4 Traffic and Transport

4.1 Introduction

4.1.1 This chapter assesses the likely significant traffic and transport effects resulting from the Proposed Development.

4.1.2 A Transport Assessment (TA) has been prepared to accompany this chapter and is attached at Appendix 4.1.

4.1.3 The future baseline used within this assessment differs from the other chapters due to industry requirements used to assess the impact of development traffic within the TA and is explained further in section 4.5.

4.2 Regulatory and Policy Framework

Planning Policies

<u>National Policy Statements</u>

4.2.1 National Policy Statements have been developed to guide the decision-making process for NSIPs. The NPSs define the national need for certain types of infrastructure, as well as the issues to be considered by the examining body when assessing whether a location is acceptable for the type and scale of development proposed.

4.2.2 EN-1 (DECC 2011a) sets out national policy for energy infrastructure projects defined as NSIPs under the Planning Act 2008. It is noted that this document refers to the former Infrastructure Planning Commission (IPC), whose functions are now replaced by the Planning Inspectorate's National Infrastructure Directorate. Section 1.1 of this document states that:

> *"For such applications this NPS, when combined with the relevant technology-specific energy NPS, provides the primary basis for decisions by the IPC."*

4.2.3 In relation to CHP, paragraph 4.6.3 of EN-1 states:

> *"Using less fuel to generate the same amount of heat and power reduces emissions, particularly CO2. The Government has therefore committed to promoting Good Quality CHP, which denotes CHP that has been certified as highly efficient under the CHP Quality Assurance programme."*

4.2.4 In relation to traffic and transport it states that the consideration and mitigation of transport impacts is an essential part of the Government's wider policy objectives for sustainable development.

4.2.5 It highlights that for the applicant if a project is likely to have significant transport implications, the applicant's ES should include a transport assessment. Applicants should consult the Highways Agency and Highways Authorities as appropriate on the assessment and mitigation. Where appropriate a travel plan should also be prepared and if additional transport infrastructure is proposed, applicants should discuss with network providers the possibility of co-funding by Government for any third-party benefits.

4.2.6 Where mitigation is needed, possible demand management measures must be considered and if feasible and operationally reasonable, required, before considering requirements for the provision of new inland transport infrastructure to deal with remaining transport impacts. The IPC should have regard to the cost-effectiveness of demand management measures compared to new transport infrastructure.

4.2.7 The IPC state that they may attach requirements to a consent where there is likely to be substantial HGV Traffic that:

- *"Control numbers of HGV movements to and from the site in a specified period during its construction and possibly on the routing of such movements;*
- *Make sufficient provision for HGV parking, either on the site or at dedicated facilities elsewhere, to avoid 'overspill' parking on public roads, prolonged queuing on approach roads and uncontrolled on-street HGV parking in normal operating conditions; and*
- *Ensure satisfactory arrangements for reasonably foreseeable abnormal disruption, in consultation with network providers and the responsible police force."*

4.2.8 It is noted that if an applicant suggests that the costs of meeting any obligations or requirements would make the proposal economically unviable this should not in itself justify the relaxation by the IPC of any obligations or requirements needed to secure the mitigation.

4.2.9 A further five technology-specific NPSs were published for the energy sector covering fossil fuel electricity generation (EN-2), renewable electricity generation (both onshore and offshore) (EN-3), gas supply infrastructure and gas and oil pipelines (EN-4), the electricity transmission and distribution network (EN-5), and nuclear electricity generation (EN-6).

<u>National Planning Policy Framework (NPPF)</u>

4.2.10 The National Planning Policy Framework (NPPF) was published in March 2012 and sets out national policy for delivering sustainable growth and development. The NPPF aims to make the planning system less complex and more accessible. The NPPF sets out the Government's planning policies for England and how these are expected to be applied. In terms of transport the objectives outlined in NPPF are:

"The transport system needs to be balanced in favour of sustainable transport modes, giving people a real choice about how they travel. (Paragraph 29).

Encouragement should be given to solutions which support reductions in greenhouse gas emissions and reduce congestion. In preparing Local Plans, local planning authorities should therefore support a pattern of development which, where reasonable to do so, facilitates the use of sustainable modes of transport." (Paragraph 30)

4.2.11 When determining planning applications, Paragraph 32 of the NPPF states:

"All developments that generate significant amounts of movement should be supported by a Transport Statement or Transport Assessment. Plans and decisions should take account of whether:

- *The opportunities for sustainable transport modes have been taken up depending on the nature and location of the site, to reduce the need for major transport infrastructure;*
- *Safe and suitable access to the site can be achieved for all people; and*
- *Improvements can be undertaken within the transport network that cost effectively limit the significant impacts of the development. Development should only be prevented or refused on transport grounds where the residual cumulative impacts of development are severe."*

4.2.12 Paragraph 35 of the NPPF emphasises the importance of protecting and exploiting opportunities for the use of sustainable transport modes for the movement of goods or people:

"Plans should protect and exploit opportunities for the use of sustainable transport modes for the movement of goods or people. Therefore, developments should be located and designed where practical to:

- *accommodate the efficient delivery of goods and supplies;*
- *give priority to pedestrian and cycle movements, and have access to high quality public transport facilities;*
- *create safe and secure layouts which minimise conflicts between traffic and cyclists or pedestrians, avoiding street clutter and where appropriate;*
- *establishing home zones;*
- *incorporate facilities for charging plug-in and other ultra-low emission vehicles; and*
- *consider the needs of people with disabilities by all modes of transport."*

4.2.13 Planning Practice Guidance - Travel Plans, Transport Assessments and Statements in Decision-Taking (PPG) was published in March 2014 and provides a concise report on the use and importance of Transport Assessments / Statements and Travel Plans. Regarding whether to provide a Transport Assessment, Transport Statement or no assessment, the guidance states:

> *"Local planning authorities, developers, relevant transport authorities, and neighbourhood planning organisations should agree what evaluation is needed in each instance.*

4.2.14 The guidance states that Transport Assessments / Statements and Travel Plans can positively contribute to:

- *"encouraging sustainable travel;*
- *lessening traffic generation and its detrimental impacts;*
- *reducing carbon emissions and climate impacts;*
- *creating accessible, connected, inclusive communities;*
- *improving health outcomes and quality of life;*
- *improving road safety; and*
- *reducing the need for new development to increase existing road capacity or provide new roads."*

4.2.15 The guidance states that Transport Assessments / Statements and Travel Plans should be proportionate to the size and scope of the proposed development, be tailored to particular local circumstances and be established at the earliest practicable possible stage of a development proposal.

4.2.16 The guidance continues by stating that these reports should be brought forward through collaborative ongoing working between the Local Planning Authority / Transport Authority, transport operators, Rail Network Operators, Highways Agency and other relevant bodies.

<u>Circular 02/2013: The Strategic Road Network and the Delivery of Sustainable Development</u>

4.2.17 Circular 02/2013: The Strategic Road Network and the Delivery of Sustainable Development was published by the Department for Transport in September 2013. The Circular sets out the way in which the Highways Agency (now Highways England) will engage with communities and the development industry to deliver sustainable development and economic growth whilst safeguarding the primary function and purpose of the strategic road network.

4.2.18 Circular 02/2013 replaces Circular 02/2007 and 01/2008. Circular 02/2013 states that 'the Highways Agency supports the economy through the provision of a safe and reliable strategic road network, which allows for the efficient movement of people and goods'. Similarly, to the NPPF, Circular 02/2013 states that 'development should only be prevented or refused on transport grounds where the residual cumulative impacts of development are severe.

Vision for Kent 2012 – 2022

4.2.19 This is a countywide strategy for the social, economic and environmental wellbeing of Kent's communities. It has been written around three major ambitions:

- To grow the economy, by supporting businesses to be successful including improvements to the transport network and the provision of high-speed broadband;
- Tackling disadvantage, by fostering aspiration rather than dependency including the provision of comprehensive reliable and affordable public transport services providing access to education and employment opportunities; and
- To put citizens in control, by involving people in the making decisions and working with them to design services that meet their needs and suit them.

Growth without Gridlock (2010)

4.2.20 Growth without Gridlock is the county's 20-year plan for essential transport improvements and innovative funding solutions to support the substantial growth planned: 23,000 new homes and 40,000 new jobs by 2021. The Plan calls for greater transport funding and delivery powers for local transport authorities and calls on the DfT to progress those schemes of national importance, including a third Thames Crossing, a long-term solution to Operation Stack, improvements to the M2/ A2 corridor and a scheme of foreign road user charging.

Highways Agency – Kent Corridors to M25 Route Strategy Evidence Report (2014)

4.2.21 The A2/ M2 corridor forms part of the Trans European Transport Network (TEN-T) and is one of the gateways to Europe. Traffic flows at the western end of the route as it approaches the M25 are almost 140,000 vehicles per day. In the length of the M2 between Faversham and Sittingbourne, traffic flows are approximately 20,000 vehicles per day. The volume of goods vehicles is reasonably constant between Dover and Sittingbourne at approximately 3,000 per day.

4.2.22 The A249 between the A2 and M2 carries the lightest traffic flow of the strategic road network, but has a low rate of journey time reliability. There is consistently significant delay on the M2 between junctions 6 (Faversham) and 5 (Sittingbourne).

4.2.23 Junction 5 (Sittingbourne) and 7 (Brenley Corner) of the M2 are in the top 50 worst crash sites on the strategic route network. Lengths of route in Swale with poor crash records are:

- M2 J6 to J7 coast bound,
- A249 southbound between A2 and M2
- A249 Brielle Way, Sheerness

4.2.24 The condition of the carriageway on the M2/ A2 corridor is considered to be severely degraded in both directions between J5 (Sittingbourne) and Canterbury. The majority of the A249 north of the M2 will reach the end of its design life by 2020. There are gaps in the remote monitoring of motorway incidents, CCTV and Variable message signing on the M2 between junctions 5 (Sittingbourne) and 7 (Brenley Corner).

4.2.25 Local Transport Plan for Kent 2016 - 2031

4.2.26 The preparation and submission of a Local Transport Plan (LTP) is a statutory requirement of all local transport authorities in England. An LTP sets out the authority's policies and delivery plans for managing and improving the local transport network. The government's Guidance on LTPs (July 2009) made clear that they should reflect and support Local Plans and that, in two-tier areas, county councils should work closely with districts to ensure alignment between these documents and ensure that the transport implications of development proposals are identified and mitigated at an early stage in the planning process.

4.2.27 KCC's strategic approach for Kent's fourth Local Transport Plan (LTP4), covering the period 2016 to 2031, stems from the following ambition for Kent:

> *"To deliver safe and effective transport, ensuring that all Kent's communities and businesses benefit, the environment is enhanced and economic growth is supported."*

4.2.28 This ambition will be realised through five overarching policies that are targeted at delivering specific outcomes. These outcomes are:

- *"Outcome 1: Economic growth and minimised congestion;*
- *Outcome 2: Affordable and accessible door-to-door journeys;*
- *Outcome 3: Safer travel;*
- *Outcome 4: Enhanced Environment;*
- *Outcome 5: Better health and wellbeing."*

4.2.29 Transport Priorities for Swale with relevance to the proposed site include:

- *"The A249 / Grovehurst Road junction;*
- *Extension of the Northern relief road to the A2 and then M2;*
- *A249 corridor capacity enhancements to support growth;*
- *Improvements to Key Street junction;*
- *Improvements to M2 Junction 5 – funding committed by Highways England;*
- *Improved transport connections to and from major centres of employment in the borough.*

4.2.30 The local transport plan highlights that the A249 provides a primary north, south route for Kent. Capacity issues at M2 Junction 5, where the A249 meets, is acting as a major barrier to growth in the Borough. Highways England is currently evaluating options to improve the M2 J5 and consultation with the wider public on final proposed options is proposed for early 2017.

4.2.31 It also states that a corridor study of the A249 is needed to define what improvements to the principal junctions (Grovehurst, Key Street and Bobbing) will be required to support the new allocations in the Local Plan, with the A249/Grovehurst Road Junction already identified.

Swale Borough Local Plan

4.2.32 The Swale Borough Local Plan is a key planning document for Swale, setting out the vision and overall strategy for the area and how it will be achieved for the period from 2014 to 2031. The Local Plan was adopted in July 2017.

4.2.33 The local plans overarching vision for the transformation of the borough is:

"to transform its economic, social and environmental prospects, making it one of the best places in Britain in which to live, work, learn and invest."

4.2.34 Policy DM 6 - Managing transport demand and impact - states that development proposals generating a significant amount of transport movements will be required to support their proposal with the preparation of a Transport Assessment (including a travel plan) which will be based on the councils most recent strategic modelling work. The highways Agency may also require a Transport Assessment if the development is deemed to impact on the strategic road network.

4.2.35 It also highlights that development proposals should be sustainable, avoid a new direct access onto the strategic or primary distributor route network, integrate air quality management and environmental quality, and where traffic generation leads to a decrease in safety or is in excess of capacity of the highway network, improvements will be required.

4.2.36 The new Swale Borough Local Plan sets out the strategy for the Borough, including the achievement of sustainable development (Chapter 4). The chapter also includes a key diagram which indicates broad locations for growth, protection and enhancement:

- a series of core policies that take important issues for Swale and create the necessary linkages with the policy themes, set out in national planning policy and other local plan policies (Chapter 5);
- details of allocations, the identification of regeneration areas, a neighbourhood plan and an area of search (Chapter 6);
- a framework of development management policies to guide the determination of planning applications by setting out criteria for development proposals (Chapter 7); and
- a framework for implementation and monitoring of the Local Plan. Chapter 8 sets out the issues affecting the delivery of the Local Plan, whilst a separately published Implementation Delivery Schedule details the infrastructure necessary to support the Local Plan.

The Swale Transportation Strategy 2014 – 2031 Draft, Appendix

4.2.37 The transportation strategy for Swale is a comprehensive document looking at the issues regarding transport in Swale and potential solutions to these. It does this in line with national and local policies, which are set out within the policy context. The transportation action plan is structured into four main sections, with each section supported by actions and outcomes, linked to the Borough's ambitions:

- Encouraging sustainable travel
- Improvements to transport infrastructure
- Alternative access to services
- Road Safety

4.2.38 Several key transport challenges are identified for Swale with those relevant to the site listed:

- Congestion at M2 junction 5 acts as a barrier to further development on Swale
- Capacity improvements required at A49 Key Street and Grovehurst interchanges
- Public transport tends to be inaccessible for the mobility impaired
- Traffic congestion with school / employment commuting into Sittingbourne, causing rural rat runs in the south of town, and air quality issues
- Transport interchange between cycle routes, bus services, and train services is poor, therefore encouraging the use of cars to rail stations, which add to problems with parking and congestion
- Constrained viability of new development to provide significant infrastructure contributions

4.2.39 The success of the strategy will be measured objectively against the following target indicators:

- *"Traffic volumes at specific location*
- *Number of journeys to work by car*
- *Mode share: walking cycling and bus*
- *Bus timetable reliability*
- *Number of people killed and seriously injured*
- *Vehicle emissions"*

4.2.40 Target 1 states to maintain traffic flows at key locations, in relation to the site it states that Grovehurst Road traffic flows should be maintained at 15,400 vehicles per day.

4.2.41 For employment and other non-residential development, where considered appropriate, the Borough Council will expect the submission of a Travel Plan (as part of a Transport Assessment) alongside the planning application, in accordance with the relevant County Council SPG on such matters.

4.2.42 Any provision or financial contribution sought will be secured through a planning condition or appropriate legal agreement.

4.3 Methodology

Scoping and Consultation

4.3.1 The formal scoping exercise is summarised in Chapter 3. This ES follows the advice received from Highways Officers at Kent County Council and Highways England set out within the formal scoping response.

Establishing Baseline Conditions

4.3.2 Site visits have been undertaken which identified the geometries and layout of the highway network, its local environs and the location of sensitive receptors. Traffic flow data has been obtained from the Department for Transport and Highways England and site-specific traffic surveys have been undertaken. Personal Injury Accident data has been obtained from Kent County Council to enable road safety to be analysed. Full details of these are set out in Section 2 of the Transport Assessment.

Relevant Guidance

4.3.3 As a matter of best practice, this assessment has been undertaken based on current relevant guidance for assessing the environmental effects of traffic. This is set out within The Institute of Environmental Assessment (IEA) (now the IEMA) publication 'Guidance Note Number 1: Guidelines on the Environmental Assessment of Road Traffic', 1993, the 'IEMA Guidelines' with reference to Volume 11 – Environmental Impact Assessment of the Design Manual for Roads and Bridges (DMRB).

Magnitude of Impact

4.3.4 The IEMA Guidelines recommend two rules to be considered when assessing the impact of development traffic on a road link and how far the geographical boundaries of that assessment should extend:

- Rule 1: Include highway links where traffic flows will increase by more than 30% (or the number of heavy goods vehicles will increase by more than 30%); and

- Rule 2: Include any other specifically sensitive areas where total traffic flows have increased by 10% or more.

4.3.5 The above guidance is based upon knowledge and experience of environmental effects of traffic. The 30% threshold is based upon research and experience of the environmental effects of traffic, with less than a 30% increase generally resulting in imperceptible changes in the environmental effects of traffic. At a simple level, the guidance considers that projected changes in total traffic flow of less than 10% creates no discernible environmental effect, hence the second threshold as set out in Rule 2.

4.3.6 In cases where the thresholds are exceeded, Column 3 in Table 2.1 of the IEMA guidelines set out a list of environmental effects which should be assessed for their magnitude of change: noise, vibration, visual impact, severance, driver delay, pedestrian delay, pedestrian amenity, accidents and safety, hazardous loads, air pollution and dust and dirt.

4.3.7 Definitions of each of the potential effects identified in the IEMA guidelines are summarised below along with explanatory text relating to assessment criteria to determine the magnitude of impact. It is on this basis that the assessment in this chapter has been undertaken.

4.3.8 It is acknowledged at paragraph 2.4 of the IEMA guidelines that not all the effects listed in Column 3 of Table 2.1 would be applicable to every development. A detailed inspection of the surrounding road network incorporating the current geometric layout of the road, traffic management and regulation orders and general observations of existing road user movements has been undertaken to assist with the assessments.

Noise and Vibration

4.3.9 The potential effects relating to noise and vibration as a result of construction traffic is set out in Chapter 7.

Visual Effects

4.3.10 The visual effect of traffic is complex and subjective and includes both visual obstruction and visual intrusion. The IEMA guidelines states that obstruction refers to the blocking of views, by structures for example, and intrusion refers to the more subjective impact by traffic on an area of scenic beauty or of historical or conservation interest.

4.3.11 It goes on to state that increases in the number of large or high-sided vehicles may have an intrusive impact in areas of scenic beauty and in historic or conservation areas and acknowledges that in the majority of situations the changes in traffic resulting from a development will have little effect.

4.3.12 Where relevant, the visual effects of traffic are considered within this chapter and the magnitude of impact identified using professional judgement and the advice provided in the IEMA Guidelines. The visual effects of the scheme as a whole are considered in Chapter 11.

Severance

4.3.13 Severance is the perceived division that can occur within a community when it becomes separated by a major traffic artery. The term is used to describe a complex series of factors that separate people from places and other people. Severance can also result from difficulty in crossing a heavily trafficked road (IEMA, March 1993).

4.3.14 The guidance indicates that severance effects are considered 'slight', 'moderate' and 'substantial' with changes in traffic flows of 30%, 60% and 90% respectively.

4.3.15 Where relevant, effects on severance are considered within this chapter.

Driver Delay

4.3.16 Where roads affected by development are at or near capacity, the traffic associated with such development can cause or add to vehicle delays. Some roads are typically at or near capacity during the weekday AM (08:00 to 09:00) and PM (17:00 to 18:00) peak hours. Other sources of delay for non-development traffic can include:

- at the proposed site access where there will be additional turning movements;
- on the roads passing the site where there is likely to be additional traffic;
- at other key intersections along the road which might be affected by increased traffic; and
- at junctions where the ability to find gaps in the traffic may be reduced, thereby lengthening delays.

4.3.17 Where relevant, the effects on driver delay are considered within this chapter and the magnitude of impact identified using professional judgement and the advice provided in the above guidance document.

Pedestrian Delay

4.3.18 Highly trafficked roads and changes to the volume or speed of traffic may affect the ability of people to cross roads. Studies have shown that pedestrian delay is perceptible or considered significant beyond a lower delay threshold of 10 seconds, for a link with no crossing facilities. A 10 second pedestrian delay in crossing a road broadly equates to a two-way link flow of approximately 1,400 vehicles per hour (IEMA, March 1993).

4.3.19 Where relevant, the effects on pedestrian delay are considered within this chapter and the magnitude of impact identified using professional judgement and the advice provided in the above guidance document.

Pedestrian Amenity

4.3.20 The term pedestrian amenity is broadly defined as the relative pleasantness of a journey. It is considered to be affected by traffic flow, speed and composition as well as footway width and the separation/protection from traffic.

4.3.21 It encompasses the overall relationship between pedestrians and traffic, including fear and intimidation which is the most emotive and difficult effect to quantify and assess. There are no commonly agreed thresholds for quantifying the significance of changes in pedestrian amenity, although the IEMA guidelines refer to a useful study which could be referenced when considering any effect. These thresholds are replicated in Table 4.1.

Degree of Hazard	Average Traffic Flow over 18-hour day (veh/hour)	Total 18-hour heavy goods vehicle flow	Average Speed over 18-hour day (mile/hour)
Extreme	1,800 +	3,000 +	20 +
Great	1,200–1,800	2,000–3,000	15-20
Moderate	600–1,200	1,000–2,000	10-15

Table 4.1: Example of Fear and Intimidation

4.3.22 Where relevant, the effects on pedestrian amenity are considered within this chapter and the magnitude of impact identified using the above example of fear and intimidation.

Accidents and Safety

4.3.23 It is possible to estimate the effects of increased traffic on accidents and safety from existing accident records, national statistics, the type and quantity of traffic generated, journey lengths and the characteristics of the routes in question.

4.3.24 Where relevant, the effects on accidents and safety are considered within this chapter and the magnitude of impact identified using professional judgement and the advice provided in the above guidance document.

Hazardous Loads

4.3.25 Some developments may involve transporting hazardous loads by road such as special wastes, toxic materials and chemicals. Where appropriate, the risks associated with accidents on such movements are identified or quantified within this chapter and the magnitude of impact identified using professional judgement and the advice provided in the above guidance document.

Dust and Dirt

4.3.26 Certain types of development, particularly construction sites, can give rise to deposition of dust and dirt on surrounding roads. The overall impact of this phenomenon normally depends to a large extent on the management practices adopted at the site in question, such as vehicle sheeting and wheel washing.

4.3.27 Problems with dust and dirt are unlikely to occur at distances greater than 50m from the road (IEMA, March 1993).

4.3.28 Where relevant, the effects relating to dust and dirt are considered within this chapter and the magnitude of impact identified using professional judgement and the advice provided in the above guidance document.

Sensitive Receptors

4.3.29 Paragraph 2.5 of the IEMA Guidelines explains that locations which may be sensitive to changes in traffic conditions could be:

- people at home;
- people in work places;
- sensitive groups such as children, the elderly or the disabled;
- sensitive locations such as hospitals, churches, schools or historical buildings;
- people walking or cycling;
- open spaces;
- recreational sites;

- shopping areas;
- sites of ecological/nature conservation value; and
- sites of tourist/visitor attraction.

4.3.30 As a general guide, the determination of receptor sensitivity is based on the criteria of value, adaptability and tolerance. In terms of transport, receptors include people that are living in and using facilities, and using transport networks, in the area.

4.3.31 Given that all persons are deemed to be of equal value, sensitivity to changes in transport conditions is generally focussed on vulnerable user groups who are less able to tolerate, adapt to or recover from changes. Table 4.2 summarises the broad criteria for identifying receptor sensitivity as based on the IEMA Guidelines..

Sensitivity	Typical Descriptors
High	Receptors of greatest sensitivity to traffic flows: schools, colleges, playgrounds, accident black spots (with reference to accident data), retirement homes, urban/residential roads without footways that are used by pedestrians
Medium	Traffic flow sensitive receptors including: congested junctions, doctors' surgeries, hospitals, shopping areas with roadside frontage, roads with narrow footways, unsegregated cycleways, community centres, parks, recreation facilities
Low	Receptors with some sensitivity to traffic flow: places of worship, public open space, nature conservation areas, listed buildings, tourist attractions and residential areas with adequate footway provision
Negligible	Receptors with low sensitivity to traffic flows and those sufficiently distant from affected roads and junctions

Table 4.2: Definitions of Sensitivity or Value

4.3.32 Highway links with descriptions of high or medium sensitivity will be considered against the Rule 2 threshold described above. Other links with descriptions of low or negligible sensitivity will be considered against the Rule 1 threshold. Where necessary, professional judgement has been applied in identifying the relevant category for each link.

4.3.33 Receptors to be considered within the impact assessment were selected based upon the access route to be taken by the construction route vehicles generated by K4 will use i.e. Barge Way, Swale Way, A249.

Significance Criteria

4.3.34 The approach to the assessment of significance of effects is summarised in Table 4.3 and Table 4.4 below, adapted from the Design Manual for Roads and Bridges (DMRB) HA 205/08. This considers the duration, magnitude, direction and location of each effect as well as the sensitivity of the receptor. Where any of the above potential effects define any specific criteria to determine effects, these will be assessed to establish the significance.

Magnitude	Typical Descriptors
High	Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements (Adverse). Large scale or major improvement of resource quality; extensive restoration or enhancement; major improvement of attribute quality (Beneficial).
Medium	Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements (Adverse). Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality (Beneficial).
Low	Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements (Adverse). Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring (Beneficial).
Negligible	Very minor loss or detrimental alteration to one or more characteristics, features or elements (Adverse). Very minor benefit to or positive addition of one or more characteristics, features or elements (Beneficial).
No change	No loss or alteration of characteristics, features or elements; no observable impact in either direction.

Table 4.3: Definitions of Magnitude

Sensitivity	Magnitude of Impact			
	Negligible	Low	Medium	High
Negligible	Negligible	Negligible or slight	Negligible or slight	Slight
Low	Negligible or slight	Negligible or slight	Slight	Slight or moderate
Medium	Negligible or slight	Slight	Moderate	Moderate or Substantial
High	Slight	Slight or moderate	Moderate or substantial	Substantial

Table 4.4: Assessment Matrix

4.3.35 The broad definitions of the terms used to determine significance criteria are as follows:

- Substantial: These beneficial or adverse effects are considered to be very important considerations and are likely to be material in the decision-making process;
- Moderate: These beneficial or adverse effects may be important, but are not likely to be key decision-making factors. The cumulative effects of such factors may influence decision-making if they lead to an increase in the overall adverse effect on a resource or receptor;
- Slight: These beneficial or adverse effects may be raised as local factors. They are unlikely to be critical in the decision-making process, but are important in enhancing the subsequent design of the project; and
- Negligible: No effects or those that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.

4.3.36 Effects described as moderate or above are considered to be significant.

4.3.37 In accordance with the above IEMA guidelines, the assessment is based upon the relative change between the baseline conditions and the baseline plus construction / development / decommissioning conditions. The effect along key highway links of the adjacent highway network where any K4 related traffic is predicted to route along and could result in an environmental effect will be assessed.

4.4 Baseline Conditions

Site Access

4.4.1 The construction of K4 will utilise the existing accesses to the Mill; from the A249 via Swale Way (western entrance) or from Swale Way onto Barge Way (northern entrance) as shown on Figure 4.1.

4.4.2 The western access provides access to the car park and to the weighbridges for HGV access. The northern access provides access to the Trailer Park and to K3, which is currently under construction and is located to the south east of the Mill.

Highway Network

4.4.3 From the north, as shown on Figure 4.1, the private access road forms the southern arm of a three-arm roundabout with Barge Way. The roundabout has been constructed to have four-arms, however, the north-western arm is incomplete and only the kerbs forming its entry and exit are constructed to enable later access to the north-west.

4.4.4 Barge Way is a 7.3m wide single carriageway road with a 3.0m wide combined footway / cycleway along its northern side. It has street lighting, a 40mph speed restriction and no parking restrictions. To the north, Barge Way accesses Ridham Docks and to the west it forms the eastern arm of a four-arm roundabout with Fleet End, which provides access to a Morrison's distribution centre. Barge Way continues south to form the northern arm of a three-arm roundabout with Swale Way.

4.4.5 Swale Way forms part of the Sittingbourne Northern Perimeter Road, linking the A249 to the Eurolink Industrial Estate with a number of junctions along it providing access to the surrounding residential and industrial areas of Sittingbourne.

4.4.6 Staff associated with the Mill route from Swale Way via Ridham Avenue. A large staff car park located in the south-west corner of the Mill provides parking for all staff onsite.

4.4.7 Swale Way is a 7.3m wide single carriageway road with street lighting, 40mph speed restriction and no parking restrictions. There is a 3.0m wide combined footway / cycleway along its southern side between Barge Way and the A249 and along its south-western side between Barge Way and the Eurolink Industrial Estate.

4.4.8 At its western end, Swale Way forms a grade separated dumbbell roundabout with the A249 and the B2005 Grovehurst Road. The eastern roundabout is a five-arm roundabout connecting Swale Way, the B2005 Grovehurst Road, the A249 on-slip road, the A249 off-slip road and the A249 over-bridge.

4.4.9 The western roundabout is a four-arm roundabout connecting Grovehurst Road, the A249 on-slip road, the A249 off-slip road and the A249 over-bridge.

4.4.10 The A249 is a dual carriageway road and forms part of the trunk road network. It routes broadly north to south between the Isle of Sheppey and the County town of Maidstone respectively. It forms grade separated junctions with the B2006, A2, M2 and M20 and provides access to London, M25 and the remainder of the strategic highway network.

Pedestrian Routes

4.4.11 There are combined footway / cycleways along the northern side of Barge Way and along the southern and south-western sides of Swale Way. These link to the residential streets in the immediate vicinity of Swale Way, which in turn provide access to the wider residential areas of Sittingbourne. These residential streets generally have footways on both sides of the carriageway; therefore, a good network of footways allows pedestrians to route between the site and the surrounding residential areas.

4.4.12 The Saxon Shore Way is a long-distance footpath which follows the shore of the Swale to the east of the Mill. The footpath continues north towards Chertney Marshes and further to Gillingham. To the south it links into Sittingbourne and continues east towards Faversham. The route is not lit and is not generally surfaced.

Cyclist Routes

4.4.13 The site is within close proximity to on and off-road cycle routes which link to the wider Kemsley and Sittingbourne area. The National Cycle Network Route 1 is a long-distance cycle route connecting Dover and the Shetland Islands, passing along the B2005 Grovehurst Road between Sittingbourne and Kemsley. National Cycle Network Route 174 routes on Sheppey Way linking Route 1 to the Isle of Sheppey.

4.4.14 The combined footway / cycleways along Barge Way and Swale Way to provide a range of cycle routes to surrounding areas, linking to Routes 1 and 174 of the National Cycle Network.

Public Transport

4.4.15 A summary of the bus services in the vicinity of the site is summarised in Table 4.5.

4.4.16 The closest bus stops are located on Ridham Avenue, approximately 1km west of the site, and are served by bus service number 347 which provides a direct link to Sittingbourne town centre. The journey time from Kemsley to Sittingbourne is approximately 20 minutes and the service operates 4 buses per hour throughout the day and 3 buses per hour on a Saturday.

4.4.17 Additional bus stops are located on Grovehurst Road approximately 2km west of the site. These bus stops are served by service numbers 324, 326, 339, and 341.

No.	Operator	Route	Service Frequencies (per hour)				
			Monday - Friday				Saturday
			AM Peak	Off Peak	PM Peak	Evening	
347	Arriva	Kemsley-Sittingbourne	4	4	4	4	3
324	Chalkwell Coaches	Sheerness – Iwade-Kemsley- Milton Regis – Sittingbourne – Faversham - Canterbury	1 service per day Monday, Wednesday and Friday each way				0
326	Chalkwell Coaches	Sheerness - Sittingbourne – Chatham	1 services per day each way				
339	Chalkwell Coaches	Sheerness – Iwade – Sittingbourne – Hempstead valley	1 service per Tuesday and Thursday each way				0

Table 4.5: Summary of Local Bus Services

4.4.18 Kemsley Railway Station is located approximately 2km west of the site on Grovehurst Road. Southeastern Trains operate all services from Kemsley Railway Station.

4.4.19 Kemsley Railway Station has some direct services to London Victoria with a service frequency of two trains during the weekday morning with a journey time of approximately one hour and twenty-five minutes. Additional half-hourly services are available to London Victoria which require a change over at Sittingbourne.

4.4.20 Kemsley Railway Station has access to far more frequent train services via Sittingbourne Railway Station. With services from Kemsley approximately every 20 to 30 minutes and a journey time of 4-6 minutes, Sittingbourne Railway Station has frequent train services to London Victoria, London St Pancras International, Ramsgate and Dover Priory

Traffic Flows

4.4.21 To determine existing traffic flows on the adjacent local highway network, traffic surveys were commissioned and undertaken by an independent traffic survey company in March 2017. Figure 4.1 shows the road network.

4.4.22 Automatic Traffic Counters (ATCs) were placed at three locations and started at midnight on Thursday 23 March 2017. They operated for seven consecutive days. The survey locations were as follows:

- Swale Way, south of the Barge Way roundabout and north of the Reams Way priority junction;
- Swale Way, south of Reams Way and north of the Ridham Avenue roundabout; and
- Swale Way, south of Ridham Avenue.

4.4.23 The ATC on Swale Way, south of Reams Way and north of the Ridham Avenue roundabout had some incomplete data due to damage to the counter. Traffic flows during these periods were therefore calculated using factors from the other ATCs.

4.4.24 Traffic surveys were also undertaken in June 2016. ATCs were placed at three locations and started at midnight on Sunday 5 June 2016. They operated for seven consecutive days. The survey locations were as follows:

- Swale Way between the B2005 Grovehurst Roundabout and Barge Way;
- Barge Way between Swale Way and
- Fleet End; and Barge Way east of Fleet End.

4.4.25 The ATC on Swale Way between the B2005 Grovehurst Roundabout and Barge Way had some incomplete data due to damage to the counter. This occurred on the Monday between 00:00 and 04:00 and on Sunday between 03:00 and 24:00. Traffic flows during these periods were therefore calculated using factors from the other ATCs.

4.4.26 Manual Classified Counts (MCCs) were also undertaken at key junctions on the network as follows:

- Swale Way / Barge Way Roundabout;
- Fleet End / Barge Way Roundabout;
- Barge Way / Site Access Roundabout; and
- A249 / Grovehurst Road / Swale Way / B2005 Grade Separated Dumbbell Junction.

4.4.27 These surveys were undertaken between 07:00 and 19:00 on Tuesday 28th March 2017 and identified the weekday AM and PM peak hours as between 08:00 and 09:00 and between 17:00 and 18:00 respectively.

4.4.28 The Annual Average Daily Traffic Flow (AADT) was obtained from the Department for Transport for the A249, south of the B2005 Grovehurst Road / Swale Way junction.

4.4.29 Traffic flow data was also obtained from Highways England. Hourly traffic flow data was obtained for the A249 between the A2 and the M2 for the month of June 2017 (a neutral month). Hourly data for a weekday, a Saturday and a Sunday was calculated using the hourly data obtained for the A249 between the A2 and the M2.

4.4.30 Based on the above, the following links have been assessed in terms of development impact:

- Link 1 – Swale Way between the A249 and Barge Way;
- Link 2 – Barge Way between Swale Way and Fleet End;
- Link 3 – Barge Way east of Fleet End;
- Link 4 – A249 South of Swale Way Junction;
- Link 5 – Swale Way North of Reams Way Junction;

- Link 6 - Swale Way South of Reams Way Junction; and
- Link 7 – Swale Way South of Ridham Avenue Roundabout
- Link 8 – M2 East of A249
- Link 9 – M2 West of A249

4.4.31 The HGV route to the site will be from the A249 to Swale Way and then Barge Way. No HGVs will route directly from the A2 using Castle Road and Swale Way south of the Barge Way roundabout; therefore, and as agreed with KCC Highways no assessment of the links on Swale Way south of Barge Way or Castle Road has been undertaken.

Road Safety

4.4.32 To assess road safety along the adjacent highway network, Personal Injury Accident (PIA) data has been obtained from Kent County Council for the five-year period from 1st April 2011 to 31st March 2016. The study area includes Barge Way and Swale Way between the site access to the north, to the Ridham Avenue roundabout to the south. Swale Way between the B2005 Grovehurst Road grade-separated junction with the A249 to the Barge Way roundabout was also obtained. The location of the PIAs are shown at Appendix 4.2.

4.4.33 In total there were 21 injury accidents within the five-year period of which 19 were slight and 2 were serious. There were no fatal injury accidents.

4.4.34 Both of the serious injury accidents occurred in different locations and had different contributory factors. One occurred at the Swale Way / Ridham Avenue roundabout when a single vehicle lost control on the roundabout. The other occurred at the Swale Way / Lloyd Drive junction when a driver swerved to avoid an animal in the road and collided with an oncoming vehicle.

