Appendix 2.4

CLIMATE CHANGE MITIGATION AND ADAPTATION ASSESSMENT

CLIMATE CHANGE MITIGATION AND ADAPTATION ASSESSMENT

Fort Halstead, Sevenoaks

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CBRE

1.0 Introduction

1.1 This technical note details the findings of a climate change assessment that has been undertaken for a proposed development at Fort Halstead, Sevenoaks (hereafter referred to as the 'proposed development').

1.2 This report is separated into two different sections covering different aspects of the Environmental Impact Assessment Directive (2014/52/EU)[1], as transposed into the Town and Country Planning (Environmental Impact Assessment) Regulations 2017 (as amended)[2], and supporting guidance published by the Institute of Environmental Management and Assessment (IEMA)[3,4], as relevant to the outline nature of this planning application:

- **Climate Change Mitigation Assessment, including Greenhouse Gas Impact Assessment**: the potential effects of the proposed development on climate (for example, greenhouse gas emissions as a result of from the proposed development), including the level to which it may affect the ability of the UK Government to meet its carbon reduction plan targets; and
- **Climate Change Adaptation Assessment, including in-combination and Climate Change Resilience Assessment**: the combination of the possible effects of climate and the proposed development on the surrounding environment and the resilience of the proposed development to the changing climate.

1.3 The remainder of this report is structured as follows:

- Chapter 2: Legislation and Planning Policy Context;
- Chapter 3: Greenhouse Gas Impact Assessment;
- Chapter 4: Climate Change Adaptation Assessment; and
- Chapter 5: Summary and Conclusions.

[1] Environmental Impact Assessment Directive (2014/52/EU)

[2] Town and Country Planning (Environmental Impact Assessment) Regulations 2017

[3] Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance. IEMA (2017)

[4] Institute of Environmental Management and Assessment (IEMA) (2015); IEMA Environmental Impact Assessment Guide to Climate Change Resilience and Adaptation.

2.0 Legislation and Planning Policy Context

NATIONAL LEGISLATION

Climate Change Act 2008

2.1 The Climate Change Act 2008 establishes a legally binding target to reduce the UK's Greenhouse Gas (GHG) emissions by at least 80% by 2050 from the 1990 concentrations. To help promote progress and set the UK towards a target, the Act introduced a programme of carbon budgets, including a target stating that the annual equivalent of the carbon budget by 2020 must be at least 34% lower than budgets of 1990.

2.2 The Climate Change Act 2008 also requires the government:

- to assess regularly the risks to the UK of the current and predicted impact of climate change;
- to set out its climate change adaptation objectives; and
- to set out its proposals and policies for meeting these objectives.

NATIONAL PLANNING POLICY

Revised National Planning Policy Framework

2.3 The Revised National Planning Policy Framework (NPPF) was published on February 2019 and outlines the Government's environmental, economic and social policies for England. The NPPF sets out guidance on how the planning system must support a transition towards sustainable development to help provide resilience to the impacts of climate change. As stated in Paragraph 148:

'The planning system should support the transition to a low carbon future in a changing climate…It should help to: shape places in ways that contribute to radical reductions in greenhouse gas emissions, minimise vulnerability and improve resilience; encourage the reuse of existing resources, including the conversion of existing buildings; and support renewable and low carbon energy and associated infrastructure.'

2.4 At Paragraph 150 it continues to state:

'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.'

National Planning Practice Guidance

2.5 The National Planning Practice Guidance (NPPG) was established on the 6th March 2014 and revised to include changes to the NPPF. The NPPG provides additional guidance and interpretation of the Government's strategic policies outlined within the NPPF in a web-based resource, which is updated regularly.

