100.0% are unshared dwellings. A household space is defined as being in an unshared dwelling if it does not meet the following conditions:

- It is 'part of a converted or shared house';
- Not all the rooms are behind a door that only that household can use; and
- There is at least one other household space at the same address with which can be combined to form a shared dwelling (Ref. 16.19).

16.34 Therefore, an unshared dwelling is one that consists of only one household space.

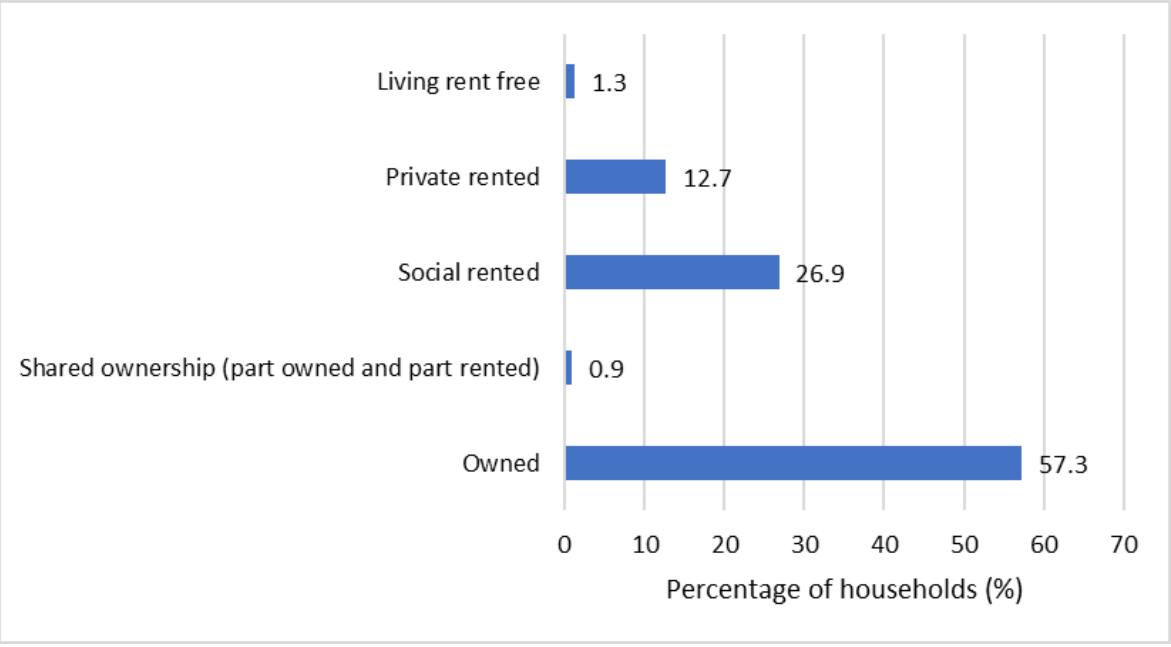
16.35 The greatest proportion of households in Welwyn Hatfield are terraced whole houses or bungalows followed by semi-detached whole houses or bungalows which equate to 34.4% and 23.0% of households, respectively (Ref. 16.20). Figure 16.6 shows a full breakdown of accommodation type for unshared dwellings.

Figure 16.6 Accommodation Type for Unshared Dwellings in Welwyn Hatfield, 2011 Census



16.36 According to the 2011 Census, 57.3% of households in Welwyn Hatfield are owned which is the greatest proportion. 26.9% of households are social rented and 12.7% of households are private rented (Ref. 16.21). Figure 16.7 illustrates this.

Figure 16.7 Tenure of Households in Welwyn Hatfield, 2011 Census



Housing Requirements

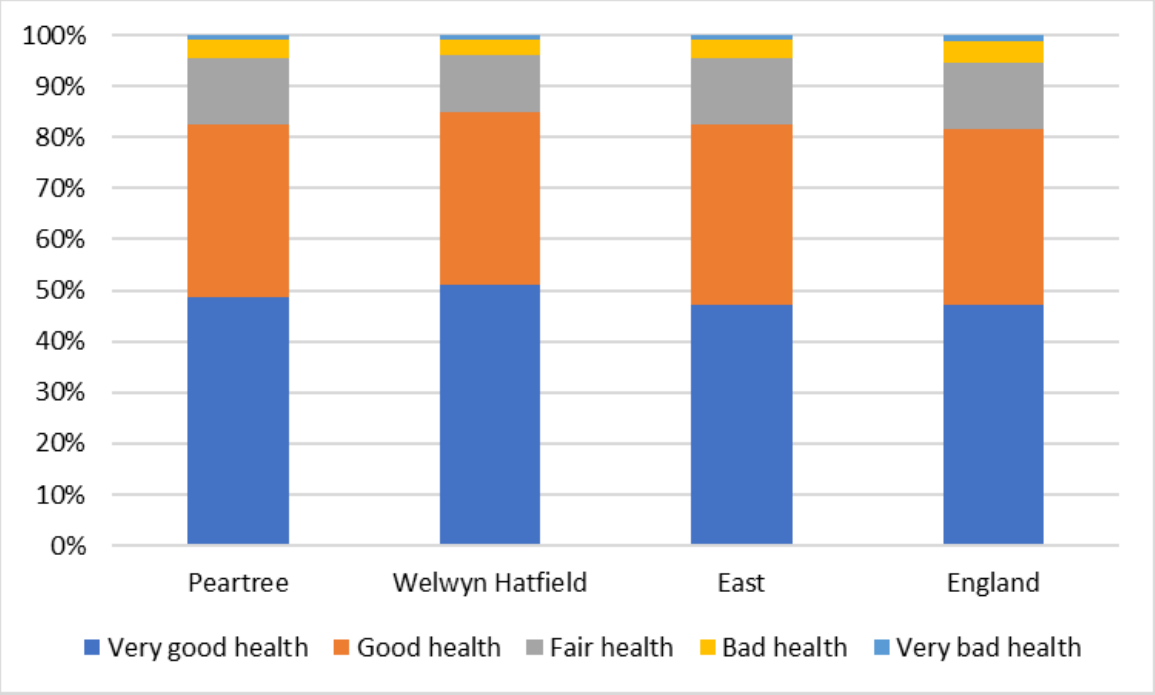
16.37 According to the Strategic Housing Market Assessment (SHMA) Update 2017 (Ref. 16.22) the population in Welwyn Garden City is expected to grow by around 26,800 between 2013 and 2032, equivalent to annual population growth of approximately 895. This exceeds the projected growth rate of 23.5% between 2013 and 2032, and exceeds the average growth rate for England of 13.6%. The council have re-assessed the need for new housing in the Borough, and identified a need for 670 dwellings per annum.

16.38 The population in Welwyn Hatfield is ageing. There will therefore be an increased demand for a range of housing to meet the housing requirements of the elderly. The SHMA estimates that there will be a need for 38 additional bed-spaces each year (up until 2032) to meet the needs for additional care home accommodation, amounting to an additional 725 care home places (Ref. 16.22). This includes 533 sheltered housing bed-spaces, 85 enhanced sheltered housing bed-spaces and 107 extra care units with 24/7 support.

Health

16.39 According to the 2011 Census, 50.9% of residents in Welwyn Hatfield are in 'Very good health', followed by 33.9% of residents who are classified in 'Good health' (Ref. 16.23). The proportion of residents in 'Very Good Health' is slightly higher than in Peartree ward and England, where 48.8% and 47.2% of residents are in 'Very good health', respectively (Ref. 16.24). Only 0.8% of residents in Welwyn Hatfield are in 'Very bad health'. The general health at different spatial scales is shown in the below figure.

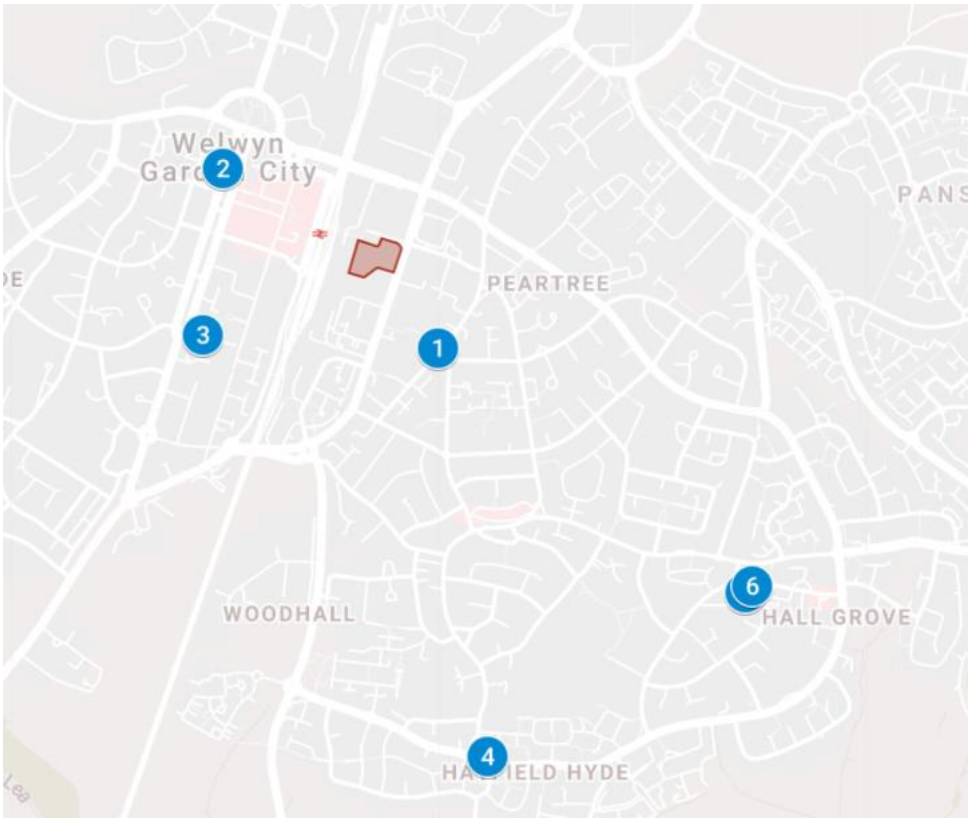
Figure 16.8 General Health in by area, 2011 Census



Local Healthcare Facilities

16.40 Within a 1.5-mile radius of the centre of the Proposed Development, there are six GP surgeries. This is summarised in Figure 16.9 and Table 16.5 below. The average ratio of patient per GP of these six practices is 1,835, which is above the best practice of 1,800 patients per GP recommended by the General Medical Council (GMC) used by the Department of Health (DoH) and Primary Care Trusts.

Figure 16.9 Map of GP surgeries within a 1.5-mile radius of the Proposed Development



Approximate Site Location = red; GP surgeries = blue

Table 16.5 GP surgeries within a 1.5-mile radius of the Proposed Development

Map Ref.	Surgery	Address	Distance (miles)	No. of GPs	Patients on list	Current patient to GP ratio	Accepting new patients?
1	Peartree Lane Surgery	110 Peartree Lane, Welwyn Garden City, Hertfordshire, AL7 3UJ	0.2	10	20,981	2,098	Yes
2	Parkway Surgery	20 Parkway, Welwyn Garden City, Hertfordshire, AL8 6HG	0.4	10	16,134	1,613	Yes
3	Garden City Practice	Birdcroft Road, Welwyn Garden City, Hertfordshire, AL8 6EH	0.4	6	10,597	1,766	Yes
4	Hollybush Lane Surgery	141 Hollybush Lane, Welwyn Garden City, Hertfordshire, AL7 4JS	1.1	10	20,981	2,981	Yes

Map Ref.	Surgery	Address	Distance (miles)	No. of GPs	Patients on list	Current patient to GP ratio	Accepting new patients?
5	Hall Grove	4 Hall Grove, Welwyn Garden City, Hertfordshire, AL7 4PL	1.1	10	16,134	1,613	Yes
6	Moors Walk Surgery	4 Hall Grove, Welwyn Garden City, Hertfordshire, AL7 4PL	1.2	10	20,981	2,981	Yes

16.41 There are eight dentists within a 1.5-mile radius of the Proposed Development. This is summarised in Table 16.6, which also demonstrates whether these dentists are accepting new patients or not. Out of the eight dentists, two have been confirmed to be accepting NHS patients of any age and one is accepting NHS patients below the age of 18. Data was not available for two dentists.

Table 16.6 Dentists within a 1.5-mile radius of the Proposed Development

Dentist	Address	Distance (miles)	Accepting new NHS patients?
Peartree Clinic Welwyn	43 Peartree Lane, Welwyn Garden City, Herts, Herefordshire, AL7 3UA	0.3	No
Church Road Dental Practice	4a Church Road, Welwyn Garden City, Herts, Hertfordshire, AL8 6NE	0.3	Only accepting children under the age of 18
Ivory Dental Clinic	10 Howardsgate, Welwyn Garden City, Hertfordshire, AL8 6BQ	0.3	No data available
Herts Community NHS Trust	Parkway Community Health Clinic, Birdcroft Road, WELWYN GARDEN CITY, Hertfordshire, AL8 6EH	0.4	Only for special needs patients by referral
Woodhall Dental Practice	33 Cole Green Lane, Welwyn Garden City, Herts, AL7 3PP	0.6	Yes
Handside Lane Surgery	178 Handside Lane, Welwyn Garden City, Herts, AL8 6SZ	0.8	Yes
Knightsfield Dental Practice	171 Knightsfield, Welwyn Garden City, Hertfordshire, AL8 7QG	1.1	Only by referral

Panshanger Dental surgery	55 Moors Walk, Panshanger, Welwyn Garden City, Herts, AL7 2AX	1.2	No data available

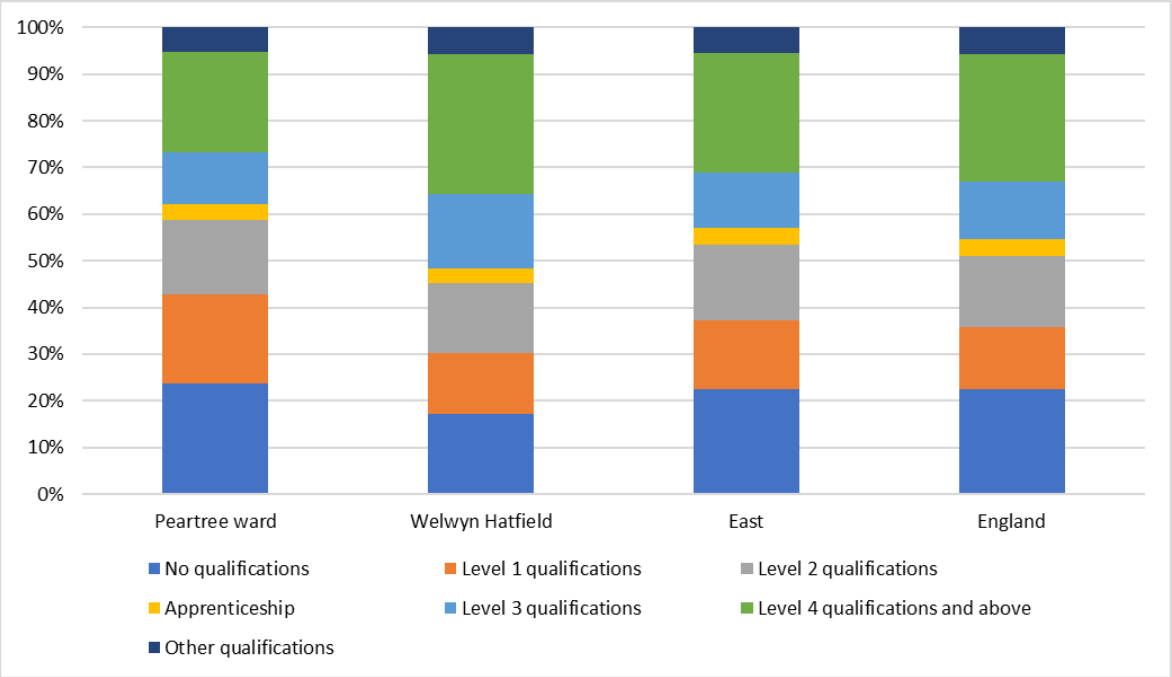
16.42 Within a 3-mile radius, there are three hospitals. These are New QEII Hospital (1.2 miles away), Queen Victoria Memorial Hospital (2.2 miles away) and One Hatfield Hospital (2.4 miles away). While the New QEII Hospital treats minor injuries 24/7, the nearest hospital providing Accident and Emergency services is Lister Hospital, 8.5 miles from the Site.

Education

Qualifications

16.43 Within Welwyn Hatfield, 30.0% of its residents aged 16 and over have Level 4 qualifications and above which includes any type of higher education above A levels. This is higher than at regional and national values equating to 25.7% and 27.4%, respectively. The proportion of residents in Peartree ward with Level 4 qualifications and above is 21.4% which is lower than at other spatial scales. The proportion of residents with no qualifications in Welwyn Hatfield is 17.2% which is lower than in the East and England. The proportion of Peartree ward residents with no qualifications is 23.8% which is higher than the borough level but similar to the regional and national average. Figure 16.10 demonstrates the levels of qualifications across the different scales.

Figure 16.10 Qualifications by Area, 2011 Census



Local Education Provision

16.44 The Department of Education (DFE) states that statutory walking distances are 2 miles for children under 8 years and 3 miles for children aged 8 and over and further elaborates that 'Best practice suggests that the maximum each way length of journey for a child of primary school age to be 45 minutes and for secondary school age 75 minutes, but these should be regarded as the maximum' (Ref. 16.25).

16.45 In order to assess the current state of local education provision for the Proposed Development, this chapter considers an appropriate walking distance as being 1 mile for nurseries, 1 mile for primary schools and 3 miles for secondary schools, measured from the centre of the Proposed Development.

Early years

16.46 In England, all 3 to 4-year olds are entitled to 570 hours of free early education or childcare per year, which amounts to 15 hours of free nursery education for 38 weeks of the year (Ref. 16.26). Children between 3 to 4-years old of working parents are entitled to 30 hours of free childcare for 38 weeks since 2017. In addition, 2-year old children of parents receiving income support are entitled to 15 hours of free childcare for 38 weeks of the year. Therefore, as well as paid childcare, it is likely that the policy will create a demand on childcare as a result of the entitlement for free childcare.

16.47 This assessment has identified seven nurseries within a 1-mile walking distance from the centre of the Proposed Development. The data was aggregated from the website childcare.co.uk, daynurseries.co.uk and google maps. The nurseries were also contacted to gain an understanding of their existing capacity to determine whether they would be able to accommodate the potential child yield. This is shown in Table 16.7 below.

Table 16.7 Local nursery provision within 1 mile of the Proposed Development

Nursery	Address	Walking Distance (miles)	Age range	Total Number of places	Capacity
Playschool Nursery (Welwyn Garden City)	Trevelyan House, 7 Church Rd, Welwyn Garden City AL8 6NT	0.5	3 months to 5 years	75	Some spaces available, currently subject to change
Rowan Tree Day Nursery and Pre-school	9 Guessens Rd, Welwyn Garden City AL8 6QW	0.6	2 months to 5 years	75	No capacity, have a waiting list
Ludwick Nursery School	Holwell Rd, Welwyn Garden City AL7 3RP	0.7	2 years to 4 years	No data available	No data available
Squirrels Day Nursery	Holwell Road, Welwyn Garden City, Herts, AL7 3RP	0.7	3 months to 5 years	84	Limited capacity, a few places available part-time
Little Tulips Day Nursery	121 Woodhall Ln, Welwyn Garden City AL7 3TP	0.8	3 months to 5 years	65	No capacity, have a waiting list
Barn Close Pre-school	Quaker Meeting House, Handside Ln, Welwyn Garden City AL8 6SP	1.0	2 years to 4 years	No data available	No data available
Busy Bees in Welwyn Garden City	Unit 1, Shire Park, 2 Kestrel Way, Welwyn Garden City AL7 1TN	1.0	3 months to 5 years	74	Some spaces available in all age groups, currently subject to change

16.48 Due to the timing of the assessment, two of the nurseries with current capacity were unable to confirm if their capacity would remain stable or if places would be taken up as parents feel more comfortable returning their children to nursery if Coronavirus related anxiety around childcare reduces.

16.49 The Hertfordshire Childcare Sufficiency report (2019) carried out an assessment of childcare capacity across Hertfordshire and identified the following:

- In Welwyn Hatfield 44% of registered Ofsted childcare providers offer free early education for two year olds, 73% offer free early education for three to four year olds and 63% of providers offer 30 hours free childcare;
- 95% of survey responders in the Welwyn and Hatfield area indicated that the childcare that is currently available meets the needs of their families;
- Not all parents are aware of their entitlement to free early education or free childcare; and
- That a new provision is required in the Welwyn Garden City south east area to meet current demand.

Primary

16.50 There are five primary schools within a 1-mile radius of the centre of the Proposed Development. The table below summarises these local primary schools using the most recent pupil net capacity data from 2018/2019 from the DFE (Ref. 16.27).

Table 16.8 Local primary school provision within 1 mile of the Proposed Development

Primary school	Walking Distance (miles)	Number on roll	School places	Net capacity	Surplus capacity
Peartree Primary School	0.3	174	228	54	31.0%
Holwell Primary School	0.6	336	420	84	25.0%
Our Lady Roman Catholic Primary School	0.7	193	210	17	8.8%
Templewood Primary School	1.0	208	210	2	1.0%
Swallow Dell Primary and Nursery School	1.0	416	420	4	1.0%
Total		**1,327**	**1,488**	**161**	**12.1%**

(Source: DFE Net Public Capacity 2018/2019)

16.51 The table above demonstrates that for that reporting period there was capacity for 161 primary school pupils across the five primary schools.

16.52 The Government recommends that for surplus capacity, in mainly urban areas, a reasonable target is 5%, a figure that both enables accommodation of unanticipated in migration and minimises the expenditure on running oversized premises. Three of the primary schools

for which data is available meet this target and the average percentage across the five schools is 12.1%.

16.53 Hertfordshire Council regularly publish primary school forecasts for future predicted capacity. Across Welwyn Garden City East, a larger area consisting of 11 primary schools, current projected future capacity for primary school places in reception is shown in the table below (Ref. 16.28). This suggests that demand for school places in reception is not predicted to increase to above 2018-2019 levels up to 2023-2024 and that a surplus in reception year places is predicted for all years.

Table 16.9 Projected reception year capacity in Welwyn Garden City East, Hertfordshire County Council

	Actuals		Forecast			
	2018-2019	2019-2020	2020-2021	2021-2021	2022-2023	2023-2024
Total Year R Demand	463	446	433	457	421	423
Total Year R Places Available			480	480	480	480
Surplus or Shortage of Year R Places (No.)			47	23	59	57
Surplus or Shortage of Year R Places (%)			9.8%	4.8%	12.3%	11.9%

Secondary

16.54 There are three secondary schools within a 3-mile radius of the Site. Table 16.10 summarises these local secondary schools using the most recent pupil net capacity data from 2018/2019 from the Department for Education (DFE).

Table 16.10 Local secondary school provision within 3 miles of the Proposed Development

Secondary school	Walking Distance (miles)	Number on roll	School Places	Net capacity	Surplus capacity
Stanborough School	1.2	1,084	1,176	92	8.5%
Ridgeway Academy	1.4	629	1,100	471	74.9%
Monk's Walk School	2.1	1,328	1,341	13	1.0%
Total		**3,041**	**3,617**	**576**	**18.9%**

(Source: DFE Net Public Capacity 2018/2019)

16.55 Table 16.10 shows that there is currently capacity for 576 additional secondary school pupils across the three secondary schools. Two out of these three schools meet the 5% surplus capacity target. On average, the three schools currently have a surplus capacity of 18.9%.

16.56 Hertfordshire Council regularly publish secondary school forecasts for future predicted capacity. Across Welwyn Garden City, an area consisting of the three secondary schools identified above, current projected future capacity for year 7 secondary school places is shown in the table below (Ref. 16.29). This suggests that that demand for year 7 school places is predicted to increase to above 2018-2019 levels with a deficit in secondary school capacity from 2022-2023 onwards.

Table 16.11 Projected reception year capacity in Welwyn Garden City East, Hertfordshire County Council

	Actuals		Forecast						
	2018-2019	2019-2020	2020-2021	2021-2021	2022-2023	2023-2024	2024-2025	2025-2026	2026-2027
Total Year 7 Demand	572	624	602	634	647	676	637	657	675
Total Year 7 Places Available			646	646	646	646	646	646	646
Surplus or Shortage of Year 7 Places (No.)			44	12	-1	-30	9	-11	-29
Surplus or Shortage of Year 7 Places (%)			6.8%	1.9%	-0.2%	-4.6%	1.4%	-1.7%	-4.5%

16.57 Table 16.12 presents the economically active and unemployment rates for Welwyn Hatfield, East of England and Great Britain, for the period April 2019 to March 2020 (Ref. 16.30). This provides an indication of the potential labour supply available. Equivalent information at ward level is not available.

Table 16.12 Economic Activity and Employment Rates, (April 2019 to March 2020)

Economic Activity	Welwyn Hatfield (numbers)	Welwyn Hatfield (%)	East of England (%)	Great Britain (%)
Economically Active*	69,900	84.6	80.5	79.1
In Employment*	67,700	81.9	77.9	76.0
Employees*	58,600	70.8	66.5	64.9
Self Employed*	7,900	9.6	11.2	10.8
Unemployed #	2,300	3.2	3.2	3.9

Notes: * numbers are for those aged 16 and over, % are for those aged 16-64

numbers and % are for those aged 16 and over. % is a proportion of economically active

16.58 The percentage of economically active people in Welwyn Hatfield is higher than the East of England and Great Britain averages. 3.2% of the economically active residents over the age of 16 in Welwyn Hatfield were unemployed between April 2019 and March 2020, this is below both the national average.

16.59 According to ONS data, as of March 2020, 2.0% of Welwyn Hatfield residents aged 16 to 64 years were claimants (Ref. 16.31). These are unemployed people who have registered as Job Seekers and are receiving Job Seekers' Allowance. This is lower than the average for the East of England (2.4%) and the national average (3.1%).

Key Employment Sectors

16.60 The number of employee jobs by industry within Welwyn Hatfield and percentage totals for Welwyn Hatfield, East of England and Great Britain are shown in Table 16.13 (Ref. 16.32).