4.4.35 Only one cluster of four or more injury accidents was recorded in the study area at the Swale Way / Lloyd Drive junction, where five injury accidents occurred. Four of these resulted in slight injury and one resulted in serious injury. The results, as set out in Chapter 2 of the TA attached at Appendix 4.1, show that there are no consistent contributory factors to these PIAs.

4.4.36 An analysis of the injury accidents that occurred within the study area suggests that there are no common contributory factors amongst them. It is therefore considered that there are no existing road safety issues in the vicinity of the site.

Sensitivity of Receptors

4.4.37 Receptors to be considered within the impact assessment were selected based upon the access route to be taken by vehicles to the site and the assessment methodology set out above.

4.4.38 Table 4.6 highlights the qualification of the sensitivity assessment of each receptor group for the proposals.

Receptor	Sensitivity	Qualification
Swale Way between the A249 and Barge Way	Low	Road link contains residential properties on its southern side only that are set back from the carriageway and screened. There is a good standard footway / cycleway on its southern side.
Barge Way between Swale Way and Fleet End	Low / Negligible	There is a good standard footway / cycleway on its western side. Road link does not contain any other sensitive receptors as advised by the IEMA Guidelines.
Barge Way east of Fleet End	Low / Negligible	There is a good standard footway / cycleway on its northern side. Road link does not contain any other sensitive receptors as advised by the IEMA Guidelines.
A249 south of Swale Way	Negligible	Road link does not contain any other sensitive receptors as advised by the IEMA Guidelines.
Swale Way north of Reams Way	Low	Road link contains residential properties on its western side only that are set back from the carriageway and screened. There is a good standard footway / cycleway on its western side
Swale Way south of Reams Way	Low	Road link contains residential properties on its western side only that are set back from the carriageway and screened. There is a good standard footway / cycleway on its western side
Swale Way south of Ridham Avenue	Negligible	Road link does not contain any other sensitive receptors as advised by the IEMA Guidelines.
M2 East of A249	Negligible	Road link does not contain any other sensitive receptors as advised by the IEMA Guidelines.
M2 West of A249	Negligible	Road link does not contain any other sensitive receptors as advised by the IEMA Guidelines.

Table 4.6: Sensitivity of Road Links

4.4.39 On the basis of the above, all road links will be assessed against the Rule 1 threshold.

Limitations and Assumptions

4.4.40 The baseline data has been obtained from recognised sources and methodologies and in that sense, there is only limited limitations to their use. The traffic surveys, Department for Transport and Highways England data covers 2016 and 2017 and is considered representative of current conditions.

4.4.41 The route to be utilised by construction vehicles (Barge Way, Swale Way, A249, M2) is an established HGV route. Construction details have been informed by construction contractors and thus there is low uncertainty about some of the construction parameters to be adopted and low uncertainty about the timescale and phasing of construction.

4.5 Future Baseline

Future Assessment Year

4.5.1 Because the fuel (gas) will be delivered by pipeline, there is no need for any vehicular feed, thus K4 will not generate any regular traffic when it is operational. There would be occasional ad-hoc maintenance vehicles but these would be rare, not an everyday occurrence and when they do occur would likely taken the form of a single van. When K4 is decommissioned, the process will require its removal from site which will generate associated vehicle movements, including HGV movements. As there will be no further use of the materials, such materials will be able to be removed in bulk meaning larger payloads can be achieved and therefore, there will be lower traffic flows than during construction. This chapter therefore, considers the impact of K4 during the construction phase.

4.5.2 The peak construction period is expected at the start of the programme when groundworks and foundation works are ongoing, this would be during 2019. Therefore, for assessment purposes, the traffic flows on the adjacent highway network have been estimated for a future year of 2019.

Traffic Growth Rates and Committed Development

4.5.3 A future year baseline traffic scenario of 2019 has been created by applying traffic growth rates to the observed traffic flows and then adding in the traffic flows of 'committed developments' i.e. developments that have planning consent but are not yet generating traffic on the network.

4.5.4 This is consistent with the Transport Assessment that is attached at Appendix 4.1. The Transport Assessment considers sustainability, the ultimate capacity of the highway network and the impact of development upon the transport network. Developments that already have planning consent have already been through that process and have identified any highway and transport improvements that may or may not be necessary to mitigate their impact. There is no further opportunity for these developments to provide additional highway or transport mitigation and so these developments and their highway and transport schemes are treated as committed within any future year scenarios.

4.5.5 For this reason, those developments (traffic flows and their highway and transport mitigation schemes) form part of a future transport baseline scenario for any other developments that follow. In doing that, the impact of development proposals that follow consented developments is able to be determined in the knowledge of what has already been consented in transport and highways terms along with the need for any additional highway and transport improvements that may be necessary.

4.5.6 Other developments that emerge at the same time are treated together and are cumulatively assessed against the baseline scenario described above to determine their cumulative impact and their cumulative highway and transport mitigation requirements (if required).

4.5.7 The Transport Assessment is undertaken in this way so that the NPPF 'severity test' (Paragraph 32, NPPF) is correctly judged and correct conclusions are drawn. This chapter adopts the same approach in terms of committed developments and cumulative developments for consistency with the Transport Assessment and to ensure the traffic scenarios are the same. The creation of the future baseline scenario with the inclusion of committed developments is set out below.

4.5.8 Before adding in any committed development traffic flows, growth rates have been applied to the observed traffic flows using the DfT software TEMPRO to create base 2019 traffic flows. The TEMPRO software presents the output of the DfT's National Trip End Model which forms part of the National Transport Model (NTM). The DfT's Webtag guidance Unit 3.15.2 advises the use of NTM in preference to the National Road Traffic Forecasts (NRTF) as the NTM data is based on a more up-to-date model.

4.5.9 It should be noted that growth rates include allowances for background traffic growth as well as development growth and, in some instances, the application of growth rates and the addition of traffic flows from committed developments plus cumulative developments (i.e. emerging developments that do not yet have planning consent) can result in double counting of traffic flows.

4.5.10 In this instance, given that a 2019 baseline year is being developed, any such effect of double counting by applying the growth rate and committed/cumulative traffic flows will be negligible, and so no adjustments to the growth rates have been made.

4.5.11 The TEMPRO growth rates obtained are listed in Table 4.7.

	Road Type	
Base Year	Trunk	Principal
2016 to 2019	1.034	1.035
2017 to 2019	1.024	1.023

Table 4.7: TEMPRO Growth Rates

Existing Permissions at the Mill

4.5.12 Proposed development in combination with other schemes that are operational / constructed, consented or for which planning permissions are currently being sought, and which affect traffic flows, will be assessed and are described below.

K3

4.5.13 Kent County Council granted planning permission for the development of the Wheelabrator Kemsley Generating Station in March 2012 (planning ref. SW/10/444). In addition, the following applications relevant to the facility have been submitted and granted planning permission:

- Application to Kent County Council for a non-material amendment to the site layout (planning ref. PAG/MC/SW/10/444/R) (granted September 2013).;
- Application to Kent County Council to vary condition (2) and delete condition (4) of planning permission SW/10/444 to allow a variation to the permitted hours of delivery to allow for 24 hours 7 days per week operation (planning ref. SW/12/506680) (granted April 2015); and
- Application to Kent County Council for a non-material amendment to the building footprint, elevation and site layout (planning ref. SW/10/444/RA) (granted December 2015).

4.5.14 The Wheelabrator Kemsley Generating Station has been consented by Kent County Council and is currently under construction. Under the existing programme of construction, it is due to be completed and operational by June 2019.

4.5.15 The estimated traffic flows at the K3 Generating Station and along the adjacent highway network have been taken from the Transport Assessment that was prepared in support of its original planning application.

4.5.16 The non-material amendments to the planning application did not affect the consented traffic flows at the Generating Station.

4.5.17 Several additional applications have been made in relation to the K3 Generating Station:

- Application to Kent County Council for the formation of an improved access road and associated development to serve the Wheelabrator Kemsley generating station (planning ref. SW/12/1001) (granted November 2012);
- Application to Kent County Council for a non-material amendment to provide for the repositioning and change to the capacity of the pond to accommodate surface water drainage from the access road (planning ref. PAG/SW/12/1001) (granted August 2013); and
- Application to Kent County Council for the variation of Condition 6 of planning permission SW/12/1001 to provide the formation of improved access road and associated development to serve Wheelabrator Kemsley Generating Station (planning ref. SW/13/1257) (granted February 2014).

4.5.18 These applications do not affect the consented traffic flows at the K3 Generating Station.

IBA Facility

4.5.19 There is planning consent for the construction of a standalone IBA facility adjacent to the Wheelabrator Kemsley Generating Station site (planning ref. KCC/SW/0265/2016).

4.5.20 The IBA permission allows for 84 daily HGV movements.

4.5.21 The estimated traffic flows generated by the IBA Facility and along the adjacent highway network have been taken from the Transport Assessment that was prepared in support of its original planning application.

Other Committed Developments

4.5.22 An assessment of 'committed' developments in the local area that have gained permission has been undertaken to determine whether they are operational, or when they are likely to be operational within the timescales of construction for K4. This is to form a view of whether the traffic generated by the developments will already be present in the traffic surveys undertaken for the assessment of K4, or whether they should be added as 'committed' developments within the Future Baseline 2019 traffic flows and assessments. The sites included in Table 4.8 have been reviewed.

Site Number	Site Name	Application number	Status	Submitted / Decision Date	Status	Traffic Flows
1	KPM Sustainable Energy Plant (SEP) (K3)	SW/10/444	Granted	2010 / 2012	K3 built – new DCO proposal (Site 13)	Operational traffic flows included within committed flows and form the future baseline.
2	KPM Recycling Depot	16/501228/FULL	Granted	2016 / 2016	Not Built	Operational traffic flows included within committed flows and form the future

Site Number	Site Name	Application number	Status	Submitted / Decision Date	Status	Traffic Flows
						baseline.
3	KPM Incineration Bottom Ash Facility (IBA)	16/507687/COUNTY	Granted	2016 / 2016	Not Built	Operational traffic flows included within committed flows and form the future baseline.
4	Gypsum Recycling Building (Ridham Docks)	16/501484/COUNTY	Granted	2016 / 2016	Not Built	Operational traffic flows included within committed flows and form the future baseline.
5	KPM Anaerobic Digester	SW/11/1291	Granted	2011 / 2012	Assumed Operational	Operational flows lower than previous site. Reduction in flows not included committed flows.
6	Fulcrum Business Park Development	14/500327/OUT	Granted	2014 / 2016	Not Built	Operational traffic flows included within committed flows and form the future baseline.
7	Nicholls Transport Depot	SW/12/0816	Granted	2012 / 2013	Operational	Operational traffic flows included within committed flows and form the future baseline.
8	Materials Recycling Facility (Ridham Docks)	SW/12/1211	Granted	2012 / 2013	Not Built	Operational traffic flows included within committed flows and form the future baseline.
9	Eurolink V	15/510589/OUT	Granted	2015 / 2016	Not Built	Operational traffic flows included within committed flows and form the future baseline.
10	Tonge Corner Solar Park	SW/14/0224	Granted	2014 / 2015	Partly built	Construction flows only – no operational flows. No flows onto local network, therefore not included within committed flows.
11	Steam Pipeline (Ridham Dock to KPM)	16/506935	Granted	2016 / 2016	Assumed not built	Minimal construction vehicles only, therefore not included within committed flows.
12	Kemsley Sustainable Energy Plant (SEP) (K3)	EN010083	Awaiting Decision	2017 / Awaiting Decision	K3 built – new DCO proposal	Power upgrade to the consented SEP (site number 1, above) with no change to the throughput or vehicle movements. Operational traffic flows would remain the same as site reference 1 and are included within committed flows.

Site Number	Site Name	Application number	Status	Submitted / Decision Date	Status	Traffic Flows
13	Thermal Energy Facility Kemsley Field Business Park	15/500348/COUNTY	Granted	2015/2015	Not built	Operational traffic flows included within committed flows

Table 4.8: Review of Committed Developments

4.5.23 Based on the above, the following developments are considered as committed developments and will form part of the future year baseline scenario:

- 1/12 – KPM Sustainable Energy Plant (SEP) (K3);
- 2 – KPM Recycling Depot;
- 3 – KPM Incineration Bottom Ash Facility (IBA);
- 4 – Gypsum Recycling Building;
- 6 – Fulcrum Business Park;
- 7 – Nicholls Transport Depot;
- 8 – Materials Recycling Facility; and
- 9 – Eurolink V
- 13 – Kemsley Field Thermal Energy Facility.

4.5.24 The traffic flows generated by these committed developments have been taken from their respective Transport Assessments that supported their planning applications; where the Transport Assessment did not assign traffic to the wider network, observed junction turning movements and observed link movements along with distributions used in other applications and Census 2011 Journey to Work data have been used. These committed development traffic flows are set out in the Transport Assessment attached at Appendix 4.1.

4.5.25 The committed development traffic flows have been added to the 2019 base traffic and the resultant 2019 baseline scenario is attached at Appendix 4.3.

4.6 Predicted Effects

Construction Effects

Trip Generation

4.6.1 Construction vehicle movements have been estimated by the project team, including input from the appointed contractor Costain.

4.6.2 During construction, it is estimated there will be an average of 100 staff on site with a peak of up to 200 staff on site during the early groundworks and foundation works period.

4.6.3 It is estimated that construction of K4 will generate an average of 25 to 30 HGV deliveries per day (average of 50 to 60 HGV movements per day) throughout the 20-month construction period. During the early groundworks and foundation works period, this could peak at up to 40 HGV deliveries per day (up to 80 HGV movements per day). This includes all associated construction activities including all deliveries (including abnormal indivisible loads) and all removal of material / waste etc. The demolition of K1 does not form part of this application and so the vehicle movements associated with that is not included in these numbers.

4.6.4 At this stage, it is estimated there will be around 15 abnormal indivisible loads to be delivered to site under Police or contractor escort. These are included within the above estimates.

Mode Share

4.6.5 To estimate the likely mode of transport that construction workers would use to travel to and from the site, the 2011 Census Journey to Work data has been analysed for the Kemsley Workplace Zone. The workplaces within this zone include the Mill as well as the adjoining employment units, all of which have similar levels of accessibility and shift patterns and is thus reasonably representative for assessment purposes for construction workers to K4.

4.6.6 The Workplace Population Census data is set out within the Transport Assessment at Appendix 4.1 and has been applied to the level of construction staff to predict the level of vehicle trip generation for the site.

4.6.7 In summary, the Census data predicts that 85% of staff will arrive via car, 4.9% would arrive as a car passenger, 3.1% would arrive by bicycle, 2.6% would arrive on foot and 1.5% would arrive by train.

4.6.8 Due to the nature of teams of construction workers moving from one site to the next, workers tend to quickly identify others in their team who live near to them and car share amongst themselves. It can therefore be expected that the proportion of car sharers may be higher than the above and thus the proportion of car drivers may reduce. However, the above provides for a robust analysis based on a robust estimate of construction workers arriving by car.

4.6.9 On the basis of the above, it is estimated there would be an average of 85 construction staff arriving and departing via car per day to K4. At the construction peak, it is estimated there will be up to 170 construction staff arriving and departing via car per day.

Temporal Distribution

4.6.10 Construction activities will be undertaken during normal construction working hours of 07:00 and 19:00 on weekdays and 07:00 to 16:00 on Saturdays and only very occasionally on Sundays where needs dictate, which is consistent with the K3 construction activities that are currently ongoing and were permitted as part of its planning consent. Construction HGV movements may occur during these hours.

4.6.11 Construction HGV movements will be generated throughout the day and will be typically spread fairly equally in terms of hourly movements. Although there may be occasional peaks of construction HGV movements at various times of the day, these will be balanced by subsequent troughs and balance out on different days to being typically evenly spread. Therefore, an average day will see a fairly equal spread of construction HGV movements across the working day.

4.6.12 Daily construction HGV movements have therefore been spread equally across the twelve-hour working weekday and nine hour working weekend.

4.6.13 Construction staff would typically arrive between 06:00 and 07:00, and depart between 19:00 and 20:00 on a weekday. On a weekend, construction staff would typically arrive between 06:00 and 07:00 and depart between 16:00 and 17:00. It is assumed that all staff arrive and depart within these hours to ensure a robust assessment.

4.6.14 Based upon the calculations set out above, a breakdown of the peak construction traffic flows and the average construction traffic flows are shown in Tables 4.9 and 4.10 respectively.

Time Begin	5 Day Average						Saturday/Sunday					
	Arrivals		Departures		Two Way		Arrivals		Departures		Two Way	
	Cars	HGVs	Cars	HGVs	Cars	HGVs	Cars	HGVs	Cars	HGVs	Cars	HGVs
06:00	170				170		170				170	
07:00		4		3				4		3		
08:00		3		4		7		3		4		7
09:00		4		3		7		4		3		7
10:00		3		4		7		3		4		7
11:00		4		3		7		4		3		7
12:00		3		4		7		3		4		7
13:00		3		3		6		3		3		6
14:00		3		3		6		3		3		6
15:00		3		3		6		3		3		6
16:00		3		3		6			170		170	
17:00		4		3		7						
18:00		3		4		7						
19:00			170		170							
Total	170	40	170	40	340	80	170	30	170	30	340	60

Table 4.9: Peak Construction Traffic Flows

Time Begin	5 Day Average						Saturday					
	Arrivals		Departures		Two Way		Arrivals		Departures		Two Way	
	Cars	HGVs	Cars	HGVs	Cars	HGVs	Cars	HGVs	Cars	HGVs	Cars	HGVs
06:00	85				85		85				85	
07:00		3		2		5		3		2		5
08:00		2		3		5		2		3		5
09:00		3		2		5		3		2		5
10:00		2		3		5		2		3		5
11:00		3		2		5		3		2		5
12:00		2		3		5		2		3		5
13:00		3		2		5		3		2		5
14:00		2		3		5		2		3		5
15:00		3		2		5		3		3		5
16:00		2		3		5			85		85	
17:00		3		2		5						
18:00		2		3		5						
19:00			85		85							
Total	85	30	85	30	170	60	85	23	85	23	170	45

Table 4.10: Average Construction Traffic Flows

<u>Trip Distribution and Assignment</u>

4.6.15 The origin of construction HGVs and their route to the site will vary through the process and is expected to vary on a day by day basis depending upon the construction activity being undertaken and the contractor(s) involved. Given the layout of the adjacent highway network and the strategic nature of its routes and destinations, it is likely that the routes by construction HGVs will be on the strategic road network to the A249 then Swale Way and Barge Way.

4.6.16 For the purposes of this assessment, it is assumed that up to 20% of construction HGVs would be from neighbouring areas and these movements would be via the M2 east of the A249 (6.67% i.e. 1/3 of 20%), the M2 west of the A249 (6.67%) and the A249 south of the M2 (6.67%). Of the remaining 80%, 25% could be from areas in south / south of London with HGVs travelling via the M20 and the A249 south of the M2 to / from the site and 55% could be from areas in north / north of London with HGVs travelling via the M2 west of the A249 and the A249 south of the M2 to / from the site.

4.6.17 Census 2011 Journey to Work data has formed the basis of the assumptions of construction staff vehicle routeing.

4.6.18 The construction traffic has been assigned to the road network in accordance with the above, and the resultant predicted average and peak construction traffic flows are attached at Appendix 4.4.

Impact of Construction Traffic

4.6.19 Assessments have been undertaken for the average and peak construction traffic flows to enable an understanding of the typical effects throughout the construction phase to be identified.

4.6.20 In accordance with the IEMA guidelines, the construction traffic flows have been assessed against the 2019 baseline traffic flows as attached at Appendix 4.5. A summary of the assessments is set out in Table 4.11 and Table 4.12.

Receptor	Weekday Impact		Saturday Impact		Sunday Impact	
	Total Vehicles	HGVs	Total Vehicles	HGVs	Total Vehicles	HGVs
Swale Way between the A249 and Barge Way	1.0%	1.9%	1.6%	2.6%	2.6%	5.2%
Barge Way between Swale Way and Fleet End	0.7%	2.5%	1.0%	2.8%	1.6%	4.0%
Barge Way east of Fleet End	1.4%	3.6%	2.4%	4.7%	3.4%	6.0%
A249 south of Swale Way	0.5%	1.1%	0.6%	1.6%	0.7%	2.1%
Swale Way north of Reams Way	1.1%	0.0%	1.9%	0.0%	2.5%	0.0%
Swale Way south of Reams Way	1.1%	0.0%	1.9%	0.0%	2.7%	0.0%
Swale Way south of Ridham Avenue	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
M2 East of A249	0.0%	0.0%	0.0%	0.1%	0.1%	0.1%
M2 West of A249	0.2%	0.5%	0.2%	0.8%	0.2%	1.2%

Table 4.11: Summary of Daily Impact of Average Construction Traffic Flows

Receptor	Weekday Impact		Saturday Impact		Sunday Impact	
	Total Vehicles	HGVs	Total Vehicles	HGVs	Total Vehicles	HGVs
Swale Way between the A249 and Barge Way	1.8%	2.5%	3.0%	3.4%	4.8%	6.8%
Barge Way between Swale Way and Fleet End	1.0%	3.3%	1.3%	3.7%	2.0%	5.2%
Barge Way east of Fleet End	1.9%	4.8%	3.1%	6.2%	4.5%	7.9%
A249 south of Swale Way	1.0%	1.5%	1.1%	2.0%	1.3%	2.7%
Swale Way north of Reams Way	2.2%	0.0%	3.8%	0.0%	5.1%	0.0%
Swale Way south of Reams Way	2.2%	0.0%	3.8%	0.0%	5.5%	0.0%
Swale Way south of Ridham Avenue	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
M2 East of A249	0.1 %	0.1%	0.1%	0.1%	0.1%	0.1%
M2 West of A249	0.1%	0.5%	0.1%	0.8%	0.2%	1.2%

Table 4.12: Summary of Daily Impact of Peak Construction Traffic Flows

4.6.21 As can be seen, the increases as a result of the average and peak construction traffic flows on weekdays, Saturdays and Sundays are all lower than the Rule 1 threshold of a 30% increase identified above as the relevant threshold for the links due to their receptor sensitivity identified in Table 4.6.

4.6.22 The average construction period sees the largest predicted increases in traffic flows on Barge Way east of Fleet End where increases of 1.4%, 2.4% and 3.4% are predicted on a weekday, Saturday and Sunday respectively. The peak construction period sees the largest predicted increases in traffic flows on Swale Way, south of Reams Way with increases of 2.2%, 3.8% and 5.5% predicted on a weekday, Saturday and Sunday respectively.

4.6.23 The largest increases in HGV movements are also predicted on Barge Way east of Fleet End where increases of 3.6%, 4.7% and 6.0% are predicted on a weekday, Saturday and Sunday respectively with average construction traffic and 4.8%, 6.2% and 7.9% predicted on a weekday, Saturday and Sunday respectively with peak construction traffic.

4.6.24 On the basis that the increases on all the links are lower than the Rule 1 threshold, and in accordance with the IEMA Guidelines, the average and peak construction traffic flows will result in imperceptible effects along the adjacent highway network.

4.6.25 The magnitude of impact of the average construction traffic flows along the adjacent highway network would be negligible as defined in Table 4.3. The significance of the increase in traffic flows along the adjacent highway network as a result of the average and peak construction traffic would therefore be negligible as determined by the IEMA Guidelines , thus the effect would be not significant.

<u>Effects of Abnormal Indivisible Loads</u>

4.6.26 Notwithstanding the above conclusions on the effects of construction traffic, it is noted that the movement of abnormal indivisible loads can sometimes require separate consideration. To ensure a robust assessment it is therefore considered appropriate to consider possible effects of the abnormal indivisible loads along the local access route from the trunk road network (i.e. between the A249 and the site) below. At this stage, it is estimated there will be around 15 abnormal indivisible loads to be delivered to site under Police or contractor escort and the assessment has been based upon this.

4.6.27 **Traffic Noise and Vibration -** There would be 15 abnormal indivisible loads to the site. Abnormal indivisible loads tend to be slow moving and mainly cause delay.

4.6.28 Existing and forecast traffic noise levels are greatly influenced by the volume of traffic, percentage of HGVs and distance from the source. The movement of abnormal indivisible loads will not alter total traffic volumes or percentage of HGVs by any noticeable amounts, whilst residential properties are all set back from the local road network and incorporate screening (fences). It is considered that the effect of noise as a result of the abnormal indivisible loads upon receptors along the local access route would be negligible or slight adverse (negligible magnitude of impact with negligible / low sensitivity as set out in Tables 4.3 and Table 4.4) and thus not significant.

4.6.29 There are two types of vibration caused by HGVs; ground borne vibration and air borne vibration. Ground borne vibration principally occurs from poorly maintained roads, and people hear and experience the effects of vehicles passing over ruts and holes in the road surface. The local access road is newly constructed and there are no such ruts or holes that would induce ground borne vibration. Other ground borne vibration effects may arise from the road structure being unsuitable to accommodate very heavy loads. Modern roads are built to accommodate heavy loads and in instances where they are not then this is identified as part of the detailed abnormal indivisible load route analysis required as part of the Special Order process (which permits large vehicles to travel along the road network) and overcome by increasing the number of axles on the transporting vehicle to spread the load and reduce axle loadings.

4.6.30 Airborne vibration can lead to a number of effects, such as window rattling and floor movement, and this may concern people living adjacent to roads particularly where there is a large increase in lorry traffic. In this instance, the abnormal indivisible loads would not be regular, properties are set back from the local access road and there is screening in place. It is considered that the effect of vibration as a result of the abnormal indivisible loads upon receptors along the local access route would be negligible or slight adverse (negligible magnitude of impact with negligible / low sensitivity as set out in Tables 4.3 and Table 4.4) and thus not significant.

4.6.31 **Disruption and Driver Delay -** Any effects of delay to other road users would only be apparent during the movement of abnormal indivisible loads as a result of their large size and low speed rather than their numbers. Along the local access roads, the police and any other escort personnel would ensure that driver delay is minimised by identifying locations ahead of the abnormal indivisible load where it could stop safely to allow vehicles to pass. There would be 15 abnormal indivisible loads and it is good practice for these to all be undertaken outside of peak traffic hours to prevent any disruption or delay during these periods.

4.6.32 It is considered that some driver delay would occur as a result of the abnormal indivisible loads, however the temporary nature and safe escorting of vehicles should be borne in mind. It is considered that the disruption and driver delay effect as a result of the abnormal indivisible loads upon receptors along the local access roads would be negligible or slight adverse (negligible magnitude of impact with negligible / low sensitivity as set out in Tables 4.3 and Table 4.4) and thus not significant.

4.6.33 **Increased Risk of Accidents -** There is a potential for impacts on safety as a consequence of driver frustration related to the movement of abnormal indivisible loads. However, all abnormal indivisible loads will be under police escort who will be there not only to assist the abnormal indivisible loads but to control any oncoming vehicles or vehicles following the abnormal indivisible load. On this basis, driver frustration should be minimised and the risk of accidents reduced. It is therefore considered the accidents and safety effect as a result of the abnormal indivisible loads upon receptors along the local access route would be negligible (negligible magnitude of impact with negligible sensitivity as set out in Tables 4.3 and Table 4.4) and thus not significant.

4.6.34 **Severance, Intimidation and Pedestrian Delay -** An increase in vehicle numbers, particularly HGVs, could result in additional delays to pedestrians wishing to cross the road or result in a perceived severance of a community. HGV traffic, particularly abnormal indivisible loads, can reduce the amenity of pedestrian routes in towns and villages to the extent that pedestrians feel intimidated by the traffic.

4.6.35 There would be only 15 abnormal indivisible loads which could result in intimidation, pedestrian delay or severance and these would be infrequent. On this basis, it is therefore considered the effect of severance, intimidation and pedestrian delay as a result of the abnormal indivisible loads upon receptors along the local access roads would be negligible (negligible magnitude of impact with negligible sensitivity as set out in Tables 4.3 and Table 4.4) and thus not significant.

4.6.36 **Dust and Dirt -** HGVs have the potential to distribute dust and dirt from the construction site onto the local road network. These effects would be most pronounced in the immediate vicinity of the site entrance, where a wheel wash will be located and the abnormal indivisible loads will have to utilise it like all other HGVs. It is therefore considered the dust and dirt effect as a result of the abnormal indivisible loads upon receptors along the local road network would be negligible (negligible magnitude of impact with negligible sensitivity as set out in Tables 4.3 and Table 4.4) and thus not significant.

4.6.37 **Visual Effects -** The movements of high-sided vehicles could be considered visually intrusive. This effect would be short-term and only occur during the movement of abnormal indivisible loads. It is therefore considered the visual effect as a result of the abnormal indivisible loads upon receptors along the local access roads would be negligible (negligible magnitude of impact with negligible sensitivity as set out in Tables 4.3 and Table 4.4) and thus not significant.

Operational Effects

4.6.38 As with K1, K4 will not generate any operational delivery traffic during operation due to fuel delivery being from a gas pipeline. There would be occasional ad-hoc maintenance vehicles but these would be rare, not an everyday occurrence and when they did occur would likely be one van (or similar).

4.6.39 Given this, the number of vehicle movements associated with K4 when it is operational would be minimal and would be unlikely to create any discernible transport impacts. On this basis, no assessments are necessary for the operational phase.

4.7 Decommissioning

4.7.1 When K4 reaches the end of its operational life it would be demolished and decommissioned. Since there is no further use for the materials, such materials can be removed in bulk after demolition. This means that larger payloads can be achieved and the traffic flows associated with decommissioning are lower than those during its construction. As such, a lower impact from traffic can be expected to occur in comparison to the construction phase.

4.7.2 Notwithstanding this, a Demolition Management Plan will be prepared and the transport related contents agreed with Highway Officers prior to decommissioning.

4.8 Mitigation

Mitigation of Construction Effects

4.8.1 A Construction Traffic Management Plan (CTMP) will be prepared and agreed with Highway Officers prior to construction commencing and the works will be undertaken in accordance with this. The CTMP will be a management tool that contractors will follow to minimise the impact of construction vehicles. It will be regularly monitored and reviewed on an ongoing basis to seek to further reduce impacts where possible. The expected measures and outcome of the CTMP have been considered when undertaking the above assessments.

4.8.2 The CTMP would include measures to manage construction vehicles at the site and, for example, will include details such as:

- Programme and total timescale for the project, each major phase of the construction and the anticipated start date;

- Days and hours of site construction works;
- Vehicular access routes to and from the site;
- Details on the number, type, size and weight of vehicles accessing the site;
- Details of how contractors, delivery companies and visitors will be made aware of the access route;
- Measures to ensure route compliance;
- Site plan showing compound locations where materials, skips and plant will be stored along with loading / unloading / laydown areas;
- Demonstration that vehicles can access the site and turn to exit in a forward direction;
- Contingency details on where delivery vehicles will wait to load/unload in the event they are unable to access the site;
- Details on vehicle wheel wash facilities be provided;
- Details on the arrangements for co-ordinating and controlling delivery vehicles;
- Details on the arrangements for supervising, controlling and monitoring vehicle movements to/from the site;
- Details on the arrangements to ensure that the loading/collection areas are clear of vehicles and materials before the next HGV arrives;
- Details on any specific arrangements for contractor car sharing / minibus / collection / drop-off arrangements to and from the site;
- Details on the arrangements for contractor parking on site;
- Details on monitoring and review;
- Details on how complaints from local residents and businesses, etc. will be dealt with, reported and acted upon;
- Details on the transport requirements for abnormal indivisible loads;
- A detailed swept path analysis of abnormal indivisible loads;
- Details of any measures to accommodate abnormal indivisible loads along the access route along with the management measures to be adopted; and
- Details of any road condition surveys.

4.8.3 Given the above conclusions, there is no requirement for any additional mitigation over and above the CTMP from an environmental impact perspective, and hence no mitigation schemes are proposed.

Mitigation from Completed Development Effects

4.8.4 As set out above, K4 will only generate a small number of vehicles associated with maintenance during operation. There is no requirement for any transport related mitigation measures when K4 is operational.

4.9 Residual Effects

4.9.1 Residual effects are those that are predicted to remain after implementation of the secondary mitigation measures described above. As set out above, there are no significant effects predicted and therefore no residual significant effects predicted.

4.10 Cumulative Effects

4.10.1 KCC have requested that the following sites are included in a cumulative assessment:

- 17/505073/FULL Erection of a tile factory including service yard, storage yard and car parking area;
- 16/506193/ENVSCR EIA Screening Opinion – Land South of Iwade -Outline application for proposed residential development of 275 dwellings including affordable housing with open spaces, appropriate landscaping and minor alterations to the surrounding highway network (access); and
- 17/503713/ENVSCR | EIA Screening Opinion | Land East of Iwade – Outline application for proposed residential development of 440 dwellings.

4.10.2 A full planning application has been submitted and is currently being decided for the tile factory meaning that if permission is granted these vehicles may be on the highway network at the same time as the K4 construction vehicles.

4.10.3 With respect to the Iwade residential developments, it is unlikely, as only screening opinions have currently been applied for, that these developments will be generating any traffic before the end of the construction of K4 in 2020 (following completion of construction, K4 will only generate negligible ad-hoc trips associated with maintenance) and therefore, these sites have not been included in the cumulative assessment.

4.10.4 The traffic flows generated by the tile factory have been based on the traffic generation set out in the Transport Statement that supported its planning application; they have been assigned to the highway network using observed HGV movements at the Grovehurst Dumbbell junction and observed traffic flows on the A2 / M2 / A249(S) link flows.. These cumulative development traffic flows are set out in the Transport Assessment attached at Appendix 4.1.

4.10.5 In addition, the following sites have been included in the cumulative assessment:

- 18/500257/EIFUL Proposed development of 155 dwellings on land adjacent toe Quinton Farm House, Quinton Road, Sittingbourne
- 18/500393/FULL Erection of a natural gas fuelled reserve power plant at Plot N2c, Castle Road, Eurolink, Sittingbourne

4.10.6 A sustainable urban extension comprising up to 1,100 new dwellings, a secondary and primary school on Land North of Quinton Road (also known as North West Sittingbourne) has submitted an EIA Scoping (16/506014/EIASCO). Due to its current position in the planning process this site is unlikely to generate traffic movements before the end of construction of K4 in 2020 and has not been included in the cumulative assessment.

4.10.7 The development traffic flows have been taken from the relevant TA/TS. Where traffic flows have not been assigned or not assigned to the whole of the network being considered in this assessment, professional judgement using 2011 Journey to Work Census and assignment used in the committed development assessment has been used.

4.10.8 Finally, an application is to be submitted for a new road link within the Kemsley Paper Mill site; this scheme will be completed before K4 is commenced and therefore, the site will not be generating construction vehicle movements at the same time as the K4 development. The road will not generate additional traffic after construction. Therefore, it has not been included in the cumulative assessment.

4.10.9 These cumulative development traffic flows are set out in the Transport Assessment attached at Appendix 4.1.

4.10.10 The cumulative development traffic flows have been added to the 2019 baseline scenario and the cumulative scenario is attached at Appendix 4.6.

<u>Impact of Cumulative Development</u>

4.10.11 Assessments have been undertaken for the average and peak construction traffic flows to enable an understanding of the typical effects throughout the construction phase to be identified.

4.10.12 In accordance with the IEMA guidelines, the cumulative traffic flows have been assessed against the 2019 future baseline traffic flows i.e. 2019 plus committed traffic flows, as attached at Appendix 4.6. A summary of the assessments is set out in Table 4.13 and Table 4.14.