2.6 The NPPG outlines why it is necessary for the planning system to reflect climate change:

- *"In addition to supporting the delivery of appropriately sited green energy, effective spatial planning is an important part of a successful response to climate change as it can influence the emission of greenhouse gases.*
- *Planning can also help increase resilience to climate change impact through the location, mix and design of development".*

2.7 Alongside this, the NPPG specifies examples of how to mitigate climate change by reducing GHG emissions. For example:

- *"Reducing the need to travel and providing for sustainable transport*
- *Providing opportunities for renewable and low carbon energy technologies*
- *Providing opportunities for decentralised energy and heating*
- *Promoting low carbon design approaches to reduce energy consumption in buildings, such as passive solar design."*

2.8 In addition, the NPPG outlines examples of developments can adapt to climate change, for example:

- *"Considering future climate risks when allocating development sites to ensure risks are understood over the development's lifetime*
- *Considering the impact of and promoting design responses to flood risk and coastal change for the lifetime of the development*
- *Considering availability of water and water infrastructure for the lifetime of the development and design responses to promote water efficiency and protect water quality*
- *Promoting adaptation approaches in design policies for developments and the public realm."*

2.9 The NPPG outlines the integration of adaptation and mitigation approaches for 'win-win' solutions for sustainable development:

- by maximising summer cooling through natural ventilation in buildings and avoiding solar gain;
- through district heating networks that include tri-generation (combined cooling, heat and power); or
- through the provision of multi-functional green infrastructure, which can reduce urban heat islands, manage flooding and help species adapt to climate change – as well as contributing to a pleasant environment which encourages people to walk and cycle.

LOCAL PLANNING POLICY

Sevenoaks Draft Local Plan July 2018

2.10 The Sevenoaks Draft Local Plan July 2018 proposes the following policy requirements in relation to climate change:

Policy CC1 - Climate Change, Flooding and Water Management

Climate Change

We will contribute to reducing the causes and effects of climate change by promoting best practice in sustainable design and construction to improve the energy and water efficiency of all new development. We will support climate change mitigation and adaptation measures, including:

a. Appropriate small-scale community led renewable energy schemes;

b. Small scale renewable and low carbon technologies where appropriate;

c. Reducing the need to travel by sustainably locating new housing and supporting the level of services and facilities;

d. Promoting sustainable design measures for new developments including passive solar design;

e. Utilising opportunities for decentralised energy and heating where appropriate; and

f. Protecting existing green spaces, trees and vegetation to absorb carbon dioxide, provide summer shading, retain and create habitats and reduce surface water runoff

g. Resilient drainage design which includes a climate change allowance.

All new non-domestic development (including conversions) must achieve BREEAM "Excellent" standards. Applicants will be expected to provide certification evidence of BREEAM score and rating at the design stage and upon completion of development.

3.0 Greenhouse Gas Impact Assessment

ASSESSMENT METHODOLOGY

3.1 This assessment encompasses a project lifecycle approach that helps identify 'hot spots' of Greenhouse Gas (GHG) emissions (for example, the stage at which the highest amount of GHG emissions will be produced, including those released due to loss of carbon stocks), and helps to make sure priority areas of mitigation are identified. This approach is coherent with guidance outlined by IEMA[5].

3.2 GHG emissions have been quantified using a calculation methodology based upon the following equation:

Activity data x GHG emissions factor = GHG emissions value

3.3 To comply with 'The GHG Protocol' (Ref) when defining potential effects, the six main GHGs considered, are carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), sulphur hexafluoride (SF_6), hydrocarbons (HCFs), and perfluorocarbons (PCFs).

3.4 Due to the hybrid nature of the planning application and that the majority of the proposed development is in outline, activity data that is required to enable a consistent approach to the quantification of GHG emissions associated with construction activities is limited. While broad material types are known, material quantities and specifications are not known with sufficient certainty to allow for an accurate GHG assessment. Therefore, a full project life cycle is impracticable at this stage of the project. Thus, in line with IEMA guidelines, a qualitative discussion of the likely GHG emissions and associated effects arising from the proposed development is outlined in this document with any additional quantified data presented, where available.

3.5 The assessment considers a 'reasonable worst-case scenario' within the confines of the assumptions made and, where possible distinguishes likely GHG emissions 'hotspots' related to the proposed development, based on similar previous developments.