16.61 The wholesale and retail industry employs around a fifth of all Welwyn Hatfield employees, which is a higher percentage than the East of England and Great Britain. The

proportion of residents employed in Professional, Scientific and Technical activities is also higher in Welwyn Hatfield than the East of England and Great Britain.

Table 16.13 Employee Jobs by Industry, 2020

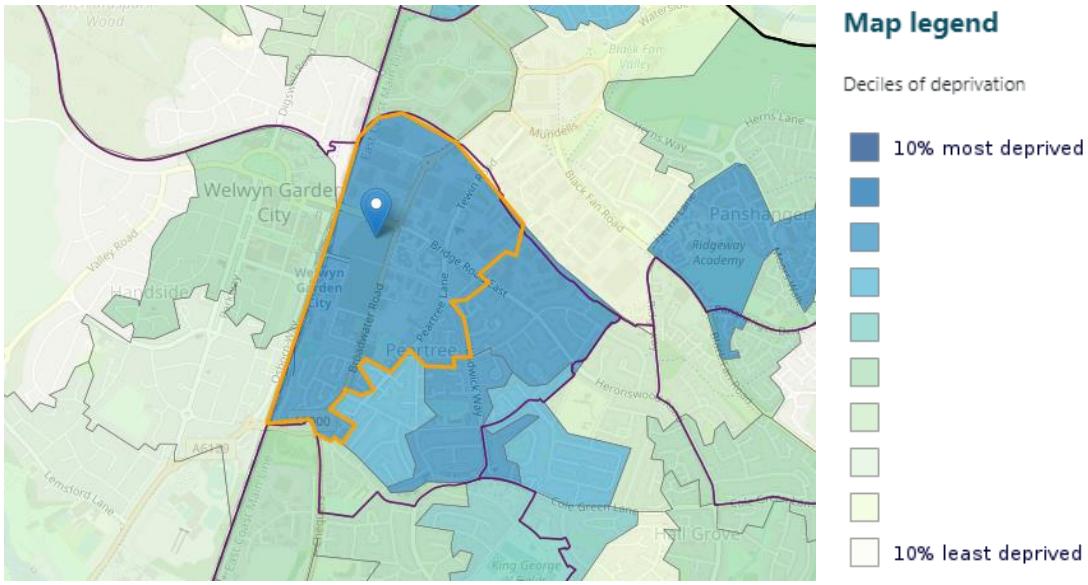
Industry	Welwyn Hatfield (employee jobs)	Welwyn Hatfield (%)	East (%)	Great Britain (%)
Mining and Quarrying	0	0	0.1	0.2
Manufacturing	3,500	3.8	7.6	8.1
Electricity, Gas, Steam and Air Conditioning Supply	10	0	0.3	0.5
Water Supply; Sewerage, Waste Management and Remediation Activities	2,000	2.2	1	0.7
Construction	4,500	4.9	5.5	4.7
Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles	18,000	19.6	16.7	15.2
Transportation and Storage	3,500	3.8	5.7	4.8
Accommodation and Food Service Activities	3,000	3.3	6.7	7.6
Information and Communication	6,000	6.5	3.6	4.2
Financial and Insurance Activities	700	0.8	2.4	3.5
Real Estate Activities	600	0.7	1.6	1.7
Professional, Scientific and Technical Activities	17,000	18.5	9.8	8.7
Administrative and Support Service Activities	7,000	7.6	10.6	9.1
Public Administration and Defence; Compulsory Social Security	3,000	3.3	3	4.3
Education	7,000	7.6	9.2	8.9
Human Health and Social Work Activities	10,000	10.9	12	13.2
Arts, Entertainment and Recreation	1,250	1.4	2.4	2.5
Other Service Activities	3,500	3.8	1.7	2

Deprivation

16.62 The Indices of Multiple Deprivation (IMD) measure the relative deprivation of small areas of England called Lower Layer Super Output Areas (LSOAs) according to range of variables including wealth, health and quality of life.

16.63 The Indices of Multiple Deprivation (2019) showed that Welwyn Hatfield ranks 215th out of the 317 local authority districts in England which demonstrates that the Site is within a local authority of slightly lower than average deprivation (Ref. 16.33). The LSOA in which the Site falls, Welwyn Hatfield 007A, is among the 30% most deprived neighbourhoods in the country. The figure below illustrates the levels of deprivation around the Site.

Figure 16.11 Indices of Multiple Deprivation around the Site, 2019



16.64 In addition, Welwyn Hatfield 007A is within the 20% most deprived neighbourhoods in the country under the Employment Deprivation Domain and the Income deprivation domain. The Employment Deprivation Domain measures the proportion of working age people involuntarily excluded from the labour market while the Income deprivation domain measures the proportion of people experiencing deprivation due to low income.

16.65 Welwyn Hatfield 007A is also within the 20% most deprived neighbourhoods in the country under the Education, Skills and Training Domain. This measures the lack of attainment and skills in the local population.

16.66 Under the Health Deprivation and Disability Domain, Welwyn Hatfield 007A is within the 30% most deprived areas in the country. This measures the risk of premature death and the impairment of quality of life through poor mental and physical health.

Crime

16.67 Crime imposes economic costs, reinforces social exclusion and can hasten the environmental decline of neighbourhoods. Fear of crime can make people reluctant to walk, use public transport, or go out after dark. It can also be a cause of mental distress and social exclusion. In particular, women and older people tend to worry more about becoming victims and this may prevent them from engaging in social activities.

16.68 The LSOA in which the Site falls is within the 40% least deprived neighbourhoods in the country for the Crime Domain. The Crime Domain measures the risk of personal and material victimisation at the local level.

16.69 According to UK Crime Statistics (Ref. 16.34), there was a total of 275 acts of crime within 1-mile of the Site (AL7 3BU) in November 2020. Tale 16.14 below demonstrates the breakdown of acts of crime.

Table 16.14 Acts of Crime within 1-mile of the Site, November 2020, UK Crime Statistics

Type of crime	Number of acts	Percentage of total crimes (%)
Anti-social behaviour	99	36.0%
Bike theft	4	1.5%
Burglary	8	2.9%
Criminal damage and arson	19	6.9%
Drugs	6	2.2%
Other theft	16	5.8%
Possession of weapons	0	0.0%
Public order	22	8.0%
Robbery	3	1.1%
Shoplifting	12	4.4%
Theft from the person	0	0.0%
Vehicle crime	19	6.9%
Violence and sexual offences	66	24.0%
Other crime	1	0.4%
TOTAL	**275**	

Open, Amenity and Play Space Provision

16.70 There are several public open and natural spaces within 2km of the Site including Campus Park and Garden (400m west), Cassie's Field Country Park (800m south), Sherrard's Park wood (1.2km northwest), King George 5th Park (1.5km southeast) and Stanborough Park (1.8km south).

16.71 Stanborough Park is the largest nearby country park covering an area of 126 acres. King George 5th Park provides a variety of sports facilities including a skate park, tennis courts, bowling green and cricket grounds.

16.72 The nearest allotments to the Site are Broadwater Crescent allotments (500m south), St Audrey's Green Allotments (800m southeast) and Parkway Close Allotments (800m west).

16.73 There are five playgrounds within 1.5km of the centre of the Site as shown in Table 16.15 below. The nearest play area is the Reed Play area which is 500m south of the centre of the Site, equivalent to a 650m walking distance. This is above the accessibility standards set out in the WHBC Planning Obligations (SPD) which are a 100m walk to a Local Area of Play (LAP), a 400m walk to a Local, Equipped Area of Play (LEAP) and a 1km walk to a Neighbourhood Equipped Area of Play (NEAP).

Table 16.15 Playgrounds within 1.5km radius of the Proposed Development

Playground	Distance (km)
Reeds Play Area	0.5
Farm Close Play Area	0.9
King George V playground	1.3
Little Rivers Play Area	1.4
Melbourne Court	1.5

Community Facilities Provision

16.74 Within a 2km radius of the Site, there are six community centres. These are listed in the table below.

Table 16.16 Community centres within a 2km radius of the Proposed Development

Community centre	Distance (km)
Campus West Arts and Conference Centre	0.8
Woodhall Community Centre	0.9
Vineyard Barn	1.1
The Green Community Hall	1.4
Panshanger Community Centre	2.0
Hazel Grove Community Centre	2.0

16.75 Within a 2km radius of the Site, there are two libraries which are Welwyn Garden City Central Library (800m northwest) and Woodhall library (1.1km southeast).

16.76 The nearest youth services are available at Welwyn Garden City Young People's Centre in Oaklands College (700m northwest).

16.77 The nearest leisure centre is Gosling Sports Park 1.1km south of the Site. Stanborough Park Water Sports Centre is also 2.0km south of the Site which offers open water swimming and a variety of outdoor water sports.

IDENTIFICATION AND EVALUATION OF KEY EFFECTS

During Construction

Employment and Economy

16.78 Consideration of the construction works is best considered at the regional level (East of England) due to the mobile nature of this type of employment. It is estimated that 2,445 years of construction employment would be created by the Proposed Development, equating to 245 FTE jobs for the seven year duration of construction. These are jobs which would be directly created by the Proposed Development and also those created along the supply chain, through the provision of goods and services to the construction process.

16.79 A proportion of jobs may also 'leak' outside the region. Taking into account the predicted employment generation detailed above, and having regard to the fact that a proportion of jobs may likely 'leak' outside the region, it is anticipated that there will be a temporary non-significant **Minor Beneficial** impact from direct and indirect employment from construction.

During Operation

Population and Demography

Total population

16.80 The Proposed Development will bring forward up to 721 residential units. Using a standard ratio of 2.4 residents per household (the average household size in Welwyn Hatfield from the 2011 Census), it is estimated that 721 residential units would accommodate approximately 1,730 residents. The residential units would become gradually occupied in two phases so these new residents would not all come forward at once.

Child Yield

16.81 To identify the demand on early years and education services caused by the Proposed Development, the likely child yield has been calculated using the New Wandsworth Child Yield Multipliers (Appendix 16.1). This method has been used to provide a detailed breakdown of child yield in the absence of specific child yield ratios published by WHBC. This is based on multipliers applied to the proposed numbers of units adjusted according to the unit type (flat/house), size (number of beds) and tenure (market / intermediate and social rented/

affordable). Given that the proposed tenure will be dependent on funding, a range has been applied. Predicted child yield due to the Proposed Development is shown in Table 16.17.

Table 16.17 Predicted Child Yield

Age (years)	Yield
0 to 4	35-111
5 to 10	11-22
11 to 15	3-31
16 to 18	8-25
TOTAL	**57-189**

16.82 The Proposed Development could generate a total child yield of 57-189 children in two phases. Of these children, 35-111 will be aged 0-4 years (61%), 11-22 will be aged 5-10 years (19%) and 11-56 will be aged 11-18 years (19%). The impacts of child yield on educational facilities are detailed in Local Education Provision section below.

Housing

Housing Types, Sizes & Tenures

16.83 The Proposed Development will bring forward up to 721 residential units which will contribute to the overall housing delivery target in Welwyn Hatfield of 12,500 additional dwellings by 2031.

16.84 The class of residential dwellings will be a mix of sizes and will range from 1 bed to 3 bed. All of these units can be assumed to be market units in the event that a grant is not secured from Homes England. An indicative size mix of all residential units across the Site is shown in the table below.

Table 16.18 Indicative Size Mix

Size	Number	Percentage
Studio	45	6%
1 Bed	227	32%
2 Bed	424	59%

Size	Number	Percentage
3 Bed	25	3%
Total	**721**	

16.85 All residential units within the Proposed Development would be built to both the Nationally Described Space Standards and be accessible and adaptable in accordance with Building Regulation M4(2). Building the Proposed Development to these standards would ensure the provision of high quality housing stock in Welwyn Hatfield.

16.86 The location of the Proposed Development is highly accessible and would address the WHBC District Plan objective of reducing the use of private cars and directing growth to those areas with good transport networks and which are well served by jobs, services and facilities.

16.87 Taking all of the above into account, the likely effect on housing provision within Welwyn Hatfield is considered to be long-term, significant **Minor Beneficial** impact.

16.88 In addition, the Applicant is intending to obtain a grant from Homes England with the intention to provide a high level of affordable housing on-site in a mix of tenures. This would not be secured through legal agreement. For Phase 2 (the detailed aspect of the scheme), the indicative tenure mix assuming a grant is obtained is set out in the table below.

Table 16.19 Phase 2 Indicative Tenure Mix

Size	Studio	1 Bed	2 Bed	3 bed	Total	Percentage (%)
Private Sale	2	8	13	0	23	7%
Shared Ownership	22	63	119	0	204	64%
Rent-to-Buy	0	15	26	4	45	14%
Social Rent	0	15	26	4	45	14%
Total	**24**	**101**	**184**	**8**	**317**	

Note: Subject to funding.

16.89 For the outline aspect of the scheme, the tenure mix will be confirmed at reserved matters stage.

Expenditure of Additional Residents

16.90 The Proposed Development will bring forward up to 721 residential dwellings which are estimated to be occupied by 1,730 residents. The flats, their residents and their spending can be regarded as additional within the borough; even if residents previously lived in the borough, it can reasonably be assumed that their previous accommodation will be readily re-occupied.

16.91 According to the ONS statistics on family spending in the financial year ending March 2020, the average weekly household spending was £585.60 (Ref. 16.35). Based on 721 residential units it is estimated that the gross annual expenditure of the residential development will be £22.0 million.

16.92 It is estimated that 50% of this total expenditure will be spent locally, thus resulting in an additional £11.0 million spent in the local economy. Calculations can be seen in Appendix 16.1.

16.93 Therefore, operational phase residents spending is considered to have a permanent **Moderate Beneficial** impact on the local economy over the long-term.

Local Healthcare Facilities

Local GP surgeries

16.94 The Proposed Development is anticipated to bring forward a residential population of 1,730 persons in two phases. Combined with the current number of patients registered at the surgeries, this would total 49,442 patients. Therefore, the GP to patient ratio would be 1,902. This is greater than the best practice figure of 1,800. Despite this, all GPs identified are still accepting new patients to their surgeries which suggests that there is some capacity for the anticipated population that the Proposed Development will generate. Therefore, it is considered that there will be a permanent, long-term, **Moderate Adverse** impact.

Local dentists

16.95 The baseline assessment identified eight dentists within 1.5 miles of the Site. These dentists varied as to whether they are accepting new patients or not. Nonetheless, it is considered that these eight dentists would have the capacity to cater for the anticipated population of 1,730 persons, thus it is anticipated that there will be a permanent, long-term, **Negligible** impact.

Local hospitals

16.96 There are three hospitals within a 3-mile radius of the Site. These offer a range of facilities but do not provide an Accident and Emergency department. It is considered that these hospitals will have the capacity for the projected population of 1,730 persons. Therefore, there will be a long-term, permanent, **Negligible** impact.

Local Education Provision

Early Years

16.97 The Proposed Development is anticipated to generate 35-111 children aged 0 to 4 years who will require nursery school places. According to the Department of Education's Childcare and Early Years Survey of Parents in England (2018), a total of 52% of pre-school children (aged 0 to 4) were likely to receive formal childcare (Ref. 16.36). This includes day nurseries, nursery schools, nursery classes and playgroups or pre-schools. Therefore, the Proposed Development will bring forward 18-58 children who will require formal childcare places.

16.98 The baseline assessment identified seven nurseries within a 1-mile walking distance of the Proposed Development. The baseline assessment identified that there is currently fluctuating or limited capacity at the five nurseries for which information was provided and there are waitlists at some of them. It is difficult to know the exact space available however, it can be anticipated that there is limited capacity for the 18-58 children that would require a nursery place. Therefore, it is anticipated that there would be a permanent **Moderate adverse** impact in the long-term.

Primary

16.99 The Proposed Development is anticipated to bring forward 11-22 pupils aged 5 to 10 years who will require primary school places. The baseline assessment identified five primary schools within a 1-mile walking distance of the Site. There is currently the capacity for 161 additional primary school pupils across these schools. Reception year capacity across local primary schools in Welwyn Garden City east is also predicted to remain relatively stable up to 2023-2024.

16.100 Therefore, it is considered that there is sufficient capacity to accommodate the additional population of those aged 5 to 11 years generated by the Proposed Development.

16.101 Therefore, a permanent **Negligible** impact in the long-term is anticipated.

Secondary

16.102 The Proposed Development is anticipated to bring forward 11-56 pupils aged 11 to 18 years who will require secondary school places. There are three secondary schools within a 3-mile walking distance of the Site which currently have capacity for 576 pupils due to low occupancy levels at the Ridgeway Academy. However, capacity in Year 7 at these schools is projected to decline due to increased demand and therefore there will be insufficient capacity from 2022-2023 onwards.

16.103 Therefore, it is determined that there is not sufficient capacity to accommodate for the projected yield of 11 pupils aged 11 to 18 years. As a result, the impact is permanent **Moderate Adverse** in the long-term.

Crime

16.104 The Proposed Development will be designed in accordance with Secured By Design principles and will:

- Create natural surveillance and maximise active frontages throughout the Proposed Development. This will include active edges at ground level along the weave, Western edge, and Broadwater Road. The mews streets will be overlooked by the podium and flats at first floor, as well as having active corners at ground floor level;
- Provide well lit entrances and CCTV; and
- Include a site management office in Block 12 for increased surveillance and security.

16.105 As the design of the Proposed Development will help to impede the potential for crime, the impact is permanent **Negligible** to **Minor Beneficial** in the long-term.

Open, Amenity and Play Space Provision

16.106 The proposals include a variety of open and amenity space provisions. This will include 3,745 sqm of designated public open space and 5,340 sqm semi-private open space at podium and terrace level. This will include community raised beds on the semi-private roof terraces.

16.107 The Proposed Development will include the provision of a Local Area for Play (LAP) as part of the public open space for the outline element of scheme. This is a small area of unsupervised open space which will be specifically designated for young children aged 4-6 for play activities close to where they live. The details of this play space will be confirmed at the detailed design stage.

16.108 The Proposed Development will also provide publicly accessible external gym equipment, informal “play on the way” equipment and amenity lawn space.

16.109 Additional doorstep play space will be provided for young children up to the age of 6 at podium level for all residential blocks. For the detailed aspect of the scheme the area of this is 129sqm. For the outline aspect of the scheme, the area of play provision will be confirmed at the detailed design stage.

16.110 As a result of these open space provisions, there will be a permanent **Minor Beneficial** impact in the long-term.

16.111 In addition to the play space provision identified as part of the baseline, a new Local Equipped Area for Play (LEAP) will also be provided to the south of the Site as part of the Phase One South Side development which will include play space provision for children aged 4-8 years and would be accessible to residents of the Proposed Development.

Community Facilities Provision

16.112 The proposed incoming population will create an additional demand on existing community infrastructure. WHBC have set a standard for the provision of community facilities in the borough which should be one facility per 4,000 people or per 1,740 dwellings.

16.113 While no community facilities will be provided on-site, the baseline assessment has identified six community centres, two libraries, one youth centre and two leisure centres within 2km of the Site.

16.114 However, the Proposed Development is also likely to create an increased demand for local library services and youth services.

16.115 This is considered to have a permanent **Minor Adverse** impact in the long-term.

ASSESSMENT OF CUMULATIVE EFFECTS

16.116 With regard to cumulative impacts, it is considered unlikely that the Proposed Development would generate any cumulative impacts that would warrant mitigation with regard to those aspects identified above that result in a Beneficial impact. As such, only those areas where the potential residual impacts were considered to be of Adverse or Negligible significance, is there potential for a cumulative effect to occur that could result in an Adverse impact.

16.117 Further, certain aspects are considered unlikely to result in cumulative effects, such as housing. Therefore, the following aspects have been considered with regard to cumulative effects:

- Healthcare facilities (local GP facilities);
- Local education provision (early years', primary and secondary); and
- Community facilities (including libraries and youth services).

16.118 Of the cumulative schemes that have been identified, only those where a planning application has been submitted or where detailed information is available about the emerging proposals have been considered with regards to cumulative socio-economic impacts. The Pall Mall Distribution site has therefore not been include in the assessment of cumulative socio-economic impacts.

16.119 Given that Former Argos Direct Distribution Depot (6/2015/1957/MAJ) and Land East of Bessemer Road (6/2016/1058/FULL) do not contain any residential elements or community facilities they will not result in any cumulative impact on healthcare, education or community facilities and has therefore been excluded from further assessment.

16.120 The following schemes have been therefore considered as cumulative to the Proposed Development for the purposes of this ES Chapter:

- North Side (latest revised scheme tested as worst-case scenario)
- Phase 1 of South Side (Extant Planning Permission)
- Rank Xerox Ltd (6/2017/1568/MAJ)
- Mercury House (6/2016/2624/FULL)
- 51 Bridge Road East (6/2017/2104/MAJ)
- Accord House (6/2018/2472/MAJ)
- 73 Bridge Road East (6/2020/2268/MAJ)

- 37 Broadwater Road (6/2018/2387/MAJ)
- Former Roche Building (6/2016/1882/FULL)
- 29 Broadwater Road (6/2019/3024/MAJ)
- Biopark (6/2020/3420/MAJ)

During Construction

16.121 The cumulative schemes will generate employment opportunities during their construction phases, which will have a potential cumulative beneficial effect for supply chain businesses in the construction phase. These effects are uncertain and are unlikely to be significant.

During Operation

16.122 In total, the cumulative schemes will bring forward 2,174 units. Based on an average household size of 2.4 people in each Class C3 residential unit and maximum occupancy of extra care units, the cumulative developments will generate a resident population of 5,052 individuals. Together with the 1,730 persons generated by the Proposed Development, this is a total of 6,782 new residents in the area. Table 16.20 shows the breakdown of these calculated populations per scheme.

Table 16.20 Population of Cumulative Schemes

Scheme	Number of Units	Population
North Side	1,220	2,763
Phase 1 of South Side	208	499
Rank Xerox Ltd	38	91
Mercury House	43	103
51 Bridge Road East	54	130
Accord House	25	60
73 Bridge Road East	111	266
37 Broadwater Road	24	58
Former Roche Building	34	82
29 Broadwater Road	128	307
Biopark	289	693
Total	**2,174**	**5,052**

Local Healthcare Facilities

16.123 The baseline assessment identified six GP surgeries within a 1.5-mile radius of the Site.

16.124 An additional 5,052 persons from the cumulative schemes, which do not explicitly offer healthcare facilities within their proposals, combined with the current number of registered patients and the population expected to be brought forward by the Proposed Development totals 54,494 persons. This increases the GP to patient ratio to 2,096 which is slightly greater than the best practice ratio of 1 GP to 1,800 patients.

16.125 However, as the baseline assessment identified, all of these GP surgeries are accepting new patients this suggests that there is some capacity for this future population.

16.126 Therefore, the cumulative impact is anticipated to be permanent **Moderate Adverse** in the long-term.

Local Education Provision

16.127 To identify the likely pupil product from each development, the new Wandsworth Child yield ratios were used. The child yield calculations are based on the number of applicable residential dwellings and therefore extra care dwellings and over 55s social rent dwellings have been excluded from the calculations. Full methodology can be seen in **Appendix 16.1** and the breakdown of child yield in Table 16.21.

Table 16.21 Predicted Child Yield for the Cumulative Schemes

Scheme	Predicted pupils			Total
	0 to 4 years	5 to 10 years	11 to 18 years	
Phase 1 of Extant Planning Permission	24	2	9	35
North Side	38	12	14	64
Rank Xerox Ltd	4	2	3	9
Mercury House	0	0	0	0
51 Bridge Road East	5	1	2	8
Accord House	0	0	0	0
73 Bridge Road East	12	4	6	22
37 Broadwater Road	1	1	0	2
Former Roche Building	1	0	0	1
29 Broadwater Road	21	4	11	36
Biopark	22	8	9	39
Total	**128**	**34**	**54**	**216**

16.128 The cumulative schemes will bring forward 128 children aged 0-4 years which, when combined with the Proposed Development, totals 163-239 children aged 0-4 years. Assuming 52% of pre-school children (aged 0 to 4) are likely to receive formal childcare, this will bring forward a total of 84-124 children who will require formal childcare places.

16.129 The baseline assessment identified seven nurseries within a one-mile walking distance of the Site. The baseline assessment identified that there is currently fluctuating or limited capacity at the five nurseries that provided information and there are waitlists at some of them. It is difficult to know the exact space available however, it can be anticipated that there is limited capacity for the 84-124 children that would require a nursery place. As a result, the cumulative impact on nursery provision is anticipated to be permanent **Moderate Adverse** in the long-term.

16.130 The cumulative schemes will bring forward 34 pupils of primary school age which, when combined with the Proposed Development, totals 45-56 pupils of primary school age. The baseline assessment that there is currently capacity for 161 primary school pupils across the five primary schools within a 1-mile walking distance of the Site.

16.131 The capacity levels in reception classes in primary schools across Welwyn Garden City east are expected to remain at or above current levels until 2023-2024. No data is available beyond this time period.

16.132 Therefore, the cumulative impact on primary schools is anticipated to be **Negligible** in the long-term.

16.133 The cumulative schemes will bring forward 54 secondary school pupils which, when combined with the Proposed Development, totals 65-110 secondary school children. The baseline assessment identified that there is no capacity from 2022-2023 onwards for the three secondary schools within a 3-mile walking distance of the Site.

16.134 Therefore, the cumulative impact on secondary schools is anticipated to be permanent **Moderate Adverse** in the long-term.

Community Facilities

16.135 The baseline assessment has identified six community centres, two libraries, one youth centre and two leisure centres within 2km of the Site.

16.136 The cumulative schemes and Proposed Development will bring 5,052 new residents to the area. This will result in increased demand on community facilities including local Libraries and Youth Services.

16.137 However, some of the cumulative schemes will also bring forward new community space including the North Side and Biopark. Therefore, the cumulative impact on community facilities is a **Minor Adverse** to **Moderate Beneficial** impact.

Inter-Relationship Effects

16.138 There are no inter-relationships with other topic areas identified.

ENHANCEMENT, MITIGATION AND RESIDUAL EFFECTS

During Construction

Employment and Economy

16.139 No mitigation measures are required. Therefore, the residual impact remains temporary **Minor Beneficial** in the long-term.