Receptor	Weekday Impact				Saturday Impact				Sunday Impact			
	Construction		Cumulative		Construction		Cumulative		Construction		Cumulative	
	Tot Veh	HGV	Tot Veh	HGV	Tot Veh	HGV	Tot Veh	HGV	Tot Veh	HGV	Tot Veh	HGV
Swale Way between the A249 and Barge Way	1.0%	1.9%	2.0%	7.1%	1.6%	2.6%	1.6%	2.6%	2.6%	5.2%	2.6%	5.2%
Barge Way between Swale Way and Fleet End	0.7%	2.5%	0.7%	2.5%	1.0%	2.8%	1.0%	2.8%	1.6%	4.0%	1.6%	4.0%
Barge Way east of Fleet End	1.4%	3.6%	1.4%	3.6%	2.4%	4.7%	2.4%	4.7%	3.4%	6.0%	3.4%	6.0%
A249 south of Swale Way	0.5%	1.1%	1.0%	3.8%	0.6%	1.6%	0.6%	1.6%	0.7%	2.1%	0.7%	2.1%
Swale Way north of Reams Way	1.1%	0.0%	2.7%	14.9%	1.9%	0.0%	1.9%	0.0%	2.5%	0.0%	2.5%	0.0%

Receptor	Weekday Impact				Saturday Impact				Sunday Impact			
	Construction		Cumulative		Construction		Cumulative		Construction		Cumulative	
	Tot Veh	HGV	Tot Veh	HGV	Tot Veh	HGV	Tot Veh	HGV	Tot Veh	HGV	Tot Veh	HGV
Swale Way south of Reams Way	1.1%	0.0%	2.7%	14.3%	1.9%	0.0%	1.9%	0.0%	2.7%	0.0%	2.7%	0.0%
M2 East of A249	0.0%	0.0%	0.1%	0.6%	0.0%	0.1%	0.0%	0.1%	0.1%	0.1%	0.1%	0.1%
M2 West of A249	0.1%	0.4%	0.2%	1.0%	0.1%	0.6%	0.1%	0.6%	0.1%	0.9%	0.1%	0.9%

Table 4.13: Summary of Daily Impact of Cumulative Development Including Average Construction Traffic Flows

Receptor	Weekday Impact				Saturday Impact				Sunday Impact			
	Construction		Cumulative		Construction		Cumulative		Construction		Cumulative	
	Tot Veh	HGV	Tot Veh	HGV	Tot Veh	HGV	Tot Veh	HGV	Tot Veh	HGV	Tot Veh	HGV
Swale Way between the A249 and Barge Way	1.8%	2.5%	2.9%	7.7%	3.0%	3.4%	3.0%	3.4%	4.8%	6.8%	4.8%	6.8%
Barge Way between Swale Way and Fleet End	1.0%	3.3%	1.0%	3.3%	1.3%	3.7%	1.3%	3.7%	2.0%	5.2%	2.0%	5.2%
Barge Way east of Fleet End	1.9%	4.8%	1.9%	4.8%	3.1%	6.2%	3.1%	6.2%	4.5%	7.9%	4.5%	7.9%
A249 south of Swale Way	1.0%	1.5%	1.5%	4.2%	1.1%	2.0%	1.1%	2.0%	1.3%	2.7%	1.3%	2.7%
Swale Way north of Reams Way	2.2%	0.0%	3.8%	14.9%	3.8%	0.0%	3.8%	0.0%	5.1%	0.0%	5.1%	0.0%
Swale Way south of Reams Way	2.2%	0.0%	3.8%	14.3%	3.8%	0.0%	3.8%	0.0%	5.5%	0.0%	5.5%	0.0%
M2 East of A249	0.1%	0.1%	0.1%	0.6%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
M2 West of A249	0.2%	0.5%	0.3%	1.1%	0.2%	0.8%	0.2%	0.8%	0.2%	1.2%	0.2%	1.2%

Table 4.14: Summary of Daily Impact of Cumulative Development including Peak Construction Traffic Flows

4.10.13 As can be seen, the increases as a result of the average construction traffic flows on weekdays, Saturdays and Sundays are all lower than the Rule 1 threshold of a 30% increase identified above.

4.10.14 The largest increases in traffic flows are predicted on Swale Way, north of Reams Way, where increases of 2.7%, 1.9% and 2.5% are predicted on a weekday, Saturday and Sunday respectively with average construction traffic. These increases rise by 1.1 – 2.6% when peak construction traffic is considered.

4.10.15 The largest increases in HGV movements are predicted on Swale Way, north of Reams Way, where increases of 14.9% are predicted on a weekday; K4 will not generate any HGVs along this link and therefore the predicted increase is due solely to the other cumulative sites considered in the assessment.

4.10.16 On the basis that the increases on all the links are lower than the Rule 1 threshold of a 30% increase, identified above as the relevant threshold for the links due to their receptor sensitivity identified in Table 4.6, and in accordance with the IEMA Guidelines, the average and peak construction traffic flows will result in imperceptible effects along the adjacent highway network.

4.10.17 The magnitude of impact of the average construction traffic flows along the adjacent highway network would be negligible as defined in Table 4.3. The significance of the increase in traffic flows along the adjacent highway network as a result of the average and peak construction traffic would therefore be negligible to slight as determined by the IEMA GUidelines, thus the effect would be not significant.

4.11 Summary

4.11.1 This chapter assesses the likely significant traffic and transport effects resulting from the Proposed Development. Assessments have been undertaken using current guidance documents and best practice and baseline conditions have been established through industry standard methods.

4.11.2 K4 will not generate any regular traffic when it is operational. The ES Chapter therefore, considers the impact of K4 during the construction phase. The peak construction period is expected at the start of the programme when groundworks and foundation works are ongoing, this would be during 2019.

4.11.3 During construction, it is estimated there will be an average of 100 staff on site with a peak of up to 200 staff on site during the early groundworks and foundation works period.

4.11.4 It is estimated that construction of K4 will generate an average of 25 to 30 HGV deliveries per day (average of 50 to 60 HGV movements per day) throughout the 20-month construction period. During the early groundworks and foundation works period, this could peak at up to 40 HGV deliveries per day (up to 80 HGV movements per day). This includes all associated construction activities including all deliveries (including abnormal indivisible loads) and all removal of material / waste etc. The demolition of K1 does not form part of this application and so the vehicle movements associated with that is not included in these numbers.

4.11.5 Construction activities will be undertaken during normal construction working hours of 07:00 and 19:00 on weekdays and 07:00 to 16:00 on Saturdays and only very occasionally on Sundays where needs dictate, which is consistent with the K3 construction activities that are currently ongoing and were permitted as part of its planning consent.

4.11.6 In accordance with current guidance, this assessment has calculated that the construction traffic will have a negligible to slight impact on the adjacent highway network and nearby receptors. Thus, it is predicted that the construction traffic would not result in any significant effects. However, to ensure any effects are minimalised a

Construction Traffic Management Plan will be prepared and agreed with Highways Officers.

4.11.7 When the construction traffic is considered with traffic expected to be generated by cumulative sites, this assessment has calculated that the combined effect will have a negligible to slight impact on the adjacent highway network and nearby receptors. Thus, it is predicted that the cumulative traffic would not result in any significant effects.

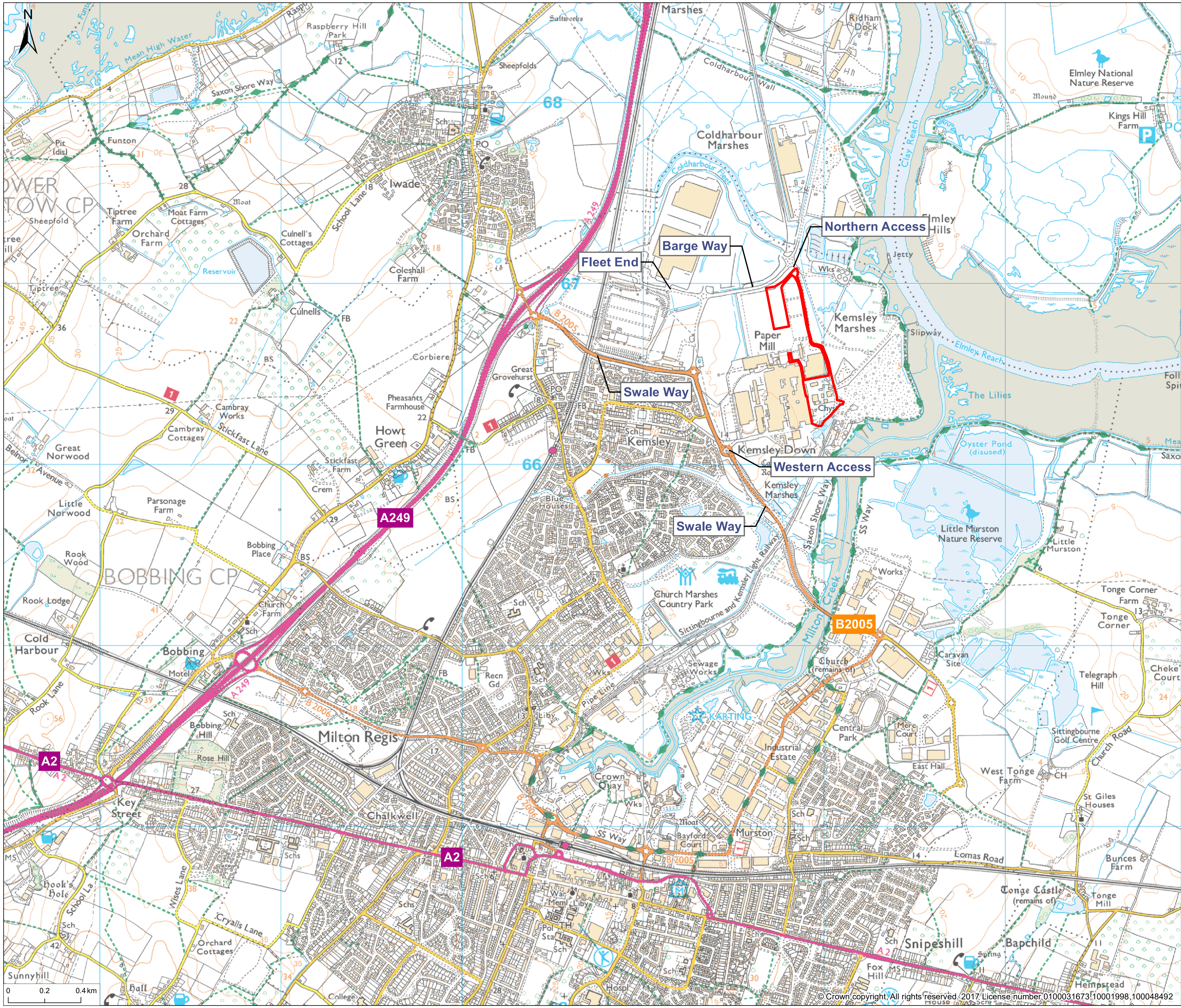
4.11.8 There would be no regular traffic generated when K4 is operational and traffic during decommissioning is predicted to be lower than that during construction and thus it is reasonable to assume the same conclusions can be drawn. Thus, it is predicted that the operational and decommissioning traffic would also not result in any significant effects.

References

4.1 Department for Communities and Local Government (DCLG) (2012): *National Planning Policy Framework*, London: DCLG

4.2 Institute for Environmental Management and Assessment (IEMA) (1993) *Guidance Note Number 1: Guidelines on the Environmental Assessment of Road Traffic*: IEMA

4.3 *Volume 11 – Environmental Impact Assessment, Design Manual for Roads and Bridges (DMRB)*: Highways Agency et al



Legend

Site Boundary

Notes
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Project	Kemsley K4
Title	Site Location Plan

Status	Drawn By:	PM/Checked By
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4.1

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5 Air Quality

5.1 Purpose of this Chapter

5.1.1 This chapter assesses the likely significant air quality effects resulting from the Proposed Development.

5.2 Regulatory and Policy Framework

5.2.1 There are three main aspects to the regulatory framework affecting potentially-polluting developments; the planning process determines whether and where the development can be located; building regulations control the design and construction of developments; and once built, regulation of pollution from the operation of certain prescribed processes is by the Environmental Permitting Regulations or by nuisance provisions for premises not operating prescribed processes. The relevant parts of the framework of pollution regulation, planning policy and relevant guidance is summarised below.

Industrial Emissions Directive Limits

5.2.2 The plant would be designed and operated in accordance with the requirements of the Industrial Emissions Directive (2010/75/EU) [Ref 5.1], known hereafter as the IED, which requires adherence to emission limits for a range of pollutants.

Air Quality Directive and Air Quality Standards Regulations

5.2.3 The 2008 Ambient Air Quality Directive (2008/50/EC) [Ref 5.2] aims to protect human health and the environment by avoiding, reducing or preventing harmful concentrations of air pollutants; it sets legally binding concentration-based limit values, as well as target values. There are also information and alert thresholds for reporting purposes. These are to be achieved for the main air pollutants: particulate matter (PM_{10} and $PM_{2.5}$), nitrogen dioxide (NO_2), sulphur dioxide (SO_2), ozone (O_3), carbon monoxide (CO), lead (Pb) and benzene. This Directive replaced most of the previous EU air quality legislation and in England was transposed into domestic law by the Air Quality Standards Regulations 2010 [Ref 5.3], which in addition incorporates the 4th Air Quality Daughter Directive (2004/107/EC) that sets targets for ambient air concentrations of certain toxic heavy metals (arsenic, cadmium and nickel) and polycyclic aromatic hydrocarbons (PAHs). Member states must comply with the limit values (which are legally binding on the Secretary of State) and the Government and devolved administrations operate various national ambient air quality monitoring networks to measure compliance and develop plans to meet the limit values.

UK Air Quality Strategy

5.2.4 The Environment Act 1995 established the requirement for the Government and the devolved administrations to produce a National Air Quality Strategy (AQS) for improving ambient air quality, the first being published in 1997 and having been revised several times since, with the latest published in 2007 [Ref 5.4]. The Strategy sets UK air quality standards and objectives for the pollutants in the Air Quality Standards Regulations plus

1,3-butadiene and recognises that action at national, regional and local level may be needed, depending on the scale and nature of the air quality problem.

5.2.5 Standards are concentrations of pollutants in the atmosphere which can broadly be taken to achieve a certain level of environmental quality. Standards, as the benchmarks for setting objectives, are set purely with regard to scientific evidence and medical evidence on the effects of the particular pollutant on health, or on the wider environment, as minimum or zero risk levels. Objectives are policy targets expressed as a concentration that should be achieved, all the time or for a percentage of time, by a certain date.

5.2.6 There is no legal requirement to meet objectives set within the UK AQS except where equivalent limit values are set within the EU Directives.

5.2.7 The 1995 Environment Act also established the UK system of Local Air Quality Management (LAQM), that requires local authorities to go through a process of review and assessment of air quality in their areas, identifying places where objectives are not likely to be met, then declaring Air Quality Management Areas (AQMAs) and putting in place Air Quality Action Plans to improve air quality. These plans also contribute, at local level, to the achievement of EU limit values. Defra is currently reviewing the LAQM process.

5.2.8 For the purposes of this assessment, the limit values set out in the Air Quality Standards Regulations 2010 and the objective levels specified under the current UK AQS have been used. There is no legal requirement to meet objectives set within the UK AQS except where equivalent limit values are set within the EU Directives.

5.2.9 The limit values and objectives relevant to this assessment are summarised in Table 5.1.

Pollutant	Averaging Period	Objectives/ Limit Values	Not to be Exceeded More Than
Nitrogen Dioxide (NO_2)	1 hour	200 $\mu g.m^{-3}$	18 times per calendar year
	Annual	40 $\mu g.m^{-3}$	-
Carbon Monoxide (CO)	Maximum daily running 8 hour mean	10,000 $\mu g.m^{-3}$	-
Particulate Matter (PM_{10})	Annual	40 $\mu g.m^{-3}$	-

Table 5.1 Summary of Relevant Air Quality Limit Values and Objectives

5.2.10 In July 2017, Defra published the 'UK plan for tackling roadside nitrogen dioxide concentrations'. This describes the Government's plan for bringing roads with NO_2 concentrations above the EU Limit Value back into compliance within the shortest possible time. This plan has since been found to be unlawful and the UK Government has been instructed to prepare a supplementary plan by October 2018.

Environmental Protection Legislation

Environmental Permitting

5.2.11 Certain industrial installations are regulated under the Environmental Permitting (England and Wales) Regulations 2016, which implement the EU Directive 2008/1/EC concerning Integrated Pollution Prevention and Control ("the IPPC Directive"). The Environmental Permitting Regulations (EPR) define activities that require the operator to obtain an Environmental Permit from the EA.

5.2.12 EPR is a regulatory system to control the environmental and health impacts across all environmental media (using an integrated approach) of certain listed industrial activities, via a single permitting process. To gain a permit, operators have to demonstrate in their applications, in a systematic way, that the techniques they are using or are proposing to use for their installation are the Best Available Techniques (BAT) to prevent or minimise the effects of the activity on air, land and water taking account of relevant local factors. The permitting process also places a duty on the regulating body to ensure that the requirements of the IPPC Directive are included for permitted sites to which these apply.

5.2.13 It is a mandatory requirement of EPR that the Agency ensures that no single industrial installation regulated is the sole cause of a breach of a UK air quality objective. Additionally, the Agency has committed to guarantee that no installation will contribute significantly to a breach of a UK air quality objective.

5.2.14 To do this the Agency will ensure that BAT is used to deliver the maximum improvements to air quality where UK air quality objectives are in danger of being breached.

Planning Policies

National Policy Statements (NPS)

5.2.15 Section 5.2 of the Overarching National Policy Statement for Energy (EN-1) *Air quality and emissions* sets out the potential impacts associated with infrastructure development, what should be included in an ES and the role of the IPC (now the Secretary of State) in decision making and mitigation. It states "*The ES should describe:*

- *any significant air emissions, their mitigation and any residual effects distinguishing between the project stages and taking account of any significant emissions from any road traffic generated by the project;*
- *the predicted absolute emission levels of the proposed project, after mitigation methods have been applied;*
- *existing air quality levels and the relative change in air quality from existing levels; and*
- *any potential eutrophication impacts."*

5.2.16 Section 2.5 of the National Policy Statement for Fossil Fuel Electricity Generating Infrastructure (EN-2) follows a similar structure to EN-1 and refers to relevant sections of EN-1. The main difference is the Mitigation section which, for EN-3, will depend on the type and design of a generating station.

National Planning Policy Framework (NPPF)

5.2.17 The NPPF sets out 12 core land-use planning principles. The relevant core-principle in the context of this air quality assessment is that planning should *"contribute to conserving and enhancing the natural environment and reducing pollution"*. (Paragraph 17)

5.2.18 Under the heading 'Conserving and Enhancing the Natural Environment', the NPPF states:

> *"The planning system should contribute to and enhance the natural and local environment by:*
>
> …
>
> *preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability…* "(Paragraph 109)

National Planning Practice Guidance (NPPG)

5.2.19 The National Planning Practice Guidance (NPPG) was issued on-line in March 2014 and is updated periodically by government as a live document. The Air Quality section of the NPPG describes the circumstances when air quality, odour and dust can be a planning concern, requiring assessment.

5.2.20 The NPPG advises that whether or not air quality is relevant to a planning decision will depend on the proposed development and its location. Concerns could arise if the development is likely to generate air quality impact in an area where air quality is known to be poor. They could also arise where the development is likely to adversely impact upon the implementation of air quality strategies and action plans and/or, in particular, lead to a breach of EU legislation (including that applicable to wildlife).

5.2.21 The NPPG states that when deciding whether air quality is relevant to a planning application, considerations could include whether the development would:

- *"Significantly affect traffic in the immediate vicinity of the proposed development site or further afield. This could be by generating or increasing traffic congestion; significantly changing traffic volumes, vehicle speed or both; or significantly altering the traffic composition on local roads. Other matters to consider include whether the proposal involves the development of a bus station, coach or lorry park; adds to turnover in a large car park; or result in construction sites that would generate large Heavy Goods Vehicle flows over a period of a year or more.*

- *Introduce new point sources of air pollution. This could include furnaces which require prior notification to local authorities; or extraction systems (including chimneys) which require approval under pollution control legislation or biomass boilers or biomass-fuelled CHP plant; centralised boilers or CHP plant burning other fuels within or close to an air quality management area or introduce relevant combustion within a Smoke Control Area;*

- *Expose people to existing sources of air pollutants. This could be by building new homes, workplaces or other development in places with poor air quality.*

- *Give rise to potentially unacceptable impact (such as dust) during construction for nearby sensitive locations.*

- *Affect biodiversity. In particular, is it likely to result in deposition or concentration of pollutants that significantly affect a European-designated wildlife site, and is not directly connected with or necessary to the management of the site, or does it otherwise affect biodiversity, particularly designated wildlife sites."*

5.2.22 The NPPG provides advice on how air quality impacts can be mitigated and notes *"Mitigation options where necessary will be locationally specific, will depend on the proposed development and should be proportionate to the likely impact. It is important therefore that local planning authorities work with applicants to consider appropriate mitigation so as to ensure the new development is appropriate for its location and unacceptable risks are prevented. Planning conditions and obligations can be used to secure mitigation where the relevant tests are met."*

Swale Borough Council's Development Plan

5.2.23 The Bearing Fruits 2031: The Swale Borough Local Plan was formally adopted by the council on 26 July 2017. In relation to air quality, paragraph 7.7.3 of the plan states that *"Transport and industry are the Borough's main air pollution emitters"*. It refers to the need for assessment where developments could have an impact on air quality levels within the AQMAs.

5.2.24 There are no specific policies in the plan guiding industrial development in relation to air quality impacts; the policies generally focus on managing and controlling the impacts of development arising from traffic emissions. In particular, in relation to managing traffic impacts, policy DM6 states that air quality management and environmental quality should be integrated *"into the location and design of, and access to, development and, in so doing, demonstrate that proposals do not worsen air quality to an unacceptable degree especially taking into account the cumulative impact of development schemes within or likely to impact on Air Quality Management Areas"*.

5.2.25 In this case, the key pollutants from the proposed development are oxides of nitrogen which are also a key concern for traffic emissions. While policy DM6 is not strictly relevant to this development, the assessment has regard for the cumulative impact of the development on the surrounding area including the designated AQMAs.

5.3 Assessment Methodology

Scoping and Consultation

5.3.1 Neither the NPPF nor the NPPG is prescriptive on the methodology for assessing air quality effects or describing significance; practitioners use guidance provided by Defra and non-governmental organisations, including Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM). However, the NPPG does advise that:

"Assessments should be proportionate to the nature and scale of development proposed and the level of concern about air quality, and because of this are likely to be locationally specific. The scope and content of supporting information is therefore best discussed and agreed between the local planning authority and applicant before it is commissioned."

5.3.2 It lists a number of areas that might be usefully agreed at the outset.

5.3.3 This air quality assessment covers the elements recommended in the NPPG. The approach is consistent with the EPUK & IAQM Land-Use Planning & Development Control: Planning For Air Quality document [Ref 5.6], the IAQM Guidance on the assessment of dust from demolition and construction [Ref 5.7] and, where relevant, Defra's Local Air Quality Management Technical Guidance: LAQM.TG16 [Ref 5.8]. It includes the key elements listed below:

- Establishing the background Ambient Concentration (AC).
- Qualitative assessment of likely construction-phase impacts with mitigation and controls in place.
- Quantitative assessment of the effects from the completed development on local air quality from stack emissions utilising a "new generation" Gaussian dispersion model, ADMS 5. The assessment has considered both the Process Contributions (PC) from the facility in isolation, and the resultant Predicted Environmental Concentrations (PEC) that includes the AC.

5.3.4 The EPUK & IAQM guidance [Ref 5.6, paragraph 7.9] advises that the organisation engaged in assessing the overall risks should hold relevant qualifications and/or extensive experience in undertaking air quality assessments. The RPS air quality team members involved at various stages of this assessment have professional affiliations that include Fellow and Member of the Institute of Air Quality Management, Chartered Chemist, Chartered Scientist, Chartered Environmentalist and Member of the Royal Society of Chemistry and have the required academic qualifications for these professional bodies. In addition, the Director responsible for authorising all deliverables has over 20 years' experience. Appendix 1.1 provides CVs of those involved in this assessment.

5.3.5 The scope and methodology for the air quality assessment, as set out in this chapter, was agreed with the Environmental Protection Team Leader at Mid Kent Environmental Health. A copy of the consultation emails are shown in Appendix 5.1.

Establishing Baseline Conditions

5.3.6 In urban areas, pollutant concentrations are primarily determined by the balance between pollutant emissions that increase concentrations, and the ability of the atmosphere to reduce and remove pollutants by dispersion, advection, reaction and deposition. An atmospheric dispersion model is a practical way to simulate these complex processes; such a model requires a range of input data, which can include emissions rates, meteorological data and local topographical information. The model used and the input data relevant to this assessment are described in the following sections.

5.3.7 The atmospheric pollutant concentrations depend not only on local sources, but also on regional pollution and pollution from more remote sources brought in on the incoming air mass. This background contribution needs to be added to the fraction from the modelled sources, and is usually obtained from measurements or estimates of urban background concentrations for the area in locations that are not directly affected by local emissions sources.

5.3.8 Background pollution levels have been derived from consideration of Air Quality Review & Assessment findings and assessment of existing local air quality through a review of available air quality monitoring and Defra background map data in the vicinity of the proposed site.

Assessment of Effects

Construction Phase

5.3.9 Regarding exhaust emissions from construction-related vehicles (contractors' vehicles and Heavy Goods Vehicles (HGVs), diggers, and other diesel-powered vehicles), these are unlikely to have a significant impact on local air quality [Ref 5.6] except for large, long-term construction sites: the EPUK & IAQM *Land-Use Planning & Development Control: Planning For Air Quality* document [Ref 5.6] indicates in Table 6.2 that air quality assessments should include developments increasing annual average daily Heavy Duty Vehicle (HDV) traffic flows on the local road network by more than 25 within or adjacent to an AQMA and more than 100 elsewhere. Construction-related traffic is expected to access the Site via the A249 and the M2. Neither route is located within a designated AQMA. There will also be movements within the site, between the laydown/compound area and the footprint of K4; however, this internal road is located well away from sensitive receptors and so has not been assessed.

5.3.10 The average number of two-way HGV movements generated by construction activities is estimated at 60 per day. The indicative criterion of 100 vehicles outside an AQMA is therefore not exceeded. When the HGV movements are averaged across the year, taking into account non-working days, the increase in the annual average daily traffic is even lower.

5.3.11 The traffic flows are expected to be significantly lower on other routes other than the A249 and the M2 as the traffic redistributes. Therefore, the aforementioned EPUK & IAQM traffic-flow thresholds are not expected to be exceeded for any individual road during the construction phase of this project and the impacts of construction-vehicle exhaust emissions have not been assessed specifically and can be considered to be negligible.

5.3.12 Dust is the generic term used to describe particulate matter in the size range 1-75 µm in diameter [Ref 5.9]. Particles greater than 75 µm in diameter are termed grit rather than dust. Dusts can contain a wide range of particles of different sizes. The normal fate of suspended (i.e. airborne) dust is deposition. The rate of deposition depends largely on the size of the particle and its density; together these influence the aerodynamic and gravitational effects that determine the distance it travels and how long it stays suspended in the air before it settles out onto a surface. In addition, some particles may agglomerate to become fewer, larger particles; whilst others react chemically.

5.3.13 The effects of dust are linked to particle size and two main categories are usually considered:

- PM_{10} particles, those up to 10 µm in diameter, remain suspended in the air for long periods and are small enough to be breathed in and so can potentially impact on health; and

- Dust, generally considered to be particles larger than 10 µm which fall out of the air quite quickly and can soil surfaces (e.g. a car, window sill, laundry). Additionally, dust can potentially have adverse effects on vegetation and fauna at sensitive habitat sites.

5.3.14 The IAQM Guidance on the assessment of dust from demolition and construction sets out 350 m as the distance from the site boundary and 50 m from the site traffic route(s) up to 500 m of the entrance, within which there could potentially be nuisance dust and PM_{10} effects on human receptors. For sensitive ecological receptors, the corresponding distances are 50 m in both cases. (In this particular application. These distances are set to be deliberately conservative. These distances are set to be deliberately conservative.

5.3.15 Concentration-based limit values and objectives have been set for the PM_{10} suspended particle fraction, but no statutory or official numerical air quality criterion for dust annoyance has been set at a UK, European or World Health Organisation (WHO) level. Construction dust assessments have tended to be risk based, focusing on the appropriate measures to be used to keep dust impacts at an acceptable level.

5.3.16 The IAQM dust guidance aims to estimate the impacts of both PM_{10} and dust through a risk-based assessment procedure. The IAQM dust guidance document states on page 4: *"The impacts depend on the mitigation measures adopted. Therefore the emphasis in this document is on classifying the risk of dust impacts from a site, which will then allow mitigation measures commensurate with that risk to be identified."*

5.3.17 The IAQM dust guidance provides a methodological framework, but notes that professional judgement is required to assess effects: *"This is necessary, because the diverse range of projects that are likely to be subject to dust impact assessment means that it is not possible to be prescriptive as to how to assess the impacts. Also a wide range of factors affect the amount of dust that may arise, and these are not readily quantified."*

5.3.18 Consistent with the recommendations in the IAQM dust guidance, a risk-based assessment has been undertaken for the development, using the well-established source-pathway-receptor approach:

- The dust impact (the change in dust levels attributable to the development activity) at a particular receptor will depend on the magnitude of the dust source and the effectiveness of the pathway (i.e. the route through the air) from source to receptor.

- The effects of the dust are the results of these changes in dust levels on the exposed receptors, for example annoyance or adverse health effects. The effect experienced for a given exposure depends on the sensitivity of the particular receptor to dust. An assessment of the overall dust effect for the area as a whole has been made using professional judgement taking into account both the change in dust levels (as indicated by the Dust Impact Risk for individual receptors) and the absolute dust levels, together with the sensitivities of local receptors and other relevant factors for the area.

5.3.19 The detail of the dust assessment methodology is provided in Appendix 5.3.

5.3.20 The assessment methodology does not consider the air quality impacts of dust from any contaminated land or buildings; the issue of contamination is dealt with in Chapter 8: Ground Conditions.

Operational Phase

Summary of Key Pollutants Considered

5.3.21 As set out in paragraph 5.3.9, the EPUK & IAQM *Land-Use Planning & Development Control: Planning For Air Quality* document indicates that air quality assessments should include developments increasing annual average daily HDV flows by more than 25 within or adjacent to an AQMA and more than 100 elsewhere. For Light Duty Vehicle (LDV) traffic flows, the increase is more than 100 within or adjacent to an AQMA and more than 500 elsewhere. Once completed, there will be 4 employees accessing the site on a daily basis and occasional maintenance vehicle movements. As such, the EPUK & IAQM thresholds are highly unlikely to be exceeded; therefore, the impacts from operational-vehicle exhaust emissions have not been assessed and can be considered negligible. The assessment of the completed development focuses on emissions from K4.

5.3.22 The key pollutant emissions associated with combustion processes in general are oxides of nitrogen (NO_X), CO, SO_2, volatile organic compounds (VOCs), water and other pollutants in trace quantities. However, for gas turbines specifically, the pollutants of local concern are NO_x and CO.

5.3.23 Emissions of total NO_x from combustion sources comprise nitric oxide (NO) and NO_2. The NO oxidises in the atmosphere to form NO_2. The assessment of operational impacts from K4 therefore focuses on changes in NO_2 and CO concentrations at ground level receptors. Emissions for CO_2 are considered in Chapter 6 Greenhouse Gases and Climate Change.

Dispersion Model Selection

5.3.24 A number of commercially available dispersion models are able to predict ground level concentrations arising from emissions to atmosphere from elevated point sources. Modelling for this study has been undertaken using ADMS 5, a version of the ADMS (Atmospheric Dispersion Modelling System) developed by Cambridge Environmental Research Consultants (CERC) that models a wide range of buoyant and passive releases to atmosphere either individually or in combination. The model calculates the mean concentration over flat terrain and also allows for the effect of plume rise, complex terrain, buildings and deposition. Dispersion models predict atmospheric concentrations within a set level of confidence and there can be variations in results between models under certain conditions; the ADMS 5 model has been formally validated and is widely used in the UK and internationally for regulatory purposes.

5.3.25 ADMS comprises a number of individual modules each representing one of the processes contributing to dispersion or an aspect of data input and output. Amongst the features of ADMS are:

- An up-to-date dispersion model in which the boundary layer structure is characterised by the height of the boundary layer and the Monin-Obukhov length, a length scale dependent on the friction velocity and the heat flux at the surface. This approach allows the vertical structure of the boundary layer, and hence concentrations, to be calculated more accurately than does the use of Pasquill-Gifford stability categories, which were used in many previous models (e.g. ISCST3). The restriction implied by the Pasquill-Gifford approach that the dispersion parameters are independent of height is avoided. In ADMS the concentration distribution is Gaussian in stable and neutral conditions, but the vertical distribution is non-Gaussian in convective conditions, to take account of the skewed structure of the vertical component of turbulence;

- A number of complex modules including the effects of plume rise, complex terrain, coastlines, concentration fluctuations and buildings; and

- A facility to calculate long-term averages of hourly mean concentration, dry and wet deposition fluxes and radioactivity, and percentiles of hourly mean concentrations, from either statistical meteorological data or hourly average data.

<u>Meteorological Data</u>

5.3.26 The most important meteorological parameters governing the atmospheric dispersion of pollutants are wind direction, wind speed and atmospheric stability as described below:

- Wind direction determines the sector of the compass into which the plume is dispersed;

- Wind speed affects the distance that the plume travels over time and can affect plume dispersion by increasing the initial dilution of pollutants and inhibiting plume rise; and

- Atmospheric stability is a measure of the turbulence of the air, and particularly of its vertical motion. It therefore affects the spread of the plume as it travels away from the source. New generation dispersion models, including ADMS, use a parameter known as the Monin-Obukhov length that, together with the wind speed, describes the stability of the atmosphere.

5.3.27 For meteorological data to be suitable for dispersion modelling purposes, a number of meteorological parameters need to be measured on an hourly basis. These parameters include wind speed, wind direction, cloud cover and temperature. There are only a limited number of sites where the required meteorological measurements are made.

5.3.28 The year of meteorological data that is used for a modelling assessment can have a significant effect on source contribution concentrations. Dispersion model simulations have been performed using five years of data from Gravesend between 2012 and 2016.

5.3.29 Wind roses have been produced for each of the years of meteorological data used in this assessment and are presented in Figure 5.1.

<u>Surface Roughness</u>

5.3.30 The roughness of the terrain over which a plume passes can have a significant effect on dispersion by altering the velocity profile with height, and the degree of atmospheric turbulence. This is accounted for by a parameter called the surface roughness length.

5.3.31 A surface roughness length of 0.5 m has been used within the model to represent the average surface characteristics across the study area.

Terrain

5.3.32 A complex terrain file has been included within the model to ensure that the relative height between receptors and the source of emissions is taken into account.

Building Wake Effects

5.3.33 The movement of air over and around buildings generates areas of flow circulation, which can lead to increased ground level concentrations in the building wakes. Where building heights are greater than about 30 - 40% of the stack height, downwash effects can be significant. Chapter 2 provides a site layout plan. The buildings associated with the Proposed Development that have been included within the model are provided in Table 5.2.

	Building Name	Approx. location of centre (x,y)	Length (m)	Width (m)	Height (m)
K4	HRSG	591968,166308	30.8	16.5	35.2
	Turbine Hall	591970,166290	25.3	19.8	16.5
	Dump Condenser	591994, 166280	16.5	13.2	8.8
	Equipment Room	592029, 166314	23.1	13.75	9.9
	Gas Turbine	591991, 166312	16.5	8.8	9.9
	Fin Fan Cooler	592009, 166281	11.55	7.15	7.7
	Generator	592000, 166315	5.5	4.4	6.6
K1/K2	Deaerator	592033, 166422	25	9	25
	Control Block	592028, 166392	30	36	15
	Gas Turbine House 1	592003, 166384	22	8	16
	Gas Turbine House 2	591987, 166378	22	8	16
	Package boilers	591949, 166368	35	35	13
	PRW storage plant	591939, 166443	15	41	20
	FBC boiler house	591973, 166413	26	15	28
	Fabric filters	591922, 166421	10	4	18
	Ash hoppers	591930, 166411	12	5	25
K3	Air Cooled Condenser	592098, 166589	29	80	27
	Turbine Hall	592150, 166634	40	27	23
	Flue Gas Treatment	592166, 166599	16	44	23
	Flue Gas Treatment	592181, 166615	24	43	31
	Boiler Hall	592192, 166639	30	61	50
	Bunker Hall	592223, 166662	40	72	36
	Tipping Hall	592253, 166692	46	51	21
	Bottom Ash Hall	592193, 166697	16	32	21

Table 5.2 Proposed Buildings Included Within the Model

Stack Parameters and Emissions Rates Used in Model

5.3.34 Stack and emissions characteristics modelled are provided in Table 5.3. Two locations of the K4 CHP stack are currently under consideration. For the purposes of modelling, it has been assumed that pollutant emission concentrations are at the limit set in the IED. As this is the maximum concentration that could be permitted, this is a worst case assumption. The locations of the stacks are shown in Figure 5.2.

5.3.35 For the purposes of determining the cumulative impacts, K1, K2 and K3 have been included in the model and the resulting concentrations added to the measured background concentration. The assessment can be considered conservative as emissions from K1 and K2 are already included to an extent within the background concentration and, by including K1 and K2 explicitly within the model, there is potential for double-counting of the impacts. K4 will replace K1; however, the two plant may run simultaneously for a short period, likely to be a matter of months. The inclusion of both K4 and K1 operating continuously, all year round, in the model is therefore a worst case assumption.

Parameter	Unit	K4 – Proposed CHP	K1 – Existing CHP	K2 – Fluidised Bed Combustor	K3 – Sustainable Energy Plant
Grid coordinates	x,y	Stack Location 1: 591953.369,166305.606 Stack Location 2: 591968.661,166308.668	591975, 166347	591914, 166437	592135, 166569
Stack height	m	70	75	72	90
Internal diameter	m	4	3.6	1.4	3.25
Efflux velocity	$m.s^{-1}$	15	18.65	14.95	19.06
Efflux temperature	°C	100	100	160	140
Actual Volumetric flow	$m^3.s^{-1}$	158.64	190.0	23.0	158.42
O2	%	12.75	10	11	8.1
Water	%	8.01	20	26	17.8
NOx Emission Concentration Limit	$mg.Nm^{-3}$	50 (15% O_2)	90 (15% O_2)	200 (11% O_2)	200 (11% O_2)
CO Emission Concentration Limit	$mg.Nm^{-3}$	100 (15% O_2)	100 (15% O_2)	50 (11% O_2)	50 (11% O_2)
Normalised Volumetric Flow (0°C, dry)	$Nm^3.s^{-1}$	146.87 (15% O_2)	203.96 (15% O_2)	10.73 (11% O_2)	110.98 (11% O_2)
NOx Mass Emission Rate	$g.s^{-1}$	7.3	18.4	2.2	22.2
CO Mass Emission Rate	$g.s^{-1}$	14.7	20.4	0.5	5.6

Table 5.3 Stack and Emissions Characteristics – Main Stacks

5.3.36 In addition, backup power will be provided by the existing K1 boilers and a new boiler. The backup boilers will not run when the K4 CHP is running. The inclusion of the boilers running at the same time as K4 and K1 in the model is a worst case assumption. It should be noted that the existing K1 boilers have been modelled using the existing emissions used within the modelling to support the K1 permit application. In reality, the existing K1 boilers will be upgraded and emissions should be lower than modelled in this assessment. For the purposes of the modelling, it has been assumed that the boilers will operate for 500 hours, distributed evenly across the year.