3.6 The following sources of information that describe the proposed development have informed this assessment:

- ES Volume II (CBRE, September 2019);
- Design & Access Statement (JTP, September 2019);
- Fort Halstead Energy Strategy (CBRE, September 2019); and
- Fort Halstead Hybrid Sustainability Statement (CBRE, September 2019).

Geographic Scope

3.7 The geographic scope for the assessment comprises the application site.

Baseline Conditions

3.8 The baseline assessment involves a 'business as usual' scenario, whereby no development goes ahead and there is no change to the amount of GHG emissions arising from the site.

[5] IEMA (2017) Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance

Sensitive Receptors

3.9 The global climate has been allocated as a receptor for the purposes of the GHG emissions impact assessment. Though to enable significance evaluation of the estimated GHG emissions arising from the proposed development, the UK GHG inventory and specifically the third UK national carbon budget were used as a substitution for the global climate. IEMA guidance does not include a standard definition for receptor sensitivity to GHG emissions. The UK carbon budget and been defined as a sensitive receptor. The rationale is as follows:

- Any further GHG impacts could affect the UK's ability to reduce its GHG emissions and therefore meet its future carbon budgets; and
- The significance of restricting global warming to below 2°C this century, as broadly declared by the climate science community.

Significance of Effects

3.10 For the purposes of this assessment, it is considered that any rise in GHG emissions compared to the baseline has the potential to be significant because of the high sensitivity of the receptor (global climate) to increases in GHG emissions. It is believed appropriate to define further categories or level of effects (e.g. minor, moderate & major) due to the bias of these categories in the absence of any defined industry guidance. This accords with IEMA guidance, that states that all GHG emissions have the ability to be major and that the application of the standard EIA significance criteria is not deemed to be suitable for climate change mitigation assessments.

APPLICATION SITE & BASELINE CONDITIONS

3.11 The application site, which extends to circa 75.20 hectares (ha), is centred on NGR 549741, 159317 and located approximately 4km north-east of Sevenoaks and 8km south-east of Orpington on the edge of the North Downs, within the administrative boundary of Sevenoaks District Council (SDC).

3.12 The application site is located within an area dominated by farmland and scattered villages, most notably the villages of Halstead, Knockholt and Knockholt Pound. Residential properties are also located along Crow Drive and Star Hill Road immediately to the northeast and southwest of the site, respectively. Land within the Applicant's ownership adjoins the application site, covering an additional circa 56.69ha of mainly woodland and grassland.

3.13 The main access into the application site is via Crow Drive off the A224 Polhill Road/London Road in the north-eastern part of the site. There is an additional hours restricted access to the application site off Star Hill. The A224 connects to the M25 motorway at Junction 5, which is located approximately 700m south of the site, although as the M25 motorway continues to the east of the application site in parallel with the A224, the M25 extends within 90m from the site, at the closest point. Crow Drive leads to Crow Road, which extends through the application site (unclassified road) to Star Hill Road (C road classification) to the south-west of the site.

3.14 The application site is currently occupied in large part by the Defence Science and Technology Laboratory (DSTL) and in part by QinetiQ, a specialist defence company, which provides scientific and technical research services to the Ministry of Defence (MoD). Due to the current consolidation and relocation of DSTL, the majority of the application site will be

vacant thereafter and available for redevelopment. Although QinetiQ intend to remain on the application site subject to the improvement of its premises as part of the redevelopment.

3.15 The GHG emissions associated with the current site activities are related primarily to the operations of DSTL and QuentiQ on site. Specific activity is not available to enable these emissions to be measured. Although it is considered that traffic generation and energy use are the current primary sources of GHG emissions at the site.

NATURE OF THE PROPOSALS

3.16 The following sections describe the various elements of the scheme that are relevant to the assessment of its environmental effects. Further detail is provided in the Planning Statement and Design & Access Statement, which both accompany the planning application.