During Operation

Housing

16.140 No mitigation measures are required. Therefore, the residual impact remains permanent **Minor Beneficial** in the long-term.

Employment and Economy

16.141 There are no required mitigation measures associated with operational employment generation. Therefore, the residual impact remains permanent **Minor Beneficial** in the long-term.

16.142 There are no required mitigation measures associated with local expenditure. Therefore, the residual impact remains permanent **Moderate Beneficial** in the long-term.

Local Healthcare Facilities

16.143 Mitigation to increase the capacity for local GP services will be provided in the form of a Healthcare Contribution to Hertfordshire County Council. Following this, the residual impact will be permanent **Negligible** in the long-term.

16.144 There are no required mitigation measures associated with the impact on dentists. Therefore, the residual impact remains permanent **Negligible** in the long-term.

16.145 There are no required mitigation measures associated with the impact on hospitals. Therefore, the residual impact remains permanent **Negligible** in the long-term.

Local Education Provision

16.146 Mitigation to increase the capacity for nurseries and other early years providers will be provided in the form of a Childcare Contribution to Hertfordshire County Council. Following this, the residual impact will be **Negligible** in the long-term.

16.147 Mitigation to increase the capacity for primary schools will be provided in the form of a Primary Education Contribution to Hertfordshire County Council. Therefore, the residual impact remains permanent **Negligible** in the long-term.

16.148 Mitigation to increase the capacity for secondary schools will be provided in the form of a Secondary Education Contribution to Hertfordshire County Council. Following this, the residual impact will be **Negligible** in the long-term.

Crime

16.149 Given the residential units have been designed in accordance with Secured By Design principles, no additional mitigation measures are necessary. Therefore, the residual impact remains permanent **Negligible** to **Minor Beneficial** in the long-term.

Open, Amenity and Play Space Provision

- No mitigation measures are necessary. Therefore, the residual impact remains permanent **Minor Beneficial** in the long-term.

Community Facilities Provision

16.150 Mitigation measures will be provided in the form of a Youth Contribution and a Library Contribution to maintain and enhance the capacity of local youth services and library services. Therefore, the residual impact will be **Moderate Beneficial.**

SUMMARY

16.151 In summary, the Socio-economic residual impacts of the Proposed Development will be mostly **Beneficial** or **Negligible**. These impacts and associated mitigation measures are detailed in Table 16.22 below.

Table 16.22 Socio-economic Summary Table

Potential Effect	Nature of Effect (Permanent or Temporary)	Significance	Mitigation/ Enhancement Measures	Residual Effects
Employment and Economy – Construction phase	Temporary	Minor Beneficial	No mitigation	No change
Housing	Permanent	Minor Beneficial	No mitigation	No change
Employment and Economy – Local Expenditure	Permanent	Moderate Beneficial	No mitigation	No change
Local Healthcare Facilities – GP surgeries	Permanent	Moderate Adverse	Healthcare Contribution	Negligible
Local Healthcare Facilities – dentists	Permanent	Negligible	No mitigation	No change
Local Healthcare Facilities – Hospitals	Permanent	Negligible	No mitigation	No change
Local Education Provision – Nurseries	Permanent	Moderate Adverse	Childcare contribution	No change
Local Education Provision – Primary Schools	Permanent	Negligible	Primary Education contribution	Negligible
Local Education Provision – Secondary Schools	Permanent	Moderate Adverse	Secondary Education contribution	Negligible
Crime	Permanent	Negligible to Minor Beneficial	No mitigation	No change
Open, Amenity and Play Space Provision	Permanent	Minor Beneficial	No mitigation	No change
Community Facilities Provision	Permanent	Minor Adverse	Youth Contribution and Library Contribution	Negligible

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17 CLIMATE CHANGE

INTRODUCTION

17.1 This chapter of the ES includes:

- An assessment of the likely significant impacts of climate change on the resilience of the Proposed Development during operation; and
- An assessment of the likely significant impacts of the Proposed Development on the environment with regard to climate change through the direct and indirect release of GHG emissions during construction and operation.

17.2 It also describes the methods used to assess the impacts; the baseline conditions currently existing at the Site and in the surrounding area; the mitigation and adaptation measures required to prevent, reduce or offset any significant adverse effects; and the likely residual impacts after these measures have been adopted.

ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

Assessment Methodology

Scope of the Assessment

17.3 The EIA Directive 2014 sets out the rationale for incorporating climate change into the EIA process (Ref. 17.1). It states:

> *"Climate change will continue to cause damage to the environment and compromise economic development. In this regard, it is appropriate to assess the impact of projects on climate (for example greenhouse gas emissions) and their vulnerability to climate change."*

17.4 The requirements of the EIA Directive 2014 have been adopted within UK EIA Regulations 2017 and require that the assessment provides:

> *"A description of the likely significant effects of the development on the environment resulting from, inter alia:*
>
> *(f) the impact of the project on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the project to climate change".*

17.5 Therefore, this ES Chapter covers:

- An assessment of the likely significant impacts of climate change on the resilience of the Proposed Development during operation; and
- An assessment of the likely significant impacts of the Proposed Development on the environment with regard to climate change through the direct and indirect release of GHG emissions during construction and operation.

17.6 The assessment has followed guidance within the IEMA 'Environmental Impact Assessment Guide to: Climate Change Resilience & Adaptation' (Ref. 17.2) and IEMA guidance on 'Assessing Greenhouse Gas Emissions and Evaluating their Significance' (Ref. 17.3).

Climate Change Resilience Assessment

Baseline Data

17.7 Baseline data for the climate change risks posed to the Proposed Development has been gathered using the United Kingdom Climate Projections (UKCP) to establish the climatic data surrounding current seasonal temperatures and precipitation. This stage of the assessment was used to analyse the current climate and compare these findings, in relation to the Proposed Development, to the climate change projections identified in the UK Climate Change Projections 2018 (UKCP18) (Ref. 17.4).

17.8 The UKCP18 aim to assist decision makers in assessing the climate change risks associated with projects. The projections form part of the Met Office Hadley Centre Climate Programme, which is supported by the Department of Business, Energy and Industrial Strategy (BEIS) and the Department for Environment, Food and Rural Affairs (DEFRA). The UKCP18 provides the most up-to-date assessment of how the climate in the UK may change over the 21st century.

17.9 The UKCP18 use a range of future emission trajectories to assess different climate change scenarios. These emission trajectories include where global emissions of greenhouse gases (GHG) rapidly peak and decline towards the climate targets in the Paris Agreement, to where fossil fuel use increases to even higher GHG emissions. The UKCP18 use representative concentration pathways (RCPs) that represent different levels of GHG concentrations in the future. For this assessment, the high (RCP8.5) emission scenario has been used for a set of key climate change parameters. This scenario was selected in accordance with IEMA Guidance

on assessing climate change resilience (Ref. 17.2) as the most conservative scenario to ensure all potential risks are addressed.

17.10 In addition, the UK Climate Change Risk Assessment: Government Report (CCRA) (Ref. 17.5) has been used to form the basis of this resilience assessment.

Assessment Overview

17.11 The climate change resilience assessment applied to the Proposed Development covers the following stages:

- Defining the future climate baseline;
- Identifying and determining the sensitivity of receptors;
- Reviewing and determining the magnitude of effect;
- Determination of significance; and
- Developing additional adaptation including adaptive management for significant risks.

17.12 Once the sensitivity receptors to climate change within the Site have been identified, the impact of these climate variables will be evaluated based on the magnitude of effect and the tolerable thresholds will be determined. Following this, the significance will be determined.

17.13 This will be achieved by undertaking a systematic structural and fabric resilience risk assessment to identify and evaluate the impact on the structural and fabric resilience of the Proposed Development. This aspect of the Chapter will focus on the impact of extreme weather events arising from climate change, and where appropriate, mitigation against these impacts.

Significance Criteria

17.14 For the purposes of the climate resilience assessment, the usual EIA significance ratings do not apply but the climate change resilience of the Proposed Development must still be fully estimated and evaluated. Therefore, specific project criteria have been used to determine the significance of effect in line with the IEMA Climate Change Resilience Guidance (Ref. 17.2).

17.15 Each impact identified has been assessed against three variables as shown in Table 17.1- Receptor sensitivity (Rs); Probability (P); and Consequence (C) of the risk.

17.16 Using this methodology, each risk is assigned a score (Total Risk Score = Rs x P x C) between 1 (no or very low risk) and 27 (very high risk) for three separate time periods:

- 2030s (2020-2039);
- 2060s (2050-2069); and
- 2090s (2080-2099).

17.17 Scoring risks against three different timescales provides an indication of when action may need to be taken to adapt and increase resilience so the asset in question is able to perform effectively for its intended useful design life. For some risks, action should be taken early to avoid significant disruption and economic impact. Other risks only need to be addressed either shortly before or as they occur. For example, the risk of severe and widespread flooding may need to be addressed early through planning and design activities (such as installing higher drainage capacity and flood protection). In contrast, when considering the resilience of road surfaces to extreme weather events, adaptive management is a more suitable approach as this allows resilience to be built into a project when necessary during ongoing maintenance or replacement.

17.18 The scores for Receptor sensitivity (Rs), Probability (P) and Consequence (C) are established through the understanding of the specific risk and the level of resilience or exposure of the Proposed Development to climate change and through a review of relevant literature and climate change data. These are shown in Table 17.1 – Receptor sensitivity, Probability and Consequence Factors below.

17.19 Total Risk Scores (Rs x P x C) are categorised as follows:

- Total Risk Score of 18-27 – Very High Risk for the specified time period (Major Adverse Effect);
- Total Risk Score of 12-17 – High Risk for the specified time period (Moderate Adverse Effect);
- Total Risk Score of 8-11 – Medium risk for the specified time period (Minor Adverse Effect); and
- Total Risk Score of <8 – Low Risk for the specified time period (Negligible Effect).

17.20 Therefore a risk score of 8 or more means that climate change resilience impacts are considered likely to be significant prior to mitigation.

Table 17.1 Receptor Sensitivity, Probability and Consequence Factors

Factor	Commentary
Receptor sensitivity (R_S) – the sensitivity of the receptor/receiving environment is the degree of response of a receiver to a change and a function of its capacity to accommodate and recover from a change if it is affected. This considers the susceptibility of the receptor and the vulnerability of the receptor to potential climate effects. Susceptibility is the receptor's ability to withstand/ be substantially altered by the projected changes to the existing/ prevailing climatic factors (e.g. lose much of its original function and form). Vulnerability is the receptor's dependence on existing/prevailing climatic factors and reliance on these specific existing climate conditions continuing in future. Sensitivity is determined using quantifiable data, where available, the consideration of existing designations, relevant legislation, national and local policy and international, national, regional and local standards.	1 = Low susceptibility and/ or vulnerability 2 = Moderate susceptibility and/ or vulnerability 3 = High susceptibility and/ or high vulnerability
Probability (P) – likelihood of the impact occurring over the specified time period.	1 = Unknown occurrence or relatively low probability of the impact occurring in project lifetime e.g. no occurrence or may occur once 2 = Medium likelihood that the impact will occur in the lifetime of the project e.g. once or more 3 = There is a high likelihood that the impact will occur multiple times in the project lifetime e.g. every 15 years or more
Consequence (C) - This reflects the geographical extent of the effect or the number of receptors affected (e.g. scale), the complexity of the effect, degree of harm to those affected and the duration, frequency and reversibility of effect.	1 = No or minimal consequence e.g. effect is small in scale relative to the project, results in no harm, has a short duration (e.g. 1 day) and is reversible. 2 = Moderate consequence, must meet one of the following thresholds: • Results in some level of harm; or • Medium scale effect that has some potential for cascading effects on other aspects of the Proposed Development. 3 = High consequence, must meet one of the following thresholds: • Irreversible or longer duration (e.g. 1 week) effect on any aspect of the project; • Results in unacceptable harm; or Large scale effect that has cascading effects on the wider function of the Proposed Development.

17.21 Those risks and opportunities that scored 8 or above (as shown in Table 17.7) have been assessed further to identify potential adaptation responses that could be implemented to reduce the sensitivity, probability and consequences(s) of the impact.

GHG Assessment

17.22 For the GHG assessment, a summary of the scope of GHG impacts and the sources of emission data where these have been quantified is provided in Table 17.2 below.

Table 17.2 GHG Data Sources

Development phase	Baseline	Proposed Development	Methods and Data Sources
Construction emissions	Baseline assumed to be zero	Embodied carbon emissions from all materials in Proposed Development; construction transport, construction waste and construction plant.	GHG calculation of whole life cycle embodied carbon based on RIBA benchmark per indicative GIA of the Proposed Development. Construction embodied carbon emissions assumed to be 33% of total based on data from LETI on medium scale residential developments.
Operational Transport	Baseline is zero as there is no existing development that would result in transport emissions.	Opening year transport GHG emissions	Operational transport emissions estimated based on: -Daily development trips from Transport Assessment assuming a maximum of 3% HGV vehicles based on the previous assessment. Trips outside of these hours are predicted to be minimal, -BEIS 2020 Carbon factors using an average sized petrol vehicle (0.1743 Kg CO_{2e}/ km) and an average laden articulate HGV (0.91569 Kg CO_{2e}/ km); and -Distances based on 2011 Census Travel to Work Data by car from Peartree ward scaled up by 50% to account for differences in straight line distances and the local road network.
Operational energy use	Baseline is zero as there is no existing development that would result in operational energy use.	Energy strategy of the Proposed Development	Regulated CO_2 emissions from Sustainability and Energy Statement for the Proposed Development
Sources: RIBA 2030 Climate Challenge benchmarks (Ref. 17.7); LETI Embodied Carbon Primer (Ref. 17.8); BEIS 2020 GHG Conversion Factors for Company Reporting (Ref. 17.9) and 2011 Census Travel to Work data (Ref. 17.10).			

Whole Life Embodied Carbon

17.23 The whole life embodied carbon value has been taken from the Royal Institute of British Architects (RIBA) 2030 Climate Challenge benchmarks for whole life embodied carbon for domestic and non-domestic buildings (Ref. 17.7). The benchmarks are provided as kg of CO_{2e} per square metre of Gross Internal Area (GIA). CO_{2e} is a measure of all six major GHGs (carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), sulphur hexafluoride (SF_6), hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs). The following benchmarks are therefore provided which are considered a worst case scenario estimate based on current regulatory minimum requirements:

- Domestic buildings: 1,000kgCO_{2e}/m^2.

Significance Criteria

17.24 The usual EIA significance criteria are not applicable to assess the GHG emissions of the Proposed Development and the criteria set out in the IEMA guidance have been used. IEMA recommend that all GHG emissions are significant and that their occurrence must be addressed by implementing mitigation. In the absence of an established universal methodology to determine the level of significance of different sources of GHG emissions, the criteria used in the tables below have been used to determine significance of emissions relative to the CO_2 emissions for Welwyn Hatfield in 2018 as reported by BEIS (Ref. 17.11).

Table 17.3 GHG Significance Criteria

Significance	Criteria
Major Adverse/ Beneficial	Major increase (adverse) or decrease (beneficial) (above 10%, 61,510t CO_2) in annual Welwyn Hatfield emissions
Moderate Adverse/ Beneficial	Moderate increase (adverse) or decrease (beneficial) (above 1%, 6,151.0t CO_2) in annual Welwyn Hatfield emissions
Minor Adverse/ Beneficial	Minor increase (adverse) or decrease (beneficial) in GHG emissions (below 1%, 615.1t CO_2) in annual Welwyn Hatfield emissions

Source: UK local authority and regional carbon dioxide emissions national statistics (2018 data)

ASSUMPTIONS, EXCLUSIONS AND LIMITATIONS

Climate Change Resilience

17.25 This assessment uses the UKCP18 projections of the future climate that are based on Met Office climate models which represent the current understanding of the climate system. The Met Office's UKCP18 Caveats and limitations report identifies that:

- Climate projections are dependent on future greenhouse gases assumptions;
- Estimated ranges for future climate are conditional; and
- UKCP18 does not capture all possible future outcomes.

17.26 The models used for UKCP18, as with all climate modelling, are inherently based on statistical, and dataset choice assumptions with expert judgement playing a role in the various methodological and data choices. The data scenarios, therefore, should be interpreted as climate projections that will have some variance as models and observed impacts are recorded.

17.27 This assessment considers the resilience of the Proposed Development to future climate change. Therefore, it does not follow the standard assessment and approach for this EIA, and it is not possible to provide an assessment of any residual effects following adaptation as there are scientific unknowns within the climate system. However, whilst the detail of the residual effects following adaptation cannot be stated, the adaptation measures identified are considered best practice in order to minimise the residual impact of climate change on the Proposed Development.

GHG Assessment

17.28 Benchmarks used in the calculation of whole life carbon emissions are based on likely worst case scenario figures from industry documentation. However, there are inevitably variations between buildings and therefore an accurate figure for the construction embodied carbon is not included as part of this assessment.

17.29 It is acknowledged that the comparison between construction embodied carbon emissions from construction activities, materials and waste and Welwyn Hatfield Borough Council emissions is not a direct comparison given that emissions from Welwyn Hatfield reported by BEIS do not include material imports and upstream activities from outside the Borough. Despite this, comparisons to local authority emissions are considered the most reasonable comparison to make in the absence of detailed data on upstream emissions.

17.30 The emissions factors used in the operational transport GHG assessment are based on 2020 UK emissions factors from BEIS and are therefore likely to reduce significantly for transport over the lifetime of the Proposed Development. However, given the uncertainties associated with the speed of decarbonisation, current emission factors are considered the most appropriate for this assessment and consider a worst case scenario.

17.31 The operational energy GHG assessment is based on standard industry methodologies for reporting regulated energy emissions based on the Energy and Sustainability Statement prepared by Norman Bromley.

LEGISLATION, PLANNING POLICY AND GUIDANCE

International

The Paris Agreement (2016)

17.32 The Paris Agreement is an international agreement on climate change created as a result of the United Nations Framework Convention on Climate Change (UNFCCC) Conference of the Parties in 2015 (Ref. 17.12). It was fully ratified in 2016.

17.33 The Paris Agreement introduced a number of targets with regard to climate change adaptation and mitigation:

- Mitigation: reducing emissions – a long-term goal to limit global average temperature rise to 'well below' 2°C above pre-industrial levels and a rapid reduction in global emissions in accordance with the best available science, after peaking as soon as possible;
- Transparency and global stocktake – government meetings every five years to set more ambitious targets as required by science;
- Adaptation – government agreement to strengthen society's ability to deal with the impacts of climate change; and
- Loss and damage – recognising the importance of averting, minimising and addressing loss and damage associated with the negative effects of climate change; and acknowledging the need to cooperate and enhance the understanding, action and support in areas such as early warning systems, emergency preparedness and risk insurance.

17.34 Signatory nations are required to produce Nationally Determined Contributions (NDCs) that set out their targets to meet the Paris Agreement through national level policy. Many businesses are also taking action to meet the long-term goal, for example by setting their own carbon targets and developing sustainability strategies. Some have done this formally through the Science Based Targets initiative that helps businesses set targets to reduce greenhouse gas emissions in line with the level of decarbonisation required to meet the 2°C temperature rise.

National

The Climate Change Act (2008)

17.35 The Climate Change Act (Ref. 17.13) sets a long term, legally binding target for reducing UK greenhouse gas emissions by a minimum of 80% by 2050 from a 1990 baseline, with a mid-term target of a 34% reduction by 2020. The Climate Change Act was amended in 2019 by introducing a new target for reducing UK greenhouse gas emissions by a minimum of 100% by 2050 from a 1990 baseline (Ref. 17.14). This is otherwise known as a net zero target because some emissions can remain if they are offset by removal from the atmosphere and/ or by trading in carbon units.

17.36 The Climate Change Act also provides for a Committee on Climate Change (CCC), which sets out binding carbon budgets on the Government for five-year periods. The system of carbon budgeting constrains the total amount of emissions in a given time period and sets out a procedure for assessing the risks of the impact of climate change for the UK, stimulating a requirement for the Government to develop an adaptation programme.

17.37 The most recent sixth carbon budget covers the period 2033-2037 and requires annual emissions to be limited to an average of 78% below 1990 levels by 2035.

17.38 The Climate Change Act introduced new powers and duties on climate change adaptation and mitigation, these included:

- A UK-wide Climate Change Risk Assessment that must occur every five years;
- A National Adaptation Programme that must be put in place and reviewed every five years to address the most pressing climate change risks;

- Government power to require 'bodies with functions of a public nature' and 'statutory undertakers' – e.g. water and energy utilities - to report on how they have assessed the risks of climate change to their work, and their response; and
- Adaptation Sub-Committee of the independent CCC in order to oversee progress on the national programme and advise on the risk assessment.

National Planning Policy Framework (2019)

17.39 The revised National Planning Policy Framework (NPPF) was published in February 2019, replacing the previous NPPF that was adopted in March 2012 (Ref. 17.15). The revised NPPF sets out the Government's planning policies for England and how they are expected to be applied. It sets out a framework that aims to achieve sustainable development throughout the planning system with three overarching objectives – economic, social and environmental.

17.40 At the heart of the NPPF is a 'presumption in favour of sustainable development'.

17.41 The NPPF sets out how to deliver sustainable development under 13 subheadings. Subheading 14 of the NPPF outlines how development plans should be planning for climate change and taking a proactive approach to mitigating and adapting to climate change. Paragraph 150 states that:

'New development should be planned for in ways that:

a) avoid increased vulnerability to the range of impacts arising from climate change. When new development is brought forward in areas which are vulnerable, care should be taken to ensure that risks can be managed through suitable adaptation measures, including through the planning of green infrastructure; and

b) can help to reduce greenhouse gas emissions, such as through its location, orientation and design. Any local requirements for the sustainability of buildings should reflect the Government's policy for national technical standards.'

17.42 Paragraph 153 states that:

'In determining planning applications, local planning authorities should expect new development to:

a) comply with any development plan policies on local requirements for decentralised energy supply unless it can be demonstrated by the applicant, having regard to the type of development involved and its design, that this is not feasible or viable; and

b) take account of landform, layout, building orientation, massing and landscaping to minimise energy consumption.'

UK Climate Change Risk Assessment (2017)

17.43 The Government published the UK Climate Change Risk Assessment (CCRA) Government Report on 18th January 2017, the second in a five-yearly cycle (Ref. 17.5). The methodology enables the comparison of over 56 risks and opportunities, from a number of disparate sectors, based on the magnitude of the impact and confidence in the evidence base. This is shown in Table 17.4 below.

17.44 The CCRA analysis indicates that buildings and infrastructure will be affected by both extreme weather events and long-term gradual change in the climate. The challenges arise from higher temperatures and changing rainfall patterns.

Table 17.4 Risks and Opportunities Identified in the UK Climate Change Risk Assessment 2017 Report

Risks	Opportunities
Flooding and coastal change risks to communities, businesses and infrastructure.	Milder winters reducing cost of heating buildings/homes, alleviating fuel poverty and winter deaths.
Risks to health, wellbeing and productivity from high temperatures.	Warmer weather and longer growing seasons increasing agricultural and forestry production.
Risk of shortages in public water supply and water for agriculture, energy generation and industry, with impacts on freshwater ecology.	Economic opportunities for businesses from increased demand for adaptation related goods and services.
Risks to vital goods and services provided by natural capital.	Warmer temperatures improve health, wellbeing and tourism.
Risks to domestic and international food production and trade.	

Local

Welwyn Hatfield District Plan (2005)

17.45 The Welwyn and Hatfield District Plan was adopted in 2005. A number of policies have been saved until it is replaced by a Local Development Framework The District Plan contains the following 'saved' policies relevant to this assessment:

Policy SD1 - Sustainable Development: proposals must demonstrate that the principles of sustainable development are satisfied and that they accord with the objectives and policies of the Distract plan and the sustainability criteria in the Supplementary Design Guidance.

Policy R3 Energy Efficiency: This policy states that developments are expected to include measures to maximise energy conservation through the design of buildings, site layout and provision of landscaping; and incorporate the best practical environmental option for energy supply.

Policy R5 Waste Management requires large developments to minimise waste generation during design, construction, operation and occupation and to maximise the utilisation of appropriate secondary construction materials, including recycled aggregates.

Policy R10 Water Conservation Measures states that new development will be expected to incorporate water conservation measures wherever applicable, including sustainable drainage systems, water storage systems, soft landscaping and permeable surfaces to help reduce surface water run-off.

Broadwater Road West SPD (2008)

17.46 The Broadwater Road West SPD sets out the development framework to support the sustainable regeneration and redevelopment of Broadwater Road West. This includes requirements that need to be addressed as part of the redevelopment process including sustainability initiatives.

17.47 It sets out the following key elements of the masterplan framework that are of relevant to this assessment:

- Achieve sustainable design including maximising energy efficiency and promoting water efficiency measures; and
- Promote sustainable resource management including promoting a site wide CHP.

Welwyn Hatfield Borough Council Emerging Local Plan, 2017

17.48 A revised Local Plan was submitted for examination on 15th May 2017 (Ref. 17.16).

17.49 The following policies are of relevance to this ES Chapter.

Policy SP1 Delivering Sustainable Development: Proposals for new development must incorporate adaptation and mitigation principles relating to climate change. These are to include: energy and water efficiency measures; the use of low carbon and renewable energy; the provision of green infrastructure; sustainable drainage systems (SUDs).

Policy SP4 Transport and Travel: This policy seeks to address climate change through putting in place improved opportunities for travelling by public transport, walking and cycling.

Policy SP10 Sustainable design and construction: The layout and design of proposals reflect the energy hierarchy to maximise opportunities to reduce carbon emissions. The use of renewable and low carbon energy infrastructure is used where it is appropriate. Proposals are responsive to how the climate will change over their lifetime and minimise their contribution to the urban heat island effect.

Policy SADM 13 Sustainability requirements: All major development proposals must demonstrate that they have sought to maximise opportunities for renewable and low carbon sources of energy supply. All newly constructed dwellings will be required to achieve an estimated water consumption of no more than 110 litres/person/day, with water reuse and recycling and rainwater harvesting incorporated wherever feasible.

Welwyn Hatfield Council's Climate Change Strategy (2020)

17.50 The Welwyn Hatfield Council declared a climate change emergency in 2019 (Ref. 17.17) and set itself the following five objectives:

- Reduce carbon emissions from our own estate and operations to net zero by 2030.
- Comply with statutory obligations to mitigate and adapt to climate change.
- Work with, support, encourage and engage residents, communities, businesses and other partners in initiatives to reduce carbon emissions.