Parameter	Unit	K4 – Proposed Boiler	K1 – Existing Boilers
Grid coordinates	x,y	591950, 166317	591950, 166325 591977, 166282
Stack height	m	35	72
Internal diameter	m	0.8	1.7
Efflux velocity	$m.s^{-1}$	9	18.1
Efflux temperature	° C	145	215
Actual Volumetric flow	$m^3.s^{-1}$	6	41
O2	%	2	4.5
Water	%	5.5	5.5
NOx Emission Concentration Limit	$mg.Nm^{-3}$	100 (3% O_2)	200 (3% O_2)
CO Emission Concentration Limit	$mg.Nm^{-3}$	N/A	300 (3% O_2)
Normalised Volumetric Flow (0^0C, dry)	$Nm^3.s^{-1}$	3.91	19.87
NOx Mass Emission Rate	$g.s^{-1}$	0.4	4.0
CO Mass Emission Rate	$g.s^{-1}$	N/A	6.0

Table 5.4 Stack and Emissions Characteristics – Package Boilers

<u>Modelled Scenarios</u>

5.3.37 The modelled scenarios are summarised below:

- Proposed Development - K4 with the modelled K2 and K3 included in the ambient concentration;
- Package Boilers - Proposed K4 boiler and existing K1 boilers; and

- Simultaneous Operation of K1, K2, K3 and K4.

Stack Height Determination

5.3.38 Gas is a clean-burning fuel; nevertheless there is a need to discharge the flue gases through an elevated stack to allow dispersion and dilution of the residual combustion emissions. The stack needs to be of sufficient height to ensure that pollutant concentrations are acceptable by the time they reach ground level. The stack also needs to be high enough to ensure that releases are not within the aerodynamic influence of nearby buildings, or else wake effects can quickly bring the undiluted plume down to the ground.

5.3.39 A stack height determination has been undertaken to identify the stack height required to overcome the wake effects of nearby buildings and to establish the height at which there is minimal additional environmental benefit associated with the cost of further increasing the stack. The Environment Agency removed its detailed guidance, Horizontal Guidance Note EPR H1 [Ref 5.10], for undertaking risk assessments on 1 February 2016; however, the approach used here by RPS is consistent with that EA guidance which required the identification of *"an option that gives acceptable environmental performance but balances costs and benefits of implementing it."*

5.3.40 The stack height determination involved running a series of atmospheric dispersion modelling simulations to predict the ground-level concentrations with the stack at different heights. The results of the stack height determination are provided in Appendix 5.4.

NO_x to NO_2 Assumptions for Annual-Mean Calculations

5.3.41 Total conversion (i.e. 100%) of NO to NO_2 is sometimes used for the estimation of the absolute upper limit of the annual mean NO_2. This technique is based on the assumption that all NO emitted is converted to NO_2 before it reaches ground level. However, in reality the conversion is an equilibrium reaction and even at ambient concentrations a proportion of NO_x remains in the form of NO. Total conversion is, therefore, an unrealistic assumption, particularly in the near field [Ref 5.11, page 47]. While this approach is useful for screening assessments, it is not appropriate for detailed assessments.

5.3.42 Historically, the Environment Agency has recommended that for a 'worse case scenario', a 70% conversion of NO to NO_2 should be considered for calculation of annual average concentrations. If a breach of the annual average NO_2 objective/limit value occurs, the Environment Agency requires a more detailed assessment to be carried out with operators asked to justify the use of percentages lower than 70%.

5.3.43 Following the withdrawal of the Environment Agency's H1 guidance document, there is no longer an explicit recommendation; however, for the purposes of this detailed assessment, a 70% conversion of NO to NO_2 has been assumed for annual average NO_2 concentrations in line with the Environment Agency's historic recommendations.

NO_x to NO_2 Assumptions for Hourly-Mean Calculations

5.3.44 An assumed conversion of 35% follows the Environment Agency's recommendations [Ref 5.12] for the calculation of 'worse case' scenario short-term NO_2 concentrations.

Modelling of Long-term and Short-term Emissions

5.3.45 Long-term (annual-mean) NO_2 has been modelled for comparison with the relevant annual mean objectives.

5.3.46 For short-term NO_2, the objective is for the hourly-mean concentration not to exceed 200 $\mu g.m^{-3}$ more than 18 times per calendar year. As there are 8,760 hours in a non-leap year, the hourly-mean concentration would need to be below 200 $\mu g.m^{-3}$ in 8,742 hours, i.e. 99.79% of the time. Therefore, the 99.79th percentile of hourly NO_2 has been modelled.

Significance Criteria

Construction Phase

5.3.47 Dust impact risk categories have been determined for demolition, earthworks, construction and trackout. These have been used to define the appropriate site-specific mitigation measures based on those described in the IAQM dust guidance. The guidance states that provided the mitigation measures are successfully implemented, the resultant effects of the dust exposure will normally be "not significant".

Operational Phase

5.3.48 The EPUK & IAQM Land-Use Planning & Development Control: Planning For Air Quality document advises that:

> *"The significance of the effects arising from the impacts on air quality will depend on a number of factors and will need to be considered alongside the benefits of the development in question. Development under current planning policy is required to be sustainable and the definition of this includes social and economic dimensions, as well as environmental. Development brings opportunities for reducing emissions at a wider level through the use of more efficient technologies and better designed buildings, which could well displace emissions elsewhere, even if they increase at the development site. Conversely, development can also have adverse consequences for air quality at a wider level through its effects on trip generation."*

5.3.49 When describing the air quality impact at a sensitive receptor, the change in magnitude of the concentration should be considered in the context of the absolute concentration at the sensitive receptor. Table 5.4 provides the EPUK & IAQM approach for describing the long- human-health air quality impacts on sensitive receptors in the surrounding area.

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

Table 5.5 Annual-mean Descriptors for Individual Sensitive Receptors

5.3.50 The following notes accompany Table 5.5:

(1) AQAL = Air Quality Assessment Level, which may be an air quality objective, EU limit or target value, or an Environment Agency 'Environmental Assessment Level (EAL)'.

(2) The table is intended to be used by rounding the change in percentage pollutant concentration to whole numbers, which then makes it clearer which cell the impact falls within. The user is encouraged to treat the numbers with recognition of their likely accuracy and not assume a false level of precision. Changes of 0%, i.e. less than 0.5% will be described as negligible.

(3) The table is only designed to be used with annual mean concentrations.

(4) Descriptors for individual receptors only; the overall significance is determined using professional judgement. For example, a 'moderate' adverse impact at one receptor may not mean that the overall impact has a significant effect. Other factors need to be considered.

(5) When defining the concentration as a percentage of the AQAL, use the 'without scheme' concentration where there is a decrease in pollutant concentration and the 'with scheme;' concentration for an increase.

(6) The total concentration categories reflect the degree of potential harm by reference to the AQAL value. At exposure less than 75% of this value, i.e. well below, the degree of harm is likely to be small. As the exposure approaches and exceeds the AQAL, the degree of harm increases. This change naturally becomes more important when the result is an exposure that is approximately equal to, or greater than the AQAL.

(7) It is unwise to ascribe too much accuracy to incremental changes or background concentrations, and this is especially important when total concentrations are close to the AQAL. For a given year in the future, it is impossible to define the new total concentration without recognising the inherent uncertainty, which is why there is a category that has a range around the AQAL, rather than being exactly equal to it.

5.3.51 The human-health impact descriptors above apply at individual receptors. The EPUK & IAQM guidance states that the impact descriptors "*are not, of themselves, a clear and unambiguous guide to reaching a conclusion on significance. These impact descriptors are intended for application at a series of individual receptors. Whilst it maybe that there are* *'slight', 'moderate' or 'substantial' impacts at one or more receptors, the overall effect may not necessarily be judged as being significant in some circumstances."*

5.3.52 The above criteria and matrix are for assessing the long-term impacts; for short term impacts the EPUK & IAQM guidance states in paragraphs 6.36 and 6.39 that:

> *"The Environment Agency uses a threshold criterion of 10% of the short term AQAL as a screening criterion for the maximum short term impact. This is a reasonable value to take and this guidance also adopts this as a basis for defining an impact that is sufficiently small in magnitude to be regarded as having an insignificant effect. Background concentrations are less important in determining the severity of impact for short-term concentrations, not least because the peak concentrations attributable to the source and the background are not additive.*
>
> *Where such peak short term concentrations from an elevated source are in the range 10-20% of the relevant AQAL, then their magnitude can be described as small, those in the range 20-50% medium and those above 50% as large. These are the maximum concentrations experienced in any year and the severity of this impact can be described as slight, moderate and substantial respectively, without the need to reference background or baseline concentrations. That is not to say that background concentrations are unimportant, but they will, on an annual average basis, be a much smaller quantity than the peak concentration caused by a substantial plume and it is the contribution that is used as a measure of the impact, not the overall concentration at a receptor. This approach is intended to be a streamlined and pragmatic assessment procedure that avoids undue complexity."*

5.3.53 Professional judgement by a competent, suitably qualified professional is required to establish the significance associated with the consequence of the impacts. This judgement is likely to take into account the extent of the current and future population exposure to the impacts and the influence and/or validity of any assumptions adopted during the assessment process.

Limitations and Assumptions

5.3.54 All air quality assessment tools, whether models or monitoring measurements, have limitations. The choices that the practitioner makes in setting-up the model, choosing the input data, and selecting the baseline monitoring data will decide whether the final predicted impact should be considered a central estimate, or an estimate tending towards the upper bounds of the uncertainty range (i.e. tending towards worst-case).

5.3.55 The atmospheric dispersion model itself has limitations, due to it being a simplified version of the real situation: it uses a sophisticated set of mathematical equations to approximate the complex physical and chemical atmospheric processes taking place as a pollutant is released and as it travels to a receptor. The predictive ability of even the best model is limited by how well the turbulent nature of the atmosphere can be represented.

5.3.56 Each of the data inputs for the model, listed earlier, will also have some uncertainty associated with them. Where it has been necessary to make assumptions, these have mainly been made towards the upper end of the range informed by an analysis of relevant, available data.

5.3.57 The main components of uncertainty in the total predicted concentrations, made up of the background concentration and the modelled fraction, include those summarised in Table 5.6.

Concentration	Source of Uncertainty	Approach to Dealing with Uncertainty	Comments
Background Concentration	Characterisation of current baseline air quality conditions	The background concentration used within the assessment is the most conservative value from a comparison of measured and Defra mapped concentration estimates.	The background concentration is the major proportion of the total predicted concentration. The conservative assumptions adopted ensure that the background concentration used within the model should lead to a forecast concentration that is towards the top of the uncertainty range, rather than a central estimate.
	Characterisation of future baseline air quality (i.e. the air quality conditions in the future assuming that the development does not proceed)	The future background concentration used in the assessment is the same as the current background concentration and no reduction has been assumed. This is a conservative assumption as, in reality, background concentrations are likely to reduce over time as cleaner vehicle technologies form an increasing proportion of the fleet.	
Model Input/Output Data	Meteorological Data	Uncertainties arise from any differences between the conditions at the met station and the development site, and between the historical met years and the future years. These have been minimised by using meteorological data collated at a representative measuring site. The model has been run for 5 full years of meteorological conditions.	The modelled fraction is likely to contribute to the result being between a central estimate and the top of the uncertainty range.
	Receptors	The model has been run for a grid of receptors. In addition, receptor locations have been identified where concentrations are highest or where the greatest changes are expected.	
Cumulative Effects	Sources	K4 will replace K1; however, the plant may need to run for a short period prior to the commissioning of K4. Both plant are included within the model, operating continuously throughout the year.	The modelled cumulative fraction is likely to contribute to the result being toward the top of the uncertainty range.

Table 5.6 Approaches to Dealing with Uncertainty in the Assessment

5.3.58 The analysis of the component uncertainties indicates that, notwithstanding the limitations of the assessment, the predicted total concentration is likely to be towards the top of the uncertainty range rather than being a central estimate. The actual concentrations that will be found when the development is completed are unlikely to be higher than those presented within this report and are more likely to be lower.

5.4 Baseline Conditions

Overview

5.4.1 The background concentration often represents a large proportion of the total pollution concentration, so it is important that the background concentration selected for the assessment is realistic. The NPPG and EPUK & IAQM guidance highlight public information from Defra and local monitoring studies as potential sources of information on background air quality. LAQM.TG16 [Ref 5.8] recommends that Defra mapped concentration estimates are used to inform background concentrations in air quality modelling and states that: *"Where appropriate these data can be supplemented by and compared with local measurements of background, although care should be exercised to ensure that the monitoring site is representative of background air quality"*.

5.4.2 For this assessment, the background air quality has been characterised by drawing on information from the following public sources:

- Defra maps [Ref 5.13], which show estimated pollutant concentrations across the UK in 1 km grid squares; and
- Published results of local authority Review and Assessment (R&A) studies of air quality, including local monitoring and modelling studies.

5.4.3 A detailed description of how the baseline air quality has been derived for this Proposed Development is summarised in the following paragraphs.

Review and Assessment Process

5.4.4 Swale Borough Council (SBC), has designated four areas as AQMAs due to high levels of NO_2 attributable to road traffic:

- AQMA 1 – Newington AQMA, 6 km west of the Site.
- AQMA 2 – Ospinge Street, Faversham, 9.7 km southwest of the Site.
- AQMA 3 – East Street, Sittingbourne, 3 km south of the Site.
- AQMA 4 – St Pauls Street, Sittingbourne, 2.8 km south of the Site.

5.4.5 The Site is not located within a designated AQMA. As such, air quality at the Site is good.

Local Urban Background Monitoring

5.4.6 Monitors at urban background locations measure concentrations away from the local influence of emission sources. SBC does not operate any continuous automatic instruments in a background location. The nearest continuous automatic monitor in a background location is in the neighbouring borough of Maidstone, approximately 13 km from the Site; the urban background monitor at Chatham Luton was closed in 2014 and the urban background monitor at the Chaucer Technology School in Canterbury is approximately 23 km from the Site, considerably further away than the Maidstone site.

5.4.7 The most recent annual-mean concentrations measured at Maidstone are presented in Table 5.7. Values shown in italics have low data capture.

Monitor Name	Approx. Distance from the Site (km)	Pollutant	Concentration (µg.m^{-3})						
			2011	2012	2013	2014	2015	2016	Ave
Maidstone (Rural Background)	13	NO_2	12.5	13.7	13.5	12.3	12.6	12.0	12.8
		PM_{10}	15.8	17.5	18.8	25.3	*19.0*	20	19.4

Table 5.7 Automatically Monitored Urban Background Annual-Mean Concentrations

5.4.8 SBC manually monitors NO_2 concentrations at three urban background locations using passive diffusion tubes and the most recently measured annual-mean concentrations are presented in Table 5.8. All concentrations have been adjusted for bias in accordance with good practice.

Monitor Name	Approx. Distance from the Site (km)	x	y	Concentration (µg.m^{-3})					
				2011	2012	2013	2014	2015	Ave
SW34 - Hernehill Village Hall	15.5	606624	161110	14.9	13.1	11.9	10.0	10.2	12.0
SW77 - Kemsley Fields, Swale Way	0.4	591035	166521	32.3	31.3	34.5	30.9	29.7	31.7
SW88 - Sonara Way	2.5	589320	165047	-	27.2	*24.3*	*22.3*	19.5	23.3

Table 5.8 Passively Monitored Urban Background Annual-Mean NO_2 Concentrations

5.4.9 There has been no monitoring of carbon monoxide in the south-east in recent years.

Defra Mapped Concentration Estimates

5.4.10 Defra's total annual-mean NO_2 concentration estimates have been collected for the 1 km grid squares of the monitoring sites and the Site. Similarly, Defra's total annual-mean PM_{10} concentration estimates have been collected for the 1 km grid square of the Maidstone (rural) monitoring sites and the Site. The concentrations are summarised in Table 5.9 and Table 5.10.

Monitor Name	Approx. Distance to Site (km)	Concentration (µg.m^{-3})	
		Range of Monitored	Estimated Defra Mapped
Maidstone	13.0	12.0 - 13.7	13.6
SW34 -Hernehill Village Hall	15.5	10.0 – 14.9	11.8
SW77 - Kemsley Fields, Swale Way	0.4	29.7 – 34.5	16.5
SW88 - Sonara Way	2.5	19.5 – 27.2	16.8
The Site	-	-	16.5

Table 5.9 Defra Mapped Annual-Mean NO_2 Concentration Estimates

Monitor Name	Approx. Distance to Site (km)	Concentration (µg.m^{-3})	
		Range of Monitored	Estimated Defra Mapped
Maidstone	13.0	15.8 – 25.3	13.6
The Site	-	-	17.2

Table 5.10 Defra Mapped Annual-Mean PM_{10} Concentration Estimates

Appropriate Background Concentrations for the Development Site

5.4.11 For NO_2, the Defra mapped concentration estimates are within the range of the results from monitoring at the Maidstone continuous automatic monitor but below the range at the other monitoring sites. At the closest monitoring locations to the site, SW77 and SW88, Defra mapped concentration estimates are well below the bottom of the range. This suggests that the Defra mapped concentration estimate would not be conservative or representative of concentrations at the Site. On that basis, the average of the concentrations monitored at SW77 Kemsley Fields has been used as the background annual-mean concentration within the model.

5.4.12 For PM_{10}, the Defra mapped concentration estimate is below the range of the results from monitoring at the Maidstone continuous automatic monitor suggesting that the Defra mapped concentration estimate would not be conservative or representative of concentrations at the Site. On that basis, the average of the concentrations monitored at Maidstone has been used as the background annual-mean concentration within the model.

5.4.13 In the absence of local CO monitoring, the background annual-mean concentration has been extracted from the Defra mapped background concentration estimate and a maximum daily running 8-hour mean has been estimated as twice the annual-mean CO concentration [Ref 5.14].

5.5 Future baseline

5.5.1 Historically the view has been that background traffic-related NO_2 concentrations in the UK would reduce over time, due to the progressive introduction of improved vehicle technologies and increasingly stringent limits on emissions. However, the results of recent monitoring across the UK suggest that background annual-mean NO_2 concentrations have not decreased in line with expectations. Inspection of the results of local monitoring presented here indicates that there is no particular trend over time for concentrations of NO_2 or PM_{10} in the vicinity of the Site. To ensure that the assessment presents conservative results, no reduction in the background has been applied for future years. Furthermore, should k4 not proceed, K1 would continue to operate but the CHP would be upgraded to meet IED emissions limits. Table 5.11 summarises the annual-mean background concentrations for NO_2, PM_{10} and CO used in this assessment. Where short-term background concentrations are required, the annual-mean concentrations have been doubled.

Pollutant	Data Source	Concentration ($\mu g.m^{-3}$)	
		Long-term	Short-term
NO_2	SW77 - Kemsley Fields, Swale Way – diffusion tube	31.7	63.4
PM_{10}	Maidstone - continuous automatic monitor	19.4	-
CO	Defra Mapped Concentration Estimates (2001)	271	542

Table 5.11 Summary of Background Annual-Mean Concentrations used in the Assessment

Sensitive Receptors

5.5.2 The air quality assessment predicts the impacts at locations that could be sensitive to any changes. For human-health effects, such sensitive receptors should be selected where the public is regularly present and likely to be exposed over the averaging period of the objective. LAQM.TG16 [Ref 5.8] provides examples of exposure locations and these are summarised in Table 5.11.

Averaging Period	Objectives should apply at:	Objectives should generally not apply at:
Annual-mean	All locations where members of the public might be regularly exposed. Building façades of residential properties, schools, hospitals, care homes.	Building façades of offices or other places of work where members of the public do not have regular access. Hotels, unless people live there as their permanent residence. Gardens of residential properties. Kerbside sites (as opposed to locations at the building's façades), or any other location where public exposure is expected to be short-term.
Daily-mean	All locations where the annual-mean objective would apply, together with hotels. Gardens of residential properties.	Kerbside sites (as opposed to locations at the building's façade), or any other location where public exposure is expect to be short-term.
Hourly-mean	All locations where the annual and 24 hour mean would apply. Kerbside sites (e.g. pavements of busy shopping streets). Those parts of car parks, bus stations and railway stations etc which are not fully enclosed, where members of the public	Kerbside sites where the public would not be expected to have regular access.

	might reasonably be expected to spend one hour or more. Any outdoor locations to which the public might reasonably be expected to spend 1-hour or longer.	

Table 5.12: Examples of Where Air Quality Objectives Apply

5.5.3 The ground level concentrations have been modelled across a grid of 20 km by 20 km, with a spacing of 200 m, centred on the stack.

5.5.4 In addition, the effects of the proposed development have been assessed at the façades of a representative selection of discrete local existing receptors. All human receptors have been modelled at a height of 1.5 m, representative of typical head height. The locations of these discrete receptors are listed in Table 5.13 and illustrated in Figure 5.2.

Receptor ID	Receptor	Approx Distance to Site (m)	Grid Reference	
			x	y
R1	Recreation Way	670	591391	166087
R2	Premier Way	970	590967	166509
R3	Grovehurst Road	1,540	590404	166463
R4	Grovehurst Road	1,510	590746	165486
R5	Saffron Way	1,580	590924	165184
R6	Straymarsh Farm	4,200	592706	170419
R7	Wigeon Road	1,790	590368	167295
R8	Howt Green	2,250	589762	165887
R9	Lorimar Court	2,870	589256	165287
R10	Key Street	4,360	588127	164204
R11	Newlands Avenue	3,880	588855	163953
R12	East Street	2,870	591165	163568
R13	Frognam Gardens	4,900	595060	162529
R14	Hartlip Hill	7,600	584437	165225
R15	Rookery Close	6,500	588203	160829
R16	Wren's Hill	8,600	597167	159333
R17	Nunfield House	8,100	584481	163112
R18	Squirrels Farm	9,500	584146	160880

Table 5.13: Modelled Sensitive Receptors

5.5.5 The AQS NO_2 objectives for all the different averaging periods apply at the façades of the modelled sensitive receptors.

5.5.6 The receptor points selected for the assessment of sensitive ecological sites are described in Appendix 5.5.

5.6 Predicted Effects

Construction Effects

Construction Dust

5.6.1 The level and distribution of construction dust emissions will vary according to factors such as the type and size of dust, duration and location of dust-generating activity, weather conditions and the effectiveness of suppression methods.

5.6.2 The main effect of any dust emissions, if not mitigated, could be annoyance due to soiling of surfaces, particularly windows, cars and laundry. However, it is normally possible, by implementation of proper control, to ensure that dust deposition does not give rise to significant adverse effects, although short-term events may occur (for example, due to technical failure or exceptional weather conditions). The following assessment, using the IAQM methodology, predicts the risk of dust impacts and the level of mitigation that is required to control the residual effects to a level that is "not significant".

Risk of Dust Impacts

5.6.3 The IAQM dust guidance gives examples of the dust emission magnitudes for demolition, earthworks and construction activities and trackout. These example dust emission magnitudes are based on the site area, building volume, number of HDV movements generated by the activities and the materials used. These example magnitudes have been combined with details of the period of construction activities to provide the ranking for the source magnitude that is set out in Appendix 5. 3, Table A1.

Source

5.6.4 The site area is more than 10,000 m^2, the dust emission magnitude for the earthworks phase is classified as large.

5.6.5 The total volume of the buildings to be constructed would be between 25,000 and 100,000 m^3, the dust emission magnitude for the construction phase is classified as medium.

5.6.6 The maximum number of deliveries to site in any one day is expected to be more than 50 HDVs. The dust emission magnitude for trackout would be classified as large.

5.6.7 The source magnitudes in each of the four phases are summarised in Table 5.14.

Earthworks	Construction	Trackout
Large	Medium	Large

Table 5.14: Dust Emission Magnitude for Earthworks, Construction and Trackout

Pathway and Receptor

5.6.8 All earthworks and construction activities are assumed to occur within the site boundary. As such, receptors at distances within 20 m, 50 m, 100 m, 200 m and 350 m of the site boundary have been identified. The sensitivity of the area has been classified and the results are provided in Table 5.15 below.

Potential Impact	Sensitivity of the Surrounding Area	Reason for Sensitivity Classification
Dust Soiling	Low	There are no highly sensitive receptors in the area. The closest residential properties are more than 350 m from the Site (Appendix 5.3, Table A4)
Human Health	Low	Background PM_{10} concentrations for the assessment is below 24 µg.m^{-3} (Appendix 5.3, Table A5)
Ecology	Low	Scrub and Marshland (low sensitivity receptor) within 50 m of site. (Appendix 5.3, Table A6)

Table 5.15: Sensitivity of the Surrounding Area for Demolition, Earthworks and Construction

5.6.9 The Dust Emission Magnitude for trackout is classified as large and trackout may occur on roads up to 500 m from the site. The sensitivity of the area has been classified and the results are provided in Table 5.16 below.

Potential Impact	Sensitivity of the Surrounding Area	Reason for Sensitivity Classification
Dust Soiling	Low	The nearest highly sensitive receptors are the residential properties to the west of Swale Way. These are more than 500 m from the Site (Appendix 5.3, Table A4)
Human Health	Low	Background PM_{10} concentrations for the assessment is below 24 µg.m^{-3} (Appendix 5.3, Table A5)
Ecology	Low	Scrub and Marshland (low sensitivity receptor) within 50 m of site. (Appendix 5.3, Table A6)

Table 5.16: Sensitivity of the Surrounding Area for Trackout

<u>Overall Dust Risk</u>

5.6.10 The Dust Emission Magnitude has been considered in the context of the Sensitivity of the Area (Appendix 5.3, Tables A6 to A9) to give the Dust Impact Risk. Table 5.17 summarises the Dust Impact Risk for earthworks, construction and trackout without the implementation of mitigation.

Source	Earthworks	Construction	Trackout
Dust Soiling	Low	Low	Low
Human Health	Low	Low	Low
Ecology	Low	Low	Low
Risk	Low	Low	Low

Table 5.17 Dust Impact Risk for Earthworks, Construction and Trackout – Without Mitigation

5.6.11 Taking the site as a whole, the overall risk is deemed to be low. The mitigation measures appropriate to a level of risk for the site as a whole and for each of the phases are set out in Section 5.7.

5.6.12 Provided this package of mitigation measures is implemented, the residual construction dust effects will not be significant. The IAQM dust guidance states that "For almost all construction activity, the aim should be to prevent significant effects on receptors through the use of effective mitigation. Experience shows that this is normally possible. Hence the residual effect will normally be 'not significant'." The IAQM dust guidance recommends that significance is only assigned to the effect after the activities are considered with mitigation in place. The agreed mitigation measures would be included in a CEMP.

Operational Effects

Short-term Impacts

5.6.13 As outlined in section 5.3, the EPUK/IAQM guidance has different impact descriptors for long-term and short-term concentrations. Table 5.18 summarises the highest predicted short-term PC for NO_2 and CO anywhere across the modelled grid. As two stack layouts for the CHP were modelled the results presented throughout this chapter are for stack location 1 with the results for stack location 2 shown in brackets. The PEC is the K4 PC added to the background AC and the modelled contributions from K2 and K3. As set out in Section 5.5, the AC is a conservative estimate as, if K4 does not proceed, K1 would be upgraded to meet IED emission limits.

Averaging period (Pollutant)	AQAL ($\mu g.m^{-3}$)	Max PC ($\mu g.m^{-3}$)	Max PC as % of AQAL	Max PEC ($\mu g.m^{-3}$)	Max PEC as % of AQAL	Impact Descriptor	Potentially Significant Yes/No
1 hour 99.79th percentile (NO_2)	200	3.6 (3.8)	2 (2)	73.3 (73.4)	37 (37)	Negligible	No
Maximum daily running 8 hour mean (CO)	10,000	18.9 (20.0)	2 (2)	564.0 (564.4)	6 (6)	Negligible	No

Table 5.18: Highest Predicted Short-term Process Contribution ($\mu g.m^{-3}$)

5.6.14 The results show that the maximum short-term PC anywhere across the modelling grid is 2% of the relevant AQAL for both stack locations. The EPUK & IAQM short-term impact descriptor for a 2% increase in concentration is 'negligible'. As such, the short-term NO_2 impacts based on modelling across the grid would not be considered to be potentially significant.

5.6.15 It is useful to see the geographical extent of the short-term impact: Figure 5.3 shows the contour plot of 99.79th percentile hourly-mean NO_2 PCs and Figure 5.4 shows the contour plot of maximum 8-hour running mean CO PCs. These illustrate that the highest predicted concentration is not at a location where the public would be exposed.

5.6.16 Dispersion modelling has also been undertaken to predict the PCs from the proposed facility at discrete receptors around the Site, as shown in Figure 5.2. Table 5.19 summarises the short-term, predicted NO_2 PCs at the discrete sensitive receptors.

Receptors	Process Contribution (1 hour 99.79th percentile) µg.m-3	Process Contribution as % of AQAL	Impact Descriptor
R1	3.08 (3.07)	2 (2)	Negligible
R2	2.54 (2.48)	1 (1)	Negligible
R3	1.67 (1.64)	1 (1)	Negligible
R4	1.79 (1.76)	1 (1)	Negligible
R5	1.78 (1.77)	1 (1)	Negligible
R6	0.69 (0.72)	0 (0)	Negligible
R7	1.36 (1.35)	1 (1)	Negligible
R8	1.21 (1.20)	1 (1)	Negligible
R9	1.11 (1.11)	1 (1)	Negligible
R10	0.75 (0.74)	0 (0)	Negligible
R11	0.81 (0.81)	0 (0)	Negligible
R12	1.00 (1.01)	0 (1)	Negligible
R13	0.72 (0.71)	0 (0)	Negligible
R14	0.52 (0.51)	0 (0)	Negligible
R15	0.46 (0.46)	0 (0)	Negligible
R16	0.43 (0.43)	0 (0)	Negligible
R17	0.41 (0.41)	0 (0)	Negligible
R18	0.33 (0.33)	0 (0)	Negligible
Maximum	3.08 (3.07)	2 (2)	

Table5.19: Short-term Predicted NO_2 Concentrations ($\mu g.m^{-3}$) at Sensitive Receptors

5.6.17 The results show that the highest PC as a percentage of the AQAL at any discrete receptor is 2% at R1. The EPUK & IAQM impact descriptor for a 2% increase in concentration is 'negligible'. On that basis and using professional judgement, the short-term impacts are not considered to be significant.

5.6.18 Table 5.20 summarises the short-term, predicted CO PCs at the discrete sensitive receptors.

Receptors	Process Contribution (maximum 8-hour running mean) µg.m-3	Process Contribution as % of AQAL	Impact Descriptor
R1	15.21 (15.36)	0 (0)	Negligible
R2	12.63 (12.47)	0 (0)	Negligible
R3	7.79 (7.71)	0 (0)	Negligible
R4	9.76 (9.78)	0 (0)	Negligible
R5	8.77 (8.66)	0 (0)	Negligible
R6	3.71 (3.80)	0 (0)	Negligible
R7	6.45 (6.42)	0 (0)	Negligible
R8	5.89 (5.84)	0 (0)	Negligible
R9	6.14 (6.11)	0 (0)	Negligible
R10	6.20 (6.17)	0 (0)	Negligible
R11	7.66 (7.65)	0 (0)	Negligible
R12	4.63 (4.58)	0 (0)	Negligible
R13	2.58 (2.57)	0 (0)	Negligible
R14	2.09 (2.09)	0 (0)	Negligible
R15	1.84 (1.85)	0 (0)	Negligible
R16	1.52 (1.52)	0 (0)	Negligible
R17	2.52 (2.52)	0 (0)	Negligible
R18	2.94 (2.94)	0 (0)	Negligible
Maximum	15.21 (15.36)	0 (0)	

Table5.20: Short-term Predicted CO Concentrations (µg.m-3) at Sensitive Receptors

5.6.19 The results show that the highest PC as a percentage of the AQAL at any discrete receptor is 0% at R1 (for stack location 2). The EPUK & IAQM impact descriptor for a 0% increase in concentration is 'negligible'. On that basis and using professional judgement, the short-term impacts are not considered to be significant.

Long-term NO_2 Impacts

5.6.20 Table 5.21 summarises the highest long-term PEC anywhere across the modelled grid. The PEC is the K4 PC added to the background AC and the modelled contributions from K2 and K3. The assessment can be considered conservative as emissions from K1 and K2 are already included to an extent within the background concentration and, by including K1 and K2 explicitly within the model, there is potential for double-counting of the impacts. As set out in Section 5.5, the AC is a conservative estimate as, if K4 does not proceed, K1 would be upgraded to meet IED emission limits. The EPUK & IAQM long-term impact descriptor is also shown.

Averaging period (Pollutant)	AQAL (µg.m^{-3})	PC (µg.m^{-3})	PC as % of AQAL	Max PEC (µg.m^{-3})	Max PEC as % of AQAL	Impact Descriptor	Potentially Significant Yes/No
Annual mean (NO_2)	40	0.58 (0.60)	1 (2)	33.0 (33.1)	83 (83)	Negligible (Slight)	No

Table 5.21: Highest Long-term Predicted Environmental Concentrations

5.6.21 At the point of the highest long-term impact across the grid, the impact descriptor is 'negligible' for stack location 1 and 'slight adverse' for stack location 2. As such, the long-term NO_2 impacts based on modelling across the grid would not be considered to be potentially significant. However, once again, relevant public exposure would not occur at the location of the grid maximum, as shown on Figure 5.5.

5.6.22 Table 5.22 summarises the long-term maximum PC and PEC values at the selected discrete sensitive receptors. The EPUK & IAQM impact descriptors are also shown.

Receptors	Process Contribution (Annual mean)	Process Contribution as % of AQAL	Predicted Environmental Concentration (µg.m^{-3})	Impact Descriptor
R1	0.24 (0.24)	1 (1)	32.4 (32.4)	Negligible
R2	0.17 (0.17)	0 (0)	32.5 (32.5)	Negligible
R3	0.16 (0.16)	0 (0)	32.4 (32.4)	Negligible
R4	0.14 (0.14)	0 (0)	32.1 (32.1)	Negligible
R5	0.13 (0.13)	0 (0)	32.1 (32.1)	Negligible
R6	0.05 (0.05)	0 (0)	31.9 (31.9)	Negligible
R7	0.05 (0.05)	0 (0)	31.9 (31.9)	Negligible
R8	0.14 (0.14)	0 (0)	32.2 (32.1)	Negligible
R9	0.08 (0.08)	0 (0)	32.0 (32.0)	Negligible
R10	0.04 (0.04)	0 (0)	31.8 (31.8)	Negligible
R11	0.04 (0.04)	0 (0)	31.9 (31.9)	Negligible
R12	0.05 (0.05)	0 (0)	31.9 (31.9)	Negligible
R13	0.03 (0.03)	0 (0)	31.8 (31.8)	Negligible
R14	0.04 (0.04)	0 (0)	31.8 (31.8)	Negligible
R15	0.02 (0.02)	0 (0)	31.8 (31.8)	Negligible
R16	0.02 (0.02)	0 (0)	31.8 (31.8)	Negligible
R17	0.02 (0.02)	0 (0)	31.8 (31.8)	Negligible
R18	0.01 (0.01)	0 (0)	31.8 (31.8)	Negligible
Maximum	0.24 (0.24)	1 (1)	32.5 (32.5)	

Table 5.22: Long-term Predicted NO_2 Concentrations (µg.m^{-3}) at Sensitive Receptors

5.6.23 The highest process contribution of 0.24 µg.m^{-3} at R1 represents 1% of the annual-mean limit value of 40 µg.m^{-3}. Adding this to the background concentration gives a total predicted environmental concentration of 32.4 µg.m^{-3}, well below the AQAL. On this basis, the long-term impacts fall into the 'negligible' category.

5.6.24 The impacts at ecological receptors are shown in Appendix 5.5 where, for all pollutants and habitat sites, the operational effects are insignificant. The designated habitats sites are considered further in Chapter 10 Ecology.

Package Boilers

5.6.25 The results set out in Tables 5.18 and 5.19 assume that the CHP operates in every hour of the year. Package boilers will provide back-up power and have been assumed to be operational for no more than 500 hours of operation per year. Additional modelling of the package boilers has been undertaken assuming that these operate at the maximum number of 500 hours per annum.