3.17 The proposals are for a mixed-use development. The full description of development as it appears on the hybrid planning application is as follows:

In detail:

- Demolition of existing buildings;
- Change of use and works to buildings Q13 and Q14 (including landscaping and public realm);
- Primary and secondary accesses.

In outline:

- Development of business space (use classes B1a/b/c) of up to 27,659 sq m GEA;
- Works within the 'X' enclave relating to energetic testing operations, including fencing, access, car parking;
- Development of up to 750 residential dwellings;
- Development of a mixed-use village centre (use classes A1/A3/A4/A5/B1a/D1/D2);
- Development of a one form entry primary school;
- Change of use of Fort Area and bunkers to Historic Interpretation Centre (use class D1) with workshop space;
- Roads, pedestrian and cycle routes, public transport infrastructure, car parking, utilities infrastructure, drainage;
- Landscaping, landforming and ecological mitigation works.

POTENTIAL EFFECTS

Construction Phase Effects

3.18 The main activities and GHG emission sources recognised during the construction phase are set out in the Table 3.1 below.

Table 3.1

Primary GHG Emission Sources from Key Activities during the Construction Phase

ACTIVITY	PRIMARY EMISSION SOURCES
Enabling and Demolition Works	
■ On site construction activity ■ On site demolition (including remediation) ■ Transport of construction materials (where these are not included in embodied GHG emissions; and ■ Transport of workers and vehicle movements on-site.	■ GHG emissions from plant and vehicles
■ Disposal and transportation of waste	■ GHG emissions from disposal and transportation of waste
■ Welfare provisions for workers	■ GHG emissions from energy use
Construction Works	
■ On site construction activity (including earthworks) ■ Transport of construction workers and vehicles movements on site ■ Transportation of construction materials (where these are not included in embodied GHG emissions)	■ GHG emissions from plant and vehicles
■ Raw material extraction and manufacturing of materials required to build the proposed development	■ Embodied GHG emissions
■ Welfare provisions for workers	■ GHG emissions from energy use
■ Removal and transport of waste generated	■ GHG emissions from disposal and transportation of waste

3.19 On the basis of industry experience of the various GHG sources identified above, the most significant emissions sources arising from the proposed development during the construction phase are likely to include embodied carbon associated with materials used on-site during construction. Materials such as concrete and steel can have high embodied carbon contents depending on the specifications used.

3.20 Secondary hotspots of GHG emissions during construction are considered to comprise:

- Construction and demolition activity due to the volume of fuel that will be used in vehicles and plant (for instance in the creation of the substructure); and
- Transport and disposal of site clearance and demolition waste (i.e. removal of existing buildings and infrastructure such as services and roads etc.).

3.21 While the transport and disposal of construction waste is unlikely to be a significant hotspot in the GHG emissions assessment, due to the high potential to recycle construction and demolition waste, the generation of waste is inherently linked to GHG emissions in terms of raw material production and transport to the site before it becomes waste.

3.22 While unlikely to be a significant hotspot, the transport of materials will result in GHG emissions, particularly when not sourced locally. Use of plant on site, particularly where energy-efficient types are not specified and where good practice is not followed, can also contribute to higher GHG emissions.

3.23 As explained in the methodology section above, it has not been considered appropriate to quantify the overall amount of GHG emissions associated with the construction of the proposed development, as any quantitative data associated with the outline component of the proposed development would be an initial estimate only, with further detail to be developed at subsequent design stages. Overall, the construction of the proposed development, would result in a net increase in GHG emissions compared to the current baseline conditions. As discussed above, IEMA guidance states that any increase in GHG emissions has the potential to be significant. Measures incorporated within the design and environmental management to minimise GHG emissions during the construction of the proposed development are summarised later in this chapter of the report.