- Embed climate change mitigation and adaptation into our plans, strategies and policies.
- Reduce carbon emissions across the borough by promoting energy efficiency measures, sustainable construction, renewable energy, sustainable transport and behavioural change.

17.51 There are, however, no specific targets, timeframes or planning requirements associated with these broad objectives. baseline conditions

Climate Change Conditions

17.52 The Site of the Proposed Development is located in the Met Office district of England South East and Central South. Average baseline climate conditions based on data from the years 1971-2000 for this region (Ref. 17.19) are shown in Table 17.5 below.

Table 17.5 Baseline climate conditions for England South East and Central South

Month	Average baseline climate conditions 1971-2000		
	Average Maximum Temperature	Average Minimum Temperature	Average Rainfall (mm)
January	7.2 ºC	1.5 ºC	81
April	12.5 ºC	3.9 ºC	52.6
July	21.7 ºC	11.9 ºC	45.2
October	14.5 ºC	7.0 ºC	83.8
Annual	14.0 ºC	6.1 ºC	776.8

Source: Met Office (2020)

17.53 Future climate projections under UKCP18 for the 25 km Grid Cell (512500, 212500) within which the Site is located, are presented in Table 17.6 for the 2030s, 2060s and 2090s (Ref. 17.20). The emission scenario RCP8.5 (high emissions scenario) was used and projections for the 50th percentile under both scenarios are displayed. The wider range shows the range of projections for 5th percentile to 95th percentile under each climate variable. These projections within Table 17.6 indicate the changes in temperature and precipitation for the projected years (2030s, 2060s and 2090s).

Table 17.6 UKCP18 Future Climate Change Projections Relative to the 1981-2000 Baseline Period under RCP8.5

Climate Variable	Predicted Change from Baseline Period 1981-2000 under RCP8.5					
	2030s (2020-2039)		2060s (2050-2069)		2090s (2080-2099)	
	RCP8.5 (50th Percentile)	Wider Range	RCP8.5 (50th Percentile)	Wider Range	RCP8.5 (50th Percentile)	Wider Range
Mean Air Temperature Anomaly at 1.5m (ºC)						
Annual Average	+1.0 ºC	+0.2 – +1.9 ºC	+2.3 ºC	+0.9 - +3.9 ºC	+4.2 ºC	+1.8 - +6.7 ºC
Winter Average	+0.9 ºC	-0.3 – +2.2 ºC	+2.1 ºC	+0.3 - +4.1 ºC	+3.6 ºC	+0.8 - +6.4 ºC
Spring Average	+0.7 ºC	-0.3 – +1.7 ºC	+1.7 ºC	+0.4 - +3.2ºC	+3.1 ºC	+0.8 - +5.4 ºC
Summer Average	+1.3 ºC	+0.2 – +2.6 ºC	+3.1 ºC	+0.7 - +5.6ºC	+5.6ºC	+1.8 - +9.7ºC
Autumn Average	+1.0 ºC	-0.3 – +2.5 ºC	+2.5 ºC	+0.5 - +4.5 ºC	+4.4 ºC	+1.5 - +7.6 ºC
Maximum Air Temperature Anomaly at 1.5m (ºC)						
Annual Average	+1.1 ºC	0.2 – +2.2 ºC	+2.6 ºC	0.8 - +4.3 ºC	+4.5 ºC	+1.7 - +7.5 ºC
Winter Average	+0.9 ºC	-0.3 – +2.2 ºC	+2.0 ºC	0.4 - +3.8 ºC	+3.4 ºC	+0.9 - +6.1 ºC
Spring Average	+0.9 ºC	-0.4 – +2.2 ºC	+2.0 ºC	0.3 - +3.7 ºC	+3.5 ºC	+0.7 - +6.4 ºC
Summer Average	+1.5 ºC	0 – +3.1 ºC	+3.5 ºC	+0.5 - +6.7 ºC	+6.4 ºC	+1.4 - +11.6 ºC
Autumn Average	+1.3 ºC	-0.2 – +2.8 ºC	+2.7 ºC	0.1 - +5.5 ºC	+4.7 ºC	+0.8 - +8.9 ºC
Minimum Air Temperature Anomaly at 1.5m (ºC)						
Annual Average	+0.9 ºC	-0.0 – +2.0 ºC	+1.8 ºC	0.5 - +3.2 ºC	+4.1ºC	+1.4 - +7.1ºC
Winter Average	+0.9 ºC	-0.3 – +2.2 ºC	+1.7 ºC	0.0 - +3.5 ºC	+3.6ºC	+0.6 - +7.0 ºC
Spring Average	+0.8 ºC	-0.6 – +2.2 ºC	+1.4 ºC	0.1 - +2.8 ºC	+3.2 ºC	+0.6 - +6.1 ºC
Summer Average	+1.2 ºC	+0.3 – +2.2 ºC	+2.3 ºC	0.7 - +3.9 ºC	+5.2 ºC	+1.9 - +8.9 ºC

Climate Variable	Predicted Change from Baseline Period 1981-2000 under RCP8.5					
	2030s (2020-2039)		2060s (2050-2069)		2090s (2080-2099)	
	RCP8.5 (50th Percentile)	Wider Range	RCP8.5 (50th Percentile)	Wider Range	RCP8.5 (50th Percentile)	Wider Range
Mean Air Temperature Anomaly at 1.5m (ºC)						
Autumn Average	+1.0 ºC	+0.5 - +2.5 ºC	+1.8 ºC	0.1 - +3.9 ºC	+4.4 ºC	+0.9 - +8.2 ºC
Precipitation Rate Anomaly (%)						
Annual Average	+1%	-9 – +11%	-3%	-18 - +12%	-3%	-17 - +14%
Winter Average	+7%	-7 – +23%	+14%	-10 - +39%	+25%	-4 - +59%
Spring Average	-1%	-11 – +10%	-3%	-18 - +12%	-6%	-25 - +14%
Summer Average	-8%	-36 – +22%	-24%	-61 - +14%	-36%	-76 - +9%
Autumn Average	+5%	-5 – +17%	+2%	-16 - +16%	+7%	-6 - +21%

17.54 Table 17.6 above shows that the following changes in climate variables are projected under the high GHG emissions scenario (RCP8.5) in the 2030s, 2060s and 2090s:

- Increases in air temperatures with higher increases in summer air temperatures (associated with an increased frequency of heatwaves);
- Increased variability in precipitation (associated with an increased frequency of heavy rainfall events and droughts);
- An average reduction in summer precipitation (associated with an increased frequency of summer droughts); and
- An average increase in winter precipitation (associated with an increased frequency of heavy rainfall events and winter storms).

17.55 The magnitude and variability of these changes in climate variables increases over time with the biggest changes by the 2090s. The magnitude of these changes would also be lower if fewer global GHGs are emitted than in the RCP8.5 scenario.

GHG Baseline

17.56 For the purpose of this assessment, the baseline for the GHG assessment has been assumed to be zero, given that the existing Site is not occupied by any buildings and this would represent a worst-case scenario when assessing the change from the baseline throughout construction and once the Proposed Development is complete and operational.

IDENTIFICATION AND EVALUATION OF KEY EFFECTS

GHG Assessment

17.57 An indicative GIA for the Proposed Development is 56,756m^2, all of which is residential area. These figures have been multiplied by the benchmarks set out in paragraph 17.24 which are considered to be a worst case scenario. The resulting whole life embodied carbon for the Proposed Development is as set out below:

- Residential units = 56,756 tonnes CO_{2e}

17.58 Therefore, the total worst-case whole life embodied carbon emissions for the Proposed Development are approximately 56,756 tonnes CO_{2e} associated with the 4 year construction phase, assumed 60 year project lifecycle and decommissioning. Based on data from the LETI Embodied Carbon Primer (Ref. 17.8), around 33% of these emissions will be associated with the construction phase.

Construction phase

17.59 As described above, around 33% of the whole life embodied carbon emissions will be associated with the construction phase, equating to approximately 18,729 tonnes CO_{2e} associated with material embodied carbon, transport, construction plant activities and waste production during the seven year construction phase. Therefore, assuming a seven year construction phase, the worst case approximate construction embodied carbon emissions would be 2,676 tonnes CO_{2e} per annum. This equates to 0.4% of 2018 Welwyn Hatfield CO_2 emissions and is considered a **Minor Adverse** impact.

Operational phase

<u>Climate Change Resilience Assessment</u>

17.60 A set of impacts for the climate change resilience during the operation of the Proposed Development have been identified as below:

- Surface water flooding to the public realm and ground floor properties;
- Building damage due to drought and ground movement;
- Overheating in homes and associated health implications;

- Soft landscaping failure due to increased extreme weather events and summer temperatures; and
- Water shortages for public use and for landscaping due to summer droughts.

17.61 To develop risks, the high emissions scenario data in Table 17.6 was used to estimate the risk prior to any adaptation measures because this would present the worst-case scenario in terms of impact severity and therefore ensure that all risks were fully evaluated. Mitigation measures for the risks are identified in the mitigation section of this chapter.

17.62 Each of these risks has been estimated using the scoring methodology set out in Table 17.3 and evaluated using the R_s x P x C calculation to produce an associated level of risk.

17.63 The results of the risk estimation and evaluation are displayed in Table 17.7.

Table 17.7 Total risk score of the Proposed Development

Impact	Timescale	Receptor Sensitivity (R_s)	Probability (P)	Consequence (C)	Total Risk Score (RsxPxC)	Risk
Surface water flooding to public realm and ground floor properties	2030s	2	1	1	4	Negligible
	2060s	2	2	2	8	Minor Adverse
	2090s	2	2	2	8	Minor Adverse
Building damage due to droughts and ground movement	2030s	1	1	3	3	Negligible
	2060s	1	1	3	3	Negligible
	2090s	1	2	3	6	Negligible
Overheating in homes associated health implications	2030s	3	2	3	12	Moderate Adverse
	2060s	3	3	3	27	Major Adverse
	2090s	3	3	3	27	Major Adverse
Soft landscaping failure due to increased extreme weather events and summer temperatures	2030s	1	2	2	4	Negligible
	2060s	2	3	2	12	Moderate Adverse
	2090s	2	3	2	12	Moderate Adverse
	2030s	3	1	2	6	Negligible

Impact	Timescale	Receptor Sensitivity (R_S)	Probability (P)	Consequence (C)	Total Risk Score (RsxPxC)	Risk
Water shortages for public use and landscaping	2060s	3	2	2	12	Moderate Adverse
	2090s	3	2	2	12	Moderate Adverse

Key Climate Change risks

17.64 Using the calculated risk scores in Table 17.7, impacts associated with climate change on the built environment at the Proposed Development will result in significant impacts on the following areas:

- Surface water flooding – **Minor Adverse** risk for 2060s and 2090s – the Proposed Development is currently at low risk to surface water flooding. However, projections demonstrated increased heavy rainfall events which is subsequently linked to more flash flood events;
- Overheating in homes– **Moderate Adverse** risk for 2030s and **Major Adverse** risk for 2060s and 2090s – With increased ambient and peak summer temperatures, this will increase the likelihood and severity of the overheating. This will also affect local people and could have negative effects on their health;
- Increased water shortages – **Moderate Adverse** risk for 2060 and 2090s – the Proposed Development will be affected by the increased likelihood of water shortages as a result of reduced total rainfall particularly during summer and increased severe rainfall. This will result in more surface water runoff and fewer opportunities for natural infiltration leading to increased risks of water shortages for public use and landscaping; and
- Soft landscaping failure – **Moderate Adverse** risk for 2060s and 2090s – increased extreme weather events, such as heatwaves, droughts and storms, will cause damage to the extensive landscaping features if they have not been designed to withstand a reduced water balance and higher ambient temperatures.

Transport

17.65 The assessment of transport related GHG emissions from the Proposed Development in operation is shown in Table 17.8. This uses annual daily trips from the Transport Assessment, the GHG emission factors from BEIS 2020 (Ref. 17.9) and the average distances derived from 2011 Census data for Peartree ward (Ref 17.11).

Table 17.8 GHG emissions from operational transport

Mode of transport	Annual Development Trips	Emission factor ($kgCO_{2e}$ per km)	Average Trip Distance (km)	CO_{2e} tonnes per annum
Car	591,519	0.1743	30	3,093
HGV	18,294	0.91569	30	503
Total	609,814			3,596

Note: Includes all Proposed Development trips from different uses. GHG Emission factors from BEIS 2020 assuming an average sized petrol car and an average laden articulate HGV.

17.66 When considering these emissions, it should be noted that the trip generation for the Proposed Development is lower than the extant planning permission for the Site as the previous trips were agreed with HCC to be an over-estimation.

Energy Consumption

17.67 The CO_2 emissions from regulated operational energy consumption of the Proposed Development have been sourced from the Norman Bromley Energy and Sustainability Statement. This uses the energy hierarchy to describe emissions savings through renewable energy sources. Table 17.9 shows the CO_2 emissions from the residential element from each stage of the energy hierarchy.

Table 17.9 Regulated Energy CO_2 emissions from the Proposed Development

	Total site-wide CO_2 ($kgCO_2$ / annum)	Emissions saving on previous scenario achieved (%)
Baseline development (BRUKL compliant TER)	748,304	-
Improved emissions (after application of energy efficiency measures)	707,667	5.4%
Improved emissions (after incorporation of efficient energy supply)	533,089	23.3%
Improved emissions (after incorporation of photovoltaics)	492,512	5.4%
Total Saving Compared to Building Regulations Compliant TER	255,792	34.2%

Source: Norman Bromley Energy and Sustainability Statement

17.68 Table 17.9 shows that the Proposed Development will aim to achieve a 34.2% reduction in CO_2 emissions through energy efficiency measures (including improving the building fabric, thermal insulation, solar gains and air tightness) and incorporating photovoltaics and a CHP system in compliance with Welwyn Hatfield Local Plan.

17.69 No renewable energy sources were incorporated here, due to the conducted feasibility assessment deeming all options either not viable or not chosen as a result of the CHP achieving compliance with the policy alone.

Overall GHG impacts

17.70 In terms of the significance of this impact, the operational GHG emissions have been compared to the 2018 total CO_2 emissions calculated for Welwyn Hatfield and reported by the BEIS (Ref. 17.11), as detailed in Table 17.10.

Table 17.10 Comparison of Proposed Development and Welwyn Hatfield CO_{2e} emissions

Footprint element	Proposed Development CO_{2e} emissions (tonnes per annum)	Proposed Development as % of Welwyn Hatfield	Significance
Operational transport (CO_{2e})	3,596	0.6%	Minor Adverse
Operational Regulated Energy (CO_2)	255	0.04%	Minor Adverse
Total	3,835	0.64%	-

17.71 Table 17.8 shows the operational transport and energy CO_2 emissions for the Proposed Development per annum and compares them to the current emissions within Welwyn Hatfield Borough. The table shows that the operational emissions for the Proposed Development will generate a maximum of 0.64% of the emissions from Welwyn Hatfield Borough resulting in a **Minor Adverse** impact for transport and operational regulated energy.

ASSESSMENT OF CUMULATIVE EFFECTS

17.72 The assessment of the effects of the Proposed Development on, and as a result of climate change considers the committed developments surrounding the Proposed Development. It is not possible to provide a detailed assessment accounting for all proposed developments in the area that may have a cumulative effect with the Proposed Development due to the global nature of climate change and the fact that the effects will not occur within a defined boundary. The emissions that each scheme makes will have some effect on climate change, but it will be a proportionally very small amount. However, the impact on climate change from the Proposed Development in combination with other developments is considered to have been minimised as far as possible as each of the cumulative schemes will have produced Flood Risk Assessments, Transport Assessments and Energy Strategies that help them individually adapt to and mitigate against climate change.

Inter-Relationship Effects

17.73 An inter-relationship has also been identified between climate change and flood risk with regard to future flood extents and predicted impacts of increased rainfall intensity on sustainable drainage design. This has been considered within the assessment and within the Flood Risk and Drainage Strategy.

ADAPTATION, MITIGATION AND RESIDUAL EFFECTS

Mitigation measures

17.74 Mitigation measures are required to reduce as far as possible the impacts the Proposed Development will have on climate change, i.e. the nature and magnitude of greenhouse gas emissions.

17.75 Whilst the design approach to mitigation is provided in this chapter, other chapters and accompanying reports should be read, in particular:

- Energy and Sustainability Statement;
- Water Quality, Hydrology and Flood Risk ES Chapter;
- Flood Risk Assessment; and
- Waste ES Chapter.

17.76 The information below sets out the mitigation measures that are to be implemented.

Construction phase

17.77 Through the use of a Construction Environmental Management Plan (CEMP), the following measures will be implemented during the construction phase to reduce GHG emissions from the construction works:

- All construction vehicles are required to switch off their engines when stationary, as well as equipment being switched off when not in use, to prevent exhaust emissions;
- Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable;
- Produce a construction plan to manage the sustainable delivery of goods and materials; and
- Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking and car-sharing).

17.78 It is the intention of the project to use all excavated material, wherever possible within the Proposed Development. A Site Waste Management Plan (SWMP) will be developed and implemented detailing how waste created during the construction phase will be managed, which will comply with the WRAP guidelines. This will include benchmarking waste against Standard,

Good and Best Practice and following the waste hierarchy. All relevant Contractors would be required to investigate opportunities to minimise waste arisings at source and, where such waste generation is unavoidable, to maximise the recycling and reuse potential of construction materials. Though the contractor for Phase Two & Three are not confirmed at this stage, it is expected when appointed they will work towards the same targets as within Phase One, including 99% diversion from landfill.

17.79 The minimisation of waste will help to reduce GHG emissions from waste materials and waste transport.

17.80 Material procurement will be undertaken with consideration of sustainable principles including:

- All building materials utilised for the Proposed Development shall be rated A+ or A in accordance with the BRE Green Guide.
- All insulation materials will have a Global Warming Potential (GWP) of 5 or less; and
- Materials will be responsibly sourced (such as FSC timber), recycled or reclaimed where possible.

17.81 As a result of these measures, the greenhouse gas emissions from the Proposed Development will be minimised.

Operational phase

Climate change adaptation measures

17.82 Adaptation measures to address the significant risks identified in Table 17.6 must be developed. These measures have been assessed to understand their suitability for implementation and potential ability to increase the resilience of the Proposed Development.

17.83 Adaptation measures will be incorporated into the design for the following risks:

- Surface water flooding;
- Overheating in homes;
- Risk to soft landscaping features; and
- Water shortage.

Surface water flooding

17.84 To increase the resilience against the risks associated with increased frequency of flooding, storms and heavy/prolonged precipitation, as well as increased seasonal variation in precipitation, the surface water drainage strategy will be designed to be resilient to storm events up to and including the 1 in 100 year event plus 40% for climate change.

17.85 The SuDS features will include the use of ponds, permeable pavements and geocellular tanks. As set out in Chapter 13, the implementation of the drainage strategy for the Site would ensure that the surface water runoff rates would be reduced significantly, as the system is designed to handle a 1 in 100 year flood plus the 40% climate change allowance. This will be applicable across the operational lifetime of the Proposed Development.

17.86 In addition, the provision of green and brown roofs on buildings will infiltrate, store and control the run-off of rainwater whilst assisting in urban cooling.

17.87 Further details on the surface water drainage strategy for the Proposed Development can be found in the Flood Risk Assessment and Drainage Strategy. This incorporates appropriate mitigation measures and includes the provision of SuDS to ensure the positive management of drainage.

Overheating in homes

17.88 TM59 overheating analysis has been carried out for the Phase One Extant Planning Permission adjacent to the Site. This has informed the overheating mitigation for the Proposed Development.

17.89 The energy strategy is based mostly on mechanical ventilation with heat recovery with increased air change rates to mitigate overheating. The need for mechanical ventilation is as a result of acoustics constraints which limit window opening at night.

17.90 Natural ventilation in the form of openable windows will also be utilised within all buildings on-site.

17.91 In addition, low emissivity glazing will be installed which allows light into the dwelling while reducing solar gains through reflecting the incoming heat. Consequently, this aids in reducing overheating.

Risk to soft landscaping features

17.92 The planting strategy includes a wide variety of species including some native species where possible and is designed to be resilient to climate change. In particular, along the western boundary the existing tree planting is being bolstered with native tree and shrub planting, which will be managed to ensure the area maximises biodiversity and ensure attractiveness. The tree planting includes a diverse mix of native cultivars & ornamental species throughout the scheme. The additional trees will provide shading and increase soil moisture retention.

17.93 A Landscape Management Plan will be conditioned and will ensure that a health assessment is carried out every five years to ensure planting remains suitable for dealing with changing climate conditions and replaced / altered where necessary. When reviewing and altering tree planting, the RHS list of trees for a changing climate will be considered.

Water Shortages

17.94 The Proposed Development will specify low water use fittings and appliances such as smaller capacity baths, dual flush WCs, flow regulated washbasin taps, and dishwashers and washing machines with low water use to limit water consumption for the residential units.

17.95 To further reduce the water consumption of the Proposed Development, opportunities for water capture from roofs to be re-used for irrigation and greywater recycling across the scheme will also be considered during the detailed design.

Greenhouse gas mitigation measures

17.96 The Proposed Development has been designed to minimise GHG emissions from transport by encouraging the use of more sustainable forms of transport. This will include:

- Secure cycle parking for every dwelling provided on-site equating to 721 cycle spaces in accordance with WHBC parking standards;
- Residents' Travel Plan to promote sustainable travel choices including a Welcome Pack to all new residents, containing information and incentives to encourage the use of sustainable transport modes by new occupiers;
- High quality pedestrian and cycle infrastructure throughout the Site;
- Provision of a Car Club secured through planning condition;

- New Car Club spaces provided on-site for new residents and the wider community; and
- Electrical vehicle charging points will be provided to all Car Club spaces and 20% of all other parking spaces on the Site.

17.97 The Energy Statement has set out a number of measures that will be implemented in the Proposed Development to minimise energy emissions in accordance with the energy hierarchy and therefore the Proposed Development's effect on climate change. This will include the following:

- Adoption of a fabric first approach with enhanced u-values and reduced thermal bridging to minimise air permeability and heat loss;
- Utilising passive design measures by considering building orientation and maximising solar gain to reduce energy consumption;
- Use of energy efficient technologies including space and water heating provided by communal boilers and CHP systems; and
- Use of photovoltaic panels.

Residual effects

Climate Change Resilience

17.98 This assessment considers the potential effects in terms of the resilience of the Proposed Development to future climate change during operation. Therefore, it does not follow the standard assessment and approach for this EIA, and it is not possible to provide an assessment of any residual effects following adaptation as there are scientific unknowns within the climate system. However, whilst the detail of the residual impacts following adaptation cannot be stated, the adaptation measures identified at this outline stage are considered best practice in order to minimise the residual impact of climate change risks on the Proposed Development.

GHG Assessment

17.99 Following the mitigation embedded into the design, construction and operation of the Proposed Development, the residual GHG impacts are considered to be as follows:

- **Minor Adverse** for construction embodied carbon;

- **Minor Adverse** for operational transport; and
- **Minor Adverse** for operational energy.

17.100 These residual impacts are based on current GHG emissions factors and therefore operational emissions are likely to reduce during the lifespan of the Proposed Development due to the increased uptake of electric vehicles and decarbonisation of electricity.

17.101 The mitigation measures are considered to be appropriate in accordance with best practice, the NPPF and the Welwyn Hatfield Borough Council Local Plan.

SUMMARY

17.102 Table 17.11 summarises the likely significant effects, identified mitigation measures and the likely residual effects identified within this chapter.

Table 17.11 Climate Change and GHG Summary Table

Potential Effect	Nature of Effect (Permanent or Temporary)	Significance	Mitigation/ Enhancement Measures	Residual Effects
Construction Effects				
Greenhouse gas emissions from construction embodied carbon (materials, waste, transport and plant)	Temporary impact, permanent climate implications	Minor Adverse	CEMP, Site Waste Management Plan, Travel Plan, CLP, selection of sustainable materials	Negligible to Minor Adverse
Operation effects – Climate Change Resilience				
Surface water flooding	Permanent	Minor Adverse for 2060s and 2090s	SuDS Strategy	Not applicable
Overheating of homes	Permanent	Moderate Adverse for 2030s and Major Adverse for 2060s and 2090s	Mechanical Ventilation, Low emissivity glazing.	Not applicable
Increased water shortages	Permanent	Moderate Adverse for 2060s and 2090s	Water efficient sanitaryware, less water intensive washing machines and dishwashers	Not applicable
Soft landscaping failures	Permanent	Moderate Adverse 2060s and 2090s	LMP to review planting and ensure it remains appropriate for future climate conditions	Not applicable
Operation effects – GHG emissions				
Operational Energy Emissions - regulated	Permanent	Minor Adverse	Fabric first approach, passive design measures, maximising solar gains, reducing heat loss, space and water heating provided by communal heat pumps and communal gas boilers.	Minor Adverse
Operational Transport Emissions	Permanent	Minor Adverse	Cycle Paths, Secure Cycle Storage, Travel Plan	Minor Adverse

REFERENCES

Ref 17.1: Directive 2014/52/EU of the European Parliament and of the Council on the assessment of effects of certain public and private projects on the environment.

Ref 17.2: IEMA (2020); Environmental Impact Assessment Guide to: Climate Change Resilience & Adaptation.

Ref 17.3: IEMA (2017); Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance.

Ref 17.4: Met Office UK (2018), UK Climate Change Projections.

Ref 17.5: HM Government, (2017); UK Climate Change Risk Assessment 2017.

Ref 17.7: RIBA (2019); RIBA 2030 Climate Challenge benchmarks.

Ref 17.8: London Energy Transformation Initiative (2020); LETI Embodied Carbon Primer, Supplementary guidance to the Climate Emergency Design Guide.

Ref 17.9: BEIS (2020); GHG Conversion Factors for Company Reporting.

Ref 17.10: ONS (2011); 2011 Census, Method of travel to work (2001 specification) by distance travelled to work (Workplace population), WP7701EW, Peartree ward. https://www.nomisweb.co.uk/census/2011/wp7701ew

Ref 17.11: BEIS (2020); UK local authority and regional carbon dioxide emissions national statistics: 2005 to 2018, https://www.gov.uk/government/statistics/uk-local-authority-and-regional-carbon-dioxide-emissions-national-statistics-2005-to-2018

Ref 17.12: UNFCCC (2016), Paris Agreement.