5.6.26 The maximum predicted annual-mean NO_2 PC for the package boilers alone (K1 and K4 package boilers) is 0.10 µg.m^{-3}. When this is added to the annual-mean PC for the CHP of 0.60 µg.m^{-3} in Table 5.21, the impact would be 'slight adverse'.

5.6.27 The maximum predicted 99.79th percentile of hourly-mean NO_2 PC for the package boilers alone (K1 and K4 package boilers) is 8.99 µg.m^{-3}. When this is added to the 99.79th percentile of hourly-mean NO_2 PC for the CHP of 3.8 µg.m^{-3} in Table 5.18, the impact would be 'slight adverse'.

5.6.28 In reality, emissions from the existing K1 package boilers are already accounted for to a degree in the background concentration assumed for the assessment. Furthermore, the package boilers will not run at the same time as the CHP; therefore the impact descriptors, that assume the CHP operates in every hour of the year and the package boilers operate for 500 hours per year, can be considered conservative.

5.6.29 On that basis and using professional judgement, the effect of the package boilers are not considered to be significant.

Other Scenarios Considered

5.6.30 K4 will replace K1; however, the two plant may run simultaneously for a short period, likely to be a matter of months during the commissioning of K4. For this scenario, K1 has explicitly been included as a point source within the model. In order to predict the annual-mean NO_2 concentration for this scenario, it has been assumed that K4 and K1 will operate simultaneously in every hour of the year.

5.6.31 The PECs have been calculated by adding the PC from modelling of K1, K2, K3 and K4 emissions to the background concentrations.

5.6.32 The maximum predicted annual-mean NO_2 PEC for K1, K2, K3 and K4 is 32.9 µg.m^{-3}, 82% of the AQAL.

5.6.33 The maximum predicted 99.79th percentile of hourly mean NO_2 PEC for K1, K2, K3 and K4 79.3 and 79.2 µg.m^{-3}, only 40% of the AQAL.

5.6.34 The maximum daily running 8 hour mean CO PEC is 578 $\mu g.m^{-3}$, only 6 % of the AQAL.

5.6.35 The PECs can be considered conservative as emissions from K1 are already included to an extent within the AC and, by including K1 explicitly within the model, there is potential for double-counting of the impacts. On that basis, the relevant AQALs are unlikely to be exceeded with K1 and K4 operating simultaneously.

5.6.36 If K1 is modified to be compliant with the IED emission limits, it is unlikely to be an improvement compared to K4. At this stage, no detailed design for an upgraded K1 is available so quantification of the improvement is not possible.

Significance of Effects

5.6.37 It is generally considered good practice that, where possible, an assessment should communicate effects both numerically and descriptively. Professional judgement by a competent, suitably qualified professional is required to establish the significance associated with the consequence of the impacts.

5.6.38 Based on the predicted concentrations, the effects are deemed to be not significant, with no predicted exceedances of any objectives or standards at modelled discrete receptors.

Sensitivity and Uncertainty

5.6.39 Section 5.3 provided an analysis of the limitations of the assessment. The conclusion of that analysis was that, overall, the predicted total concentration is likely to be towards the top of the uncertainty range rather than being a central estimate. The actual concentrations that will be found when the development is operational are unlikely to be higher than those presented within this report and are more likely to be lower.

5.6.40 The impacts at existing receptors are shown to be not significant even for this conservative scenario. Consequently, further sensitivity analysis has not been undertaken and, in practice, the impacts at sensitive receptors are likely to be lower than those reported in this conservative assessment.

5.7 Decommissioning

5.7.1 The risk of impacts during decommissioning will be the same or similar to the risk of impacts during the construction phase. With the effective implementation of the mitigation measures recommended for the construction phase, the residual effects are unlikely to be significant.

5.8 Mitigation

Mitigation of Construction Effects

5.8.1 The IAQM dust guidance lists mitigation measures for low, medium and high dust risks.

5.8.2 As summarised in Table 5.4, the predicted Dust Impact Risk is classified as low. The measures listed below are based on the IAQM dust guidance 'highly recommended' measures for low risk sites. The agreed mitigation measures would be included in a CEMP.

<u>Preparing and maintaining the site</u>

- Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.
- Avoid site runoff of water or mud.

<u>Operating vehicle/machinery and sustainable travel</u>

- Ensure all vehicles switch off engines when stationary – no idling vehicles.

<u>Operations</u>

- Use enclosed chutes and conveyors and covered skips.

<u>Waste management</u>

- Avoid bonfires and burning of waste materials.

<u>Communications</u>

- Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager.
- Display the head or regional office contact information.

<u>Site Management</u>

- Record all dust and air quality complaints, identify cause(s), 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.

<u>Monitoring</u>

- Carry out regular site inspections to monitor compliance with a Dust Management Plan, record inspection results, and make an inspection log available to the local authority when asked.

Mitigation of Operational Effects

5.8.3 Predicted concentrations of pollutants from the completed development have been demonstrated by the assessment to meet all relevant air quality standards and objectives. On that basis, no mitigation is proposed.

5.9 Residual Effects

5.9.1 Residual effects are those that are predicted to remain after implementation of the secondary mitigation measures described above. As no further mitigation is proposed for the Completed Development, the residual effects are the same as in section 5.6 and are not significant.

5.9.2 The residual construction dust effects will not be significant provided the mitigation measures described above are implemented.

5.10 Cumulative Effects

5.10.1 During the construction phase, there is the potential for cumulative effects where there are other sources of dust located within 700 metres of the project (the IAQM indicative maximum radius of effects for an individual construction site being 350m). Large construction sites would typically implement mitigation measures, such as those recommended in the IAQM dust guidance. With the effective implementation of appropriate mitigation measures at other construction sites within 700 metres of the project, the residual cumulative dust effects are unlikely to be significant.

5.10.2 Once the proposed development is completed, there is the potential for cumulative effects where there are other sources of combustion-related pollutants in close proximity to the site.

5.10.3 The PECs presented in Section 5.6 include the PCs from the existing CHP K1, being replaced by K4, plus the PCs from K2 and K3 (SW/10/4444 and EN010083). These other developments have therefore been explicitly included within the modelling. This section considers the cumulative effects of the proposed development with other schemes that are operational /constructed, consented or for which planning permissions are currently being sought.

5.10.4 16/501228/FULL – 500 m northwest - Construction of a new baling plant building within an existing waste paper storage yard. The Environmental Aspects report accompanying the planning application identified the main likely sources of emissions to air as emissions from vehicle movements generated by the operation of the proposed development. The Environmental Aspects report concluded that the air quality effects were not significant. The impacts due to vehicle emissions would be limited to 200 m from the centre of roads used by the vehicles. The proposed development is expected to generate minimal vehicle movements once completed. The main area of impact from the K4 stack is to the north-east of the stack. Therefore there is unlikely to be any overlap in the air quality impacts from the proposed development and the new baling plant.

5.10.5 16/507687/COUNTY – 150 m northeast - Construction and operation of an Incinerator Bottom Ash recycling facility. The Planning Application Supporting Statement prepared in September 2016 by Wheelabrator Technologies states that *"A full Air Quality Assessment was scoped out at the pre application discussion as the predicted impact was considered to be negligible. The Facility is not considered to pose any significant risk upon NO_2 and PM_{10} concentrations in the locality."* On that basis, no significant cumulative air quality effects are expected.

5.10.6 16/501484/COUNTY – 1 km north - Construction of a gypsum recycling building on land at Ridham Dock. The Air Quality Assessment prepared by SLR dated January 2016 identifies the key emissions to air as dust during the operational phase. An assessment of vehicle-related emissions was scoped out as the number of vehicle movements generated by the proposed development was below the threshold requiring an assessment. On that basis, no significant cumulative air quality effects are expected.

5.10.7 14/500327/OUT – 250 m south - Development of Fulcrum Business Park and extension to Milton Creek Country Park. Air quality impacts were not considered for the planning application. Moreover, the Planning Statement prepared by Paul Sharpe Associates in June 2014 stated that the proposed development would generate fewer vehicle movements than the extant permission. On that basis, the proposed development is likely to be beneficial in air quality terms and no cumulative air quality effects are expected.

5.10.8 SW/12/0816 – 1.5 km west - Relocation of the Nicholls Transport Limited business from its existing depot at Lydbrook Close, London Road, Sittingbourne, to a site on the north side of Swale Way, Sittingbourne. The Planning Statement prepared by Paul Sharpe Associates in May 2012 indicates that air quality was not considered to be a concern for the proposed development and, in consultation with Swale Borough Council, an air quality assessment of air quality impacts was scoped out. On that basis, no significant cumulative air quality effects are expected.

5.10.9 SW/12/1211 – 2.2 km north - Construction of a new Materials Recycling Facility and Waste Transfer Station. The air quality assessment considered the dust, odour and traffic-related impacts. The assessment considered the air quality impacts on the Swale SPA due to vehicles using the Old Ferry Road and Barge Way. The maximum predicted annual-mean NO_x PC was 1.0 $\mu g.m^{-3}$. When this is added the PEC of 14.2 $\mu g.m^{-3}$ shown in Appendix 5.5, the cumulative PEC is only 51% of the Critical Level of 30 $\mu g.m^{-3}$. On that basis, no significant cumulative air quality effects are expected.

5.10.10 15/510589/OUT – 2.2 km south- Development of a business park (Eurolink V) on land north of Northern Relief Road. The assessment considered the air quality impacts on the human-health receptors and the Swale SPA due to emissions from vehicle movements. The assessment predicted that the air quality impacts were negligible. On that basis, no significant cumulative air quality effects are expected.

5.10.11 SW/11/1291 – 700 m north - Construction of an anaerobic digestion (AD) plant at the Mill. Two scenarios were modelled for the assessment, with and without heat recovery, and the maximum PCs across the grid were higher for the with heat recovery scenario. The maximum PCs from Table 7.21 of the Kemsley AD application [Ref 5.15] have been added to the maximum PECs from Tables 5.18 and Table 5.21 of this chapter to give a cumulative PEC in Table 5.25.

5.10.12 18/500393/FULL – 1 km southeast - Erection of a natural gas fuelled reserve power plant with maximum export capacity of up to 12 MW. The maximum PCs at modelled discrete receptors from Tables 6.1, 6.3 and 6.5 of the air quality assessment [Ref 5.16] have been added to the cumulative PEC in Table 5.25. For CO, no maximum PC across the grid is included so the maximum PC at the modelled discrete receptors has been used instead.

5.10.13 15/500348/COUNTY – 800 m northwest - Land Off Kemsley Fields Business Park Barge Way Sittingbourne Kent. Installation of advance thermal conversion and energy facility at Kemsley Fields Business Park to produce energy and heat, including construction of new buildings to house thermal conversion and energy generation plant and equipment;

construction of associated offices; erection of external plant including storage tanks; and erection of discharge stack (KCC planning application KCC/SW/0010/2015 refers). The maximum PCs from Table 19 of the air quality assessment [Ref 5.17] has been added to the cumulative PEC in Table 5.25.

Averaging period (Pollutant)	AQAL ($\mu g.m^{-3}$)	PC – Kemsley AD ($\mu g.m^{-3}$)	PC – Reserve Power Plant ($\mu g.m^{-3}$)	PC – Garden of England Energy Facility ($\mu g.m^{-3}$)	PEC ($\mu g.m^{-3}$)	Cumulative PEC ($\mu g.m^{-3}$)	Cumulative PEC as % of AQAL
1 hour 99.79th percentile (NO_2)	200	18.1	19.57	10.7	73.4	121.77	61
Maximum daily running 8 hour mean (CO)	10,000	131.3	116.43	6.97	564.4	819.10	8
Annual-mean (NO_2)	40	1.3	0.93	1.62	33.1	36.95	92

Table 5.25: Cumulative PECs

5.10.14 The cumulative PECs are all below the AQAL and no significant cumulative air quality effects are expected.

5.10.15 SW/14/0224 – 1.5 km southeast - Erection of solar arrays of photovoltaic panels, inverter and transformer sheds, fencing, site storage cabin, combined DNO and EPC switchgear housing, internal gravel access road, and associated equipment. There are no potential sources of emissions to air. As such, no cumulative effects are anticipated.

5.10.16 14/502737/EIASCO – 1.8 km north - Request for Scoping Opinion to determine the extent of an application for a combined heat and power plant at Ridham 'B', Ridham Docks, Ridham. This application was withdrawn in September 2014 and is not considered further.

5.10.17 16/506935/COUNTY – 200 m north - Planning Application for a Steam Pipeline connecting the existing Ridham Dock Biomass Facility to the Mill at Ridham Dock. The Planning Application Supporting Statement prepared in June 2016 by SLR did not identify air quality as environmental issue. As such, no significant cumulative effects are expected.

5.10.18 17/505073/FULL- 800 m south - Erection of a tile factory including service yard, storage yard and car parking area. The Planning Statement prepared in September 2017 by Cushman and Wakefield did not identify air quality as environmental issue. No emissions to air were identified in the application documents. The number of trips generated by the development was not considered significant to the extent that an air quality assessment was not undertaken. As such, no significant cumulative effects are expected.

5.10.19 16/506193/ENVSCR EIA Screening Opinion – 2.1 km northwest - Outline application for proposed residential development of 275 dwellings including affordable housing with open spaces, appropriate landscaping and minor alterations to the surrounding highway network (access). SBC's Screening Opinion dated 23 August 2016 states that the environmental effects are not considered to be sufficiently significant to warrant to Environmental Impact Assessment. Based on this and the information currently available, no significant cumulative effects are expected.

5.10.20 17/503713/ENSCR – 1.6 km northwest - Land East of Iwade Woodpecker Drive, Iwade, Kent, ME9 8ST. SBC's Screening Opinion dated 4 September 2017 states that the environmental effects are not considered to be sufficiently significant to warrant to Environmental Impact Assessment. Based on this and the information currently available, no significant cumulative effects are expected.

5.10.21 16/506014/EIASCO EIA Scoping Opinion – 1.5 km west - A sustainable urban extension comprising up to 1,100 new dwellings (of a range of sizes, types and tenures, including affordable housing), a site of 10.50 ha for a secondary and primary school, and public open and amenity space, together with associated landscaping, access, highways (including footpaths and cycle ways), parking, drainage (including a foul water pumping station), utilities and service infrastructure works. An additional 1,100 dwellings will increase NO_2 concentrations. A comparison of the annual-mean NO_2 PECs at discrete receptors shown in Table 5.22 and the AQAL shows that there is a large headroom, approximately 7.5 $\mu g.m^{-3}$, before the air quality objective of 40 $\mu g.m^{-3}$ is exceeded. The proposed cumulative development is unlikely to increase annual-mean NO_2 concentrations enough to exceed this AQAL. Based on this and the limited information currently available, no significant cumulative effects are expected.

5.10.22 18/500257/EIFUL – 2.4 km southwest - Proposed development of 155 dwellings. The air quality chapter assessed the cumulative effects of the development and the rest of the north-west Sittingbourne Allocation. It concluded that the impacts at all individual receptors modelled was negligible with no predicted exceedances of the AQS objectives. On that basis, no significant cumulative air quality effects are expected.

5.10.23 New boundary road to be built and finished in advance of any works on K4 and to include the breaking out of the concrete from the K4 site. There will be less than 100 HGVs AADT so no significant cumulative air quality effects are expected.

5.11 Summary

5.11.1 This assessment has considered the air quality impacts during the construction and operational phase of the proposed installation of a gas-fired CHP (K4) at the Mill.

5.11.2 Impacts during the construction of the proposed development, such as dust generation and plant vehicle emissions, are predicted to be of short duration and only relevant during the construction phase. The results of the risk assessment of construction dust impacts undertaken using the IAQM dust guidance, indicates that before the implementation of mitigation and controls, the risk of dust impacts will be low. Implementation of the highly-recommended mitigation measures described in the IAQM construction dust guidance should reduce the residual dust effects to a level categorised as "*not significant*". The agreed mitigation measures would be included in a CEMP.

5.11.3 The number of vehicle movements generated by construction activities is below the threshold criteria for requiring an assessment. The impacts due to emissions from construction-related vehicle emissions are therefore considered to be "not significant".

5.11.4 Emissions from the Proposed Development have been assessed through detailed dispersion modelling using best practice approaches. The assessment has been undertaken based on a number of conservative assumptions. This is likely to result in an over-estimate of the contributions that will arise in practice from the facility. The results of dispersion modelling reported in this assessment indicate that predicted contributions and resultant environmental concentrations of all pollutants considered are 'negligible' or 'slight adverse'.

5.11.5 Using professional judgement, the resulting air quality effect of the proposed development is considered to be 'not significant' overall.

5.11.6 The proposed development does not, in air quality terms, conflict with national or local policies. There are no constraints to the development in the context of air quality.

References

5.1 Council Directive 2010/75/EU of the European Parliament and of the Council on industrial emissions

5.2 Council Directive 2008/50/EC of 21 May 2008 on ambient air quality and cleaner air for Europe

5.3 Defra, 2010, The Air Quality Standards (England) Regulations

5.4 Defra, 2007, The Air Quality Strategy for England, Scotland, Wales and Northern Ireland. Volume 2.

5.5 Communities and Local Government, March 2012, National Planning Policy Framework

5.6 EPUK & IAQM (January 2017) Land-Use Planning & Development Control: Planning For Air Quality

5.7 IAQM (2014) Guidance on the assessment of dust from demolition and construction

5.8 Local Air Quality Management Technical Guidance, 2016 (LAQM.TG16)

5.9 British Standard Institute (1983) BS 6069:Part 2:1983, ISO 4225-1980 Characterization of air quality. Glossary

5.10 Environment Agency (2010) Environmental Permitting Regulations (EPR) – H1 Environmental Risk Assessment, Annex K

5.11 Environment Agency (2007) Review of methods for NO to NO_2 conversion in plumes at short ranges

5.12 Environment Agency (undated) Conversion Ratios for NO_x and NO_2

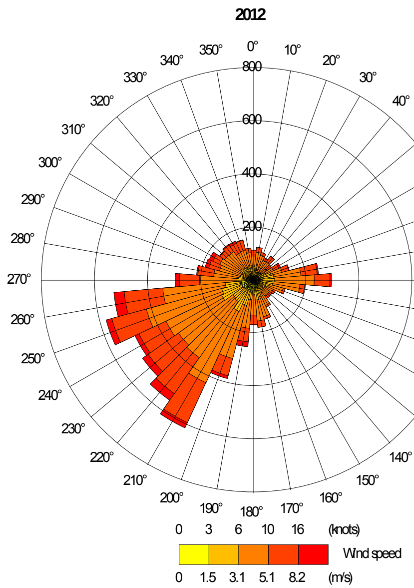
5.13 Drawn from Defra Maps at http://uk-air.defra.gov.uk/data/laqm-background-maps?year=2013

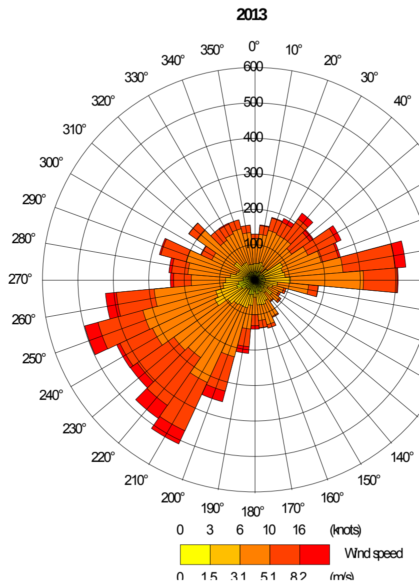
5.14 https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit

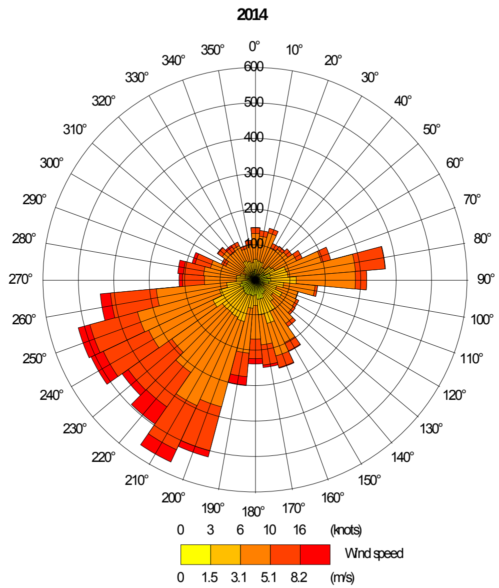
5.15 DHA Environment (2011) Proposed Anaerobic Digestor Kemsley DCH/7471

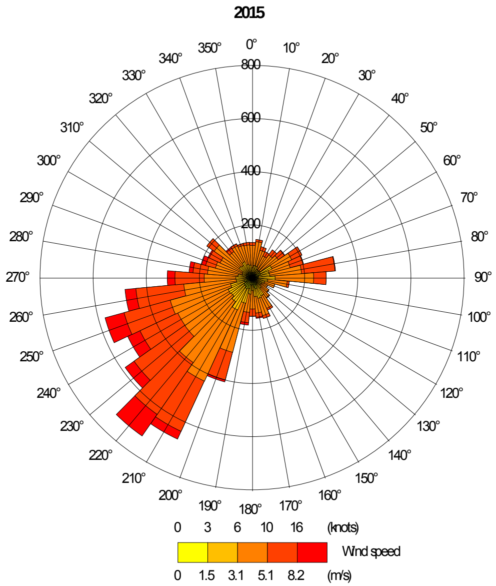
5.16 wyg (2018) Proposed Standing Reserve Power Plant at Eurolink Industrial Estate, Castle Road, Sittingbourne, Kent

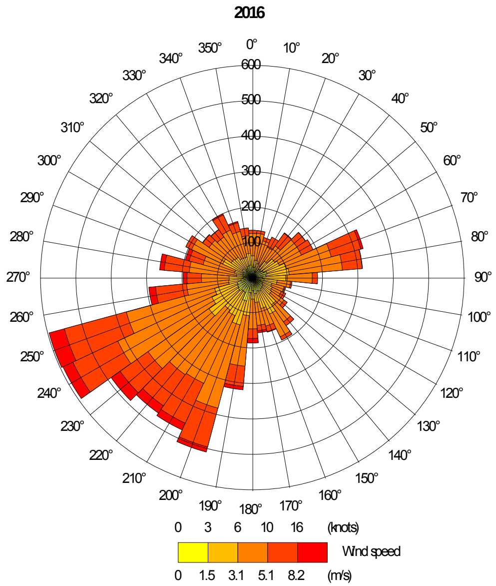
5.17 Environemntal Compliance Limited (2014) Air Quality Assessment of Emissions from the Proposed Garden of England Energy Facility











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Project: Kemsley Paper Mill (K4) CHP Plant

Job Ref: JAR9660

Date: 15/12/2017	**Rev: 0**
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Figure 5.1: Wind Rose: Gravesend, 2012 -2016

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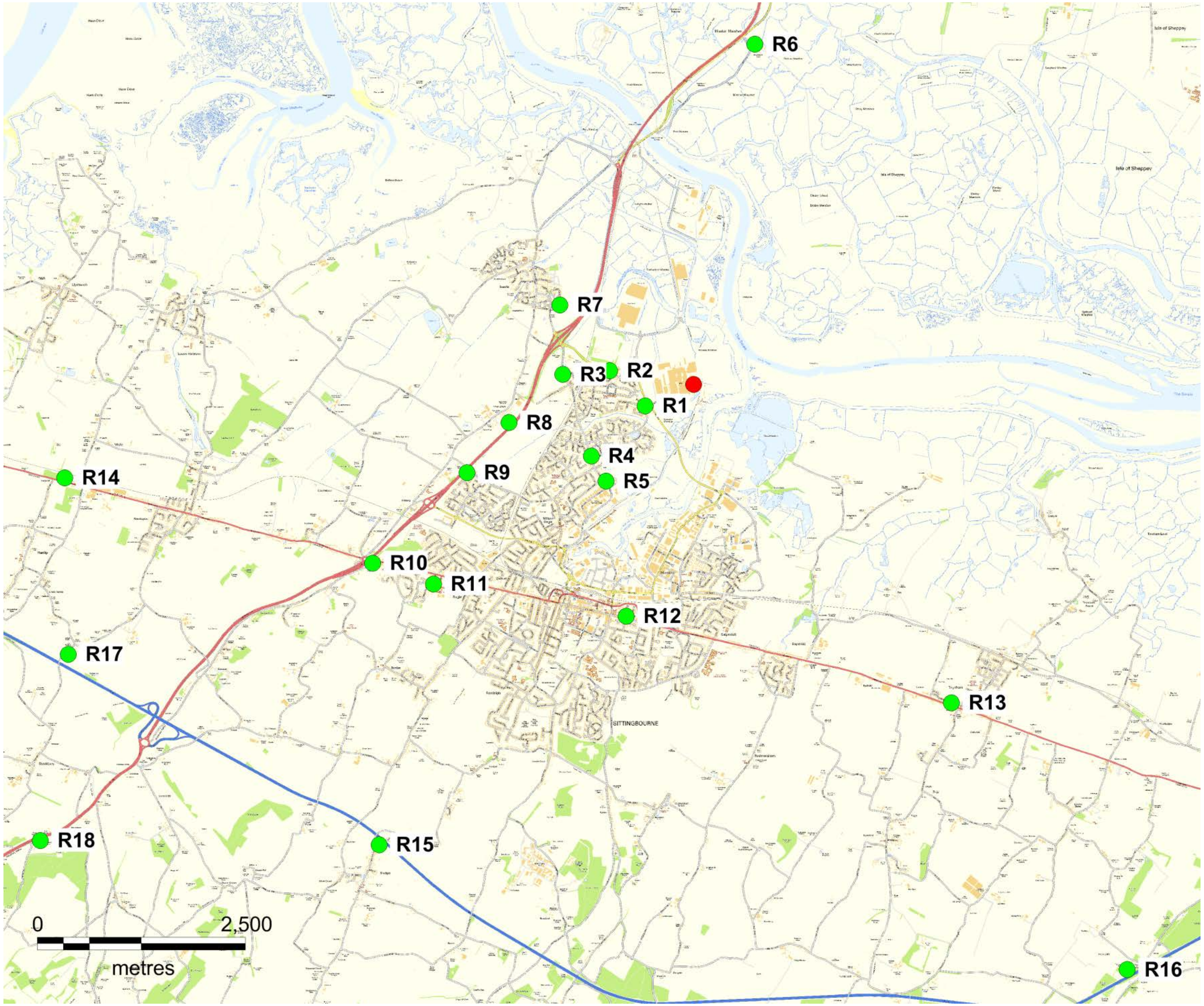

Stack (K4 CHP)

Sensitive Receptors

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Figure 5.2: Sensitive Receptors

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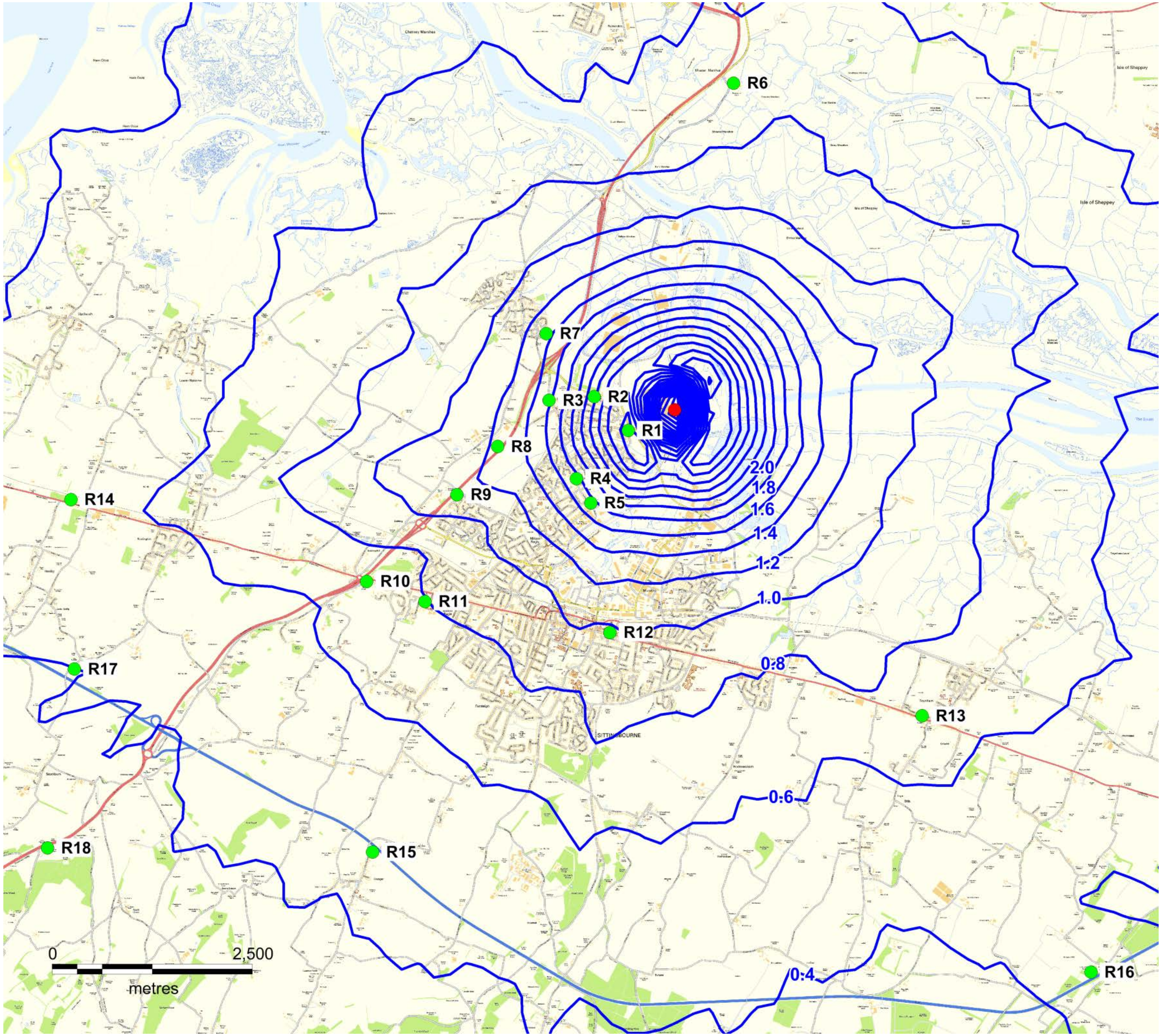

Stack (K4 CHP) - Location 1/2

Sensitive Receptors

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Figure 5.3: 99.79th percentile Hourly-mean NO_2 Process Contributions ($\mu g.m^{-3}$)

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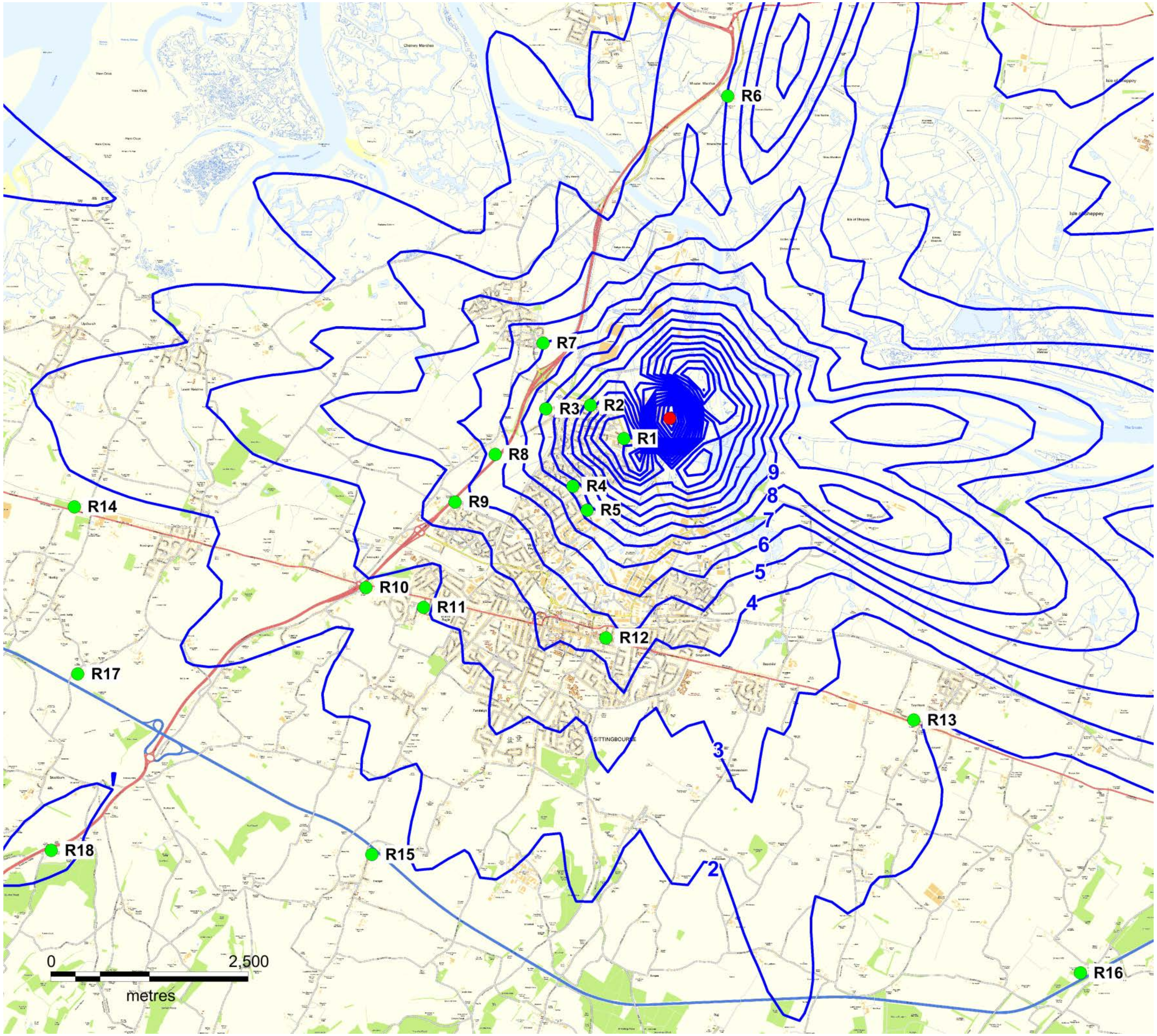

Stack (K4 CHP) - Location 1/2

Sensitive Receptors

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Client: DS Smith Paper Ltd

Project: Kemsley Paper Mill (K4) CHP Plant

Job Ref: JAR9660

Date: 21/03/2018	**Rev: 1**
Drawn: KB	**Checked: FP**

Figure 5.4: Maximum 8-hour Running Mean CO Process Contributions ($\mu g.m^{-3}$)

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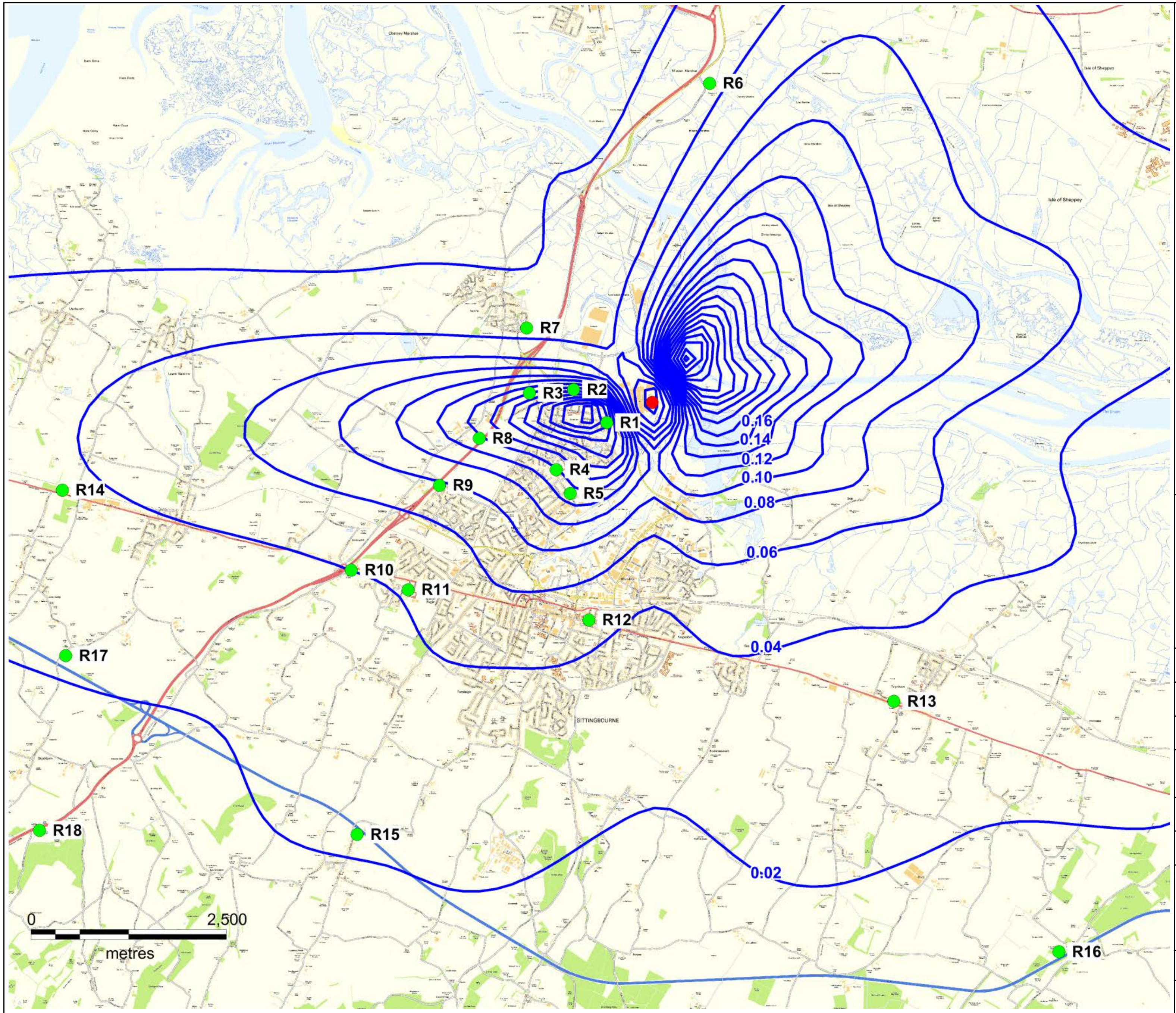

Stack (K4 CHP) - Location 1/2

Sensitive Receptors

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Figure 5.5: Annual-mean NO_2 Process Contributions ($\mu g.m^{-3}$)

6 Greenhouse Gases and Climate Change

6.1 Introduction and Purpose of this Chapter

6.1.1 This chapter assesses the likely significant effects resulting from the Proposed Development as a consequence of greenhouse gas (GHG) emissions and the resultant impact on climate change.