Operational Phase Effects

3.24 The key activities and GHG emission sources identified during the operation phase are outlined in Table 3.2 below.

Table 3.2

Primary GHG Emission Sources from Key Activities during Operation

ACTIVITY	PRIMARY EMISSIONS SOURCES
■ Energy consumption	■ GHG emissions from energy use
■ Vehicle journeys generated by the operational uses	■ GHG emissions from vehicle use
■ Maintenance of buildings and wider site	■ Embodied emissions associated with replacement materials and any maintenance equipment
■ Enhanced landscaping, including new tree planting	■ Addition of carbon sinks

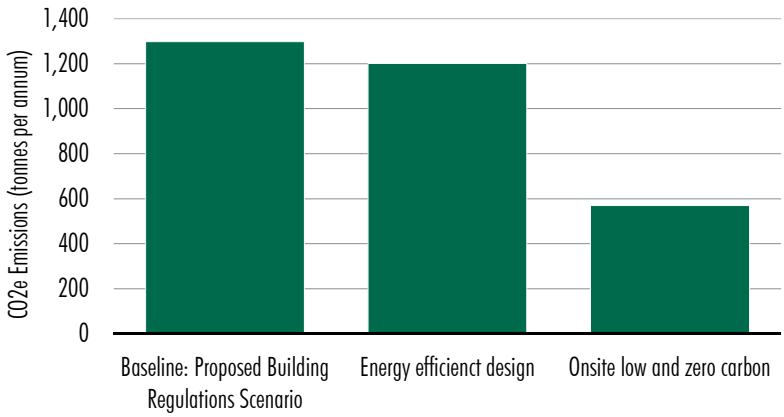
3.25 Of the GHG sources identified above, the most significant emissions sources arising from the proposed development during the operational phase are likely to be GHG emissions from vehicle journeys generated by the operational uses, such as the residential units and the primary school, and the energy use of the operational development.

3.26 The Energy Strategy (which is submitted in support of the planning application) presents the predicted CO_2 emissions associated with the energy use of the operational development, in terms of the basic design (i.e. proposed building regulations compliant scenario), as well as with various energy efficiency and low carbon measures that have been applied. The proposed energy efficiency and low carbon measures proposed are as follows:

- It is proposed that the buildings will be designed with high levels of energy efficiency. This is likely to include low fabric and window U-values, low air leakage and thermal bridging. These specifications will ensure that the development achieves a 7% improvement over the proposed building regulations scenario, using the methodology detailed within SAP10.
- Air Source Heat Pumps and 1,120 sq.m. of solar PV, equating to a 160kWp solar PV system is specified, achieving a 49% improvement over the proposed building regulations scenario.

3.27 Cumulatively, the energy strategy specifications achieve a 56% reduction over the proposed building regulations scenario. The savings against the proposed building regulations compliant scenario CO_2 emissions are illustrated in Figure 3.1.

Figure 3.1
Development Carbon Emissions



3.28 Please note that the carbon emissions for the operational development, the anticipated carbon savings and the amount of solar PV required to achieve the stated carbon savings, will be subject to a further review as the design progresses into the detailed design stages or at future reserved matters application stage, to ensure that they reflect the latest design proposals and reflect latest cost/viability calculations.

3.29 Works associated with the maintenance of the operational development will also GHG emissions; however, these are considered to be minimal in the context of the emissions generated by vehicle journeys and the operational energy use.

3.30 The proposed landscaping regime, including new tree planting and a range of other ecological enhancements will lead to the addition of carbon sinks on-site.

ENVIRONMENTAL DESIGN AND MANAGEMENT MEASURES

3.31 Measures and procedures that have been put in place to reduce GHG emissions are discussed in technical chapters of ES Volumre II (Chapters 6-14) and the Construction Environmental Management Plan (CEMP), the Energy Strategy and Sustainability Strategy, all of which are submitted as separate technical documents to support the planning application. The measures incorporated unto the design and management of the Proposed Development are summarised in Table 3.3 below.