Ref: 17.13: UK Government (2008), The Climate Change Act.

Ref 17.14: Climate Change Act 2008 (2050 Target Amendment), (2019).

Ref 17.15: UK Government (2019), National Planning Policy Framework.

Ref 17.16: Welwyn Hatfield Borough Council (2017); Welwyn Hatfield Draft Local Plan.

Ref 17.17: Welwyn Hatfield Borough Council (2020); Welwyn Hatfield Climate Change Strategy.

Ref 17.19: Met Office (2020) UK Climate Averages, 1971-2000. https://www.metoffice.gov.uk/research/climate/maps-and-data/uk-climate-averages/

Ref 17.20: UK Climate Projections User Interface (2018), Plume of time series anomalies for probabilistic projections (25km) over UK, 1961-2100, https://ukclimateprojections-ui.metoffice.gov.uk/ui/home

18 WASTE MANAGEMENT

INTRODUCTION

18.1 The potential for the generation of waste is an aspect of any activity. In relation to the Proposed Development, there are three main activities that have the potential to generate waste:

- during the Site demolition and clearance phase;
- during the construction phase; and
- during the operational phase.

18.2 It is important to note that the presented assessment is based on the current Site conditions at the ES submission date i.e. post the demolition phase.

18.3 Blocks 9 and 12 form Phase Two of the Proposed Development whilst Blocks 8 and 13 (Phase Three) are indicative i.e. being submitted for outline permission only.

18.4 There is a great deal of regulatory and financial pressure to manage wastes effectively and to avoid landfill disposal (where possible). This chapter considers this in the context of the Proposed Development and assesses the waste characteristics of the current Site use and the Proposed Development in order to try and evaluate potential effects and identify options for sustainable waste management.

ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

18.5 The aim of the waste assessment has been to determine the likely waste generation rates and how waste should be managed during site clearance, construction and during operation of the Proposed Development. The desk-based waste assessment has involved the following:

- An assessment of waste collection systems operated and co-ordinated by Welwyn Hatfield Borough Council (Waste Collection Authority);
- An assessment of current baseline conditions in relation to waste generation rates and disposal facilities within Hertfordshire County Council (Waste Disposal Authority) area;
- A review of the typical waste arisings, management practices and recycling rates within the Welwyn Hatfield Borough Council area from publicly available

statistics e.g. Department of Environment, Food and Rural Affairs (DEFRA) Waste Statistics (where available) and information on Welwyn Hatfield Borough Council website;

- Estimates of the amount of waste generated, by type, throughout the construction phase of the Proposed Development with reference to data on similar large scale construction projects published by the Building Research Establishment (BRE) SMARTWaste project; and
- An estimate of waste generation and storage requirements for the completed, occupied development using British Standard BS5906:2005 Waste Management in Buildings (Ref 18.1). This document provides guidance on the likely waste arisings and consequently storage provision.

18.6 For the construction phase, consideration has been made of the potential wastes that will be produced (based on similar construction projects). The methodology for looking at operational wastes has involved examining current waste management practices and, as far as possible, predicting waste generation activities associated with the redeveloped site.

Significance Criteria

18.7 Significant effects relating to waste will be determined within the context of identified potentially sensitive receptors. There is limited published or formalised technical guidance available for the assessment of potential waste related effects and, as such, professional judgement and experience has been relied upon in assessing potential waste effects due to the Proposed Development. In March 2020, the Institute of Environmental Management and Assessment (IEMA) published the Guide to Materials and Waste in Environmental Impact Assessment (Ref 18.2). This is the first industry publication to offer guidance and recommendations for EIA practitioners and stakeholders concerned with the impacts and effects of materials and waste on the environment. Where relevant this current guidance and has been considered throughout this chapter.

18.8 The IEMA guide states that whilst waste processing and recovery facilities may not be able to divert all received resources from landfill, these operations are a beneficiary of incoming feedstock, and are (ultimately) being used to drive arisings up the Waste Hierarchy. They, hence, create conditions that support the national and wider drive to a circular economy.

18.9 Accordingly, the IEMA guidance does not consider waste processing and recovery facilities as sensitive receptors, rather: they are part of a system that has the potential to reduce the magnitude of adverse impacts associated with waste generation and disposal. Waste

processing and recovery facilities are, hence, different to landfills, in that the latter are finite resources.

18.10 Therefore, for waste, the sensitive receptor is landfill capacity. Landfill is a finite resource, and hence, through the ongoing disposal of waste, there is a continued need to expand existing and develop new facilities. This requires the depletion of natural and other resources which, in turn, adversely impacts the environment.

18.11 In order to assess potential effects pertaining to waste, the magnitude of change (from the baseline) due to the Proposed Development has been estimated using a qualitative approach. Once determined, the magnitude of change is applied to each potentially sensitive receptor to determine the significance of any potential effects. The magnitude of change has been based on two factors (i) the volume of waste arisings and (ii) waste composition and likely waste management options which will/can be applied.

18.12 The choice of criteria has been derived from the requirement to ensure the application of the waste hierarchy (as defined by the Waste Framework Directive 2008/98/EC) i.e. ensuring disposal of waste is minimised. All local planning authorities, to the extent appropriate to their responsibilities, are aiming to drive up recycling and composting rates. The UK Government agreed on the 30th July 2020 to transpose aspects of the European Union's Circular Economy Package into UK law, agreeing on targets to recycle 65% of household waste by 2035 and to allow a maximum of 10% municipal waste going to landfill in the same timeframe.

18.13 Each factor is separately defined as having a ‘high’, ‘medium’, ‘low’ or ‘negligible’ magnitude of change. However, it is possible that the same magnitude of change may not be applied for both factors. In this instance, an average magnitude of change will be determined. For example, if the volume of waste is considered to have a high magnitude of change, but waste composition is considered to have a low magnitude of change, the overall magnitude of change will be medium. Where required a worst-case scenario will be applied to the assessment.

Table 18.1 – Magnitude of Change

Magnitude of Change	Description	
	Waste Volume	**Waste Composition & Management Options**
High	Proposed Development results in an increase in waste generation on a national scale from the baseline.	Largely hazardous waste streams that require specialised handling, storage and treatment. Disposal most likely option.
Medium	Proposed Development results in an increase in waste generation on a regional scale from the baseline.	Some hazardous waste streams that require some specialised handling, storage and treatment. Mixture of waste management options.
Low	Proposed Development results in an increase in waste generation on a local scale from the baseline.	Largely inert and/or non-hazardous waste streams typically generated by household and commercial activities such as office and retail (i.e. mixed dry recyclables, packaging waste, residual waste). Re-use, recycling and/or energy recovery most likely options.
Negligible	Insignificant increase in the volume of waste from the baseline.	Largely inert and/or non-hazardous waste streams typically generated by household and commercial activities such as office and retail (i.e. mixed dry recyclables, packaging waste, residual waste). Re-use, recycling most likely options.

18.14 Receptors that are potentially sensitive to changes in waste as a result of the Proposed Development have been identified following the assessment of baseline conditions. Using professional judgement, each has been assigned a level of sensitivity (i.e. high, medium and low) (Table 18.2).

Table 18.2 – Waste management receptor sensitivity

Sensitivity	Waste Management Systems and Infrastructure
High	Minimal range of facilities (higher up the waste hierarchy) within the region. Small amount of remaining capacity for addressing waste arisings from the Proposed Development. The baseline/future baseline (i.e. without development) of regional/national landfill void capacity is expected to reduce considerably.

Sensitivity	Waste Management Systems and Infrastructure
Medium	Moderate range of facilities available within the region providing a waste management system with more than one management route disposal (i.e. recycling and composting) in addition to final disposal. Facilities that are available but have only a moderate amount of remaining capacity for addressing waste arisings from the Proposed Development. The baseline/future baseline (i.e. without development) of regional/national landfill void capacity is expected to reduce noticeably.
Low	Wide range of facilities available in the region providing a waste management system with several management routes (i.e. recycling, composting, energy recovery, etc.) in addition to final disposal. Facilities have a large amount of remaining capacity for addressing waste arisings from the Proposed Development. The baseline/future baseline (i.e. without development) of regional/national landfill void capacity is expected to reduce minimally.

18.15 In order to determine the significant effects, the magnitude of change due to the Proposed Development and receptor sensitivity are assessed qualitatively as a function of each other. It is important to note that whilst recommended mitigation measures do have the potential to alter the magnitude of change due to the Proposed Development, they do not alter the sensitivity of any potential receptors. Table 18.3 outlines the matrix used in determining the significance of effects

Table 18.3 – Significance criteria for waste assessment

Sensitivity	Magnitude of Change			
	High	**Medium**	**Low**	**Negligible**
High	Major	Major	Moderate	Neutral
Medium	Major	Moderate	Minor	Neutral
Low	Moderate	Minor	Neutral	Neutral

18.16 The potential effects have been classified, prior to mitigation, as Minor, Moderate, Major or Neutral (either “Adverse”, “Beneficial” or “Neutral”). Where the predicted effects are considered to be significant, mitigation measures have been incorporated to eliminate or reduce the effects to an acceptable level. It is important to note that although effects can be beneficial none have been identified associated with increased waste production so have been omitted from the significance criteria and associated definitions. Accordingly, the following terms have been used to describe the significance of effects associated with the Proposed Development with regards to waste:

- **Major Adverse** – A substantial negative effect upon potentially sensitive receptors due to waste generation volumes, waste stream composition and the availability of waste management systems and infrastructure.
- **Moderate Adverse** – A noticeable negative effect upon potentially sensitive receptors due to waste generation volumes, waste stream composition and the availability of waste management systems and infrastructure.
- **Minor Adverse** – A barely perceptible negative effect upon sensitive receptors due to waste generation volumes, waste stream composition and the availability of waste management systems and infrastructure.
- **Neutral** – No discernible effect upon potentially sensitive receptors due to waste generation and waste stream composition.

LEGISLATION, PLANNING POLICY AND GUIDANCE

European Policy & Legislation

18.17 The UK was a participant at the 1992 Earth Summit in Rio de Janeiro hosted by the United Nations Conference on Environment and Development (UNCED) and at the Global Climate Change conference at Kyoto in 1997. The UK government has ratified and agreed to implement many of the objectives agreed at these international meetings. In particular, the UK signed the United Nations Framework Convention on Climate Change (UNFCCC) in 1992.

18.18 The commitments included reducing waste generation, increasing the amount of recycling and re-use, reducing dependence on techniques such as landfill and reducing carbon dioxide emissions resulting from combustion of fossil fuels.

18.19 The European Commission's Waste Framework Directive (2008/98/EC) sets the basic concepts and definitions related to waste management, such as definitions of waste, recycling, recovery. It explains when waste ceases to be waste and becomes a secondary raw material (so called end-of-waste criteria), and how to distinguish between waste and by-products. The Directive lays down some basic waste management principles: it requires that waste be managed without endangering human health and harming the environment, and in particular without risk to water, air, soil, plants or animals, without causing a nuisance through noise or odours, and without adversely affecting the countryside or places of special interest.

18.20 The Waste Framework Directive also requires the development of national waste management plans as the cornerstone of any national, regional or local policy on waste management.

18.21 The 1999 Landfill Directive (1999/31/EC as amended by 1882/2003 EC) was introduced in order to prevent, or reduce as far as possible, the negative effects of landfilling waste. It requires Member states to draw up strategies for a reduction in the quantity of bio-degradable municipal waste (BMW) disposed of to landfill.

18.22 The Hazardous Waste Directive 91/689/EC sets out the requirements for the management of hazardous wastes. It has been transposed into English law by the *Hazardous Waste (England and Wales) Regulations 2005* (as amended).

18.23 According to current information the UK government is committed to maintaining environmental standards and international obligations from 1 January 2021 (the end of the Brexit transition period). From 1 January 2021, current legislation will be changed to remove references to EU legislation, transfer powers from EU institutions to UK institutions and to make sure the UK meets international agreement obligations.

National Policy

18.24 The UK Government produced a Resources and Waste Strategy for England (Ref 18.3) in 2018. This strategy sets out how the UK will preserve material resources by minimising waste, promoting resource efficiency and moving towards a circular economy in England. The strategy sets out how the UK plans to double resource productivity and eliminate avoidable waste of all kinds (including plastic waste) by 2050.

18.25 The revised National Planning Policy Framework (NPFF) (Ref 18.4) was updated on 19 February 2019 and sets out the UK government's planning policies for England and how these are expected to be applied. This revised Framework replaces the previous NPFF published in March 2012, and revised in July 2018. The NPPF does not contain specific waste policies as these are outlined within other standalone documents e.g. National Planning Policy for Waste.

18.26 The National Planning Policy for Waste (Ref 18.5) sets out detailed waste planning policies. It should be read in conjunction with the National Planning Policy Framework, the National Waste Management Plan for England (Ref 18.6) and national policy statements for waste water and hazardous waste, or any successor documents. All local planning authorities should have regard to its policies when discharging their responsibilities to the extent that they are appropriate to waste management.

National Legislation

18.27 The *Environmental Protection Act 1990* (EPA 1990) Part II sets out waste management and disposal requirements that affect all companies or individuals producing or handling 'controlled waste' as defined in Section 75 (4) of the Act. Section 33 of the act makes it an offence to treat, keep or dispose of controlled waste without a waste management licence, unless specifically exempted. Section 34 introduces a statutory duty of care for all those producing or dealing with waste. In addition, householders must ensure that household waste is properly disposed of. Household waste is defined in section 75(5) of the *Environmental Protection Act 1990*. The householder duty of care is provided by Section 34(2A) of the Environmental Protection Act 1990 (as inserted by the *Household Waste Duty of Care Regulations 2005*).

18.28 The *Environmental Protection Act 1990* also requires local authorities to contract out waste disposal. Their responsibility for waste management is exercised through control of these contracts and through their duties as waste collection authorities. Regulation of waste disposal became the responsibility of the Environment Agency in April 1996, and is undertaken chiefly through Environmental Permitting (EPR) systems.

18.29 *Controlled Waste Regulations 1992*, as amended by *Controlled Waste Regulations 1993* define controlled waste for the purposes of EPA 1990 Part II, which introduced three categories of controlled wastes: household, industrial and commercial. Most wastes from households, industry, commerce and construction activities are controlled wastes, including wastes destined for recycling.

18.30 *The Environmental Permitting (England and Wales) Regulations 2010* (as amended) implement the European Landfill Directive (Directive 1999/31/EC on the landfilling of waste) and Council Decision 2003/33/EC establishing criteria and procedures for the acceptance of waste at landfills. The Directive aims to reduce the negative effects of landfilling on the environment and human health. Furthermore, it is an instrument for driving waste up the hierarchy through waste minimisation and increased levels of recycling and recovery.

18.31 *The Waste (England and Wales) (Amendment) Regulations 2012* require that separate kerbside collections must be deemed to be practical in each of the assessment areas, i.e. technically, environmentally and economically practicable (TEEP). If separate collections fail in any one of these areas then they are not required.

18.32 *Based* on the TEEP tests conducted across the Country so far it would appear that whilst technical practicality does not present any issues the majority of the time economical practicality cannot be established when aspects such as vehicle costs are taken into account, i.e. greater income through keeping materials separate does not usually compensate for higher collection costs. A situation exacerbated by recent significant falls in prices for several recyclates.

18.33 Historically, waste management during the construction phase of a project was governed by the *Site Waste Management Plans Regulations 2008*. These regulations were repealed on the 1st December 2013; therefore, there is no longer a legal requirement for the main contractor to produce a Site Waste Management Plan (SWMP). Recognising this position, for this project the developer will require the main contractor to adopt an agreed Resource Management Plan which, in addition to waste management, will also set criteria for the management of energy, water and materials.

Regional Policy

18.34 Hertfordshire County Council (HCC) is the Waste Planning Authority for Hertfordshire. The Council has a legal responsibility to produce a Waste Local Plan which identifies land that may be suitable for future waste management facilities (i.e. land suitable for facilities that manage or treat waste such as household waste recycling centres or waste transfer stations) and sets out policies which are used to determine planning applications for waste management.

18.35 The waste policies are set out in the Waste Local Plan that is composed of two documents:

- Hertfordshire Waste Development Framework - Waste Core Strategy & Development Management Policies, Development Plan Document 2011-2026, Adopted November 2012 (Ref 18.7); and
- Hertfordshire Waste Development Framework - Waste Site Allocations Development Plan Document 2011-2026, Adopted July 2014 (Ref 18.8).

18.36 The Employment Land Areas of Search Supplementary Planning (ELAS) Document (Ref 18.9) is a supplementary planning document which provides further guidance into the suitability of waste related development on the identified ELAS and should be used by applicants wishing to develop waste management facilities on them.

18.37 The HCC Waste Local Plan is currently under review. On 5 February 2018, HCC released a revised set of targets and indicators. These are used to monitor the implementation of policies within the Waste Core Strategy and Waste Site Allocations document.

18.38 HCC operates a WasteAware partnership. The initiative covers County, District and Borough Councils within Hertfordshire working together to reduce, reuse and recycle Hertfordshire's waste. The partnership has the following relevant strategies and reports:

- Hertfordshire Joint Municipal Waste Management Strategy 2007, Core Strategy (Ref 18.10); and
- Local Authority Collected Waste Spatial Strategy, November 2016 (Ref 18.11).

18.39 The Waste Disposal Authority (WDA) and the Waste Collection Authorities (WCAs) in Hertfordshire work jointly in the collection and disposal of waste through the Hertfordshire Waste Partnership (HWP).

18.40 In 2002, the Partnership endorsed a Joint Municipal Waste Management Strategy (JMWMS 2002). This strategy was reviewed in 2007 (Ref 18.10), taking on board developments since 2002 including changes in Government policy, changes in recycling and composting and changes in the growth of waste. A further review of the strategy commenced in 2015.

18.41 The JMWMS 2007 and accompanying Action Plan set out how the Partnership intends to manage LACW over the period to 2020 and beyond. Central to the Strategy and Action Plan is a commitment to recycle at least 50% of household waste by 2012 and reduce residual household waste to less than 285 kg per person by that time.

Local Policy

18.42 The Welwyn Hatfield District Plan was adopted in 2005. Several policies have been 'saved' until it is replaced by a Local Development Framework including Policy R5 (Waste Management). The specific policy objectives are:

- R5 – The Council will require applications for larger schemes (as defined in paragraph 5.24) to include details of the measures to be taken in the design, construction, operation, occupation and demolition of existing buildings on site to: (i) Minimise the amount of waste generated; (ii) Re-use or re-cycle suitable waste materials generated; (iii) Minimise the pollution potential of unavoidable waste; (iv) Treat and dispose of the remaining waste in an environmentally

acceptable manner; and (v) To maximise utilisation of appropriate secondary construction materials, including recycled aggregates.

18.43 The Welwyn Hatfield Local Plan (2017) will "shape the future of development" of the towns and villages within Welwyn Hatfield District up to 2032. The plan was submitted for examination in May 2017. The following policy statements are of relevance to waste management and the Proposed Development, as outlined below:

- **Policy SD1 - Sustainable Development** – Development proposals will be permitted where it can be demonstrated that the principles of sustainable development are satisfied and that they accord with the objectives and policies of this plan. To assist the Council in determining this, applicants will be expected to submit a statement with their planning application demonstrating how their proposals address the sustainability criteria in the checklist contained in the Supplementary Design Guidance.
- **Policy SP10 Sustainable design and construction (Materials and waste)** – Proposals that adopt sustainable design and construction principles, as set out below, within an integrated design solution will be supported. This should be demonstrated via a Sustainable Design Statement and associated plans. The specific materials and waste requirements are:
    - Reuse land and buildings wherever feasible and consistent with maintaining and enhancing local character and distinctiveness.
    - Reuse and recycle materials that arise through demolition and refurbishment, including the reuse of excavated soil and hardcore within the site.
    - Prioritise the use of materials and construction techniques that have smaller ecological and carbon footprints, where appropriate.
    - Consider the lifecycle of the building and public spaces, including how they can be easily modified to meet changing social and economic needs and how materials can be recycled at the end of their lifetime.
    - Space is provided and appropriately designed to foster greater levels of recycling of domestic and commercial waste.

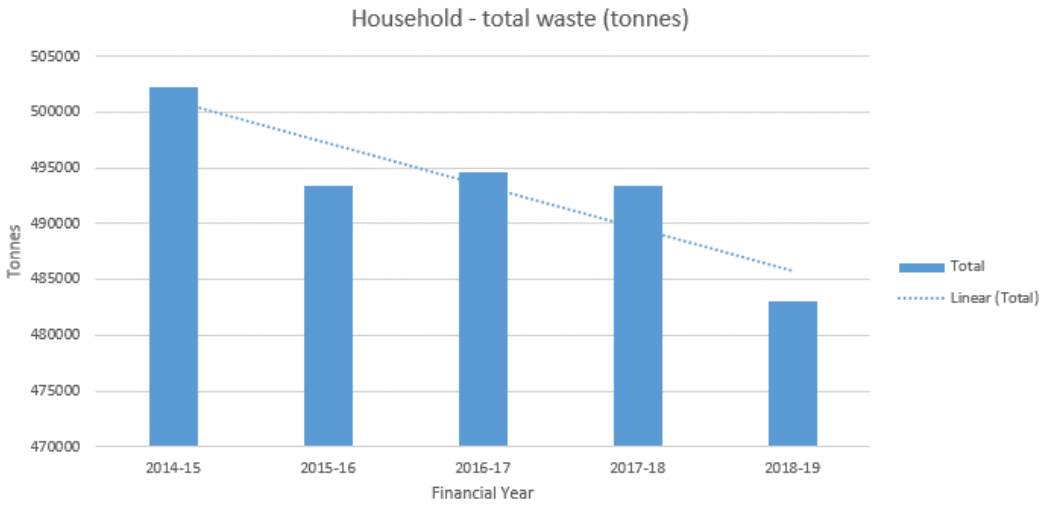
BASELINE CONDITIONS

Waste Statistics

18.44 The UK Government collates and reports several waste and recycling statistics (for England) under the ENV18 (Local authority collected waste: annual results tables) dataset (Ref 18.12). Specific data and trends for Hertfordshire County Council (HCC) for the period 2014-2019 are outlined below.

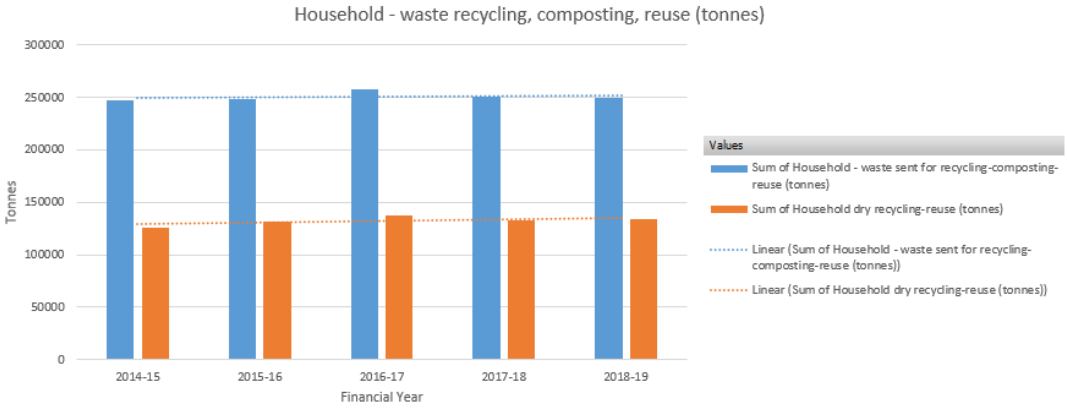
18.45 The total volume of household waste produced in HCC has been falling consistently since 2014-15 (Figure 18.1).

Figure 18.1 – HCC Household total waste (tonnes), 2014-2019



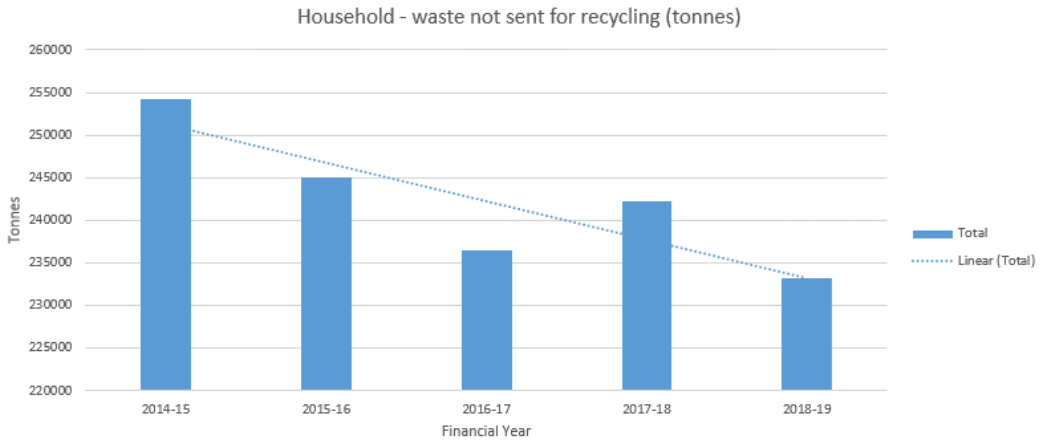
18.46 The volume of household waste sent for either recycling, composting or reuse has remained largely consistent between 2014 and 2019 (Figure 18.2). This trend is similar for the household dry waste streams.

Figure 18.2 – HCC Household recycling-composting-reuse (tonnes), 2014-2019



18.47 The volume of waste not sent for recycling has fallen considerably since 2014 (Figure 18.3).

Figure 18.3 – HCC Household - waste not sent for recycling (tonnes), 2014-2019



Waste Treatment

18.48 The volume of waste landfilled by HCC fell significantly between 2014 and 2017. The trend is now relatively stable but has seen a slight increase from 2018 onwards. This fall in landfill use has resulted in an increased use of incineration with energy recovery. This increase in EfW has also resulted in a fluctuation in the volumes of waste subject to recycling and/or composting.