6.1.2 It is supported by Appendix 6.1 containing details of the GHG emissions calculations and data inputs.

6.1.3 GHG emissions are normally expressed as carbon dioxide equivalents, explained in the methodology section below, and are therefore often referred to as 'carbon' as a shorthand (e.g. when speaking of 'low-carbon power' or 'carbon reduction targets').

6.1.4 With regard to potential climate change inter-relationships with other assessments reported in this ES, climate change impacts on flood risk and coastal change affecting the Proposed Development are assessed in Chapter: 9 Water Environment. In the judgement of the authors of Chapter 10: Ecology and Chapter 11: Landscape and Visual Effects, there is not considered to be any relevant influence of climate change on the status of ecological or landscape receptors impacted by the development.

6.2 Regulatory and Policy Framework

National Climate, Energy, Industry and Infrastructure Policies

Climate Change Act, 2008

6.2.1 The Climate Change Act 2008 [Ref. 6.1] commits the UK government to reducing greenhouse gas emissions by at least 80% of 1990 levels by 2050, and created a framework for setting a series of interim national carbon budgets and plans for national adaptation to climate risks.

6.2.2 At present the Third, Fourth and Fifth Carbon Budgets, set through The Carbon Budget Orders 2009, 2011 and 2016, are 2.54 $GtCO_2e$ for 2018-2022, 1.95 $GtCO_2e$ for 2023-2037 and 1.73 $GtCO_2e$ for 2028-2032.

6.2.3 The Climate Change Act also created the Committee on Climate Change to give advice on carbon budgets and report on progress. The Committee through its Adaptation Sub-Committee also gives advice on climate change risks and adaptation. Its advice regarding carbon and climate policy relevant to the Proposed Development is summarised below.

EU Emissions Trading Scheme (ETS)

6.2.4 Greenhouse gas emissions from energy generation facilities and energy-intensive industrial/manufacturing facilities, including paper & pulp production, are regulated by the EU ETS established by Directive 2003/87/EC as amended by Directive 2009/29/EC and implemented in the UK by the Greenhouse Gas Emissions Trading Scheme Regulations 2012 [Ref. 6.2].

6.2.5 The EU ETS allocates national emissions budgets for member states, out of an overall limit on emissions that is reducing by 1.74% each year, intended to achieve at least a 40% reduction of emissions in the relevant sectors by 2030 compared to 1990 levels. A proportion of emissions allowances are allocated by member states to industrial/manufacturing facilities, whereas power generators must purchase all emissions allowances at auction. Each facility is regulated in the UK by a GHG Emissions Permit and must obtain sufficient allowances to cover all of its emissions per annum, whether by allocation or trading: a surplus of allowances can be banked or sold; where there is a deficit, allowances must be purchased. A New Entrant Reserve is provided to allocate emissions allowances to newly developed industrial/manufacturing facilities.

6.2.6 UK policy for GHG emission reductions therefore distinguishes between the traded and non-traded sectors, taking the overall cap and reductions in emissions over time through the ETS as a committed measure that will be achieved through the cap-and-trade mechanism.

6.2.7 However, at the time of writing (November 2017), the future participation of the UK in the EU ETS following Brexit in 2019 is unclear. The Department for Business, Energy and Industrial Strategy (BEIS) intends to provide for an early allocation of ETS allowances for use in the 2018 compliance year through legislation in December 2017, but it is possible that the issue of UK allowances (and hence operation of the ETS for facilities in the UK) may be suspended from 2019 [Ref. 6.3, paragraph 1.6].

<u>Carbon Plan, 2011</u>

6.2.8 The 2011 Carbon Plan [Ref. 6.4] is the UK's national strategy under the Climate Change Act for delivering emissions reductions through to the Fourth Carbon Budget period (2023-27) and preparing for further reductions to 2050.

6.2.9 It was expected to be updated or replaced by a national 'Emissions Reduction Plan' that the former coalition government committed to publish in 2016, but that has been delayed indefinitely. Due to the age of the Carbon Plan, certain policy expectations have been overtaken by subsequent policy decisions: in particular, the expected government funding for deployment of carbon capture and storage (CCS) technology has lapsed following the failure of the second CCS competition [Ref. 6.5].

6.2.10 With regard to low carbon industry, the main desired measures summarised in paragraphs 37 to 50 are process/production efficiencies (immediate), replacing fossil fuels (during the 2020s) and use of CCS (from 2020s onwards). Overall a 20-24% reduction in industrial GHG emissions relative to 2009 levels is sought by 2027. Section 2 of the Carbon Plan, expanding on the detail of these measures, emphasises fuel switching to biomass or electricity and use of CCS. In paragraph 2.133, the Carbon Plan does note that for CHP in particular:

"the Government will continue to incentivise a combination of natural gas-fired and renewable CHP. CHP, especially for large-scale industrial plants, constitutes a significant opportunity to enhance energy efficiency and lower emissions from the industrial sector."

6.2.11 With regard to low carbon electricity generation, the policy summary in paragraph 44 indicates that fossil-fuelled electricity generation will only be supported if fitted with CCS; otherwise this would only provide backup at times of high demand. Nevertheless, paragraph 48 states that to maintain a secure energy supply, new gas-fired generation will have a significant supporting role as existing capacity closes 'over next decade' (i.e.

up to 2021). Paragraph 50 envisages fossil fuelled generation with CCS providing 10 GW of capacity by 2030. Overall, electricity generation emissions are expected to be 75-84% lower than 2009 levels by 2027 (paragraph 51).

6.2.12 Paragraph 2.172 states that "*Government modelling suggests that unabated gas could retain a significant role in electricity generation through the 2020s, potentially still producing up to two thirds of today's generation levels in 2030*", but from 2030 onwards, paragraph 2.173 states that "*…a major role for gas as a baseload source of electricity is only realistic with large numbers of gas CCS plants.*"

Advice of the Committee on Climate Change

6.2.13 Although not itself setting government policy, the Committee on Climate Change's statutory role to advise government under the Climate Change Act 2008 means that its recommendations or identification of policy gaps are relevant to consider in this assessment. In its 2015 advice [Ref. 6.6] on setting the Fifth Carbon Budget and on sectoral scenarios [Ref. 6.7] for achieving the budget, the Committee considered carbon reduction pathways and actions for the industry and power generation sectors, both relevant to the Proposed Development.

6.2.14 Chapter 4 of the sectoral scenarios report concerns industry. Among the Committee's "key findings" (pages 103-104) is that "*government policy to date is unlikely to encourage sufficient low-carbon investment in industry because it does not address many of the barriers to implementing key low-carbon opportunities (e.g. there is no well developed infrastructure strategy for CCS in energy-intensive industries)*". It goes on to further discuss the requirement for industrial CCS, energy efficiency and low-carbon process heat through fuel switching. In Table 4.1, for the paper & pulp industry, the Committee suggests carbon emissions abatement options to 2030 of using bioenergy with CHP, improved energy management and process control, and use of heat recovery.

6.2.15 Chapter 2 of the sectoral scenarios report concerns decarbonising power generation. Decarbonisation of electricity supply, to 50-100 gCO_2/kWh by 2030 from around 450 gCO_2/kWh today[1], is crucial for many other sectors in achieving the UK carbon budget, including industry. Again, the importance of CCS deployment for fossil-fuelled power generation in the 2020s onwards is emphasised. Page 88 of the main Fifth Carbon Budget report suggests that "*flexible gas-fired generation capacity*" can assist with managing the transition to low-carbon power generation "*at lowest cost*"[2].

6.2.16 The Committee's 2017 report to Parliament identifies significant policy gaps for meeting carbon budgets [Ref. 6.8]. On page 8, the Committee states that:

"New policies are needed across the economy. By 2030, current plans would at best deliver around half of the required reduction in emissions, 100-170 $MtCO_2e$ per year short of what is required by the carbon budgets. An effective set of proposals to close this policy gap must:

[1] At the time of that document's production; subsequently the carbon intensity of electricity generation in the UK has further significantly decreased, which is shown in the following sections of this chapter.
[2] In full, the Committee states: *"Flexible unabated gas plant. More efficient and flexible generation technologies are available that can operate stably at lower levels of output, provide faster frequency response than at current levels, and consume less fuel when part-loaded to provide system reserve. Greater use of these would require less overall thermal plant to be built to stabilise the system, be less likely to curtail renewables output, and reduce overall emissions."* However, it is unlikely that the Proposed Development, with its power generation level driven by process heat demand from the paper mill rather than by day-to-day levels of demand from the national electricity grid, would meet this definition.

extend the approach to signing contracts for low-carbon power; extend and strengthen policies to switch to low-carbon vehicles; undertake a major overhaul of policy so as to cut emissions from buildings; and deliver a programme for carbon capture and storage."

6.2.17 It calls for a new national strategy for CCS deployment for power and industry, for uptake of low-carbon heat and energy efficiency measures in industry, and use of more flexible fossil-fuelled power generation as discussed above.

6.2.18 The UK's ratification of the Paris Agreement [Ref. 6.9] will in the advice of the Committee require more ambitious UK carbon emission reductions than legislated for in the Climate Change Act 2008, particularly beyond 2050. However, pending further changes in emissions reduction pledges by other EU member states, the Committee has not recommended that the Fifth Carbon Budget should be altered at present [Refs. 6.10, 6.11].

6.2.19 Concerning the implications of Brexit for UK climate change policy, the Committee notes [Ref. 6.12] that this does not affect the existence of the UK's domestically-legislated climate goals for 2050. In summary, the Committee indicates that domestic policies to achieve the equivalent effects on GHG reductions as lost EU-level policies will be required, and highlights again the existing policy gap for achieving carbon reductions required by the Fifth Carbon Budget.

6.2.20 The Committee has also published a series of national risk assessments and policy recommendation reports concerning climate change risks and adaptation measures. However, the assessment of climate change risk and adaptation for the Proposed Development has been scoped out of the EIA process (save in respect of flood risk), as detailed in section 6.3, and so that policy is not detailed here.

<u>Clean Growth Strategy, 2017</u>

6.2.21 The 2017 Clean Growth Strategy for the UK [Ref. 6.13] provides few specifics about policies for heavy industrial/manufacturing business to reduce GHG emissions, but again emphasises support for deployment of CCS. It notes on page 64 that energy intensive industries will need to make progress in switching from fossil fuels to low-carbon fuels by 2030, beyond which this switching will "*need to substantially increase in scale and be coupled with deployment of new technologies, for example* [CCS]".

6.2.22 It is supported by a more detailed 'Joint Industry–Government Industrial Decarbonisation and Energy Efficiency Roadmap Action Plan' for the pulp and paper sector [Ref. 6.14]. This plan lists a number of actions, among which most relevant to the Proposed Development and climate change impacts are actions to facilitate greater use of process heat recovery, switching to biomass fuels, and energy storage and/or demand-side response to make better use of renewable energy generation.

6.2.23 Action 11 is to consider further investment in CHP, but "*this action is about short term tasks as utilising natural gas fuel will not necessarily offer significant enough carbon savings post-2035 even if consumed in CHP plant*" (page 36).

6.2.24 The power sector chapter of the Clean Growth Strategy makes no reference to gas-fired generation.

National Infrastructure Commission draft National Infrastructure Priorities, 2017

6.2.25 The recently-formed National Infrastructure Commission's October 2017 consultation report on national priorities for infrastructure [Ref. 6.15], in advance of the publication of its National Infrastructure Assessment, calls as a headline policy for "*eliminating carbon emissions from energy*" (chapter 4), although it speaks mainly about decarbonising heating and about nuclear power. It is relatively cautious about CCS, leaving further recommendations for the final National Infrastructure Assessment. The infrastructure priorities report does not specifically discuss gas-fired electricity generators.

Planning Policies

National Policy Statements for Energy, EN-1 and EN-2

6.2.1 The Overarching National Policy Statement for Energy (EN-1) [Ref. 6.17] states that while "*the UK economy is reliant on fossil fuels, and they are likely to play a significant role for some time to come… the UK needs to wean itself off such a high-carbon energy mix: to reduce greenhouse gas emissions…*" (paragraphs 2.2.5 and 2.2.6).

6.2.2 Of note also is the statement at paragraph 2.2.4 that:

"Not all aspects of Government energy and climate change policy will be relevant to IPC decisions or planning decisions by local authorities, and the planning system is only one of a number of vehicles that helps to deliver Government energy and climate change policy. The role of the planning system is to provide a framework which permits the construction of whatever Government – and players in the market responding to rules, incentives or signals from Government – have identified as the types of infrastructure we need in the places where it is acceptable in planning terms."

6.2.3 The NPS discusses the challenges of balancing security and stability of energy supply with need for low-carbon / renewable generation technologies, and the benefits of a diverse energy supply mix including some fossil-fuelled generation (section 3.6), but is clear that "*until such time as fossil fuel* [sic] *generation can effectively operate with CCS, such power stations will not be low carbon*" (paragraph 3.3.4).

6.2.4 Section 4.6 of NPS EN-1 supports CHP for thermal generating stations on grounds including the efficiency of displacing conventional fossil-fuelled separate heat and electricity generation (paragraph 4.6.8), with consequent potential for GHG emission reductions. Section 4.7 requires applicants to demonstrate readiness for future use of CCS.

6.2.5 Paragraph 5.2 states that:

"CO_2 emissions are a significant adverse impact from some types of energy infrastructure which cannot be totally avoided (even with full deployment of CCS technology). However, given the characteristics of these and other technologies, as noted in Part 3 of this NPS, and the range of non-planning policies aimed at decarbonising electricity generation such as EU ETS (see Section 2.2 above), Government has determined that CO_2 emissions are not reasons to prohibit the consenting of projects which use these technologies or to impose more restrictions on them in the planning policy framework than are set out in the energy NPSs (e.g. the CCR and, for coal, CCS requirements). Any ES on air emissions will include an assessment of CO_2 emissions, but the policies set out in Section 2, including the EU ETS, apply to these emissions. The IPC does not, therefore need to assess individual applications in terms of

carbon emissions against carbon budgets and this section does not address CO_2 emissions or any Emissions Performance Standard that may apply to plant."

6.2.6 NPS EN-2 for Fossil Fuel Electricity Generating Infrastructure [Ref. 6.18] re-iterates the NPS EN-1 policy concerning CHP and CCS readiness on pages 8 and 9, and the policy on CO_2 emissions at paragraph 2.5.2.

National Planning Policy Framework (NPPF), 2012

6.2.7 A core planning principle of the NPPF [Ref. 6.16] is that decision-taking should "*support the transition to a low-carbon future in a changing climate, taking full account of flood risk and coastal change…*" (page 5). In section 10, 'Meeting the challenge of climate change, flooding and coastal change' it states in paragraph 93 that:

"planning plays a key role in helping shape places to secure radical reductions in greenhouse gas emissions, minimising vulnerability and providing resilience to the impacts of climate change, and supporting the delivery of renewable and low-carbon infrastructure."

6.2.8 Paragraph 95 requires local authorities to "*plan for new development in locations and ways which reduce greenhouse gas emissions*" and paragraph 97 states that local planning authorities should "*recognise the responsibility on all communities to contribute to energy generation from renewable and low-carbon sources*", in particular "*identify*[ing] *opportunities… for co-locating potential heat customers and suppliers*". Under paragraph 98, applicants for energy development are not required to demonstrate the overall need for low-carbon energy.

6.2.9 Paragraph 99 states that "*new development should be planned to avoid increased vulnerability to the range of impacts arising from climate change*" and requires Local Plans (though not developers) to "*take account of climate change over the longer term, including factors such as flood risk, coastal change, water supply and changes to biodiversity and landscape.*"

6.2.10 'Low-carbon' technologies are defined in the NPPF at page 55 as "*those that can help reduce emissions (compared to conventional use of fossil fuels).*"

Swale Borough Council's Development Plan, 2017

6.2.11 Swale Borough Council Local Plan, adopted on 26th July 2017 [Ref. 6.19], states in paragraph 4.1.48 under the subheading of "*Meeting the challenge of climate change, flooding and coastal change*" in section 4 that:

"Our strategy for climate change is adaptation and mitigation – resilient to future challenges and supportive of new opportunities. Businesses able to increase jobs in low carbon sectors will be encouraged and those making sustainable changes to adapt will be supported. We will also encourage existing homes and businesses to improve their energy and waste efficiencies."

6.2.12 Paragraph 4.1.50 indicates that:

"We also need to move beyond adaptation to the impacts of climate change, reducing greenhouse gas emissions where we can. Here, the strategy has three strands:

….

3. Encouraging the use of renewables and energy efficiency improvements (inc. micro-renewable energy and free-standing projects), identifying the potential for decentralised, renewable or low carbon energy supplies and for co-locating heat customers and suppliers."

6.2.13 Local Plan Core Objective 1 is to "*adapt to climate change with innovation, reduced use of resources, managed risk to our communities and opportunities for biodiversity to thrive.*"

6.2.14 Policy ST1 item 10 is to:

"Meet the challenge of climate change, flooding and coastal change through:

a. promotion of sustainable design and construction, the expansion of renewable energy, the efficient use of natural resources and the management of emissions;

b. the management and expansion of green infrastructure; and

c. applying planning policies to manage flood risk and coastal change."

6.2.15 Policy CP1 states that:

"Development proposals will, as appropriate:

…

Create resilience in existing businesses to forecast changes in flood risk, climate change and natural processes or lead to an expansion of businesses in the low carbon sectors."

6.2.16 Policy CP4 states that:

"Development proposals will, as appropriate:

…

Maximise opportunities for including sustainable design and construction techniques including the use of recycled and recyclable materials, sustainable drainage systems, carbon reduction and minimising waste."

6.2.17 Policy DM19 states that:

"Development proposals will include measures to address and adapt to climate change in accordance with national planning policy and guidance and, where appropriate, will incorporate the following:

a. Use of materials and construction techniques which increase energy efficiency and thermal performance, and reduce carbon emissions in new development over the long term unless considerations in respect of the conservation of heritage assets indicate otherwise;

b. Promotion of waste reduction, re-use, recycling and composting, where appropriate, during both construction and the lifetime of the development;

c. Recognition that retaining and upgrading existing structures may be more sustainable than building new whilst making the most of opportunities to improve water and energy efficiency in the existing stock;

…

2. Development proposals should, where appropriate, be located, oriented and designed to take advantage of opportunities for decentralised, low and zero carbon energy, including passive solar design, and, connect to existing or planned decentralised heat and/or power schemes.

…"

6.2.18 And Policy DM20 is that "*planning permission will be granted for the development of renewable and low carbon energy sources*" subject to the development being judged acceptable through a number of environmental, planning and social criteria listed in that policy.

6.3 Assessment Methodology

Scoping and Consultation

6.3.1 The proposed scope and approach to this assessment were set out in section 3.4 of the Scoping Report submitted as part of the formal Scoping Opinion request to the Planning Inspectorate (PINS). Further details of the formal scoping undertaken with PINS and consultees, including copies of the Scoping Report and Scoping Opinion, are given in Chapter 3 and its appendices.

6.3.2 On page 26 of the Scoping Opinion, PINS summarises the information and approach set out in the Scoping Report. PINS makes two further comments:

"The Inspectorate considers that decommissioning impacts should be addressed and the assessment in the ES must also justify the approach taken to identifying all emissions (including those that are direct or indirect) and considered within the assessment."

"The Inspectorate is content that vulnerability to climate change can be scoped out."

6.3.3 Decommissioning impacts are addressed in paragraphs 6.3.39 to 6.3.41. The approach to identifying direct and indirect emissions and the resulting boundary of the assessment are set out in the following sub-parts of this section and in Appendix 6.1.

6.3.4 Natural England has commented in paragraph 4 of Annex A of its consultation response to the Scoping Report that "*the ES should… identify how the development's effects on the natural environment will be influenced by climate change…*", in the context of the principles for consideration of climate change effects on biodiversity set out in the England Biodiversity Strategy. Paragraph 10.5.2 in Chapter: 10 Ecology has addressed this point.

6.3.5 PINS and several statutory consultees have commented on climate change in the context of flood risk and coastal change. This is assessed in Chapter: 9 Water Environment.

Greenhouse Gas Emission Calculations – Overview

6.3.6 In overview, GHG emissions have been estimated by applying published emissions factors to activities in the baseline and to those required for the Proposed Development. The emissions factors relate a given level of activity, or amount of fuel, energy or materials used, to the mass of GHGs released as a consequence.

6.3.7 Further detail of the approach, data inputs and assumptions for establishing the baseline and predicting environmental effects of the Proposed Development are given in the following sections. Full details of the calculations are given in Appendix 6.1.

6.3.8 The GHGs considered in this assessment are those which are relevant from the 'Kyoto basket' of global warming gases, i.e. carbon dioxide, methane and nitrous oxide, expressed as CO_2-equivalent global warming potential (GWP). This is denoted by CO_2e units in emissions factors and calculation results. GWPs used are typically the 100-year factors in the IPCC's Fourth Assessment Report [Ref. 6.20], as those are used for calculation of most government statistics on climate change, in line with requirements of national reporting under the United Nations Framework Convention on Climate Change (UNFCCC).

6.3.9 GHG emissions caused by an activity are often categorised into 'scope 1', 'scope 2' or 'scope 3', following the guidance of the WRI and WBCSD Greenhouse Gas Protocol suite of guidance documents [Ref. 6.21]. Scope 1 emissions are those released directly by the entity being assessed, e.g. from combustion of fuel at an installation. Scope 2 emissions are those caused indirectly by consumption of imported energy, e.g. from generating electricity supplied through the national grid to an installation. Scope 3 emissions are those caused indirectly in the wider supply chain, e.g. in the upstream extraction, processing and transport of fuel consumed or the downstream disposal of waste products from an installation.

6.3.10 This assessment has sought to include emissions from all three scopes, to most completely capture the impacts attributable to the Proposed Development, where this is material and possible from the information and emissions factors available. Due to the nature of the Proposed Development, combusting large amounts of natural gas, its GHG emissions total is dominated by scope 1 emissions from gas combustion and scope 3 emissions from the gas supply chain. Scope 2 emissions are also relevant where the Proposed Development scenario compared to the baseline involves the consumption or displacement of electricity generated for the national grid. Other scope 3 emissions, e.g. from operational waste generation or employee commuting, would be *de minimis* and have not been specifically assessed.

6.3.11 Key data sources for emissions factors have been:

- BEIS and Defra (2017): UK Government GHG Conversion Factors for Company Reporting v1.0 [Ref. 6.22];
- BEIS (2017): Valuation of Energy Use and Greenhouse Gas: Supplementary guidance to the HM Treasury Green Book, and supporting data tables [Ref. 6.23];

Establishing Baseline Conditions

<u>Current Baseline</u>

6.3.12 The current baseline is the operational emissions of the Kemsley Paper Mill K1 gas-fired CHP facility that would be replaced by the Proposed Development.

6.3.13 The fuel consumption GHG emissions from operation of K1 have been established based on the metered fuel gas volume consumed in 2016 that was reported for its annual EU ETS return, and the level of steam and electricity generation during 2016 reported in the CHP Quality Assurance (CHPQA) certificate issued in March 2017.

6.3.14 The Applicant has indicated that in the typical current baseline, K1 generates around 12% more steam and 7% more electricity than recorded for 2016. The 2016 data on fuel consumption and energy outputs have been scaled up accordingly in proportion to its 2016 efficiency for steam and electricity generation respectively, i.e. keeping the efficiency in each case as reported in the CHPQA certificate for 2016 constant. Finally, for consistency of comparison, current baseline data for K1 has been scaled to the same annual operating hours as the Proposed Development, specified in paragraph 6.3.32. Further details of the energy demand and supply assumptions for the current baseline, future baseline and future with the Proposed Development are given in Appendix 6.1.

6.3.15 The GHG emissions factor for natural gas direct combustion emissions (scope 1) and indirect fuel supply chain emissions (scope 3) published by BEIS for carbon reporting [Ref. 6.22], 0.2356 kgCO_2e/kWh, has been applied.

6.3.16 Because K1 in the current baseline generates a net excess of electricity above the demand of Kemsley Paper Mill, which is exported to the national electricity grid, it is necessary also to consider the baseline of grid-connected electricity generation that is displaced by this (i.e. marginal generation sources). Indirect emissions avoided by displacement of grid electricity generation due to electricity exported by K1 have been established based on the typical export of around 5–8 MW (average of 6.5 MW assumed), to which the scope 2 factor for marginal generation in 2016 published by BEIS [Ref. 6.23], 0.2982 kgCO_2e/kWh, has been applied.

6.3.17 It has been assumed that the data provided concerning electricity and heat *supply* by K1 in the current baseline represents the current and future baseline *demand* that must be met by the Proposed Development and, where there is a deficit, by other generation sources.

Future Baseline

6.3.18 The Applicant anticipates that the consented 'K3' waste-to-energy facility, which is currently under construction, would have capacity to supply around one-third of the steam provided to Kemsley Paper Mill by K1 in the current baseline.

6.3.19 Although K1 cannot operate in its current form beyond the opening year of the Proposed Development, as it would not comply with Industrial Emissions Directive (IED) limits for air pollutant emissions in force at that time, the Applicant has indicated that the most likely future baseline for continued energy supply to the paper mill without the Proposed Development would be for K1 to be modified for IED compliance and then to continue operating.

6.3.20 The Applicant has indicated that steam from K3 would be used preferentially to either K1 or the Proposed Development, so it has been assumed that the modified K1 would supply the remaining two-thirds of its current baseline output in the future baseline. Current baseline operating data has been taken as representative of K1 in the future baseline, with fuel consumption for steam generation scaled down and annual operating hours scaled up as described in paragraph 6.3.14. Current baseline electricity generation has been assumed not to change in this scenario, as it is assumed that, commercially, the

Applicant would wish to run the K1 GTG at full capacity and also maximise electricity generation by the K1 STG[3], notwithstanding the lesser steam off-take.

6.3.21 Steam currently supplied by the paper mill's existing sludge combustor, K2, would not change in the future baseline so this is not included within the assessment.

6.3.22 GHG emissions from the modified K1's gas consumption have been calculated using the emissions factor specified in paragraph 6.3.15. Displaced emissions due to electricity exported to the national grid by K1 in the future baseline have been calculated using BEIS projections of the carbon intensity of long-run marginal electricity generation [Ref. 6.23]. The factor used is 0.2486 $kgCO_2e/kWh$ in 2021 and 0.0365 $kgCO_2e/kWh$ in 2045. Further discussion of the projections and full detail of the emissions factors in intervening years are given in Appendix 6.1.

6.3.23 Because K3 steam supply would be used preferentially in the future baseline and with-development scenario, this would not change due to the Proposed Development, and so it has not been necessary to calculate GHG emissions from K3 to inform the net emissions impact attributable to the Proposed Development.

Significance Criteria

6.3.24 The magnitude of impact on climate change has been quantified as mass of GHG emissions expressed as tCO_2e per annum and in total over the Proposed Development's operational lifetime.

6.3.25 GHG emissions have a global effect rather than directly affecting any specific local receptor to which a level of sensitivity can be assigned. The global atmospheric mass of the relevant GHGs and consequent warming potential, expressed in CO_2-equivalents, has therefore been treated as a single receptor of high sensitivity (given the severe consequences of global climate change).

6.3.26 Assessment guidance for GHG emissions [Ref. 6.24] indicates that in principle, any GHG emissions may be considered to be significant, and advocates as good practice that GHG emissions should always be reported at an appropriate, proportionate level of detail in an ES. There are however no clear, generally-agreed thresholds or methods for evaluating the significance of GHG effects in EIA, with the guidance suggesting that several possible approaches could be evaluated.

6.3.27 For this assessment, the total GHG emissions and GHG intensity of the Proposed Development (i.e. tCO_2e/MWh of useful energy generated) have been compared to the future baseline of modified K1 operation in order to evaluate the net change in GHG impact[4]. Effects from GHG emissions are described in this chapter as being adverse, neutral/negligible or beneficial based on whether there is predicted to be an increase, little or no net change, or decrease compared to the baseline, respectively. Adverse or beneficial effects are considered to be significant, taking into account the IEMA guidance and the high sensitivity of the receptor. Neutral/negligible effects are not considered to

[3] There may be additional cooling demands for excess steam in this scenario, but this is not considered likely to materially affect the overall assumed energy balance, in light of other uncertainties.

[4] Following the IEMA assessment principles guidance, which states that *"…all net GHG emissions contribute to a significant negative environmental effect; however, some projects will replace existing development that have* [sic] *higher GHG profiles. The significance of a project's emissions should therefore be based on its net GHG impact, which may be positive or negative."* [Ref. 6.25]

be significant. It is not considered possible to further differentiate degrees of significance (e.g. slight or major).

Assessment of Effects

Demolition

6.3.28 No demolition is required for the Proposed Development.

Construction

6.3.29 Due to the early stage of design, information or estimates concerning use of civil or structural construction materials, plant, or engineered/pre-fabricated components is not available save for the model number of the gas turbine to be used, SGT-800, which is manufactured by Siemens[5].

6.3.30 In general, therefore, it has not been possible to estimate construction-stage GHG emissions specific to the Proposed Development. Instead, published estimates for similar facilities have been considered, as detailed in paragraph 6.6.2, which suggest that the construction stage emissions are not material to the life-cycle total.

Operation

6.3.31 The future GHG emissions caused by operation of the Proposed Development have been predicted based on information provided by the Applicant concerning fuel input and the output of steam and electricity. This is shown in Table 6.1.

Input and output	Flow	Energy
Inputs	Fuel to gas turbine generator (GTG)*‡	142.0 MW_{th}
	Post-firing fuel to steam turbine generator (STG)‡	31.3 MW_{th}
	Input total	**173.3 MW**$_{th}$
Outputs	Electricity from GTG†	55.6 MW_{e}
	Electricity from STG†	12.5 MW_{e}
	Intermediate pressure and low pressure steam	95.3 MW_{th}
	Output total	**163.4 MW**
Crude gross efficiency	163.4 MW output / 173.3 MW input equals	**94.3%**
* at max GTG load and 10°C ambient temperature † gross power ‡ net CV		

Table 6.1: Proposed Development fuel and energy data

6.3.32 The Proposed Development is expected to have uptime of 96% (see paragraph 2.4.18 of Chapter 2), i.e. to operate as set out above for 8,410 hours per year. The operational

[5] Siemens publishes an ISO14021 Environmental Product Declaration (EPD) [Ref. 6.26] for this model (turbine only, excluding other components), which indicates that it is formed of around 99% high-alloyed steel. However, the EPD omits to give the GHG emissions associated with this product. It has not been possible to obtain a corrected EPD from Siemens providing this missing information, and estimating it via back-calculation from the component materials data in the EPD and a source of embodied data such as the World Steel Association life-cycle inventories is considered too uncertain.

lifetime of K4 is not known with certainty, but is assumed for the purpose of this assessment to be 25 years.

6.3.33 GHG emissions from gas supply and combustion have been calculated using the emissions factor specified in paragraph 6.3.15.

6.3.34 As discussed in paragraph 6.3.20, the Proposed Development is assumed to supply the energy demand of the Kemsley Paper Mill that is met by K1 in the current baseline, minus that which would be supplied by K3 in the future. An excess of electricity production by the Proposed Development would be exported to the national grid. The GHG emissions from these elements of the Proposed Development's operation have been calculated using the emissions factors specified in paragraphs 6.3.15 and 6.3.22.

6.3.35 The overall assumed energy balance for the Proposed Development is summarised in Table 6.2 and shown graphically in Appendix 6.1, Diagram 6.1.2.

Input and output	Flow	Energy
Paper mill demand in baseline	Electricity	48.3 MW_e
	Steam †	95.3 MW_{th}
	Demand total	**143.6 MW**
Proposed Development inputs	Fuel to GTG ‡	142.0 MW_{th}
	Fuel to STG ‡	31.3 MW_{th}
	Inputs total	**173.3 MW_{th}**
Proposed Development outputs	Electricity to paper mill	48.3 MW_e
	Electricity to national grid*	17.8 MW_e
	Steam to paper mill	95.3 MW_{th}
	Outputs total	**161.4 MW**

* minus parasitic load – see paragraph 6.3.37
† i.e. 143.0 MW_{th} demand in current baseline, minus one-third supplied by K3
‡ net CV

Table 6.2: Proposed Development energy balance

6.3.36 During the 4% of the year when the Proposed Development is not operating, backup auxiliary package boilers would be used to supply steam to the paper mill, as happens at present with operation of K1. It is assumed that in the future baseline with a modified K1 operating to the same annual uptime as the Proposed Development, the use of backup boilers would be the same in both cases. There would therefore be no net change in GHG emissions from boilers due to the Proposed Development, and this has not been separately calculated.

6.3.37 Available electricity generation data for the Proposed Development is for gross generation, i.e. at the generator terminals. A parasitic electrical load (i.e. the difference between gross electricity generation and available electricity for export to the paper mill or grid) of 2.0 MW has been assumed, based on experience with similar-scale CCGT facilities and information from the Applicant.

6.3.38 The possible short period of operational overlap in 2021 between the existing K1 and the Proposed Development has not been assessed, because (a) both facilities would be unlikely to operate simultaneously at full power for any significant period as K1 is decommissioned and the Proposed Development is commissioned, and (b) a short period in the order of months with any partial operating overlap would not be significant relative to the total operational emissions of the Proposed Development over its assumed 25-year lifetime.

Decommissioning and demolition

6.3.39 GHG emissions arising from potential deconstruction of K1 following decommissioning are not within the scope of the assessment[6].

6.3.40 Given the magnitude of predicted operational GHG emissions from the Proposed Development over 25 years, as assessed in this chapter, decommissioning stage emissions at the end of the Proposed Development's life are considered very unlikely to be material to the overall GHG impacts for the following reasons:

- decommissioning-stage GHG impacts are unlikely to be greater than construction-stage impacts, which have been assessed as negligible (see paragraph 6.6.2), considering activities and plant used and including embodied carbon;
- it is possible that foundations and structures for the Proposed Development could be re-used, incurring no additional GHG emissions attributable to it;
- it is likely that much of the Proposed Development's structure and energy generation components will be constructed of steel and other metals with good potential for recycling, in which case the benefits of recycling are attributed to the new material user in BEIS GHG reporting guidance (i.e. not attributed to the Proposed Development); and
- if disposed of and not recycled, the Proposed Development's construction materials are likely to be mainly inert waste (e.g. metals, concrete), not of a nature to generate GHG emissions from decomposition or incineration.

6.3.41 Further assessment of decommissioning impacts has therefore not been undertaken.

Limitations and Assumptions

6.3.42 The information inputs to the assessment have a number of uncertainties and gaps necessitating assumptions, which have been discussed in the baseline and assessment of effects methodology sections above and in Appendix 6.1. In summary, the principal uncertainties are as follows.

- There is no information available about the construction-stage materials and fuel or electricity requirements for the Proposed Development. However, based on published life-cycle analyses (referenced in section 6.6), construction-stage GHG impacts are unlikely to be material to the Proposed Development's total lifetime effects.
- Broad assumptions have been made about the energy generation and export of the Proposed Development. Depending on patterns of energy demand in the paper mill, operation of the paper mill's other steam sources (K2 and K3) and perhaps on future commercial factors affecting export of electricity to the grid, the Proposed

[6] notwithstanding which, it is worth noting that the proposed re-use of materials and components from K1 in the Proposed Development (see Chapter 2) is beneficial in GHG impact terms.

Development might have a greater or lesser load or a different balance between steam and electricity export, which might change its fuel consumption, energy output and/or efficiency over the course of a given operating period, compared to the data used for this assessment.