Table 3
Environmental Design and Management Measures to Reduce GHG Emissions

MITIGATION MEASURE	OUTCOME
Construction Phase	
Implementation of a Construction Logistics Plan and a Construction Environmental Managemental Plan to reduce the effects of HGVs and worker vehicles throughout construction.	Reduce GHG emissions from vehicle fuel consumption

Ensure all vehicles switch off engines when stationary – no idling vehicles (via requirements set out in the Construction Environmental Management Plan (CEMP)).	Reduce GHG emissions from vehicle fuel consumption
Avoid the use of diesel or petrol-powered generators and use mains electricity or battery powered equipment where practicable (via requirements set out in the CEMP).	Reduce GHG emissions from plant fuel consumption
Machines in intermittent use will be shut down in the intervening periods between use or turned down to a minimum	Reduce GHG emissions from vehicle and plant fuel consumption
Avoid bonfires and burning of waste materials	Avoid GHG emissions from bonfires or burning of waste
A Site Waste Management Plan (SWMP) will be provided within the final CEMP in due course. Opportunities for minimising and reducing waste generation will be explored and implemented wherever possible. Measures that will be investigated will include: ■ Agreements with material suppliers to reduce the amount of packaging or to participate in a packaging take-back scheme; ■ Implementation of a 'just-in-time' material delivery system to avoid materials being stockpiled, which increases the risk of their damage and disposal as waste; ■ Attention to material quantity requirements to avoid over-ordering and generation of waste materials; ■ Re-use of materials wherever feasible (e.g. re-use of crushed concrete from demolition for the piling platform or hardstandings off site; re-use of excavated sub-soil for fill or landscaping); ■ The Government has set broad targets for the use of reclaimed aggregate, and in keeping with best practice, Contractors will be required to maximise the proportion of materials recycled; ■ Segregation of waste at source; ■ Re-use and recycling of materials off-site where re-use on-site is not practical (e.g. through use of an off-site waste segregation facility and re-sale for direct re-use or re-processing); ■ Identification and use of online reuse platforms that support reuse of materials in their highest value; and ■ Identification of overall recycling rates, reuse targets and overall landfill diversion rates.	Reduce GHG emissions arising from materials usage (embodied carbon), waste disposal and associated transport
Operational Phase	
Allocation of electric vehicle charging points	Reduce GHG emissions from vehicle fuel consumption
Implementation of a Travel Plan to reduce car vehicle trip generation and promote sustainable mode share	Reduce GHG emissions from vehicle fuel consumption

Periodic monitoring of traffic flows along Star Hill Road/Rushmore Hill is proposed to inform if the Applicant should be required to design additional traffic calming measures	Reduce GHG emissions from vehicle fuel consumption
The main public transport improvements include the diversion of the existing 431 bus service into the site and provision of a new community bus service into the site.	Reduce GHG emissions from vehicle fuel consumption
Proposed comprehensive network of high-quality pedestrian and cycle routes across the site providing convenient, accessible, safe, comfortable and attractive facilities for all users.	Reduce GHG emissions from vehicle fuel consumption
Proposed off-site enhancements, namely, new on-road cycle lanes between Polhill and Shanklands Roundabout and cycle facilities at the upgraded site access junction.	Reduce GHG emissions from vehicle fuel consumption
Sustainable models will be promoted throughout the proposed development through the apportionment of cycle storage	Reduce GHG emissions from vehicle fuel consumption
The Proposed Development will target a 56% reduction in CO_2 emissions on comparison with the basic building regulations compliant scenario, through energy efficiency procedures and designs (low fabric and window U-values, low air leakage and thermal bridging, air source heat pumps and solar PV)	Reduce GHG emissions from energy use
Suitable facilities will be allocated for domestic waste including segregated bins for recycling and refuse	Reduce GHG emissions from waste disposal
New areas of enhanced grassland, woodland buffer planting and SuDS ponds have been incorporated into the design of the proposed development. Creation and enhancement of habitats of ecological value to provide a biodiversity net gain.	Creational of additional carbon sinks

No further mitigation measures apart from these environmental design and management actions are deemed essential based on the current assessment findings.