Figure 18.4 – HCC Household - landfilled (tonnes), 2014-2019

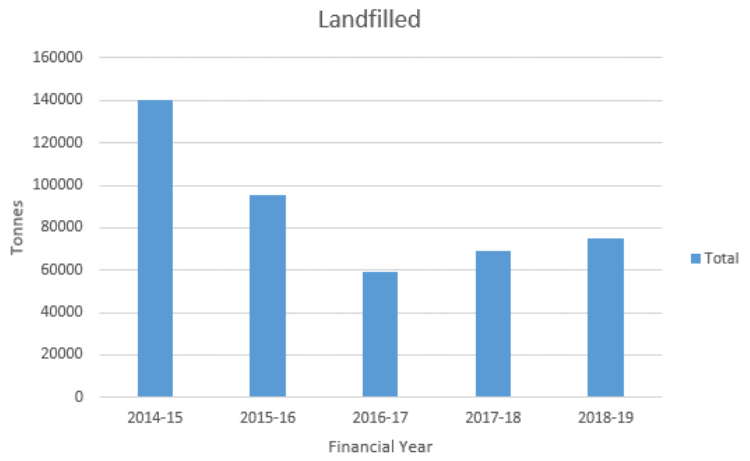


Figure 18.5 – HCC Household - incinerated (tonnes), 2014-2019

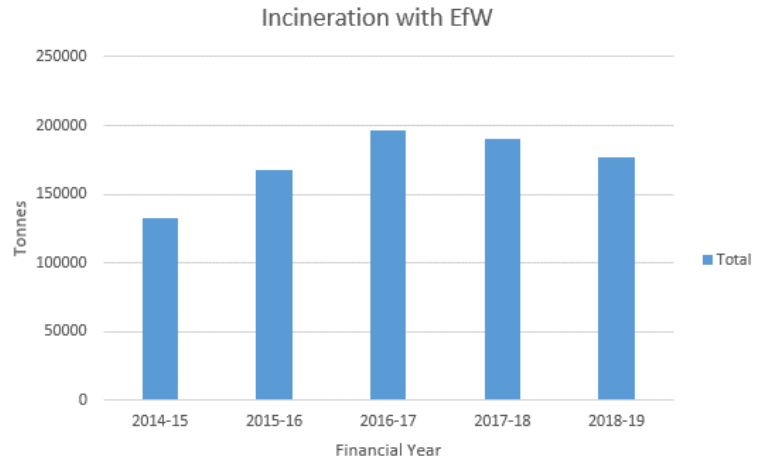
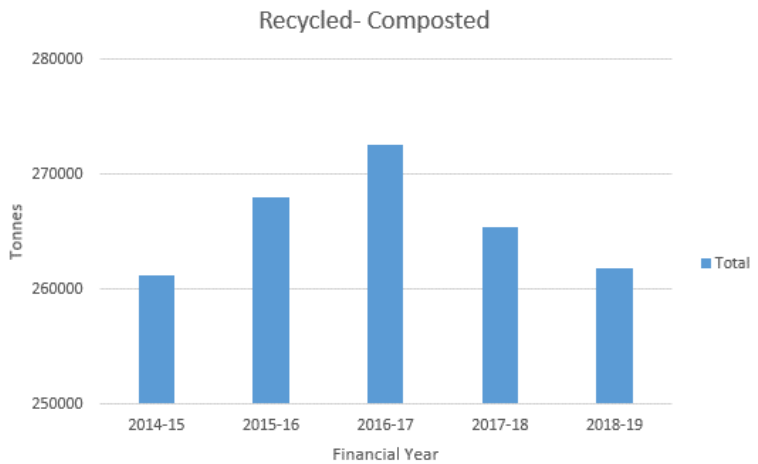
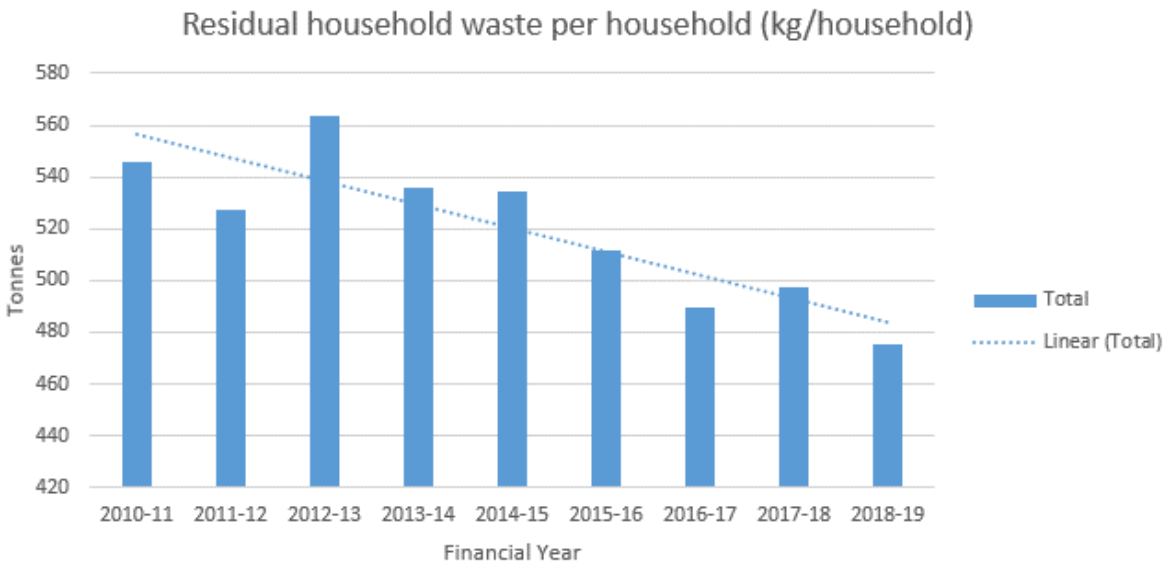


Figure 18.6 – HCC waste treatment – recycled, composted (tonnes), 2014-2019



18.49 The UK Government tracks selected waste indicators to benchmark the weight of waste produced by individual households. The number of kilograms of residual household waste collected per household in HCC (i.e. that is not sent for reuse, recycling or composting) have reduced significant since 2010-11 (from 546 kg to 475 kg). The current national (England) average is 537.2 kg/household (2018-19) (Ref 18.3).

Figure 18.7 – HCC Residual household waste per household, 2010-2019



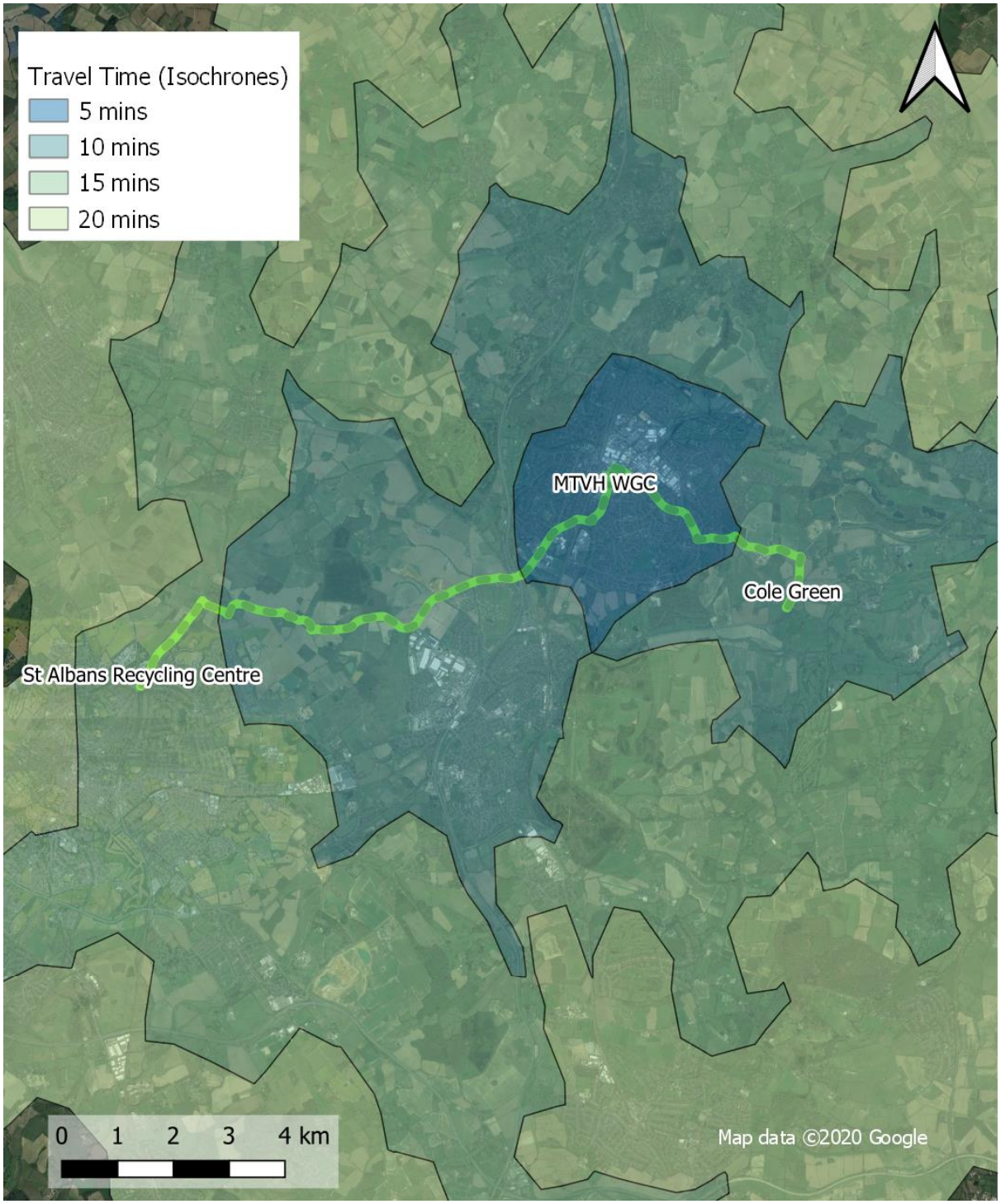
Household Waste Recycling Centres

18.50 There are two recycling centres within close proximity to the Site, Cole Green Household Waste Recycling Centre (HWRC) (5.7 km) and St Albans HWRC (11.9 km) (Figure 18.8).

18.51 The Cole Green HWRC is a 10-minute car journey from the Site. The Site is currently closed due to COVID-19. It is expected to accept a similar range of materials as the St Albans HWRC outlined below.

18.52 The St Albans HWRC is a 15-minute car journey from the Site. The Site is open 5 days a week (8am – 4pm) and can accept a range of waste materials; Automotive (batteries, oil, tyres), Building Materials (rubble, wood, soil), Cardboard, electricals (WEEE), Foil, Garden waste, Glass, Liquids and chemicals, Metals, Other (e.g. batteries, bicycles, toner cartridges etc.), paper, plastic bottles and textiles.

Figure 18.8 – Household recycling centres



18.53 HCC Environment Department undertook a waste composition analysis in May 2015 (Ref 18.11). Waste from eight HWRCs and nine WCAs were analysed. The main findings were:

- 13.3% of the waste being disposed of at HWRCs could have been recycled at the kerbside.

- 49.1% of waste deposited in the residual waste stream could have been placed into alternative collection points within an HWRC.
- Food waste was seen to be the major component of residual waste forming 32.8% of the total.
- 10% of the residual waste was paper items – 63.2% of this was recyclable at the kerbside.
- 2.9% of the residual waste was metallic – 47.6% of this was recyclable at the kerbside.
- 3% of the residual waste was glass – 89.7% of this was due to glass bottles and jars which can be recycled at the kerbside.
- Overall, 15.4% of collected residual waste could have been placed into the mixed dry recycling containers.
- Overall, 35.8% of collected residual waste could have been placed into the organic recycling containers.
- In total 51.2% of residual waste collected could have been recycled at the kerbside.

18.54 The findings suggest that further education and awareness could reduce unwanted journeys to HWRCs and improve kerbside segregation of waste streams. These shall be reflected within the proposed mitigation measures.

Waste Disposal

18.55 As outlined above the amount of residual waste has steadily decreased due to legislative and financial drivers and the associated WCA and WDA improvements.

18.56 Residual waste in Hertfordshire is primarily disposed of using two methods; Energy from Waste (EFW) and landfill. The use of EfW as a method of disposing of Hertfordshire's residual waste has increased in recent years as regional facilities were developed and available landfill capacity has reduced. Hertfordshire has been able to utilise these facilities in the short term but treatment capacity cannot be guaranteed and the locations of the facilities leads to increasing transport costs. Furthermore, there currently remains a need to utilise some landfill capacity for items unsuitable for current EfW sites. Therefore, more suitable and sustainable long term arrangements are required for the treatment of residual Local Authority Collected Waste (LACW).

18.57 Plans for a 320,000 tonnes per year EfW plant at Hoddesdon in Hertfordshire were refused in July 2019 (Ref 18.4). Hertfordshire has in place several short term 'bridging' contracts

for the management of the 250,000 tonnes of municipal residual waste currently produced in the county. These were anticipated to be needed up to summer 2023 when it was expected the Hoddesdon facility would be operational. There is therefore a shortfall in treatment capacity within the county (leading to increased transport impacts) due to the increased transfer distances to facilities located outside the county.

IDENTIFICATION AND EVALUATION OF POTENTIALLY SIGNIFICANT EFFECTS

18.58 The Proposed Development is composed of two phases:

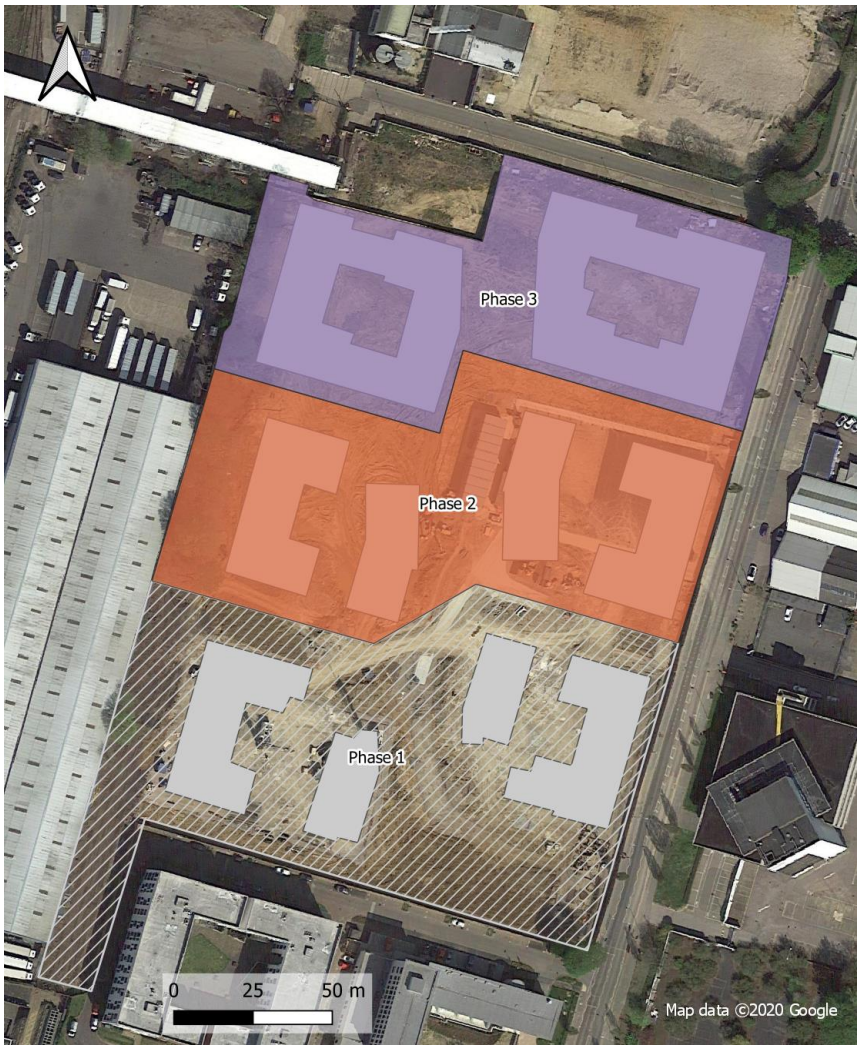
- Phase Two – Blocks 9 and 12; and
- Phase Three – Blocks 8 and 13.

18.59 Phase One of the South Side Development, comprises Blocks 10 and 11 and is located immediately to the south of the Site. Planning permission ref: 6/2018/0171/MAJ was granted in February 2019 and remains extant. The extant planning permission was granted following consideration of the environmental impacts of the development and relevant cumulative developments presented within a single Environmental Impact Assessment for the whole site.

18.60 Phase One of the South Side is not considered part of this assessment for the Proposed Development and is therefore assessed as a cumulative scheme.

Figure 18.9 – South Site Phasing plan

ColladoCollins Architects (2021). Design and Access Statement, Section 6.1 Phasing, February 2021



18.61 The Proposed Development will have two distinct phases of waste generation, the first being one-off construction related wastes (which will be short lived and transient), the second being the long term waste generation activities associated with the tenants and Site users.

18.62 For the Site, the anticipated waste types that are predicted for the construction phase are:

- Excavated soil associated (potentially contaminated) with foundation excavation and trenching for services;
- Spoil from piling operations (to be limited based on chosen technique);
- Vegetation from site stripping;
- Wastepaper, plastic, cardboard and wood from delivery of construction material and site activities during the works;

- Redundant unused construction materials (e.g. wood, glass, plastic, concrete, bricks, tiles, ceramics, insulation materials, gypsum-based materials etc.); and
- Collected groundwater and rainwater.

18.63 The volume of the wastes that will be generated cannot be specified at this time. It is possible, however, to give a relative (qualitative) assessment of the potential waste quantities and their intended fate (Table 18.4).

Table 18.4 – Fate of Construction Wastes

Waste Type	Relative Volume	Fate
Redundant construction materials	Small to moderate	Return to supplier, recycling, sale or disposal.
Wastepaper, plastic, cardboard and wood	Small to moderate	Off-site recycling and disposal via contracted waste management firm.
Excavated soil (potentially contaminated)	Small	On-site reuse and re-profiling. Off-site disposal or reuse for materials that cannot be managed on-site effectively. Preference will be given to materials reclamation and reuse rather than direct landfill disposal.
Collected perched groundwater and rainwater	Small	Discharge to site surface or drainage system under controlled (consented) conditions if suitable or treatment and off-site disposal.
Trade effluent from vehicle wheel washing	Small	Discharge to foul sewer under controlled conditions to be agreed with sewerage undertaker.
Waste oils, chemicals and potentially hazardous materials	Small	Removal to licensed treatment and disposal facilities via contracted waste management firms.
Scrap metal and redundant plant and equipment	Small	Off-site recycling.
Vegetation from site stripping and landscape maintenance.	Small	Off-site composting.
Sanitary wastewater	Small	Discharge to foul sewer under controlled conditions to be agreed with sewerage undertaker.
Spoiled and damaged goods from businesses.	Small	Return to supplier or recycling/disposal where return not possible.
Asbestos-containing material (potential for cement sheet roofing and other material to be present in the older buildings)	N/A	Specialist removal by licensed contractor and taken to hazardous waste disposal site. All removals have already been undertaken and have been excluded from this assessment.

Waste Type	Relative Volume	Fate
Key: Small = tens of tonnes/per annum Moderate = hundreds of tonnes/per annum Large = thousands of tonnes/per annum		

18.64 For the Proposed Development, the anticipated waste types that are predicted for the operational phase are:

- Construction/maintenance wastes from periodic contractor activities;
- Paper, glass, cardboard, food, wood, textiles, metal and plastic wastes from business activities and residential dwellings;
- Sanitary and cleaning chemical wastes from residential and commercial premises;
- Waste vegetation from routine maintenance of landscaped areas;
- Redundant plant and equipment (during maintenance);
- Sanitary effluent from commercial and residential premises;
- Small quantities of waste oils and chemicals from site support activities; and
- Waste oil/water mixtures and sediment from interceptor systems.

18.65 The volume of the wastes that will be generated cannot be specified at this time. It is possible, however, to give a relative (qualitative) assessment of the potential waste quantities and their intended fate (Table 18.5).

Table 18.5 – Fate of Operational Wastes

Waste Type	Relative Volume	Fate
General waste; paper, plastic, cardboard, food waste etc.	Moderate	Segregated for recycling and treatment off-site by contracted waste firms in case of commercial businesses; in the case of residential occupants via Local Authority waste collection services.
Waste oils, chemicals and potentially hazardous materials	Small	Removal to licensed treatment and disposal facilities via contracted waste management firms.
Scrap metal and redundant plant and equipment	Small	Off-site recycling.
Waste oil/water mixtures and sediment from interceptor systems (if present)	Small	Routine removal by contractor to treatment facility.

Waste Type	Relative Volume	Fate
Vegetation from site stripping and landscape maintenance.	Small	Off-site composting.
Sanitary wastewater	Small	Discharge to foul sewer under controlled conditions to be agreed with sewerage undertaker.
Spoiled and damaged goods from businesses.	Small	Return to supplier or recycling/disposal where return not possible.
Construction wastes from periodic contractor activities.	Small	Removal to licensed treatment and disposal facilities (to be managed by appointed contractor).
Key: Small = tens of tonnes/per annum Moderate = hundreds of tonnes/per annum Large = thousands of tonnes/per annum		

18.66 There are potential effects both at the point of waste generation/storage (local direct effects) and effects due to the transportation and treatment, recycling and/or disposal of produced waste streams (local, regional and national indirect effects). Indirect adverse effects may arise from road haulage, noise, dust, nuisance, vehicle emissions and water pollution etc.

18.67 The Proposed Development has no direct control (influence) over the transportation and treatment, recycling and/or disposal of the produced waste streams (with regards to household domestic waste) as this is a function of the WCA.

18.68 To ensure regional indirect effects of the transportation and treatment, recycling and/or disposal of produced waste streams is minimised the following principles shall be employed (where possible):

- Minimise waste production – Ensure (where possible) that the waste hierarchy is appropriately applied;
- Segregate hazardous and non-hazardous waste streams – Ensure waste materials are properly segregated to ensure appropriate treatment and to maximise recycling opportunities. This includes ensuring maximum kerbside waste collection; and
- Proximity Principle – Ensure waste to be recovered, treated or disposed of as near to the source as possible thus minimising transport effects. This is primarily the responsibility of the WDA.

Construction Phase

18.69 In order to assess impacts from construction waste the following section includes estimates of construction waste, based on developmental details. Estimating construction waste is possible (using published guidance and research), and having an approximate quantity for this waste type is essential in order to measure the scheme against objectives and targets planning policy and legislation.

18.70 The following estimates of construction waste have been developed using current BRE Waste Benchmark Data (SMARTWaste) (Ref 18.15). The Construction Resources and Waste Platform (CRWP) have developed indicators to aid in the calculation of waste arisings from construction projects. The Environmental Performance Indicator (EPI) estimates m^3 of waste per $100m^2$ of internal floor area. Table 18.6 outlines the relevant EPI for the Proposed Development.

Table 18.6: Estimated construction waste quantities

Block	Gross Internal Floor Area (m^2)	Generation Rate (m^3 per 100 m^2)	Construction and Demolition (C&D) Waste Generated (m^3)	C&D Waste Generated Tonnes (650 kg/m^3)
Block 12 – Residential (Phase 2)	14,167	18.1	2,564	1,667
Block 9 – Residential (Phase 2)	14,889	18.1	2,695	1,752
Block 13 – Residential (Phase 3)	18,381	18.1	3,327	2,163
Block 8 – Residential (Phase 3)	21,454	18.1	3,883	2,524
Total	**68,891**	**-**	**12,469 m^3**	**8,105 Tonnes**

Key:

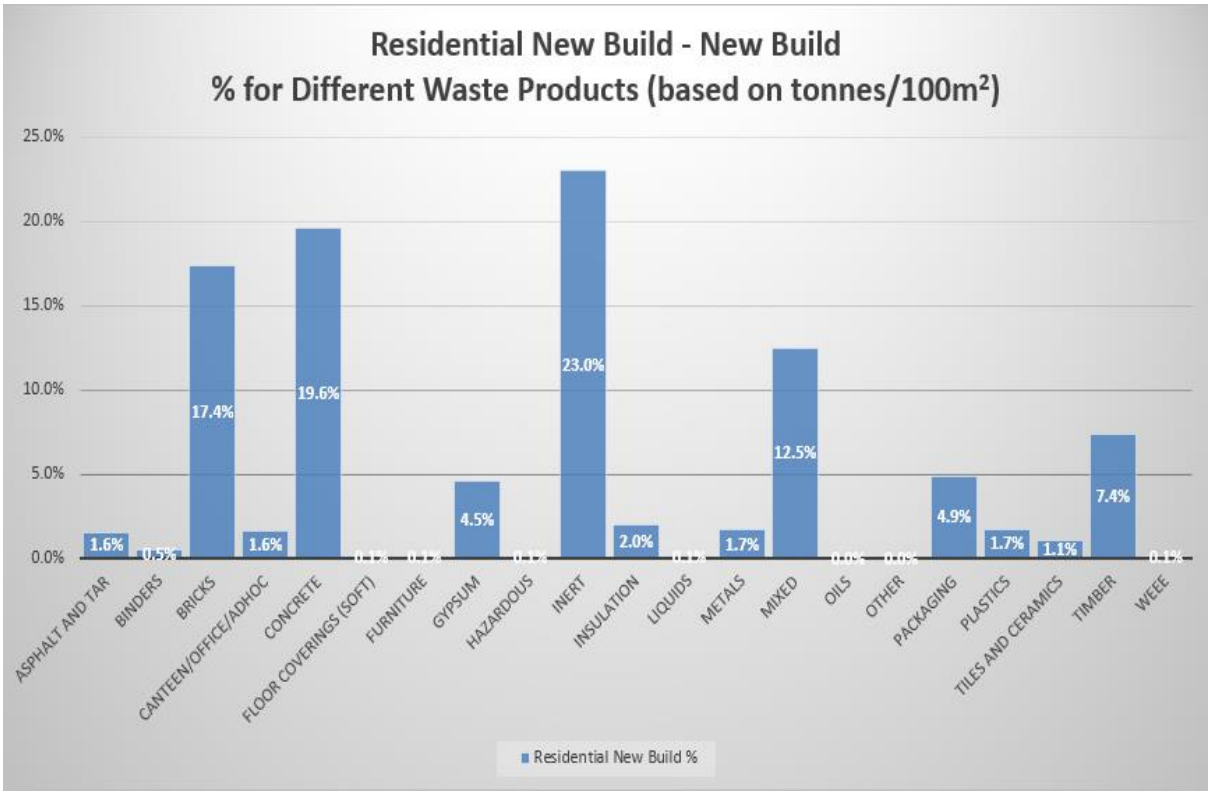
Source: Collado Collins Architects, WGC Phase 2+3 18009 - Additional Height, Comparison Schedule, 210108- Rev. 04

Generation rates obtained from BRE (2012), BRE Waste Benchmark Data, SmartWaste, Issued 26th June 2012.