- Use of scaled baseline K1 data from 2016 to represent future upgraded K1 operation with reduced steam output due to the supply from K3 may over- or under-estimate future baseline K1 emissions.

- There is uncertainty about future climate and energy policy and market responses, which affects the likely future carbon intensity of energy supplies. Government projections consistent with national carbon budget commitments have been used in the assessment.

6.3.43 Where necessary, assumptions have been made and assessment scenarios defined, as detailed in the methodology sections. The limitations have not prevented assessment of the magnitude of the Proposed Development's GHG emission impacts. While it is possible that the impact magnitude over the Proposed Development's assumed lifetime and compared to the future baseline may be over- or under-estimated, the significance of effects due to the impacts is considered to have been predicted with limited confidence, following the approach in paragraph 6.3.27.

6.4 Baseline Conditions

6.4.1 Table 6.3 shows the current baseline GHG emissions from operation of K1.

Natural gas combusted (net CV)	Gross GHG emissions	Energy generated	Electricity exported to grid	Displaced GHG emissions	Net GHG emissions	Net GHG emissions intensity
2,102 GWh	495 ktCO_2e	1,663 GWh	55 GWh	-16 ktCO_2e	479 ktCO_2e	0.2879 tCO_2e/MWh

Table 6.3: Baseline GHG emissions from K1 operation

Sensitive Receptors

6.4.2 The sensitive receptor(s) listed in Table 6.4, below, have the potential to be affected by the Proposed Development. The assessment in this chapter has considered the effects listed in the table upon the identified sensitive receptor(s).

Receptor	Importance/sensitivity/vulnerability to change
Global atmospheric mass of the relevant GHGs and consequent warming potential, expressed in CO_2-equivalents	High

Table 6.4: Potentially affected sensitive receptors

6.5 Future baseline

6.5.1 Table 6.5 shows the future baseline emissions from continued operation of K1 after modification to meet IED emission limits and with steam production scaled down due to the supply from K3. Emissions are shown in the Proposed Development's initial year of operation (2021) and in total over its assumed 25-year operational lifetime. Full results showing each intervening year are given in Appendix 6.1.

Time period	Total net GHG emissions	Net GHG emissions intensity
Initial year of operation: 2021	362 ktCO_2e	0.2871 tCO_2e/MWh
25 years of operation: 2021–2045	9,246 ktCO_2e	0.2929 tCO_2e/MWh

Table 6.5: Future baseline GHG emissions without Proposed Development

6.6 Predicted Effects

Construction Effects

6.6.1 Due to information limitations, it has not been possible to calculate construction-stage GHG emissions specific to the Proposed Development (see paragraphs 6.3.29 to 6.3.30).

6.6.2 However, published life-cycle analysis studies of CCGT facilities reviewed by Ricardo-AEA for the Committee on Climate Change in 2013 [Ref. 6.27] suggest that the construction stage typically accounts for a minor proportion – around 1% – of total life-cycle GHG emissions. On that basis, it is not considered that the Proposed Development's construction stage effects due to GHG emissions would significantly modify the significance of effects predicted for the operational stage, in the following section, and a **negligible** construction-stage effect that is not significant is predicted.

Operational Effects

6.6.3 Table 6.6 shows the magnitude of predicted GHG emissions in the Proposed Development's initial year of operation (2021) and in total over its assumed 25-year operational lifetime to 2045. Table 6.7 shows the change in predicted GHG emissions compared to the future baseline. Full results showing each intervening year are given in Appendix 6.1.

Time period	Total net GHG emissions	Net GHG emissions intensity
Initial year of operation: 2021	306 ktCO_2e	0.2254 tCO_2e/MWh
25 years of operation: 2021–2045	8,158 ktCO_2e	0.2403 tCO_2e/MWh

Table 6.6: Proposed Development GHG emissions

Time period	Change in total GHG emissions with Proposed Development		Change in GHG emissions intensity with Proposed Development	
Initial year of operation: 2021	-56 ktCO_2e	-16%	-0.0617 tCO_2e/MWh	-22%
25 years of operation: 2021–2045	-1,088 ktCO_2e	-12%	-0.0526 tCO_2e/MWh	-18%

Table 6.7: Change in GHG emissions from future baseline

6.6.4 Compared to the future baseline of modified K1 operation, the Proposed Development would in its initial year of operation provide a 16% reduction in total net GHG emissions and a 22% reduction in GHG emissions intensity per MWh. Over the course of its assumed 25-year operating lifetime, the reductions compared to the future baseline would be smaller: a 12% reduction in total net GHG emissions and an 18% reduction in GHG emissions intensity, due to the reduced benefit over time of the Proposed Development's export of electricity to the grid.

6.6.5 The predicted GHG emission reductions would be a **beneficial** effect of the Proposed Development that is considered significant, applying the definition in paragraph 6.3.27.

6.7 Mitigation

Mitigation of Construction Effects

6.7.1 Construction-stage effects are not considered likely to be material to the total life-cycle effect of the Proposed Development. In the absence of construction or design information for the Proposed Development, no additional specific mitigation can be recommended.

6.7.2 Nevertheless, in consideration of IEMA guidance that all GHG emissions are potentially significant, and government policy seeking GHG emissions reductions across all economic sectors including construction, in general terms it is recommended that the Applicant considers implementing the following additional mitigation measures during detailed design:

- Seek a reduction in total materials required and hence embodied carbon through lean/efficient design;
- Maximise re-use of materials and components from K1, insofar as feasible;
- Specify materials with low embodied carbon (e.g. based on data in the BRE Green Guide to Specification [Ref. 6.28] or product EPDs;
- Source materials locally where possible to reduce transport GHG emissions;
- Consider use of an established methodology, such as BREEAM New Infrastructure [Ref. 6.29], PAS2080 [Ref. 6.30] and/or life-cycle analysis to guide low-carbon design and construction, set a feasible reduction target and quantify its achievement.

6.7.3 Mitigation measures recommended in paragraph 5.8.2 of Chapter 5: Air Quality for inclusion in the CEMP to reduce air pollutant emissions from construction plant will also offer mitigation of construction plant GHG emissions.

Mitigation of Operational Effects

6.7.4 CCS, if feasible for the Proposed Development in future, could offer substantial further GHG emissions reductions[7], further mitigating climate change effects of the Proposed Development's direct GHG emissions from that point in its lifetime onwards. However, the Proposed Development is not required to provide for future CCS readiness in its design, as it falls below the 300 MWe capacity threshold in NPS EN-1 (paragraph 4.7.10).

[7] The specific level of GHG emissions reduction would depend on the scale of CCS scheme feasible at this site (if any), its own energy requirements, and the energy/fuel requirements for transport and injection of captured carbon at a disposal point. These factors are not known and cannot be predicted for this assessment, but in general terms the carbon and energy policy referenced in section 6.2 recognises the substantial GHG emissions mitigation that industrial CCS has the potential to provide.

6.7.5 The Proposed Development will be required under its Environmental Permit to seek continuous improvement in energy efficiency and to provide reports on this to the Environment Agency. However, the Applicant's information indicates that the Proposed Development is already expected to operate at an exceptional level of efficiency, >94%, so it is unlikely that any further energy efficiency improvements of a scale to significantly reduce its GHG emissions would be achievable.

6.7.6 Overall therefore, no further mitigation that is within the Applicant's control at the development site has been proposed or is considered to be required.

6.8 Residual Effects

6.8.1 Predicted residual effects are unchanged from paragraph 6.6.5.

Significant residual effect	Receptor sensitivity	Impact magnitude	Nature	Duration	Degree of effect	Level of certainty
Greenhouse gas emissions	High	-1,088 ktCO_2e	Beneficial	Long-term	n/a	Limited

Table 6.8: Residual effects

6.9 Cumulative Effects

6.9.1 The sensitive receptor affected by the effects of the Proposed Development is the '*global atmospheric mass of the relevant GHGs and consequent warming potential, expressed in CO_2-equivalents*' and its 'high' sensitivity has been defined taking into consideration the cumulative effects of all anthropogenic GHG emissions.

6.9.2 As GHG impacts are global, all cumulative sources are relevant: this is taken into account in the defined 'high' sensitivity of the receptor and statement that any additional GHG emissions may be considered significant. Additional cumulative effects due to other specific local development projects are therefore not individually predicted. The net effect of the Proposed Development, i.e. taking into account GHG emissions from other energy supply sources affected by it, has formed the basis of the impact assessment reported above.

6.10 Summary

6.10.1 The likely significant effects of greenhouse gas (GHG) emissions from the Proposed Development have been assessed in this Environmental Statement chapter. The global atmospheric mass of relevant GHGs and consequent warming potential, expressed in CO_2-equivalents, has been considered as a high sensitivity receptor affected by the Proposed Development.

6.10.2 Net total GHG emissions from operation of the Proposed Development have been calculated based on its expected fuel consumption and energy generation in its initial operating year (2021) and cumulatively over its assumed operating lifetime to 2045. These have been compared to GHG emissions from the future baseline operation of the existing gas-fired CHP facility, 'K1', that supplies energy to the Kemsley Paper Mill.

6.10.3 Construction– and decommissioning-stage impacts have been evaluated qualitatively and are considered not to be material to the total GHG emissions over the Proposed

Development's lifetime, which are dominated by the supply and combustion of its natural gas fuel.

6.10.4 The significance of the impacts of net GHG emissions from the Proposed Development has been evaluated with regard to change from the baseline.

6.10.5 Key uncertainties and limitations to the assessment concern the future baseline operation of K1 after modification to be compliant with Industrial Emissions Directive limits, and the resulting energy balance for supply of steam and electricity to the Kemsley Paper Mill with and without the Proposed Development.

6.10.6 The Proposed Development is predicted to cause a net total of 306 thousand tonnes of carbon-dioxide equivalent ($ktCO_2e$) in its initial year of operation and 8,158 $ktCO_2e$ over its assumed 25 year operating lifetime. Compared to the future baseline without the Proposed Development, it is predicted to save 56 $ktCO_2e$ in 2021 and 1,088 $ktCO_2e$ over its lifetime, reductions of 16% and 12% respectively. Its carbon intensity (GHG emissions per megawatt-hour of energy generated) would also be lower than the future baseline, by 22% in the first year and 18% over its lifetime.

6.10.7 The predicted GHG emission reductions would be a beneficial effect of the Proposed Development that is considered significant.

6.10.8 Potential mitigation measures have been considered, but no additional feasible mitigation for the operational phase that is within the Applicant's control at the development site has been proposed or is considered to be required.

6.10.9 Notwithstanding the limited materiality of construction-stage emissions to the total, good-practice construction stage measures to reduce GHG emissions have been recommended, consistent with IEMA guidance that any GHG emissions (and hence opportunities for reductions) may be significant.

6.10.10 Residual effects on the **high sensitivity** receptor are assessed as **long-term beneficial** with **limited** confidence.

6.10.11 As GHG impacts are global, all cumulative sources are relevant: this is taken into account in the defined 'high' sensitivity of the receptor and statement that any additional GHG emissions may be considered significant. Additional cumulative effects due to other specific local development projects are therefore not individually predicted.

Acronyms

BEIS – Department for Business, Energy and Industrial Strategy

CCGT – combined cycle gas turbine

CCR – Carbon capture readiness

CCS – carbon capture and storage

CEMP – Construction Environmental Management Plan

CHP – combined heat and power

CHPQA – CHP quality assurance

CO_2e – carbon dioxide equivalent

Defra – Department for the Environment, Food and Rural Affairs

EPD – Environmental Product Declaration

EU ETS – European Union Emissions Trading Scheme

GHG – greenhouse gas

GTG – gas turbine generator

GWP – global warming potential

HRSG – heat recovery steam generator

IED – Industrial Emissions Directive

IEMA – Institute of Environmental Management and Assessment

IPC – (former) Infrastructure Planning Commission

IPCC – Intergovernmental Panel on Climate Change

K1 – Kemsley Paper Mill's existing gas-fired CHP power station

K2 – Kemsley Paper Mill's existing sludge-fired steam generator

K3 – Kemsley Paper Mill's consented waste-fired CHP power station

K4 – the Proposed Development

kWh, MWh or GWh – kilowatt-hour, megawatt-hour or gigawatt-hour

MW_{th} or MW_e – megawatt thermal or megawatt electrical

Net CV or NCV – net calorific value, lower heating value

NPPF – National Planning Policy Framework

NPS – National Policy Statement

PINS – Planning Inspectorate

STG – steam turbine generator

UNFCCC – United Nations Framework Convention on Climate Change

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7 Noise & Vibration

7.1 Purpose of this Chapter

7.1.1 This chapter assesses the likely significant noise and vibration effects resulting from the Proposed Development.

7.1.2 The potential noise impacts considered in association with the project include the following:

During construction / decommissioning:

- Noise generated by construction plant located at the Site;
- Vibration generated by construction plant, located at the Site; and
- Noise arising from off-site traffic generated by the project during construction, operation, maintenance and decommissioning;

During operation:

- Noise arising from off-site traffic generated by the project during operation;
- Noise arising from operations at the Site, including noise from fixed and mobile plant and from HGV movements around the Site; and
- Vibration generated by operational plant at the Site.

7.2 Regulatory and Policy Framework

Planning Policies and Guidance

<u>Overarching National Policy Statement for Energy (EN-1), Section 5.11:</u>

7.2.1 The overarching National Policy Statement (NPS) for Energy (EN-1) [Ref 7.1] is part of a suite of NPSs issued by the Secretary of State for Energy and Climate Change. It sets out the Government's policy for delivery of major energy infrastructure.

7.2.2 EN-1 refers to noise and vibration assessment; para 5.11.1 explains that the Government's policy on noise is set out in the Noise Policy Statement for England (NPSE). With regard to an 'Applicant's Assessment', paragraph 5.11.4 states that:

"Where noise impacts are likely to arise from the proposed development, the applicant should include the following in the noise assessment:

- *a description of the noise generating aspects of the development proposal leading to noise impacts, including the identification of any distinctive tonal, impulsive or low frequency characteristics of the noise;*
- *identification of noise sensitive premises and noise sensitive areas that may be affected;*
- *the characteristics of the existing noise environment;*
- *a prediction of how the noise environment will change with the proposed development;*
- *in the shorter term such as during the construction period;*
- *in the longer term during the operating life of the infrastructure;*
- *at particular times of the day, evening and night as appropriate;*
- *an assessment of the effect of predicted changes in the noise environment on any noise sensitive premises and noise sensitive areas; and*
- *measures to be employed in mitigating noise.*

The nature and extent of the noise assessment should be proportionate to the likely noise impact."

7.2.3 Paragraph 5.11.5 states that:

"The noise impact of ancillary activities associated with the development, such as increased road and rail traffic movements, or other forms of transportation, should also be considered."

7.2.4 Operational noise, with respect to human receptors, should be assessed using the principles of the relevant British Standards and other guidance.

<u>National Policy Statement for Fossil Fuel Electricity Generating Infrastructure (EN-2, Section 2.7 Noise and vibration:</u>

7.2.5 The NPS for Fossil Fuel Electricity Generating Infrastructure [Ref 7.2] builds on the detail provided in EN-1. In addition to the requirements of EN-1, EN-2 directing consideration of:

- *"the gas and steam turbines that operate continuously during normal operation; and*
- *external noise sources such as externally-sited air-cooled condensers that operate continuously during normal operation."*

7.2.6 EN-2 also provides specific mitigation guidance:

"2.7.5 As described in EN-1, the primary mitigation for noise from fossil fuel generating stations is through good design, including enclosure of plant and machinery in noise-reducing buildings wherever possible and to minimise the potential for operations to create noise. Noise from gas turbines should be mitigated by attenuation of exhausts to reduce any risk of low-frequency noise transmission.

2.7.6 Noise and vibration from features including crushing and milling machinery during operation of coal-fired generating stations is unavoidable. Similarly, noise from apparatus external to the main plant may be unavoidable. This can be mitigated through careful plant selection."

National Planning Policy Framework (NPPF)

7.2.7 The National Planning Policy Framework (NPPF) [Ref 7.3], published in March 2012, sets out the Governments planning policies for England. The document does not contain any specific noise policy, or noise limits but it provides a framework for local people and local authorities to produce their own local and neighbourhood plans, which reflect the needs and priorities of their communities.

7.2.8 Section 11, 'Conserving and enhancing the natural environment', paragraph 123 relates to noise and states:

"123. Planning policies and decisions should aim to:

- *avoid noise from giving rise to significant adverse impacts[27] on health and quality of life as a result of new development;*
- *mitigate and reduce to a minimum other adverse impacts[27] on health and quality of life arising from noise from new development, including through the use of conditions;*
- *recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established;[28] and*
- *identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.'*

[27] See Explanatory Note to the Noise Policy Statement for England (Department for the Environment, Food and Rural Affairs).

[28] Subject to the provisions of the Environmental Protection Act 1990 and other relevant law."

7.2.9 The first bullet point refers to 'significant adverse impacts' which relates to the 'significant observed adverse effect level' (SOAEL) in the Noise Policy Statement for England (NPSE) [Ref 7.4], though the term 'effect' is used instead of the term 'impact' although these have been deemed to be interchangeable in this context. Therefore, given the aims above in the NPSE with regard to assessment methods and criteria, the current content of the NPPF does not require any change in previously adopted approaches.

Noise Policy Statement for England

7.2.10 The Noise Policy Statement for England (NPSE) [Ref 7.4], published in March 2010 by Defra, aims to provide clarity regarding current policies and practices to enable noise management decisions to be made within the wider context, at the most appropriate level, in a cost-effective manner and in a timely fashion.

7.2.11 Paragraph 1.6 of the NPSE sets out the long-term vision and aims of Government noise policy:

> *"Noise Policy Vision*
>
> *Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development."*
>
> *"Noise Policy Aims*
>
> *Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:*
>
> - *avoid significant adverse impacts on health and quality of life;*
> - *mitigate and minimise adverse impacts on health and quality of life; and*
> - *where possible, contribute to the improvement of health and quality of life."*

7.2.12 The aims require that all reasonable steps should be taken to avoid, mitigate and minimise adverse effects on health and quality of life whilst also taking into account the guiding principles of sustainable development, which include social, economic, environmental and health considerations.

7.2.13 With regard to the terms 'significant adverse' and 'adverse' included in the 'Noise Policy Aims', these are explained further in the 'Explanatory Note' as relating to established concepts from toxicology that are currently being applied to noise impacts, for example, by the World Health Organisation which are:

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

7.2.14 Defra has then extended these concepts for the purpose of the NPSE to introduce the concept of:

> *"SOAEL – Significant Observed Adverse Effect Level*
>
> *This is the level above which significant adverse effects on health and quality of life occur."*

7.2.15 The accompanying explanation states:

> *"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. It is acknowledged that further research is required to increase our understanding of what may constitute a significant adverse impact on health and quality of life from noise. However, not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available."*

7.2.16 With regard to 'further evidence', Defra has commissioned research to try and identify the levels at which the above effects occur but this is not yet in the public domain. However, early indications are that this research has been largely inconclusive. On this basis, and until further guidance becomes available, and given that there is no specific guidance in the NPPF on noise, there is no justification to vary assessment methods and criteria from those adopted from British Standards etc (see paragraphs 7.2.27 – 7.2.42 below).

Planning Practice Guidance - Noise (PPGN)

7.2.17 The Government has published Planning Practice Guidance on a range of subjects including noise [Ref 7.5].The guidance provides advice on how to deliver the policies of the NPPF. The PPGN reiterates general guidance on noise policy and assessment methods provided in the NPPF, NPSE and British Standards (BSs) and contains examples of acoustic environments commensurate with various effect levels. Paragraph 006 of the PPGN explains that:

> *"The subjective nature of noise means that there is not a simple relationship between noise levels and the impact on those affected. This will depend on how various factors combine in any particular situation."*

7.2.18 According to the PPGN (Paragraph: 006 Reference ID: 30-006-20141224), factors that can influence whether noise could be of concern include:

- the source and absolute level of the noise together with the time of day it occurs;
- for non-continuous sources of noise, the number of noise events, and the frequency and pattern of occurrence of the noise;
- the spectral content and the general character of the noise;
- the local topology and topography along with the existing and, where appropriate, the planned character of the area.

- where applicable, the cumulative impacts of more than one source should be taken into account along with the extent to which the source of noise is intermittent and of limited duration;

- whether adverse internal effects can be completely removed by closing windows and, in the case of new residential development, if the proposed mitigation relies on windows being kept closed most of the time;

- in cases where existing noise sensitive locations already experience high noise levels, a development that is expected to cause even a small increase in the overall noise level may result in a significant adverse effect occurring even though little to no change in behaviour would be likely to occur;

- where relevant, Noise Action Plans, and, in particular the Important Areas identified through the process associated with the Environmental Noise Directive and corresponding regulations;

- the effect of noise on wildlife;

- if external amenity spaces are an intrinsic part of the overall design, the acoustic environment of those spaces; and

- the potential effect of a new residential development being located close to an existing business that gives rise to noise should be carefully considered. This is because existing noise levels from the business even if intermittent (for example, a live music venue) may be regarded as unacceptable by the new residents and subject to enforcement action. To help avoid such instances, appropriate mitigation should be considered, including optimising the sound insulation provided by the new development's building envelope. In the case of an established business, the policy set out in the third bullet of paragraph 123 of the NPPF should be followed.

7.2.19 The PPGN provides a relationship between various perceptions of noise, effect level and required action in accordance with the NPPF (Paragraph: 005 Reference ID: 30-005-20140306). This is reproduced in Table 7.1, below.

Perception	Examples of Outcomes	Increasing Effect Level	Action
Not noticeable	No Effect	No Observed Effect	No specific measures required
Noticeable and not intrusive	Noise can be heard, but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level (LOAEL)			
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; 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.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level (SOAEL)			
Noticeable and disruptive	The 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.	Significant Observed Adverse Effect	Avoid
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Adverse Effect	Prevent

Table 7.1: Noise Exposure Hierarchy Based on the Likely Average Response

7.2.20 The PPGN describes sound that is not noticeable to be at levels below the NOEL. It describes exposures that are noticeable, but not to the extent that there is a perceived change in quality of life, as below the LOAEL; and these exposures need no mitigation. With reference to the definition of noise in the NPSE, such immissions are 'sound' and not 'noise'. On this basis, the audibility of sound from a development is not, in itself, a criterion to judge noise effects that is commensurate with national planning policy.

7.2.21 The PPGN suggests that noise exposures above the LOAEL but below the SOAEL cause small changes in behaviour. Examples of noise exposures above the LOAEL provided in the PPGN is: *having to turn up the volume on the television; needing to speak more loudly to be heard; where there is no alternative ventilation, closing windows for some of the time because of the noise; or, a potential for some reported sleep disturbance.* In line with the NPPF and NPSE, the PPGN states that consideration needs to be given to mitigating and minimising effects above the LOAEL but taking account of the economic and social benefits being derived from the activity causing the noise.

7.2.22 The PPGN suggests that noise exposures above the SOAEL cause material changes in behaviour. Examples of noise exposures above the SOAEL provided in the PPGN are, where there is no alternative ventilation, keeping windows closed for most of the time or avoiding certain activities during periods when the noise is present; and/or there is a potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. In line with the NPPF and NPSE, the PPGN states that effects above the SOAEL should be avoided and that whilst the economic and social benefits being derived from the activity causing the noise must be taken into account, such exposures are undesirable.

7.2.23 The PPGN suggests that a noise impact may be partially offset if the residents of affected dwellings have access to a relatively quiet part of their dwelling, private external amenity area and/or external public or private amenity space nearby.

7.2.24 The principles of the PPGN can also be applied to non-residential noise sensitive receptors. For example from professional judgement, for users of a public right of way, a noise which was audible but did not result in any change of behaviour would be below the LOAEL; if the noise were intrusive and resulted in some behaviour change (such as not stopping as one passes through the noisy area), then the impact would be judged to be below the SOAEL; If the noise resulted potential users to avoid the area or risk psychological stress or physiological effect, impacts would be above the SOAEL.

Swale Borough Council's Development Plan

7.2.25 The Swale Borough Council (SBC) Development Plan, "Bearing Fruits 2031" [Ref 7.6], adopted 2017, commits to "Conserving and enhancing the natural environment". In its policy relating to pollution, land contamination and unstable land, it instructs that, in context of the NPPF:

> *"Noise and vibration*
>
> *7.7.4 Assessing developments for noise and vibration - both from noise generated from new developments affecting existing development and new development close to existing noise sources - can be complex. The relevant British Standards and guidance, including BS4142, BS8233 and BS7445 need to be considered. The Council's Environmental Protection Team has published a guidance document, Noise and Vibration: Planning Guidance Document, 2013. Developers should refer to this guidance, as well as the latest revised British Standards, in their planning applications."*

7.2.26 The SBC Noise and Vibration: Planning Guidance Document, 2013 [Ref 7.7] identified above directs developers to the former issue of BS 4142:1997. Where appropriate, the current version of the standard, BS 4142:2014 will be used.

British Standard 5228 'Code of practice for noise and vibration control on construction and open sites', Parts 1 and 2, 2009

7.2.27 British Standard (BS) 5228 is a two part standard which comprises:

- BS 5228-1:2009+A1:2014 'Code of practice for noise and vibration control on construction and open sites – Part 1: Noise' [Ref 7.8]; and
- BS 5228-2:2009+A1:2014 'Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration' [Ref 7.9];

7.2.28 The Standard provides guidance, information and procedures on the control of noise and vibration from demolition and construction sites. The Control of Noise (Code of Practice for Construction and Open Sites) (England) Order 2015 [Ref 7.10] approved BS 5228-

1:2009+A1:2014 and BS 5228-2:2009+A1:2014 for the purpose of giving guidance on appropriate methods for minimising noise from construction and open sites in exercise of the powers conferred on the Secretary of State by sections 71(1)(b), (2) and (3) of the Control of Pollution Act 1974 [Ref 7.11].

7.2.29 There are no set standards for the definition of the significance of construction noise effects, however, for noise, example criteria are provided in BS 5228-1:2009+A1:2014 Annex E and for vibration, example criteria are provided in BS 5228-2:2009+A1:2014 Annex B. The assessment of whether changes in noise levels due to construction activity constitute significant effects will be dependent on the absolute levels of ambient and construction noise, as well as the magnitude, duration, time of occurrence and frequency of the noise change.

7.2.30 BS 5228-1:2009+A1:2014 provides basic information and recommendations for methods of noise control relating to construction and open sites where work activities/operations generate significant noise levels. It includes sections on: community relations; noise and persons on site, neighbourhood nuisance; project supervision; and control of noise. However, annexes include: information on legislative background; noise sources, remedies and their effectiveness (mitigation options); current and historic sound level data on site equipment and site activities; significance of noise effects; calculation procedures estimating sound emissions from sites and sound level monitoring; types of piling; and air overpressure.

7.2.31 BS 5228-2:2009+A1:2014 covers basic information and recommendations for basic methods of vibration control relating to construction and open sites where work activities/operations generate significant vibration levels. It includes sections on: community relations; vibration and persons on site; neighbourhood nuisance; project supervision; control of vibration and measurement.

<u>British Standard 4142:2014 'Methods for rating and assessing industrial and commercial sound'</u>

7.2.32 The foreword to BS 4142:2014 'Methods for rating and assessing industrial and commercial sound' [Ref 7.12] provides the following introduction for the assessment of human response to sound:

> *"Response to sound can be subjective and is affected by many factors, both acoustic and non-acoustic. The significance of its impact, for example, can depend on such factors as the margin by which a sound exceeds the background sound level, its absolute level, time of day and change in the acoustic environment, as well as local attitudes to the source of the sound and the character of the neighbourhood."*

7.2.33 The note to paragraph 8.5 of BS 4142:2014 is relevant to the assessment of the proposed development, and states:

"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."

7.2.34 BS 4142:2014 primarily provides a numerical method by which to determine the significance of sound of an industrial nature (i.e. the 'specific sound' from the proposed development) at residential NSRs. The specific sound level may then be corrected for the character of the sound (e.g. perceptibility of tones and/or impulses), if appropriate, and it is then termed the 'rating level', whether or not a rating penalty is applied. The 'residual sound' is defined as the ambient sound remaining at the assessment location when the specific sound source is suppressed to such a degree that it does not contribute to the ambient sound.

7.2.35 The specific sound levels should be determined separately in terms of the LAeq,T index over a period of T = 1-hour during the daytime and T = 15-minutes during the night-time. For the purposes of the Standard, daytime is typically between 07:00 and 23:00 hours and night-time is typically between 23:00 and 07:00 hours.

7.2.36 BS 4142:2014 states that measurement locations should be outdoors, where the microphone is at least 3.5 m from any reflecting surfaces other than the ground and, unless there is a specific reason to use an alternative height, at a height of between 1.2 m and 1.5 m above ground level. However, where it is necessary to make measurements above ground floor level, the measurement position, height and distance from reflecting surfaces should be reported, and ideally measurements should be made at a position 1 m from the façade of the relevant floor if it is not practical to make the measurements at least 3.5 m from the facade.

7.2.37 With regards to the rating correction, paragraph 9.2 of BS 4142:2014 states:

"Consider the subjective prominence of the character of the specific sound at the noise-sensitive locations and the extent to which such acoustically distinguishing characteristics will attract attention."

The commentary to paragraph 9.2 of BS 4142:2014 suggests the following subjective methods for the determination of the rating penalty for tonal, impulsive and/or intermittent specific sounds:

"Tonality

For sound ranging from not tonal to prominently tonal the Joint Nordic Method gives a correction of between 0 dB and +6 dB for tonality. Subjectively, this can be converted to a rating penalty of 2 dB for a tone which is just perceptible at the noise receptor, 4 dB where it is clearly perceptible, and 6 dB where it is highly perceptible.

Impulsivity

A correction of up to +9 dB can be applied for sound that is highly impulsive, considering both the rapidity of the change in sound level and the overall change in sound level. Subjectively, this can be converted to a penalty of 3 dB for impulsivity *which is just perceptible at the noise receptor, 6 dB where it is clearly perceptible, and 9 dB where it is highly perceptible.*

Other sound characteristics

Where the specific sound features characteristics that are neither tonal nor impulsive, though otherwise are readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied.

Intermittency

When the specific sound has identifiable on/off conditions, the specific sound level ought to be representative of the time period of length equal to the reference time interval which contains the greatest total amount of on time. … If the intermittency is readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied."

7.2.38 BS 4142:2014 requires that the background sound levels adopted for the assessment be representative for the period being assessed. The Standard recommends that the background sound level should be derived from continuous measurements of normally not less than 15-minute intervals, which can be contiguous or disaggregated. However, the Standard states that there is no 'single' background sound level that can be derived from such measurements. It is particularly difficult to determine what is 'representative' of the night-time period is because it can be subject to a wide variation in background sound level between the shoulder night periods. The accompanying note to paragraph 8.1.4 states that:

"A representative level ought to account for the range of background sounds levels and ought not automatically to be assumed to be either the minimum or modal value."

7.2.39 An initial estimate of the impact of the specific sound is obtained by subtracting the measured background sound level from the rating level of the specific sound. In the context of the Standard, adverse impacts include, but are not limited to, annoyance and sleep disturbance. Typically, the greater this difference, the greater is 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.

7.2.40 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.

7.2.41 Whilst there is a relationship between the significance of impacts determined by the method contained within BS 4142:2014 and the significance of effects described in the PPGN, there is not a direct link. It is not appropriate to ascribe numerical rating /

background level differences to LOAEL and SOAEL because this fails to consider the context of the sound, which is a key requirement of the Standard.

7.2.42 The significance of the effect of the noise in question (i.e. whether above or below SOAEL and LOAEL) should be determined on the basis of the initial estimate of impact significance from the BS 4142:2014 assessment with reference to the examples of outcomes described within the PPGN and after having considered the context of the sound. It is necessary to consider all pertinent factors, including:

- the absolute level of the sound;
- the character and level of the residual sound compared to the character and level of the specific sound; and
- the sensitivity of the receptor and whether dwellings or other premises used for residential purposes will already incorporate design measures that secure good internal and/or outdoor acoustic conditions, such as:
- facade insulation treatment;
- ventilation and/or cooling that will reduce the need to have windows open so as to provide rapid or purge ventilation; and
- acoustic screening.

7.3 Methodology

Scoping and Consultation

7.3.1 The formal scoping exercise is summarised in Chapter 3. A scoping opinion was provided in September 2017 by The Planning Inspectorate.

7.3.2 The formal scoping exercise is set out in chapter 3 with a summary of consultation responses set out in Appendix 3.1.

7.3.3 Consultation was also made with Kevin Tucker, Environmental Health Officer at Swale Borough Council (SBC) on Wednesday 17th January 2018. Stephen Scott, Senior Acoustic Consultant with RPS, contacted SBC to discuss the assessment methodology. It was confirmed by telephone that the assessment: for operational noise, should follow the assessment methodology contained within BS 4142:2014 with a rating difference appropriate to the situation; and for construction noise, the assessment could follow the examples within BS 5228, with appropriate adjustment if required. The noise surveys along the residential fringe towards the Paper Mill were discussed, with their locations considered broadly appropriate.

Establishing Baseline Conditions

7.3.4 Baseline noise conditions have been determined by survey with due regard to Chapter 10 of *IEMA's Guidelines for Environmental Noise Impact Assessment* [Ref 7.13] and British Standard 7445 'Description and measurement of environmental noise' - Parts 1 to 3, 2003

[Ref 7.14], 1991 [Ref 7.15] and 1991 [Ref 7.16]. Survey details and results are provided in Appendix 7.1.

Study Area

7.3.5 Following good practice, a study area of approximately 1 km from the red line boundary has been considered for the assessment for noise and vibration sensitive receptors (NSRs). Representative receptors within that area have been assessed for potential effect. Beyond this distance, noise predictions become unreliable; any adverse effects will have been identified within the 1 km area.

Significance Criteria

7.3.6 This section provides and describes how the magnitudes of impact relating to noise and vibration have been identified with regards to the construction and operation of the proposed K4.

Construction Noise

7.3.7 The magnitude of construction noise impacts has been determined in accordance with Annex E of BS 5228-1:2009+A1:2014 [Ref 7.8]. The significance criteria for assessing noise impact from construction works have been based on Example Method 2 contained within Annex E.3.3 of BS 5228-1:2009+A1:2014, as referred to above, this indicates that:

> *"Noise levels generated by site activities are deemed to be potentially significant if the total noise (pre-construction ambient plus site noise) exceeds the pre-construction ambient noise by 5 dB or more, subject to lower cut-off values of 65 dB, 55 dB and 45 dB L_{Aeq} period, from site noise alone, for the daytime, evening and night-time periods, respectively; and a duration of one month or more, unless works of a shorter duration are likely to result in significant effect."*

7.3.8 For the majority of NSRs, pre-construction ambient sound levels are relatively low, not consistently exceeding 62 dB $L_{Aeq,day}$; 52 dB $L_{Aeq,evening}$ and 42 dB $L_{Aeq,night}$, resulting in the criteria set within the lower cut-off levels given in Table 7.2 below applying, the most stringent limits. As such, the lower cut-off levels are used throughout the construction assessment. Assessment determination is also subject to duration criteria and where ambient sound levels are low.

Assessment category and threshold value period (L_{Aeq})	Threshold value[1], in decibels (dB)			
	No/Negligible	Minor	Moderate	Major
Night-time (23.00 to 07.00 hours)	<40	40 - 45	45 – 55	>55
Evenings (19.00 to 23.00 hours weekdays). Weekends (13.00 to 23.00 hours Saturdays and 07.00 to 23.00 hours Sundays)	<50	50 - 55	55 – 65	>65

Assessment	Threshold value[1], in decibels (dB)			
Daytime (07.00 to 19.00 hours) weekdays and Saturdays (07.00 to 13.00 hours)	<60	60 - 65	65 - 75	>75

Table 7.2: Construction Noise Threshold Criteria

<u>Construction traffic</u>

7.3.9 For noise change associated with non-permanent sources and construction road traffic, a change of 3 dB is the minimum perceptible under normal conditions, and a change of 10 dB corresponds roughly to halving or doubling of a sound.

7.3.10 It is generally accepted that an increase of 3 dB(A) or more is the threshold at which a permanent noise effect becomes significant (Design Manual for Roads and Bridges (DMRB) Volume 11 Section 3 Part 7 HD 213/11 para 3.37 [Ref 7.17]). However, for a temporary change, such as may arise from construction traffic servicing a construction site, as the noise change is not permanent, and in order to allow the project to proceed at a reasonable rate without undue constraint, it is considered justifiable, following accepted precedent, that the threshold of significance can be raised to a 6 dB(A) change. Noise change criteria are applied equally to the day and night periods.

7.3.11 It is also standard practice to categorise the degree of effect according to the extent of the predicted noise change. This is frequently implemented by the use of semantic descriptors associated with noise change bands. The approach has been used in the UK over the last 10 years in the assessment of road traffic schemes, expanding upon the criteria within DMRB and reflecting the likely duration of construction for this particular project. The criteria are based on the premise that subjective response to noise from a new source is proportional to the change in overall noise level. Hence, the semantic scale provided in Table 7.3 has been adopted to describe noise change (given that only increases are likely, there are no decrease bands).