4.0 Climate Change Adaptation Assessment

ASSESSMENT METHODOLOGY

4.1 The climate change adaption assessment studies the way in which the proposed development could possibly affect the scale of predicted climate change impacts for the surrounding environment. In the context of climate change, the scale of impacts of the proposed development and the sensitivity of receptors within the surrounding environment could be changed. In addition, the resilience of the proposed development to climate change needs to be considered.

4.2 To appreciate how the future climate may vary from existing baseline conditions, a review of readily available and relevant information sources has been carried out to establish baseline data and current understanding with regards to climate change. This is centred on the UK Climate Projections (UKCP18) predictions to comprehend the projected climate scenario in the future.

4.3 The impact of climate change on the scale of impacts from the proposed development, sensitivity of receptors and the resilience of the proposed development to climate change has been considered across the relevant technical ES chapters in ES Volume II (specifically Chapter 14: Water Resources and Flood Risk).

Geographic Scope

4.4 The study areas are defined in the relevant technical Chapters in ES Volume II (specifically Chapter 14: Water Resources and Flood Risk).

Existing Conditions and Climate Change Projections

4.5 Historic climate data obtained from the Met Office website[6] recorded by the closest meteorological station to the proposed development (East Malling) for the period 1981-2010 indicates the following:

- Average annual maximum daily temperature: 10.5°C;
- Warmest mouth on average: July (mean maximum daily temperature of 21°C);
- Coldest month on average: January (mean daily minimum temperature of 1.5°C);
- Mean annual rainfall levels: 650mm;
- Wettest month on average: October (62mm of monthly average rainfall); and
- Driest month on average: February (38mm of monthly average rainfall.

4.6 The future baseline is expected to differ from the present-day baseline described above. UK Climate Projections 2018 (UKCP18) have been developed by the UK Climate Impacts Programme (UKCIP)7 to provide projections for future climate scenarios and trends.

4.7 UKCP18 have been developed from recent advances in modelling the climate change system and the use of the new Met Office supercomputing facilities has enabled higher resolution climate projections to be produced compared with UKCP09.

4.8 A range of possible scenarios have been used by UKCP18 to inform different future emission trends. The Intergovernmental Panel on Climate Change (IPCC) proposes that current global population and urbanisation trends, slow uptake of renewable energy

[6] Met Office website. Web link: www.metoffice.gov.uk/public/weather/climate-historic

[7] UK Climate Projections website. Web link: http://ukclimateprojections.metoffice.gov.uk

sources and limited development of international climate change policy means that it is most likely that global emissions will follow the predicted high emissions scenario. Using projections from the high emissions scenario has become UK industry standard practice and therefore has been used in this assessment.

4.9 Considering the expected design life of the proposed development, the UKCP18 high emissions scenario projections for 2070 were applied to the South East region. Table 4.1 summaries the 2070 climate projections.

Table 4.1

Summary of 2070 Climate Projections

CLIMATE VARIABLE	2070 PROJECTION
Change in mean winter temperature	+3.9°C
Change in mean summer temperature	+4.9°C
Change in mean winter precipitation	+25%
Change in mean summer precipitation	+38%

However, a design life of 100 years has been addressed in Chapter 14: Water Resources and Flooding up to a year of 2130, therefore 2070 has been used a proxy year for the climate projections as outlined in Table 4.1.

Sensitive Receptors

4.10 The main impacts of climate change on the proposed development are considered to be potential impacts on flood risk from increases in river flows and rainfall intensity and potential impacts on surface water drainage systems from more intense and more frequent storms. The relevant sensitive receptors, as defined in Chapter 14, ES Volume II, are:

- Flood risk at the application site; and
- Surface water drainage at the application site.

POTENTIAL EFFECTS

4.11 The assessment of effects on flood risk and surface water drainage at the application site reported in Chapter 14, ES Volume II, has been undertaken in accordance with the latest Environment Agency climate change guidance which requires the adoption of climate change allowances on a catchment basis, and subject to the 'flood risk vulnerability' and design life of a proposed development.