18.71 The indicators within Table 18.6 above relate to waste generation rates where no minimisation, reuse or recycling of materials takes place. It would be the baseline figure against which a reduction in waste arisings would be undertaken. As well as predicting the total

construction waste generated, information on waste composition is required to fully assess the impacts of construction activities (with regards to waste). A percentage figure has been estimated using the BRE Waste Benchmark Data (SMARTWaste) (Ref 18.6) for Residential (Figure 18.10).

Figure 18.10: Estimated Construction Waste Composition - Residential



18.72 The figures above are based on standard construction operations in the UK and the estimated volumes identified above can be lowered through on-site good waste management practice. Opportunities to prevent and reduce the generation of construction waste are detailed in the following sub-sections.

18.73 Appropriate objectives and targets need to be set in relation to the minimisation and recycling of waste materials. This would ensure that a clear plan is generated for the management of specified types and quantities of materials identified. The material-specific target would be agreed with the contractors. Table 18.7 provides an overview of the government's Waste and Resources Action Programme (WRAP) Standard, Good, and Best Practice recovery rates (by material type) (Ref 18.17).

Table 18.7 – Standard, Good and Best Practice Recovery Rates by Material

Waste Type	Standard Recovery %	Good Practice Quick Win %	Best Practice Recovery %
Timber	57	90	95
Metals	95	100	100
Plasterboard	30	90	95
Packaging	60	85	95
Ceramics	75	85	100
Concrete	75	95	100
Inert	75	95	100
Plastics	60	80	95
Miscellaneous	12	50	75
Electrical Equipment	Limited Information	100	100
Furniture	0-15	25	50
Insulation	12	50	75
Cement	Limited Information	75	95
Liquids and Oils	100	100	100
Hazardous	50	Limited Information**	Limited Information**
Key: **This cannot be 100% as much hazardous waste (e.g. asbestos) must be landfilled.			

18.74 It is important to note that the main demolition phase of the Proposed Development has already been completed. Demolition rubble and excavated soils associated with the Site clearance and construction works were a significant waste stream, however, it was temporary in nature. Insofar as a summary of the management of wastes arising from the Proposed Development is concerned, the following aspects are pertinent:

- A Refurbishment and Demolition asbestos survey was undertaken on all buildings to determine the location and extent of any asbestos containing materials (ACMs) prior to demolition. All ACMs were removed from all buildings prior to demolition and disposed of off-site by an appropriately licensed asbestos contractor (as required by *The Control of Asbestos Regulations 2012*).

- Prior to demolition of buildings/structures any redundant equipment and waste materials were removed. Redundant equipment was either sold for re-use (where possible), or removed for off-site recycling or disposal via a contracted waste management firm. Waste materials were removed for off-site recycling and/or disposal by a contracted waste management firm.
- Demolition rubble was screened and crushed for either re-use on the Site (where possible) or off-site removal. The mobile plant and equipment will be permitted, as required under the *Environmental Permitting (England and Wales)*

Regulations 2010 (as amended). Techniques to minimise emissions are outlined within Process Guidance Note 3/16 (12) Secretary of State's Guidance for Mobile Crushing and Screening.

- All excavations were closely monitored to ensure the chemical characteristics of the materials were understood and that they were handled and segregated appropriately (*e.g.* potentially contaminated soils/materials were not be mixed with uncontaminated soils).
- Arising from piling operations (once generated) will be treated similarly to other excavated materials and will be appropriately monitored, analysed and managed.
- Detailed records (and where appropriate a photographic log) will be kept of all construction phase waste arisings and their management and fate. This will be available on completion of the construction phase.

18.75 The buildings that were subject to demolition are outlined within Figure 18.11 (associated with planning permission ref: 6/2018/0171/MAJ). The remaining areas were largely composed of hardstanding. This was also subject to removal as part of the previously conducted redevelopment processes.

Figure 18.11 – Demolition plan

N6-2015-0294-PP_planning_SITE PLAN DEMOLITION - 2455-T-00-0025-ZXX - REV 03

18.76 All works will be undertaken in accordance with the Environmental Management Plan (EMP) for the Proposed Development.

18.77 The main origins of waste (found in construction projects) can include:

- over-ordering due inaccurate materials estimates;
- damage to materials either during delivery or during storage on-site (handling errors, inadequate storage, poor co-ordination with other trades);
- off cuts of materials resulting from inefficient design and construction practices;
- design changes leading to reworking and wasted materials;

- temporary works materials (e.g. formworks, hoarding, etc.); and
- packaging.

18.78 To ensure waste is minimised procedures will be established to ensure (where possible) effective communication, design, procurement and logistics programmes will be established and maintained by the Principal Contractor to ensure construction resource efficiency opportunities are maximised.

18.79 The Principal Contractor (currently working on Phase 1) works to a target of 99 % diversion from landfill and at present is delivering over 99.5 %. In-line with best practice the Principal Contractor targets a series of Key Performance Indicators (KPIs), namely, m^3/per £100k, m^3 per unit and tonnes per unit. The Phase 1 Project targets are:

- 15 m^3 of waste per £100k.
- 8.53 tonnes per unit.
- 27.15 m^3 per unit.

18.80 Owing to the current stage of the Phase One project there has been limited waste generated so they are currently well below these targets. The Principal Contractor operates a Site Waste and Energy Tracker which is updated monthly and is reported during monthly meetings.

18.81 On site the Principal Contractor applies the waste hierarchy principle of:

- **Reduction** - They work with their supply chain to ensure that where possible they reduce the amount of waste. This includes things such as the removal of unnecessary packaging, with a particular focus on single use plastic, just in time delivery and the use of standard sizes where possible.
- **Reuse** - They implement cutting stations on site so that all off cuts can be returned to this area and used for smaller pieces rather than thrown away. In the site canteens and offices, they avoid disposable utensils and cups and ensure that these can all be washed and reused. Where possible they will use takeback schemes to ensure that the material is kept in the system. They also communicate any spare materials with their other sites so that these materials can then be moved and used elsewhere.
- **Recycle** - Plasterboard is always segregated for recycling but during the project they will look to ensure that they always have a minimum of one segregated skip for recycling. This is usually timber during the frame, then bricks, then plastic.

18.82 At the time of writing, the Principal Contractor for Phase Two and Phase Three has not been appointed. It is anticipated that the Phase Two and Phase Three landfill diversion targets, recycling/recovery targets, KPIs and management processes will be to an equivalent standard as implemented during Phase One.

18.83 Waste management is a key construction metric that is subject to regular review. The Principal Contractor regularly reviews the waste reports from their waste carriers which allows them to identify the waste streams that are generating the most waste and then look to either reduce this or segregate further it for recycling. Continuous improvement is inherent within their systems.

18.84 Overall, the generation and management of solid waste associated with the construction phase is considered to have a **minor adverse** effect which will be temporary in nature.

Operational Phase

18.85 The impacts of waste generation for the operational activities are similar in principle to the impacts of C&D waste generation. Waste collection, transportation and disposal methods are primarily guided by health and safety and environmental legislative requirements. As a result waste has to be managed in order to meet national legislation and local policy targets.

18.86 As waste disposal options (such as landfills) are at the bottom of the criteria for sustainable waste management practices, their acceptability and availability for future predicted waste arisings cannot be guaranteed.

18.87 Operational waste impacts are assessed on the predictions of quantities of waste arisings and compositions and the ability for the future waste to be dealt with in a manner that at the least meets fundamental health, safety and environmental criteria.

18.88 As is the case for C&D waste management, calculating future operational waste weight and volume generation rates is a difficult but a fundamentally important task. Estimations have been calculated by making use of BS 5906:2005 Waste Management in Buildings (Ref 18.1). Table 18.8 and Table 18.9 outlines the residential estimated operational weekly waste volumes.

Table 18.8 – Residential (estimated operational weekly waste quantities), by block

Residential Blocks	Maximum No. Units (all sizes)	Weekly Waste Arising (Litres)	No. 80 litre Bin/Bag Equivalent	No. 1100 litre Heavy Duty Wheeled Bin Equivalent
Block 12	155	17900	224	16
Block 9	162	18530	232	17
Block 13	183	21540	269	20
Block 8	221	26160	327	24
Total	**721**	**84130**	**1052**	**77**
Key: Basis of the assessment is 70 litres per bedroom as outlined within British Standards Institute (2005), BS 5906:2005 Waste Management in Buildings – Code of Practice.				

Table 18.9 – Residential (estimated operational weekly waste quantities), by unit type

Indicative Residential Unit Type (No. Persons)	No. Units (by type)	Sum of Weekly Arising (Litres)	Sum of 80 litre Bin/Bag Equivalent	Sum of 1100 litre Heavy Duty Wheeled Bin Equivalent
Studio 1-Bed (2P)	272	19160	240	17
2-Bed (3P)	106	14960	187	14
2-Bed (4P)	318	44640	558	41
3-Bed (5P)	25	5370	67	5
Total	**721**	**84130**	**1052**	**77**
Key: Basis of the assessment is 70 litres per bedroom as outlined within British Standards Institute (2005), BS 5906:2005 Waste Management in Buildings – Code of Practice.				

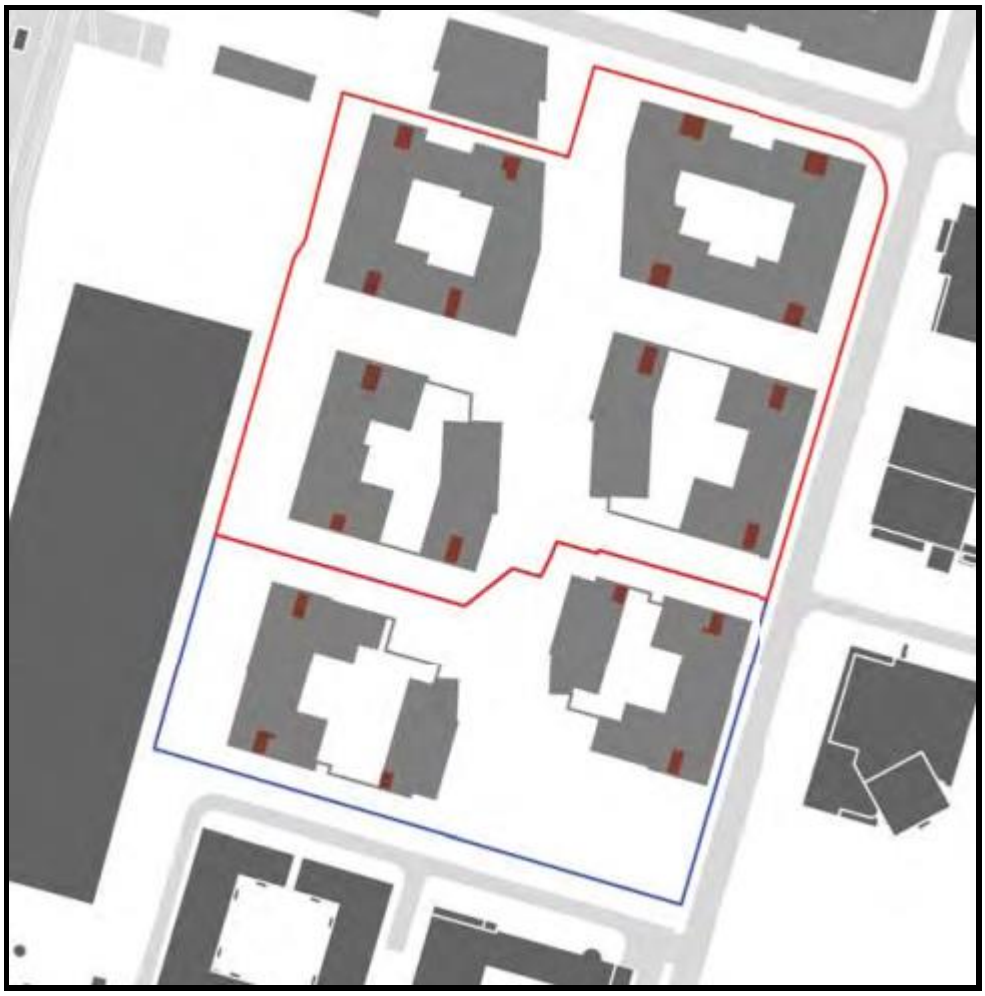
Waste Collection Procedures

18.89 It is proposed that a centralised management system will be implemented for the collection of domestic waste (including recycling). Collection points are outlined on Figure 18.12 where waste and recycling bins can be towed to by a waste operative on collection day, disposed of and the bins towed back to designated bin areas located within the undercroft areas of the individual blocks. As with car movements, it is proposed that waste and recycling lorry movements are limited to the periphery of the Site, with no requirement for vehicles to track across defined public accessible spaces.

18.90 A formal delivery and Servicing Plan (DSP) will be established and maintained for Phase Two and Phase Three.

Figure 18.12: Refuse storage points

ColladoCollins Architects (2021). Design and Access Statement. Section 9.6 Refuse Strategy, February 2021



18.91 The residential waste collection facilities provided have been designed to adhere to BS 5906:2005 'Waste Management in Buildings' (Ref 18.1) and to ensure compliance with the Building Regulations Approved Document H (Ref 18.18).

18.92 Residential tenants will have their waste collected as part of the Local Authority's municipal waste collection services and thus will be obliged to comply with The Local Authority's waste collections and recycling requirements.

18.93 Overall, the generation and sustainable management of solid waste associated with the operational phase is considered to have a **minor adverse** effect.

Wastewater Generation and Management

18.94 In addition to the aforementioned solid wastes, the proposed development will also generate wastewaters. As with most aspects of the Proposed Development, the construction and operational phases need to be considered separately. These are discussed below.

Construction Phase

18.95 Wastewaters likely to be generated on-site during the construction phase include the following:

- temporary septic tanks and/or portable toilets to be utilised by the construction workers;
- temporary discharges associated with changeover from the old drainage system to the new drainage system and its management;
- wastewater from dewatering of excavations (groundwater and surface water runoff); and
- dirty water from the temporary on-site wheel wash (should one be required during the construction works).

18.96 Temporary portable toilet units will be emptied frequently under a maintenance contract. The waste from the units will be taken off-site for treatment and disposal at a local municipal wastewater treatment works.

18.97 Any water arising from the dewatering of excavations will either be discharged back over the ground surface and allowed to infiltrate. It is likely that a permit from the EA will be required for the temporary discharge of water from excavations. If on sampling and chemical analysis such water is deemed unsuitable for discharge, the water will be collected for treatment and disposal offsite. All works will be undertaken with due attention to appropriate EA guidance.

18.98 Wastewater generated from the on-site wheel wash (if required) will be either collected in a sealed system for reuse, or collected in a sealed system for authorised disposal.

18.99 Overall, the generation and management of wastewater associated with the construction phase is considered to have a **minor adverse** effect which will be temporary in nature.

Operational Phase

18.100 The main wastewater stream once the Site is operational will be sanitary wastewater from the toilets, washrooms and wash water.

18.101 Sanitary wastewater will be discharged to the foul sewer.

18.102 Overall, the generation and management of wastewater associated with the operational phase is considered to be a **minor adverse** effect.

ASSESSMENT OF CUMULATIVE EFFECTS

18.103 Potential impacts associated with the Proposed Development may be acceptable in isolation, but when considered in the context of other developments in the immediate vicinity, may become more significant. These are referred to as 'Cumulative Impacts'. Chapter 3: Environmental Assessment Methodology of this ES provides details of the relevant schemes.

Construction Phase In-Combination Effects

18.104 Demolition and construction of the cumulative schemes would result in the generation of construction, demolition and excavation (CDE) waste similar in composition to that generated by the Proposed Development. Due to uncertainty regarding the specific demolition and construction materials and activities associated with the other developments, it is difficult to accurately quantify the volume of waste expected to be generated.

18.105 In the unlikely event that demolition and construction works of the Proposed Development coincides with that of the considered cumulative schemes, an effect of temporary moderate adverse significance would be expected. The duration of this effect would depend upon the specific demolition and construction programmes of each considered scheme. However, it is highly unlikely that demolition and construction of all the considered cumulative schemes would be undertaken simultaneously with the Proposed Development. In addition, employment of mitigation measures (in accordance with best practice) should result in the all waste materials produced during this phase being effectively and appropriately managed. As such, it is anticipated that most waste materials generated by demolition and construction works would be segregated for recycling and re-use purposes and diverted from landfill (in-line with the waste hierarchy). Therefore, through the implementation of these mitigation measures, a negligible effect would be expected during the demolition and construction phase of the Proposed Development in combination with other developments.

Operational Phase In-Combination Effects

18.106 Once all the considered cumulative schemes are complete and operational, waste arisings are anticipated to be produced due to activities associated with the use of each development. It is anticipated that due to the likely end-uses of the other developments (i.e. mixed use schemes of residential and commercial land uses), the composition of waste arisings generated by the developments would be of largely inert and non-hazardous (i.e. like that of the Proposed Development). Due to the lack of available information it is difficult to accurately quantify the amount of waste each development will produce.

18.107 Each proposed cumulative scheme will need to consider waste generated during their operational phase and will be required to apply management techniques that are in accordance with the waste hierarchy.

18.108 To manage waste arisings, at a County level, HCC currently provides a wide range waste management facilities, with additional facilities planned (subject to approval). The HCC Waste Site Allocations Development Plan Document (Ref 18.8) identifies sites for waste management facilities. This document includes maps and waste site briefs for Allocated Sites and identified Employment Land Areas of Search (ELAS). This document has been written to be in conformity with the HCC Waste Core Strategy and Development Management Policies. The wastes from these schemes would increase the total waste but the effect is not likely to be significant.

18.109 On the assumption that all the planned facilities are developed, there are not expected to be any concerns regarding the capacity of waste management facilities. It is also expected that as technology advances, further recovery and recycling methods will become available, resulting in an even lower demand for disposal at landfill and increase recycling, composting and recovery rates. When the measures discussed are combined, with the focus on waste prevention, waste minimisation, increasing recycling and recovery rates, storage capacity provisions an effect of minor adverse significance is expected during the operational phase of the Proposed Development in combination with the considered cumulative schemes.

Inter-Relationship Effects

18.110 Cross topic effects associated with both the construction and operational waste could include air quality impacts (i.e. derived from waste handling activities, waste transportation and off-site waste treatment/disposal activities), transportation impacts (i.e. derived from the handling and movement of waste from each of sites to the final treatment/disposal destinations),

water resource impacts (i.e. derived from waste handling activities and off-site waste treatment/disposal activities) and land impacts (i.e. derived from waste handling activities and off-site waste treatment/disposal activities). The potential cross topic effects are the same for each of the schemes identified. The potential to impact these receptors (both individually and in combination) has been addressed within this ES.

ENHANCEMENT, MITIGATION AND RESIDUAL EFFECTS

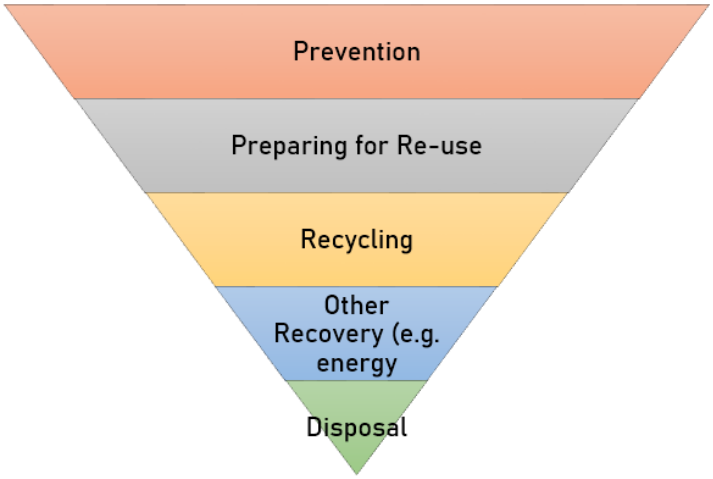
Enhancement/ Mitigation

18.111 The measures to be taken to manage solid wastes generated during the construction and operational phases have been described previously. No additional mitigation measures are considered to be required.

18.112 The measures to be taken to manage wastewaters generated during the construction and operational phases have been described previously. No additional mitigation measures are considered necessary. Further information on wastewater from the Proposed Development is also provided in Chapter 12 Water Quality, Hydrology and Flood Risk.

18.113 It should be noted that in-line with *The Waste (England and Wales) Regulations 2011*, the Proposed Development shall apply the waste hierarchy, as outlined in Figure 18.12, where disposal is considered as the last choice.

Figure 18.12: WFD Waste hierarchy



18.114 The Principal Contractor's Construction Environmental Management Plan (CEMP) will detail the practical execution of the construction works that demonstrates compliance with the

statutory requirements and best practice. The CEMP will also include Resource Management Plan (RMP) and a Site Waste Management Plan (SWMP), best practice but no longer a statutory requirement. The main objectives of the RMP will be to ensure that all building materials are managed efficiently, that waste is disposed of legally, and that material recycling, re-use and recovery is maximised.

18.115 All waste transfer documentation shall be maintained by the Principal Contractor for the required statutory period (i.e. two years for general waste and three years for hazardous waste).

Residual Effects – Construction Phase

18.116 Sustainable solutions will be implemented to enable, as far as applicable, the re-use of waste materials and avoidance of landfill disposal.

18.117 The effects arising from the construction phase are transient in nature and as such they are considered to have a **neutral** residual effect notably as a result of the waste that will be generated which would not arise under the baseline conditions.

Residual Effects – Operational Phase

18.118 Whilst the Proposed Development will result in the generation of greater volumes of waste, such waste materials will be appropriately managed. As such, the residual effect of the operational phase is considered to be **neutral**.

SUMMARY

18.119 The Proposed Development will result in the generation of waste materials as a result of the construction and operational phase.

18.120 During the construction phase wastes that will be generated will include soil, waste oils and chemicals, wastewater, scrap metal and redundant plant, and unused construction materials.

18.121 Whilst the volume of these wastes that will be generated during the construction phase cannot be specified at this time, a relative assessment of the potential waste quantities estimates there to be mainly small (tens of tonnes) to moderate (thousands of tonnes) generated. All construction works will be undertaken with due attention to appropriate statutory and best practice guidance.

18.122 In line with *The Waste (England and Wales) Regulations 2011*, the Proposed Development shall apply the waste hierarchy, where disposal is considered as the last choice.

18.123 The Principal Contractor's Construction Environmental Management Plan (CEMP) will detail the practical execution of the construction works that demonstrates compliance with the statutory requirements and best practice. The CEMP will also include Resource Management Plan (RMP) and a Site Waste Management Plan (SWMP), best practice but no longer a statutory requirement. The main objectives of the RMP will be to ensure that all building materials are managed efficiently, that waste is disposed of legally, and that material recycling, re-use and recovery is maximised.

18.124 Landfill diversion targets and waste recycling and recovery targets for the Proposed Development (during the construction phase) will be in-line with current best practice standards.

18.125 Wastes likely to be generated during the operational phase include paper, cardboard, food, metal, plastic wastes, sanitary effluent, small quantities of waste oils and chemicals from site support activities, redundant plant and equipment, waste vegetation from routine maintenance of landscaped areas, soils and from minor earthworks, construction wastes from periodic contractor activities, and waste oil/water mixtures and sediment from on-site interceptor systems (if present).

18.126 Whilst the volume of these wastes that will be generated during the operational phase cannot be specified at this time, a relative assessment of the potential waste quantities estimates there to be moderate (thousands of tonnes) generated per annum.

18.127 Residential tenants will have their waste collected as part of the Local Authority's municipal waste collection services and thus will be obliged to comply with The Local Authority's waste collections and recycling requirements.

18.128 Suitable residential waste collections facilities will be provided in-line with building regulations and BS 5906:2005 Waste Management in Buildings – Code of Practice (Ref 18.1).

18.129 It is proposed that a centralised management system will be implemented for the collection of the domestic waste (including recycling). Collection points are outlined on Figure 18.12 where waste and recycling bins can be towed to by a waste operative on collection day, disposed of and the bins towed back to designated bin areas located within the undercroft areas of the individual blocks. As with car movements, it is proposed that waste and recycling lorry movements are limited to the periphery of the Site, with no requirement for vehicles to track across defined public accessible spaces.

18.130 Sanitary wastewater from residential dwellings will be discharged to the foul sewer.

Table 18.11: Waste Management Summary Table.