4.12 The following climate change allowances have been adopted for the purposes of the assessment in accordance with the Environment Agency's guidance:

- Assessment of fluvial flood risk: + 25% ('Central' climate change allowance), + 35% ('Higher Central' climate change allowance) and + 70% ('Upper End' climate change allowance), applied to the 1 in 100 year flood event.
- Assessment of surface water flood risk: + 20% ('Central' climate change allowance) and + 40% ('Upper End' climate change allowance), applied to the 1 in 100 year storm event.
- Design of surface water drainage system: + 40% ('Upper End climate change allowance), applied to the 1 in 100 year storm event.

4.13 The site is subject to a low risk of flooding from all sources and the proposed development is not expected to notably alter the amount of impermeable surfacing across the application site during either the construction or operational phases. As such, taking into account the effects of climate change, with the inclusion of design interventions (a new surface water drainage system), the proposed development is expected to result in negligible effects on flood risk and surface water drainage at the application site during both the construction and operational phases.

ENVIRONMENT AND DESIGN MEASURES

4.14 The new surface water drainage system is discussed in the table below.

Table 4.2
Climate Change Adaptation Mitigation

PHASE	EMBEDDED MITIGATION
Operational	New surface water drainage system - The proposed SUDS based system entails the management of rainfall within the application site by routing surface water to attenuation ponds and tanks which discharge to deep borehole soakaways. The overall system has been designed to accommodate the 1 in 100 year + 40% storm event.

4.15 No further mitigation measures aside from these environmental design and management measures are considered necessary, based on the current assessment findings.

5.0 Summary and Conclusions

5.1 This technical note details the findings of a climate change assessment that has been undertaken for a proposed development at Fort Halstead, Sevenoaks. The assessment comprised:

- GHG Impact Assessment; and
- Climate Change Adaptation Assessment.

GHG IMPACT ASSESSMENT

5.2 Due to the hybrid nature of the planning application and that the majority of the proposed development is in outline, activity data that is required to enable a consistent approach to the quantification of GHG emissions associated with construction activities is limited. While broad material types are known, material quantities and specifications are not known with sufficient certainty to allow for an accurate GHG assessment. Therefore, a full project life cycle is impracticable at this stage of the project. Thus, in line with IEMA guidelines, a qualitative discussion of the likely GHG emissions and associated effects arising from the proposed development has been presented in this document with any additional quantified data also presented where available.

5.3 Of the various GHG emissions sources arising from the proposed development, the most significant sources are likely to include:

- Emissions from vehicle journeys generated by the operational uses and from the energy use of the proposed development once operational; and
- Embodied carbon associated with materials used onsite during the construction phase. Materials such as concrete and steel can have high embodied carbon contents depending on the specifications used.

5.4 Secondary GHG emissions hotspots have also been identified for a number of other sources.

5.5 According to IEMA guidance, any increase in GHG emissions could potentially be significant due to the UK Government's objective to progressively reduce GHG emissions from the current baseline.

5.6 Mitigation measures to reduce GHG emissions from the proposed development have been outlined within the technical chapters of ES Volume II and in other planning application documents, such as the Energy Strategy and the Design and Access Statement. These measures have also been summarised in this report.

CLIMATE CHANGE ADAPTATION ASSESSMENT

5.7 The climate change adaptation assessment has considered the likely ways in which the proposed development could potentially influence the magnitude of predicted climate change impacts for the surrounding environment and whether the proposed development itself is resilient to the predicted climate change.

5.8 The main impacts of climate change on the proposed development are considered to be potential impacts on flood risk from increases in river flows and rainfall intensity and potential impacts on surface water drainage systems from more intense and more frequent storms. These effects have been assessed with Chapter 14: Water Resources & Flood Risk, ES Volume II and all residual effects have been assessed as negligible.

Appendix 2.4

CLIMATE CHANGE MITIGATION AND ADAPTATION ASSESSMENT