Potential Effect	Nature of Effect (Permanent or Temporary)	Significance	Mitigation/ Enhancement Measures	Residual Effects
Construction Phase Soils, waste oils and chemicals, scrap metal and unused construction materials.	Temporary	Minor Adverse	On-site re-use of materials and off-site recycling or disposal of unsuitable materials. A Resource Management Plan will be required to ensure material recycling, re-use and recovery is maximised.	Neutral
Construction Phase Wastewaters generated during the construction phase	Temporary	Minor Adverse	The discharge of any water accumulated in excavations would be subject to monitoring and if necessary EA approval for discharge. Sanitary wastes are to be tankered off-site to an appropriate treatment facility.	Neutral
Operational Phase Solid wastes produced as per the day to day activities during the operational phase of the proposed development.	Permanent	Minor Adverse	Solid waste streams will be generated by residents and commercial tenants. Waste disposal facilities will be provided on-site for residents, who will be obliged to comply with The Local Authority's waste collections and recycling requirements. Commercial waste storage facilities will be provided. A strategy is being explored for controlling commercial waste collections, which will be written into the lease agreements to ensure a particular company is used in-line with a site wide collection policy.	Neutral
Operational Phase Wastewaters generated during the operational phase of the proposed development	Permanent	Minor Adverse	Waste water will be discharged to the foul sewer under controlled conditions to be agreed with local sewerage undertaker.	Neutral

GLOSSARY OF TERMS

ACM	Asbestos Containing Material
BMW	Bio-degradable Municipal Waste
BRE	Building Research Establishment
BREEAM	Building Research Establishments Environmental Assessment Method
CDE	Construction, Demolition and Excavation
C&D	Construction and Demolition
CEMP	Construction Environmental Management Plan
CoCP	Code of Construction Practice
CRWP	Construction Resources and Waste Platform
DEFRA	Department of Environment, Food and Rural Affairs
EA	Environment Agency
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EPA	Environmental Protection Act
EPI	Environmental Performance Indicator
EPR	Environmental Permitting
LSP	Local Strategic Partnership
NPPF	National Planning Policy Framework
PPC	Pollution Prevention and Control
RMP	Resource Management Plan
SWMP	Site Waste Management Plan
UDP	Unitary Development Plan
UNCED	United Nations Conference on Environment and Development
UNFCCC	United Nations Framework Convention on Climate Change
WMPE	Waste Management Plan for England
WRAP	Waste and Resources Action Programme

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19 CONCLUSIONS

19.1 This chapter contains the conclusions of the Environmental Statement (ES). The ES has examined the potential impacts associated with the Proposed Development during both the construction and operational phases.

19.2 The conclusions from each topic assessed in the ES are provided below.

Development Programme and Construction

19.3 This chapter identifies that the construction period would be approximately seven years and the effects of the Proposed Development would be managed through the development of a project and site-specific Construction Environmental Management Plan (CEMP). The CEMP would outline methods for contractor and general public liaison, hours of work, methods to deal with complaints, and outline management practices to control dust, traffic and access, waste, water resources, ecological and archaeological effects, ensuring a high level of control throughout the construction works.

19.4 The procedures within the CEMP would ensure the delivery of a high level of environmental control throughout the construction phase, thereby minimising the potential for adverse effects.

Transport and Access

19.5 An assessment of the likely significant effects of the Proposed Development with respect to transport has been undertaken.

19.6 It is anticipated that that the number of vehicular movements to and from the Site as a result of each phase of the construction will not be more than the number of trips generated by the completed development.

19.7 The South Side site will be constructed in three phases. Phase One is currently under construction; the current application is for a revised proposal for Phases Two and Three.

19.8 Each construction phase will have its own Demolition and Construction Management Plan, including control of access from the highway. Phase One is under construction and takes access from Broadwater Road via temporary construction accesses generally in the location of

accesses 5 and 6 as well as existing dropped kerbs. Phase Two will utilise these construction accesses. Phase Three is intended to use junction 4 for construction purposes. Once construction is complete, these accesses will form vehicular access for the operational phase.

19.9 The HGV trips will be spread throughout the day, as they will be made up of materials deliveries, off-site disposal and other trips related to the management of the construction process.

19.10 The daily traffic flow associated with the site construction traffic is considered to be relatively low and the change in magnitude for severance is considered to be negligible adverse for all links assessed. In general, the construction vehicles would use existing or newly constructed vehicle accesses from Broadwater Road. This is a main arterial route with standard footways available either on one or both sides of the carriageway. On this basis, the change in magnitude for fear and intimidation is considered to be negligible adverse for all links assessed.

19.11 The development will be supported by a Construction Logistics Plan (CLP) which will include a route management strategy as well as dictate any limitations on construction vehicle delivery hours. It is anticipated that there would be minimal flows associated with construction during the peak hours and the change in magnitude of the site access junctions for driver delay, pedestrian delay and pedestrian amenity are considered to have a magnitude of negligible adverse.

19.12 The daily traffic flow associated with the construction traffic is likely to be minimal when compared to the operational phase and as with all major construction sites it is anticipated that in addition to the CLP, a CEMP will be secured through a suitable planning condition. It is considered that the change in magnitude for accidents and safety is negligible adverse for all links assessed.

19.13 The wider development will deliver significant highway improvement works to Bridge Road and Broadwater Road as well as off-site highway improvements to increase operational capacity at a number of roundabouts remote from the Site. All highway works will be delivered by means of a Section 278 Agreement with the local highway authority. The S278 technical approval will include a requirement for a traffic management plan to ensure safe working practices within the highway as well as minimal disruption to pedestrian and cycle movements. On this basis, appropriate management is considered to result in a negligible adverse change in magnitude for fear and intimidation for all links assessed. During the construction of the highway improvement works the effect on driver delay is considered to be minor adverse but

pedestrian/cyclist delay and pedestrian/cyclist amenity are considered to have a magnitude of negligible adverse.

19.14 Once operational, the significance of the change in traffic magnitude on severance would be Moderate adverse on the Broadwater Road and Bridge Road corridors. There is no change in fear and intimidation between the baseline and with development scenarios (excluding Broadwater Road and Bridgewater Road improvement works) on the links considered.

19.15 Additional traffic is likely to lead to further delay on the local highway network. In the absence of mitigation measures, the effect on driver delay on the junctions considered would be Major / Moderate adverse.

19.16 The effect on pedestrian delay is considered as minor / negligible adverse on the Bridge Road and Broadwater Road corridors. The effect on pedestrian delay at the Bridge Road/Broadwater Road junction would be Moderate adverse.

19.17 The increase in pedestrian and cycle trips on Bridge Road, Broadwater Road and the footbridge over the railway would result in Moderate adverse pedestrian/cyclists delay on the links and junctions considered.

19.18 Following the implementation of a number of mitigation and enhancement measures the residual impact of the Proposed Development is considered to be minor / negligible adverse during both the construction and operational phases. The residual impact of the off-site highway improvement works is considered to be minor adverse during the construction phase and minor / negligible positive during the operational phase.

Air Quality

19.19 An air quality impact assessment has been undertaken to assess both construction and operational effects associated with the Proposed Development.

19.20 An assessment of the potential effects during the construction phase identified that releases of dust and particulate matter are likely to occur during site activities. Through good site practice and the implementation of suitable mitigation measures, the effect of dust and particulate matter releases may be effectively mitigated and the resultant effects are considered to be negligible.

19.21 Dispersion modelling has been carried out to assess the impact of the operational development on local air quality. The assessment has shown that NO_2 and PM_{10} concentrations are predicted to be below the relevant objective limits throughout the study area and within the Site itself. The results indicated that the impact of the emissions arising from the traffic generated by the Proposed Development is negligible. The impact with regards to new exposure is also considered to be negligible.

19.22 Modelling has also been carried out to assess the likely pollutant concentrations arising from the stack at the nearby British Lead Mill (BLM) site. The results indicate that the concentration of pollutants arising from the BLM stack will be well below the relevant air quality standards within the Proposed Development.

19.23 The Site is considered to be suitable for the proposed use with regards to air quality.

Wind Microclimate

19.24 An assessment with regards to the wind microclimate has been undertaken.

19.25 The Proposed Development is expected to have negligible effect on pedestrian level wind conditions with regards to pedestrian safety, and conditions in and around the Site are expected to rate as safe for all users.

19.26 In terms of pedestrian comfort, with respect to wind force, thoroughfares within and alongside the Site are expected to be generally suitable, and at least tolerable, for pedestrian access to, and passage through or past, the Proposed Development. These effects are considered to range from negligible to minor adverse.

19.27 Main entrances to the Proposed Development are expected to enjoy suitable conditions for pedestrian ingress / egress. Effects on entrances are therefore considered negligible.

19.28 Recreational spaces are expected to have generally suitable, and no worse than tolerable, conditions for planned activities. Effects on amenity spaces are therefore mainly negligible with some localised effects of no worse than minor adverse significance.

19.29 The Proposed Development is expected to have negligible effect on the pedestrian level wind conditions within the existing surrounding area.

19.30 Any adverse cumulative effects are expected to be limited to no worse than localised minor adverse, at the space between the North Side's Block 1 and LDS Building.

Noise and Vibration

19.31 The assessment has considered the likely effects of the Proposed Development with respect to noise and vibration. These include the effects of existing conditions on the Proposed Development and the effects of noise and vibration generated from construction of the Proposed Development on surrounding properties. Limits have been specified for the operational phases. The detailed design of the Proposed Development will ensure that noise emissions from the Site would remain below the specified background sound levels.

19.32 The assessment has been based on a computer noise model, informed and validated using environmental noise measurements and traffic data provided for the surrounding road links.

19.33 The impact of noise and vibration during construction of the Proposed Development has been predicted and assessed in accordance with BS 5228. Generic mitigation measures have been recommended, which when implemented are capable of ensuring that the impact of noise and vibration during the construction of the Proposed Development is adequately controlled.

19.34 An assessment has been carried out in accordance with the adopted criteria to determine the suitability of the Site for residential accommodation. Proposed units will require appropriate consideration of glazing and passive or active ventilation specification in order to achieve the required internal noise levels. It is proposed that this consideration is made for all properties identified as experiences a Moderate significant effect.

19.35 The impact of the increase in road traffic associated with the Proposed Development has been assessed. Likely short and long term effects due to any increase in road traffic are identified as Negligible for all existing receptors adjacent to the surrounding roads.

Townscape and Visual Amenity

19.36 The Site is located on the eastern edge of Welwyn Garden City town centre, separated by the East Coast Mainline railway. The Site is located within the industrial zone of Welwyn Garden City on the grounds of the former Shredded Wheat factory. The adjacent North Side site contains Grade II Listed buildings of the former Shredded Wheat factory, of which the silos and production hall form a visual landmark and contribute to the surrounding townscape

character, provide a sense of place and form some of the oldest industrial development within Welwyn Garden City.

19.37 Due to the decline in industry and manufacturing over the last century the Site has fallen into disrepair and dereliction, affecting the quality of the Site and immediate townscape setting. All but the 1920s parts of the former shredded wheat factory buildings have been demolished under the extant consent, with restoration and re-purposing works to the retained 1920s listed buildings requiring completion (North Side).

19.38 The majority of views into the Site are from roads, railway station and pedestrian routes adjacent to, or in very close proximity to the Site. Opportunities for views of the Site from a distance of greater than a few hundred metres are limited to the tops of the silos on the North Side, as for the most part the Site is visually screened by layers of existing intervening built form and vegetation. Long distance views, through intervening vegetation towards the tops of the silos and chimney, are currently experienced by receptors visiting Hatfield House and Gardens (a Registered Historic Park and Garden and Grade I listed building).

19.39 During construction, there would inevitably be a visual intrusion to the local townscape and views from locations close to the Site as a result primarily of large construction plant and machinery, including tower cranes, and the presence of partially completed built form of the Proposed Development (as is the case for implementation of the extant consent). However, this situation is unavoidable for the redevelopment of the Site and would only be temporary in nature.

19.40 A small proportion of existing trees and vegetation would be removed during construction but this would also be offset by the significant amount of landscaping incorporated as part of the Proposed Development. Once new planting has established, the landscape proposals would increase the vegetation coverage, diversity and amenity value within the Site.

19.41 The design of the Proposed Development is based on extensive consultation with Welwyn Hatfield Borough Council, Historic England and many other statutory and non-statutory stakeholders as part of the extant consented scheme and subsequent consultation as part of this current application. This extensive consultation has informed a sensitive and considered architectural design response for the Proposed Development that integrates sympathetically within the surrounding context, whilst maximising the height and capacity of the development.

19.42 The Proposed Development would regenerate a parcel of former industrial, brownfield, derelict land of low townscape quality that contains valued Grade II Listed buildings. The Proposed Development would introduce new high quality built form and enhance the sense of place.

19.43 The Proposed Development would introduce play provision, new public realm, green open space and highway improvements. These result in the integration of the Proposed Development in the wider setting of Welwyn Garden City.

19.44 The design of the Proposed Development in its wider context was assessed using 27 different viewpoints, which were selected in consultation with Welwyn Hatfield Borough Council and Historic England as part of the application process for the extant consented scheme and additional consultations as part of the current application.

19.45 For pedestrians in the immediate area of the Site, on Broadwater Road and on the Network Rail footbridge into the Site, the Proposed Development would positively enhance the visual quality, experience and approach creating a welcoming, safe and visually inviting townscape. People using Welwyn Garden City railway station would also experience an improvement to their views towards the Site.

19.46 For users of the Peartree Heritage Trail in close proximity to the Site the Proposed Development would result in the reduction of their sequential view of the 1920s Listed Buildings within the North Side as they travel along the trail (as is the case for the extant consented scheme). However, framed views of the retained 1920s Listed Buildings would be opened up at key points through deliberate breaks in the proposed apartment blocks and stepping of built form.

19.47 From the near distance there would be partial to glimpsed views of the upper storeys of the additional built form of the Proposed Development but generally these would not result in a significant change to these views. Similarly, visitors and tourists to Hatfield House with long distance views towards the Site would experience nominal views of the Proposed Development, seen in the context of the extant consent being implemented on the North Side and Phase One of the South Side site, resulting in a reduction in the visible extent of the silos following recent demolition of the 1930s section and partial screening of the retained silos by the Proposed Development. Careful attention has been paid to prevent the Proposed Development from breaking the skyline in key views from Hatfield House or its approach. Overall, this would not be a significant change to the view of Welwyn Garden City from this location.

Ecology & Nature Conservation

19.48 The ecological baseline value and likely significant effects resulting from the development were assessed in accordance with guidelines published by CIEEM. An ecological assessment of the Site was undertaken in 2020 to update previous assessments conducted at the Site in 2017 and 2014.

19.49 The Site is dominated by bare/re-colonising ground with some areas of hardstanding, ephemeral/short perennial, scattered scrub and trees. Overall, the Site currently holds limited ecological interest featuring habitats that are largely of negligible or limited local ecological value.

19.50 Six trees have been identified to offer low bat roosting potential. The trees are to be retained. Any works to retained trees would require pre-works checks and watching briefs as required. In the unlikely event that bats are encountered during these works, works would immediately cease and a suitably qualified ecologist would provide advice. This would ensure that no harm would come to any bats that may be roosting within the tree features.

19.51 Peregrine falcon have bred on the retained silo on the adjacent North Side site. To avoid disturbance of these birds during construction works along the northern boundary of the Site, mitigation measures will be employed at construction stage through advice from the specialist ecologists currently monitoring the peregrine breeding at the adjacent site. A permanent nesting box / ledge is to be installed as part of the renovation work on the retained silo, ensuring a long-term nesting opportunity for peregrine falcons in the area, associated with the adjacent site.

19.52 Other mammals and nesting birds within the Site will be safeguarded during clearance and construction works through the implementation of standard avoidance and mitigation measures. Long-term, opportunities for these groups, including hedgehog, will be maintained and enhanced at the Site through the provision of suitable habitat and sheltering / nesting opportunities such as hedgehog domes and bird boxes.

19.53 A small population of slow-worm has previously been translocated out of the northern site. The Site offers limited potential for reptiles in its current state. As a precaution ecological supervision will be implemented during site clearance works as required.

19.54 The majority of existing trees forming the western boundary of the Site are to be retained as part of the proposals. Invasive plants at the Site will be eradicated as part of the Proposed Development. These areas, and other locations within the Site will be supplemented with new tree planting, including native trees and shrubs of local provenance and known value to wildlife.

19.55 The ecological value of the Site would be improved as a result of habitat creation and ecological enhancement measures including tree and shrub planting, provision of bird and bat nesting and roosting opportunities, provision of hedgehog sheltering opportunities and the creation of new habitat types such as green roof features.

Water Quality, Hydrology and Flood Risk

19.56 From reviewing the baseline conditions within and surrounding the Site, groundwater and foul drainage and mains water supply are considered to be the key receptors in terms of the Proposed Development. For groundwater, this is due to the Site being situated on a Principal Aquifer and within an SPZ Zone 3. For foul drainage and mains water supply, the high sensitivity classification is due to the local drainage infrastructure not having the capacity for the Proposed Development without mitigation and consultation with Thames Water is ongoing. Surface water is considered to be medium sensitivity as the Site is located within the 'Mimram' catchment which has a 'Moderate' ecological status. Flood risk and drainage are considered to be low sensitivity receptors as the Site is located in Flood Zone 1 and is not in a critical drainage area.

19.57 The key effect during the construction phase is the potential for the remobilisation of contaminants at the Site. However, with suitable mitigation measures, the residual effect is considered to be Negligible.

19.58 Water demand and foul demand are considered to be the key potential effects during the operational phase of the Proposed Development. However, with suitable mitigation measures put in place, the residual effects are considered to be Minor Adverse for water demand and foul demand.

19.59 The Proposed Development will include Sustainable Drainage Systems (SuDS), as detailed within the Flood Risk Assessment and Drainage Strategy report. The system seeks to reduce the rate of surface water runoff in accordance with local policy. This runoff rate would be lower than the current natural rate of surface water runoff during extreme events.

19.60 In conclusion, given the location and nature of the receptors, the overall environmental effect of the Proposed Development in relation to water resources and flood risk following mitigation measures is considered to be Negligible to Minor Adverse. All residual effects are Negligible with the exception of surface water drainage (Minor Beneficial) and water/foul demand (Minor Adverse).

Soils, Geology and Contaminated Land

19.61 An assessment of ground conditions and contamination has been undertaken using the findings of a desk based study and various intrusive site investigations undertaken at the Site over many years.

19.62 An assessment of the potential impacts during the construction phase has been carried out. This has shown that during this phase of the Proposed Development, land contamination is unlikely to worsen during site activities. Through good site practice and the implementation of suitable mitigation measures such as Personal Protective Equipment (PPE) and implementing techniques as part of the Construction Environmental Management Plan (CEMP), any potential temporary impact may be effectively mitigated, and the resultant impacts are neutral.

19.63 The various phases of site investigation identified significant contamination of the groundwater underlying the Site and localised soil contamination around the former Polycell Factory (now demolished). Remediation measures (multiple phases) have been implemented to address this former source of contamination and groundwater testing has established that levels of contamination have significantly decreased within as a result. Widespread, or significant contamination has not been identified elsewhere within the Site.

19.64 The residual impact of the Proposed Development on land contamination is negligible/neutral during both the construction and operational phases.

Cultural Heritage

19.65 The likely effects of the Proposed Development on built heritage have been assessed. The assessment has been carried out in accordance with the legislation, policy and guidance provided at a national and local level.

19.66 The Site is directly south of the former Shredded Wheat Factory, which is Grade II listed. It was used for industrial use in the late 1960s and in the early 2000s it still had a relatively intensive footprint with large scale blocks and medium density industrial buildings prevalent. The Site and the land to its north and south have now been cleared for development.

19.67 The significance of the Grade II listed former Shredded Wheat Factory and the contribution of its setting to this significance has been assessed. The proposed building layout and landscaping ensures that visual links to the former Shredded Wheat Factory are maintained. The Proposed Development would better reveal the significance of the heritage asset and enhance its immediate setting. There would be a minor further reduction in visibility of the silos compared to the 'extant consented scheme' in some of the long distance views from Hatfield House and Hatfield House Park. However, this change would not harm the significance of the silos as there is no significant historical architectural link between these two heritage assets.

The assessments also conclude that the change in the setting of the Grade II listed Roche Factory Building, south of the site, would have no effect on the significance of the heritage asset.

19.68 The effect of the Proposed Development on the setting of the Welwyn Garden City Conservation Area from two important viewpoints (views 7 and 8) has been assessed. In both views the Proposed Development would add to the existing development that forms the skyline without causing harm to the setting or significance of the conservation area, since this existing skyline is neither formed of contributing buildings or the visibility of the Proposed Development would be slight as to not be significant. Owing to the distance from the Site to the Peartree Conservation Area, the Proposed Development would have no effect on its setting or its character and appearance. Distant views of the Proposed Development would be glimpsed from the public footpath, to the north-west and outside the Essendon Historic Core Conservation Area. The visibility of the proposals would be limited to the rear gardens of private properties that fall within the conservation area. There would, therefore, be no effect on the conservation area's significance.

19.69 The effects of the Proposed Development on the setting of the Grade I listed Hatfield House and Grade I registered Hatfield House Park has been assessed alongside key AVRs that accompany the application. The Proposed Development serves to reduce the distracting effect of the white painted listed silos in views from the southern approach of the Grade I listed Hatfield House, leading to an enhancement of the setting. It provides a greater level of visible built form in the view, which is of a subdued nature as a result of the choice of materials. This would lead to a very low level of 'less than substantial harm' to the significance of the Grade I listed House. With regard to the effects on the setting of the Grade I registered Hatfield House Park, the assessment concludes that the Proposed Development would be a new form of development that would be predominantly contained within the urban landscape of Welwyn Garden City. There would be no effect on the significance of the registered park.

19.70 The outcome of the assessments indicates that two significant effects in ES terms were recorded. They relate to the enhancement of the setting of the Grade II listed former Shredded Wheat Factory, which would better reveal the significance of the listed building; and to the lowest level of 'less than substantial harm' on the significance of the Grade I listed Hatfield House. The consultancy believes that, in accordance with paragraph 196 of the NPPF, the public benefits proposed with the Proposed Development, including the illustrated high quality of the proposed architecture, sensitively accounting for relevant heritage settings, outweigh the very low level of harm caused.

Socio-Economics

19.71 There are no published standards or technical guidelines that set out a preferred methodology for assessing the likely socio-economic effects of a development. A series of commonly used methodologies to quantify economic effects both during the construction of a development have therefore been adopted for the socio-economic assessment. Other qualitative techniques are also frequently adopted to assess the social effects of a development.

19.72 The baseline socio-economic conditions have been established through the interpretation of national, recognised research and survey information.

19.73 The socio-economic assessment has identified that 245 FTE jobs would be generated by the Proposed Development during the seven year construction phase. These jobs include those directly created by the Proposed Development at the Site and those created along the supply chain through the provision of goods and services to the construction process.

19.74 The provision of 721 residential dwellings would positively contribute to the housing targets within Welwyn Hatfield. Future residents are also predicted to increase household spending in the local economy by £11.0 million.

19.75 The assessment has shown that the Proposed Development will have a negligible impact on hospitals and dentists and a potential adverse impact on GP services. A Healthcare Contribution will be provided to mitigate the increased demand on local GP services. Increased children due to the Proposed Development are predicted to have a moderate adverse impact on childcare provision, a negligible impact on local primary schools and a moderate adverse impact on secondary schools. However, mitigation will be provided in the form of Primary Education, Secondary Education and Childcare Contributions.

19.76 The Proposed Development will provide a variety of open space areas including play areas resulting in a beneficial impact for future and neighbouring residents. To mitigate against increased demand for existing youth services and libraries, Youth Contributions and Library Contributions will be provided.

19.77 Potential adverse cumulative effects were identified for GP services, secondary education, childcare, libraries and youth services.

19.78 In summary, Socio-economic impacts on future and local residents due to the Proposed Development will be mostly beneficial or negligible. After incorporation of appropriate mitigation measures, no adverse impacts are predicted.

Climate Change

19.79 A Climate Change assessment has been undertaken which includes:

- An assessment of the likely significant impacts of climate change on the resilience of the Proposed Development during operation; and
- An assessment of the likely significant impacts of the Proposed Development on the environment with regard to climate change through the direct and indirect release of greenhouse gas (GHG) emissions during construction and operation.

19.80 During the operational phase, this assessment has identified potential adverse impacts due to overheating flooding, water shortages and soft landscaping failures based on climate change projections for the 2030s, 2060s and 2090s. The Proposed Development design will incorporate appropriate adaptation measures to reduce the climate change risks of flooding, water shortages, landscaping failures and overheating. This will include measures to reduce overheating in homes and buildings as part of the Energy Strategy and the implementation of a Landscape Management Plan to ensure planting remains resilient to climate change.

19.81 Despite these adaptation measures, due to the presence of scientific unknowns within the climate system, residual effects cannot be defined. However, whilst the detail of the residual impacts following adaptation cannot be stated, the adaptation measures identified are considered best practice in order to minimise the residual impact of climate change risks on the Proposed Development.

19.82 In addition, the Proposed Development will incorporate a variety of measures to reduce greenhouse gas emissions during the construction and operational phases of the Proposed Development including:

- Implementation of a Site Waste Management Plan, Travel Plan and Construction Logistics Plan during construction;
- Selection of sustainable materials;
- Minimising operational transport emissions through the Travel Plan, Car Club and provision of secure cycle storage; and

- The implementation of a variety of measures to minimise operational energy emissions including a fabric first approach.

19.83 Following the mitigation embedded into the design, construction and operation of the Proposed Development, the residual GHG impacts are considered to be as follows:

- Negligible to Minor Adverse for construction embodied carbon;
- Minor Adverse for operational transport; and
- Minor Adverse for operational energy.

19.84 These residual impacts are based on current GHG emissions factors and therefore operational emissions are likely to reduce during the lifespan of the Proposed Development due to the increased uptake of electric vehicles and decarbonisation of electricity.

19.85 The mitigation and adaptation measures are considered to be appropriate in accordance with best practice, the NPPF and the Welwyn Hatfield Borough Council Local Plan.

Waste

19.86 The potential for the generation of waste is an aspect of any activity. In relation to the Proposed Development waste will be generated during the site demolition and clearance phase (which has been completed), during the construction phase and during the operational phase.

19.87 An assessment of the potential impacts during the construction phase has been carried out using available guidance. Through good site practice and the implementation of suitable mitigation measures such as a Construction Environmental Management Plan (CEMP), Resource Management Plan (RMP) and a Site Waste Management Plan (SWMP), any potential temporary impacts may be effectively mitigated, and the resultant impacts are negligible.

19.88 The Principal Contractor (currently working on Phase One) works to a target of 99% diversion from landfill and at present is delivering over 99.5%. Waste management is a key construction metric that is subject to regular review. Continuous improvement is inherent within their systems. As of January 2021, the Principal Contractor for Phase Two and Phase Three (this application) has not been appointed. It is anticipated that the Phase Two and Phase Three landfill diversion targets, recycling/recovery targets, KPIs and management processes will be to an equivalent standard as implemented during Phase One.

19.89 Residential tenants will have their waste collected as part of the Local Authority's municipal waste collection services and thus will be obliged to comply with the Local Authority's waste collection requirements.

19.90 The residual impact of the Proposed Development is negligible/neutral during both the construction and operational phases.