Predicted Change In $L_{Aeq,T}$ or $L_{A10,T}$	Significant Yes/No?	Semantic Scale Rating / Magnitude of Impact
Increase of less than 1 dB	No	No significant change
Increase of 1 - 3 dB	No	Negligible Increase
Increase of 3 - 6 dB	No	Minor Increase
Increase of 6 -10 dB	Yes	Moderate Increase
Increase of 10 - 20 dB	Yes	Major Increase
Increase of more than 20 dB	Yes	Substantial Increase

Table 7.3: Construction Traffic Noise Criteria Levels.

<u>Construction Vibration</u>

7.3.12 Criteria for assessing the significance of construction vibration are provided in BS 5228-2:2009+A1:2014 [Ref 7.9]. Table 7.4 below details potential vibration levels measured in terms of Peak Particle Velocity (PPV) based on the guidance in BS 5228-2:2009+A1:2014 and provides a semantic scale for construction vibration effects on human receptors . Criteria are applied equally to day and night-time periods.

Peak Particle Velocity	Description	Magnitude of Impact
>0.14 mm/s	Vibration might just be perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.	Negligible
>0.3 mm/s	Vibration might just be perceptible in residential environments.	Minor
>1.0 mm/s	It is likely that vibration of this level in residential environments will cause complaint, but can be tolerated if prior warning and explanation has been given to residents.	Moderate
>10 mm/s	Vibration is likely to be intolerable for any more than a brief exposure to this level.	Major

Table 7.4: Guidance on Effects of Vibration Levels.

Operational Noise

7.3.13 The significance of the noise effects associated with the operation of the Proposed Development has been determined based upon the methodology contained within BS 4142:2014 *Methods for rating and assessing industrial and commercial sound* [Ref 7.8]. This requires the following:

- Determination and characterisation of the baseline sound environment to derive a representative background sound level for the periods of interest;
- Development of a noise model that includes the significant sound generating items of plant and activities; this model predicts noise levels at the NSRs included within the model – this provides the specific noise level at each NSR (a SoundPLAN noise model will be developed which utilises prediction methodology contained within International Standard (ISO) 9613-2:1996 'Acoustics: Attenuation of sound during propagation outdoors. Part 2: General method of calculation' [Ref 7.18);
- Specification of any character corrections as required and described in Section 9 of BS 4142:2014 including those for tonality, impulsivity, other sound characteristics and intermittency – when any corrections are made to the Specific Noise Level, this then becomes the Rating Level, $L_{Ar,Tr}$ (if no corrections are made, the level is still termed the Rating Level); and then
- Determination of the difference at each NSR between the $L_{Ar,Tr}$ and the background sound level. The difference determines the impact which can be described in accordance with Section 11 of BS 4142:2014 but this also requires consideration of the context.

7.3.14 From the above and following the guidance in BS 4142:2014, Table 7.5 can be used to define the magnitude of impact.

7.3.15 In general, criteria are applied equally to day and night-time periods. However, the night-time background sound levels are generally lower than for the daytime, resulting in more stringent criteria at night. BS 4142 instructs that the context of any potential impact should also be considered in determining impact. It may be appropriate to vary the impact criteria for individual cases by giving weight to the absolute noise levels and resulting internal noise environment at surrounding noise sensitive receptors (for example within residences) using the levels within BS 8233: *Guidance on sound insulation and noise reduction for buildings* [Ref 7.19]. The frequency and time of occurrence may also be considered.

Difference between Rating Level and Background Sound Level	BS 4142 Semantic Description	Magnitude of Impact
> 10 dB	A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.	Major
5 to 10 dB	A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.	Moderate
0 to 5 dB	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.	Minor
-10 to 0 dB		Negligible
< -10 dB	-	No change

Table 7.5: Operational Noise - Determination of Magnitude of Impact

7.3.16 Predictions are made for nine residential NSRs within a 1 km buffer of the Proposed Development, considered representative of the wider area and noise contours have also been calculated. NSRs are shown in Figure 7.2. Baseline sound levels for these properties are taken, for the purpose of assessment, to be the lower of the two measured locations. This provides a worst-case assessment.

Operational Vibration

7.3.17 Vibration from operational plant will be assessed qualitatively using professional judgement.

Assessment of Effects

7.3.18 The assessment of the effect with regards to noise and vibration is determined by correlating the magnitude of the impact and the sensitivity of the receptor. The particular method employed, with regard to IEMA's Guidelines, is presented in Table 7.6. Where a range of significance of effect is presented, the final assessment for each effect is based upon expert judgement. Specific NSRs have been identified and included within the assessment and are shown on Figure 7.1.

7.3.19 For the purposes of this assessment, any effects with a significance level of moderate adverse magnitude or greater are considered as significant adverse effects. Adverse effects of slight magnitude or below are noteworthy but not significant in terms of the EIA Regulations.

		Magnitude of impact				
		No change	**Negligible**	**Minor/Small**	**Moderate/Medium**	**Major/Large**
Sensitivity of receptor	**Negligible**	Negligible	Negligible	Negligible or slight	Negligible or slight	Slight
	Low	Negligible	Negligible or slight	Negligible or slight	Slight	Slight or moderate
	Medium	Negligible	Negligible or slight	Slight	Moderate	Moderate or substantial
	High	Negligible	Slight	Slight or moderate	Moderate or substantial	Substantial or very substantial

Table 7.6: Determination of Magnitude of Effect with regards to Impact and Sensitivity of Receptor

Limitations and Assumptions

7.3.20 In all assessments, it is good practice to consider uncertainty, which can arise from a number of different aspects of an assessment. There is a degree of uncertainty associated with: the instrumentation itself; the use of instrumentation, i.e. the measurements; the source terms used; the sound propagation model; and the subjective response of residents to the sound sources.

7.3.21 Uncertainty due to instrumentation error has been significantly reduced with the introduction of modern instrumentation and is reduced further by ensuring that all instrumentation is calibrated before and after each measurement period and is within accepted calibration intervals.

7.3.22 Every effort has been made to reduce the uncertainty of the baseline sound level measurements. Uncertainty in the baseline data has been reduced significantly by carrying out the baseline sound level survey over a period of seven days, allowing analysis of how representative the baseline data is given the naturally varying noise level at the site.

7.3.23 A quantitative assessment has been undertaken based on likely source levels provided by the measurement taken on site and relevant British Standards. This approach minimises uncertainty associated with the source term inputs to the sound propagation model.

7.3.24 With regard to subjective response, the acoustics standards and guidance adopted for the assessment are based on the subjective response of the majority of the population. This is considered to be the best that can be achieved in a population of varying subjective responses, which are dependent upon a wide range of factors.

7.3.25 On the basis of the above, whilst the magnitude of any uncertainty has not been quantitatively defined, measures have been taken to minimise this aspect in accordance with best practice.

7.3.26 It is noted the event K4 does not get consent, K1 may be modified and continue to operate. For the basis of this assessment it is therefore assumed that noise levels will remain comparable with existing levels.

7.4 Baseline Conditions

7.4.1 The proposed development is located at Kemsley Paper Mill, Sittingbourne, Kent. The site is bounded to the west by the paper mill, to the east by The Swale and to the north and south by Kemsley Marshes. The nearest residential receptors approximately 600 m to the west. This is the residential area called Kemsley. There are potential noise sensitive ecological receptors bordering the north, east and south of the proposal site. Saxon Shore Way public footpath which follows the bank of the Swale, passes the eastern extent of the site.

7.4.2 The A249 is located approximately 2 km to the north and west of the site and is accessed via Swale Way. The A249 connects with both the A2 west of Sittingbourne and the M2 at Junction 5 approximately 8 km south of the site. To the north, the A249 provides access to the Isle of Sheppey.

Sensitive Receptors

7.4.3 The sensitive receptors listed in Table 7.7 below have the potential to be affected by the Proposed Development. The assessment in this Chapter has considered the effects upon the identified sensitive receptors. Receptors are shown on Figure 7.1. Sensitivities are derived from professional judgement such as to match the impact criteria with the determination of magnitude of effect, such as to ensure that an exceedance of any mandated limit results in a significant effect.

7.4.4 Residential receptors are considered to be of medium sensitivity. This allows for other receptors of particular sensitivity to be allocated high sensitivity where appropriate.

7.4.5 One school, Kemsley Primary School, has been identified within the 1 km study area, approximately 850 m from the Site. The school is considered to be of medium sensitivity. No high-sensitivity receptors (e.g. such as hospitals, recording studios etc.) have been identified within the study area.

7.4.6 Public rights of way and parkland are considered of low sensitivity. The Saxon Shore Way footpath follows both sides of the Swale, passing within approximately 100 m of the Site. Approximately half of The Church Marshes Country Park falls between 500 m and 1 km from the K4 red line, the remaining half beyond 1 km distance.

7.4.7 The assessment of ecological receptors is considered within Ecology Chapter 10.

Receptor	Importance/ Sensitivity/ Vulnerability to Change
Residential dwellings	Medium
School, Kemsley Primary	Medium
Public Rights of Way	Low
Other noise sensitive receptors	n/a - None identified

Table 7.7: Potentially affected sensitive receptors

7.4.8 Ecological receptors are identified within Chapter 10 Ecology.

7.5 Existing Noise Environment

7.5.1 Baseline noise survey data gathered in 2016 is used to determine a representative baseline sound level across the Site and wider area. The local noise environment within the residential areas is determined by noise arising from traffic movements. From Chapter 4 Traffic and Transport, traffic growth of around 3.5% is anticipated between 2016 and 2019. This would equate to a noise increase of approximately 0.1 dB, indicating that the 2016 data remains valid without modification for assessment in 2019 and beyond.

7.5.2 Baseline sound measurements were carried out between Tuesday 7th June and Tuesday 14th June 2016 at 41 Reams Way and 97 Walsby Drive. It is considered that these locations are representative of the neighbouring residential areas. These locations are shown in Figure 7.2.

7.5.3 Table 7.8 below provides a summary of the representative baseline levels determined by survey. The representative level has been determined by consideration of the survey data to provide a level indicative of the quieter times during the survey period. This is considered a robust approach.

NSR	Survey Location	Period	Representative Background Sound Level $L_{A90,T}$ (dB)	Range of Background Sound Levels $L_{A90,T}$ (dB)	Range of Residual Sound Level $L_{Aeq,T}$ (dB)
Reams Way	LT1	07:00 - 23:00	49	40 – 62	60 - 64
		23:00 - 07:00	43	38 – 56	54 - 59
Walsby Drive	LT2	07:00 - 23:00	39	32 – 49	47 - 51
		23:00 - 07:00	35	30 – 48	45 - 51

Table 7.8: Representative Baseline Sound Levels

7.5.4 Within this assessment, the minimum representative day and night-time levels are used; ie. 39 dB $L_{A90,day}$ and 35 dB $L_{A90,night}$. These are considered to provide the basis for a robust assessment and reflect the context of the proposal within the wider area.

7.5.5 No significant vibration is transmitted beyond the footprint of the neighbouring industrial buildings, so existing vibration levels across the site and wider area are considered to be negligible. Assessment of vibration effects are compared against absolute levels, rather than vibration level change. Therefore no measurement of baseline vibration is required.

Future baseline

7.5.6 The likely future baseline conditions of the application site in the absence of the Proposed Development have been considered.

7.5.7 Based on the traffic flow data provided for the existing baseline (2017) and future baseline (2019) scenarios, predictions indicate that baseline sound levels are likely to increase by approximately 0.1 dB due to the natural increase in traffic flows on the local road network. For 2021, as K4 becomes operational, no traffic assessment has been undertaken as there will be minimal if not no movements associated with K4.

7.5.8 In the event K4 does not get consent, K1 may be modified and continue to operate. For the basis of this assessment it is assumed that noise levels will remain comparable with existing levels and no assessment of a modified K1 in the absence of K4 has been assessed.

7.5.9 As the K3 generating station, IBA recycling facility and access track have planning permission from Kent County Council, the consented future baseline of the site comprises the built and operational development of both buildings in accordance with their permissions in addition to the future baseline conditions described above.

7.6 Predicted Effects

7.6.1 Effects of the development of K4 may arise during its construction, operation, and eventual decommissioning. The effects of noise are generally limited to the area immediately surrounding the development site, and so receptors representative of the immediate surrounding areas within the study area have been assessed.

Construction Effects

7.6.2 The impacts of the construction of K4 have been considered with regards to noise and vibration. No significant demolition will be required for the construction of K4.

7.6.3 For the purposes of this Environmental Statement chapter, construction effects are temporary and relatively short-term (less than 5 years). Construction noise and vibration will be intermittent, depending on the nature of the construction phase and day-to-day programme, but with more intense activity at the start and consequentially higher noise levels during site clearance and foundation construction. Once construction works cease, construction noise and vibration will also immediately cease.

7.6.4 Although the majority of the works will be undertaken during the daytime, in exceptional circumstances, it may be necessary for evening or night works to occur. The Project will be undertaken within prescribed working hours except by prior written agreement of Swale Borough Council.

Construction Noise

7.6.5 The nearest residential properties are over 500 m from the main construction area of K4. Given the separation between the K4 site and the nearest residential receptors, construction activities are unlikely to result in significant adverse effect due to noise.

7.6.6 At this stage of assessment, detailed construction programme and methodology is not available. Three of the more noisy phases of construction works have been considered: piling works; general excavation; and concrete works. Other construction activities, such as installing plant, would be expected to result in noise levels below that for those identified above.

7.6.7 For piling, it has been assumed that the significant plant with regards to noise comprise: two piling rigs, one excavator and one truck mixer. For general excavation, plant assumed are: one Excavator and three trucks. For concrete works, plant assumed are: one concrete pump and three mixers. A 150 kva generator would operate throughout. Typical noise source levels have been taken from BS 5228-1:2009+A1:2014 or provided by Costain's engineers, and are summarised in Table 7.9 below.

Plant	Source	dB SPL @ 10m
Excavator - 20T	BS5228 C2.3	78
Generator - 150kva	BS5228 C6.39	65
Concrete pump - 40m	BS5228 C4.25	82
CFA piling rig - 65T	Costain	85
Impact Pile Driver	BS5228 C3.1	89
8 wheel muckaway truck / truck mixer	BS5228 C4.21	76

Table 7.9: Typical Construction Plant Noise Levels

7.6.8 Specific sound levels at the NSRs identified have been calculated using 3D sound modelling software 'SoundPlan v7.4', with input acoustic data based that provided by Costain and taken from BS 5228. Calculation of the above indicates that overall noise emissions from concreting works will be approximately 4 dB below that for CFA piling; and noise emissions from general excavation around 6 dB below that from CFA piling activity. Other construction activities would also result in noise levels below that for CFA piling.

7.6.9 A qualitative assessment of the overall likely effects is therefore considered for the works as a whole, based on the likely most-noisy activity.

7.6.10 The most noisy construction activity on site would likely be associated with site clearance and piling, in particular if impact piling is required. As a worst case assessment, and to inform the ecological assessment, a prediction of impact piling noise has been made. Noise contours showing maximum noise levels during piling are provided in Figure 7.3.

7.6.11 During piling, noise levels from the piling are predicted to be a maximum of 40 dB L_{Aeq} at any surrounding residential area, as determined by the noise model. For daytime and evening works, this would be of negligible magnitude under the criteria adopted from BS 5228. For night-time works, a level of 40 dB L_{Aeq} just reaches the minor adverse impact criteria. Construction noise levels during general excavation and concreting would be lower than for piling.

7.6.12 For the residential NSRs identified, this would equate to a slight adverse effect (not significant). From the maximum predicted levels above, during construction, effects on Kemsley Primary School would be negligible; effects on the PRoW would be negligible.

7.6.13 Construction of the facility will also necessitate a significant number of construction vehicles accessing the Site, a high proportion of which will be HGVs. Construction traffic will consist of mix of light and heavy commercial vehicles to transport materials and equipment to and within the site. Given that the site is accessed by well maintained and appropriate roads, already serving the adjacent industrial areas, any increase in vehicle movements is unlikely to result in anything but a negligible increase in road traffic noise.

7.6.14 From the Traffic and Transport chapter 4, construction works will result in up to a maximum of around 250 vehicle two-way movements per day, including 80 HGVs. With these vehicles use the existing road network, there is the potential to increase the existing road traffic noise experienced by the residents of surrounding properties. Road links are described in Traffic and Transport chapter 4.

7.6.15 A summary of the traffic flows from chapter 4 are provided in Tables 7.10 to 7.12 below, for weekdays, Saturday & Sunday. The increase in noise arising from each link as a result of the additional construction traffic is provided in the last column, calculated using the formula within the Calculation of Road Traffic Noise (CRTN) [Ref 7.20]

Road Link	Time basis	5 Day Average				
		2019 Future Baseline		Construction Traffic		dB Increase
		Total	HGVs	Total	HGVs	
Link 1 Swale Way East of B2005 Grovehurst Roundabout	12 hr	16876	2143	80	80	**0.1**
	24 hr	22240	3050	249	80	**0.1**
Link 2 Barge Way North of Swale Roundabout	12 hr	5188	1706	80	80	**0.2**
	24 hr	8099	2367	80	80	**0.1**
Link 3 Barge Way West of Fleet End Roundabout	12 hr	2871	1252	80	80	**0.2**
	24 hr	4186	1661	80	80	**0.2**
Link 4 A249 South of Swale Way Junction	12 hr	31164	14572	80	80	**0.0**
	24 hr	41564	20231	242	80	**0.0**
Link 5 Swale Way north of Reams Way Junction	12 hr	11605	581	0	0	**0.0**
	24 hr	14382	828	170	0	**0.0**
Link 6 Swale Way south of Reams Way Junction	12 hr	11641	623	0	0	**0.0**
	24 hr	14401	870	170	0	**0.0**
Link 7 Swale Way south of Reams Way Junction	12 hr	10706	492	0	0	**0.0**
	24 hr	13043	653	1	0	**0.0**

Table 7.10: Construction Vehicle Noise – 5 Day Average

Road Link	Time basis	Saturday				
		2019 Future Baseline		Construction Traffic		dB Increase
		Total	HGVs	Total	HGVs	
Link 1 Swale Way East of B2005 Grovehurst Roundabout	12 hr	9361	1121	84	60	**0.1**
	24 hr	13043	1782	169	60	**0.1**
Link 2 Barge Way North of Swale Roundabout	12 hr	2687	1068	0	60	**0.2**
	24 hr	4588	1620	0	60	**0.1**
Link 3 Barge Way West of Fleet End Roundabout	12 hr	1195	673	0	60	**0.3**
	24 hr	1914	971	0	60	**0.2**
Link 4 A249 South of Swale Way Junction	12 hr	26602	13684	81	60	**0.0**
	24 hr	35215	18261	162	60	**0.0**

Link 5 Swale Way north of Reams Way Junction	12 hr	7058	188	85	0	**0.0**
	24 hr	8881	306	170	0	**0.1**
Link 6 Swale Way south of Reams Way Junction	12 hr	6899	201	85	0	**0.0**
	24 hr	8795	300	170	0	**0.1**
Link 7 Swale Way south of Reams Way Junction	12 hr	6767	86	0	0	**0.0**
	24 hr	8376	163	1	0	**0.0**

Table 7.11: Construction Vehicle Noise – Saturday

Road Link	Time basis	Sunday				
		2019 Future Baseline		Construction Traffic		dB Increase
		Total	HGVs	Total	HGVs	
Link 1 Swale Way East of B2005 Grovehurst Roundabout	12 hr	4682	34	144	60	**0.6**
	24 hr	7110	86	229	60	**0.4**
Link 2 Barge Way North of Swale Roundabout	12 hr	983	268	60	60	**0.7**
	24 hr	1914	429	60	60	**0.4**
Link 3 Barge Way West of Fleet End Roundabout	12 hr	158*	11	60	60	**5.5***
	24 hr	289*	35	60	60	**3.1***
Link 4 A249 South of Swale Way Junction	12 hr	21646	11373	141	60	**0.0**
	24 hr	28456	14950	222	60	**0.0**
Link 5 Swale Way north of Reams Way Junction	12 hr	5220	136	85	0	**0.1**
	24 hr	6601	217	170	0	**0.1**
Link 6 Swale Way south of Reams Way Junction	12 hr	4829	146	85	0	**0.1**
	24 hr	6145	215	170	0	**0.1**
Link 7 Swale Way south of Reams Way Junction	12 hr	5055	86	0	0	**0.0**
	24 hr	6276	123	1	0	**0.0**

* Very low base flows

Table 7.12: Construction Vehicle Noise – Sunday

7.6.16 From the tables above, it can be seen that for most links, on all days, any noise change arising from change in traffic flows due to additional construction vehicles would result in a noise increase of less than 1 dB.

7.6.17 The exception to this is for Link 3 Barge Way West of Fleet End Roundabout, where an increase of 5 dB during Sunday daytime, or 3 dB over a 24-hour Sunday period is indicated. This link, however, has a very low baseline flow (less than 1000 vehicles per 24-hour), resulting in the noise change indicated for this link being significantly over-reported, being masked by any existing ambient noise. Furthermore, this link is well separated from any residential NSRs. Consequently, it is considered that all construction traffic noise will be of negligible adverse impact or below.

7.6.18 For residential NSRs, PRoW and the identified school, this would equate to a negligible adverse effect.

7.6.19 It is considered, therefore, that construction works on site would not result in any significant impact within the surrounding residential area. Notwithstanding this, best practicable means to reduce construction noise impact (including minimising night-time works where practicable) should be implemented to minimise any potential for disturbance to the surrounding area.

Construction Vibration

7.6.20 Surface plant such as cranes, compressors and generators are not recognised as sources of high levels of environmental vibration. Even at a closest distance of 10 m, PPVs significantly less than 5 mm/s are generated by such plant. For example, from BS 5228-2:2009+A1:2014, a tracked excavator may generate a PPV of approximately 0.6 mm/s and a heavy lorry on poor road surface a PPV of less than 0.1 mm/s at 10 m distance. These values are well below limits at which even cosmetic building damage becomes likely. Similarly, whilst vibration from impact piling might result in higher vibration levels at source, vibration level would be insignificant beyond the immediate development area.

7.6.21 The nearest residential properties are over 500 m from the main construction area of K4. From BS 5228-2, vibration levels decrease rapidly with increasing distance and is also attenuated by energy absorption in the soil and by obstacles and discontinuities. Given the separation between the K4 site and the nearest residential receptors, vibration from construction activities will be significantly below the minor significance criteria. As such, vibration is considered to have no or negligible impact magnitude, and will have no significant adverse effect. Notwithstanding this, vibration impacts will be minimised to ensure any sensitive activities and machinery associated with the existing Mill are not adversely affected by the works.

7.6.22 Any impacts and effects on other non-residential NSRs would also be negligible. The school identified is beyond the nearest residential properties and of similar sensitivity to them. The PRoW is not considered sensitive to vibration.

7.6.23 Similarly to that for construction traffic noise; vibration levels arising from HGVs off-site, peak or cumulative vibration levels would not be significantly any greater than that arise from existing traffic. As such construction traffic vibration would be of negligible impact and consequently negligible effect on NSRs.

Operational Effects

Operational Noise

7.6.24 Noise during operation will arise from mobile and fixed plant. Plant items within buildings will contribute to an internal reverberant noise level which will be attenuated by the building structure before radiating into the environment. External plant items will radiate noise straight into the environment, as will the heat recovery steam generator (HRSG) stack, exhaust stacks and air intakes. The locations of these plant items are shown in **Figures 2.4a&b** in Chapter 2. A summary of the noise sources modelled are provided in Table 7.13.

Item No.	Drawing Reference		dB L_{pA} at 1m	dB L_{wA}
(a)	Local Equipment Room (including battery enclosure)	Not noisy	-	-
(b)	Generator	Internal reverberant levels, attenuated by building structure standard thermal insulation.	89	-
(c)	Gas Turbine	Internal reverberant levels, attenuated by building structure standard thermal insulation.	89	-
(d)	Heat Recovery Steam Generator	HRSG - Air Intake	-	89
		HRSG - Exhaust Air	-	89
		GT Filter House	-	93
(e)	H.R.S.G. Stack	-	-	98
(f)	Turbine Hall (including steam turbine)	Turbine Hall	85*	-
		Machine Hall Blow Down Vessel	-	92
		Safety Valves Systems	-	130
(g)	CHP pipe bridge	Not noisy	-	-
(h)	Dump Condenser	Fans 1-32	-	98
(i)	Fin Fan Cooler	-	-	93
(j)	Package Boiler Stack	-	-	92
(k-w)	Start Transformer	-	-	90
(k-w)	Fire Extinguishing Cabinet	Not noisy	-	-
(k-w)	Switchgear	Not noisy	-	-
(k-w)	Block Transformer	-	-	90
(k-w)	EB Transformer	-	-	90
(k-w)	Package Boiler	Internal reverberant levels, attenuated by building structure standard thermal insulation.	80	-
(k-w)	Fuel Gas Skid	Gas Reduction Station	-	92
		GT Gas Filters	-	95
		Gas Heaters	-	95
(k-w)	Condensate Pumps	-	-	93
(k-w)	Chemical Dosing	Not noisy	-	-
(k-w)	Effluent Sump	Not noisy	-	-
(k-w)	Condensate Tank	Not noisy	-	-
(k-w)	Boiler Water Feed Pumps	-	-	93

Table 7.13 Operational Noise Source Levels

7.6.25 The operation of K4 will result in no significant additional vehicle or HGV movements, as discussed in Chapter 4 Traffic and transport.

7.6.26 Operational noise from the K4 facility has been predicted for three operating scenarios:

- Scenario 1: During normal CHP operation, heat in the form of steam is provided to the Paper Mill, which provides the necessary cooling to sustain the electrical generation process.
- Scenario 2: Should the Paper Mill not require heat when the CHP is in operation (due to sudden change in Paper Mill operation), then the CHP will bring into action the Dump Condenser array, which is a significant additional source of noise.
- Scenario 3: In exceptional (emergency) circumstance, such as the sudden non-operation of the turbine, it is necessary to vent all steam to atmosphere. This is done through steam safety valve systems.

7.6.27 With regard to Scenario 3, the use of the steam releases are likely to be less than that for the existing K1 facility; an oversized dump condenser is proposed for K4 (plant that doesn't exist for K1) such that the need to operate the steam pressure immediate release valve will be greatly reduced.

7.6.28 For context, the frequency of operation of the steam release valves for the existing K1 CHP facility is reported as "The main HP safety valves (2 x WHRB S/htr safety v/v's) have either lifted on approximately 3 to 4 times a year for a duration of approximately 60 to 90 seconds on each occasion."

7.6.29 Predictions of operational noise have been made using the noise source data in Table 7.13 and SoundPLAN 7.4 noise modelling software. SoundPLAN implements the prediction methodology set in BS EN ISO 9613-2.

7.6.30 During normal operation, noise from the CHP Plant is assumed to be neither tonal nor impulsive when considered from the surrounding NSRs (an assumption considered reasonable for appropriately specified and well-maintained plant). Any plant noise specification will either require this, or require that a more stringent overall noise level is achieved. A zero dB rating correction (as determined using the BS 4142 methodology) is applied within the calculations and assessment for normal and Dump Condenser operation.

7.6.31 The steam release valve, when in use, will generate noise which may be tonal and is likely to be readily distinctive against the residual acoustic environment. As such, a +3 dB rating correction under BS4142 is applied.

7.6.32 Details of the predicted noise levels, and the assessment against representative background sound levels and anticipated noise change is given in Tables 7.14 to 7.16 for the three scenarios. Noise contours showing predicted noise levels for normal operations with and without the dump condenser are provided in Figure 7.4 and Figure 7.5.

NSR	Period	Representative Background Sound Level $L_{A90,T}$ dB	Specific Sound Level $L_{Aeq,Tr}$ dB	Rating Penalty dB	Rating Level, $L_{Ar,Tr}$ dB	Rating / Background Level Difference dB	Representative Residual Sound Level $L_{Aeq,T}$ dB	Noise Change L_{Aeq} dB
Marsh Rise	Day	39	33	0	33	-6	47	0.2
	Night	35	33	0	33	-2	45	0.3
Off Reams Way	Day	39	34	0	34	-5	47	0.2
	Night	35	34	0	34	-1	45	0.3
Reams Way	Day	39	32	0	32	-7	47	0.1
	Night	35	32	0	32	-3	45	0.2
Reams Way N	Day	39	33	0	33	-6	47	0.2
	Night	35	33	0	33	-2	45	0.3
Reams Way S	Day	39	33	0	33	-6	47	0.2
	Night	35	33	0	33	-2	45	0.3
Recreation Way N	Day	39	33	0	33	-6	47	0.2
	Night	35	33	0	33	-2	45	0.3
Recreation Way S	Day	39	32	0	32	-7	47	0.1
	Night	35	32	0	32	-3	45	0.2
Walsby Drive N	Day	39	32	0	32	-7	47	0.1
	Night	35	32	0	32	-3	45	0.2
Walsby Drive S	Day	39	33	0	33	-6	47	0.2
	Night	35	33	0	33	-2	45	0.3

Table 7.14: Operational Assessment Summary (Normal Operation – Scenario 1)

NSR	Period	Representative Background Sound Level $L_{A90,T}$ dB	Specific Sound Level $L_{Aeq,Tr}$ dB	Rating Penalty dB	Rating Level, $L_{Ar,Tr}$ dB	Rating / Background Level Difference dB	Representative Residual Sound Level $L_{Aeq,T}$ dB	Noise Change L_{Aeq} dB
Marsh Rise	Day	39	38	0	38	-1	47	0.5
	Night	35	38	0	38	3	45	0.8
Off Reams Way	Day	39	36	0	36	-3	47	0.3
	Night	35	36	0	36	1	45	0.5
Reams Way	Day	39	34	0	34	-5	47	0.2
	Night	35	34	0	34	-1	45	0.3
Reams Way N	Day	39	35	0	35	-4	47	0.3
	Night	35	35	0	35	0	45	0.4
Reams Way S	Day	39	36	0	36	-3	47	0.3
	Night	35	36	0	36	1	45	0.5
Recreation Way N	Day	39	38	0	38	-1	47	0.5
	Night	35	38	0	38	3	45	0.8
Recreation Way	Day	39	35	0	35	-4	47	0.3

S	Night	35	35	0	35	0	45	0.4
Walsby Drive N	Day	39	37	0	37	-2	47	0.4
	Night	35	37	0	37	2	45	0.7
Walsby Drive S	Day	39	39	0	39	0	47	0.7
	Night	35	39	0	39	4	45	1.0

Table 7.15: Operational Assessment Summary (Normal Operation with Dump Condenser – Scenario 2)

NSR	Period	Representative Background Sound Level $L_{A90,T}$ dB	Specific Sound Level $L_{Aeq,Tr}$ dB	Rating Penalty dB	Rating Level, $L_{Ar,Tr}$ dB	Rating / Background Level Difference dB	Representative Residual Sound Level $L_{Aeq,T}$ dB	Noise Change L_{Aeq} dB
Marsh Rise	Day	39	59	3	62	23	47	12.5
	Night	35	59	3	62	27	45	14.5
Off Reams Way	Day	39	60	3	63	24	47	12.7
	Night	35	60	3	63	28	45	14.7
Reams Way	Day	39	58	3	61	22	47	11.7
	Night	35	58	3	61	26	45	13.6
Reams Way N	Day	39	59	3	62	23	47	12.3
	Night	35	59	3	62	27	45	14.2
Reams Way S	Day	39	59	3	62	23	47	12.5
	Night	35	59	3	62	27	45	14.5
Recreation Way N	Day	39	60	3	63	24	47	12.8
	Night	35	60	3	63	28	45	14.7
Recreation Way S	Day	39	60	3	63	24	47	13.0
	Night	35	60	3	63	28	45	14.9
Walsby Drive N	Day	39	58	3	61	22	47	11.7
	Night	35	58	3	61	26	45	13.6
Walsby Drive S	Day	39	59	3	62	23	47	11.9
	Night	35	59	3	62	27	45	13.8

Table 7.16: Operational Assessment Summary (Normal Operation and Steam Release Valves – Scenario 3)

7.6.33 The receptors above are identified as residential. The sensitivity of the receptor is therefore, considered to be medium.

7.6.34 During normal operation, without the dump condenser operating, a maximum rating difference between specific rating level and representative background level of -1 dB is predicted. This would be of negligible adverse impact following the criteria adopted. The addition of noise from K4 would result in a noise increase of no more than 0.3 dB; also considered a negligible impact.

7.6.35 The effect of these negligible impacts on residential properties is considered to be of negligible or slight adverse effect, and not significant.

7.6.36 During normal operation with the dump condenser operating, a maximum rating difference between specific rating level and representative background level of +4 dB is predicted. This would be of minor adverse impact following the criteria adopted. The addition of noise from K4 would result in a noise increase of no more than 1 dB, also a minor impact.

7.6.37 The effect of these minor impacts on residential properties is considered to be of slight adverse effect, and not significant.

7.6.38 During extraordinary or emergency operation, with the dump condenser and steam release valve operating, a maximum rating difference between specific rating level and representative background level of +28 dB is predicted. This would be of major adverse impact for the duration of occurrence, following the criteria adopted. The addition of noise from K4 would result in a noise increase of no more than 15 dB.

7.6.39 Absolute noise levels approaching 60 dB L_{Aeq} are predicted at neighbouring residences during use of the safety valve system. Whilst such a level is not immediately prejudicial to health, off-site, it may result in sleep disturbance and general annoyance to local residents. For information, the distance within which the lower action level of The Control of Noise at Work Regulations 2005 [Ref 7. 22] would be exceeded is approximately 125 m from the source, with the upper action level exceed at around 70 m distance.

7.6.40 However, the anticipated infrequency of steam release for K4 will be less than for K1, which is historically approximately 3 to 4 times a year for a duration of approximately 60 to 90 seconds on each occasion, due to the of provision of a steam condenser (not an existing feature of K1). In the consideration of the context required by BS 4142:2014, it is considered that this infrequency of occurrence would not constitute a moderate or major significant impact. Consequently, the steam release occurrence is considered no more than a slight adverse effect.

7.6.41 Whilst the results above relate to assessment based on **Figures 2.4a&b** in Chapter 2, minor changes to the site layout would be unlikely to result in any significant changes to the levels predicted or the impact or effect outcomes.

Operational Vibration

7.6.42 The plant will be designed and installed as to minimise vibration transmission from any plant items which might generate vibration. This control of vibration at source is necessary to maximise life of the plant, minimise maintenance and prevent interference with other processes within the K4 and wider site. Typically, the use of vibration isolation mounts into concrete pads will ensure that groundborne vibration is not perceptible beyond the immediate area of the plant.

7.6.43 The nearest residential properties are over 500 m from the main construction area of K4. As discussed in BS 5228-2, vibration levels decrease rapidly with separation. Given the separation between the K4 site and the nearest residential receptors, vibration from operational activities will be significantly below the negligible significance criteria.

7.6.44 No non-residential NSRs have been identified as being sensitive to vibration; for example, the PRoW is not considered vibration-sensitive. Notwithstanding this, groundborne operational vibration is not likely to be perceptible beyond the immediate area of the plant.

7.6.45 As such, vibration is considered to have no or negligible impact magnitude, and will have no significant adverse effect.

Operational Traffic

7.6.46 The facility will generate no significant operational traffic; within Chapter 4 Traffic and Transport it is stated that the number of vehicle movements associated with K4 when it is operational would be minimal and would be unlikely to create any discernible transport impacts.

7.6.47 The noise and vibration impacts of operational traffic are therefore considered to be none or negligible. For surrounding NSRs, this would result in negligible adverse effects due to noise or vibration arising from operational traffic.

Decommissioning

7.6.48 The exact operational life of K4 is currently unknown however at the point that it reaches the end of its operational life it will be decommissioned. The effects in relation to noise and vibration will be no worse than, but are likely to be similar to or less than, those that occurred during the construction phase.

7.6.49 As identified within Traffic and Transport Chapter 4, the traffic flows associated with decommissioning are lower than those during its construction. Consequently any traffic impacts will also be no greater than those experienced during construction.

7.6.50 The decommissioning of K1, excluding any demolition works, will not require significantly noisy works. Consequently no adverse impact or effects due to the decommissioning of K1 will occur.

7.7 Mitigation

7.7.1 Specific measures necessary to mitigate adverse noise or vibration effects are identified in this section.

7.7.2 In addition to these required mitigation measures, best practicable means should be adopted to minimise noise emissions as far as is reasonably practicable.

Mitigation of Construction Effects

7.7.3 No specific mitigation is identified as being required to reduce construction noise or vibration adverse effects.

7.7.4 Notwithstanding this, best practicable means should be adopted to minimise noise emissions as far as is reasonably practicable. This should include minimising noisy night-time and weekend working, and adherence to a Construction Environmental Management Plan (CEMP) or similar which will demonstrate how the construction works will meet best practicable means. Examples of appropriate construction mitigation are provided in BS 5228-1:2009+A1:2014.

7.7.5 The Project will be constructed during prescribed working hours except by prior written agreement of SBC.

Mitigation of Operational Effects

7.7.6 No specific mitigation is identified as being required to reduce noise or vibration arising from normal operation of the K4 facility, including use of the Dump Condenser array.

7.7.7 Any plant noise specification (other than for steam release valves) will either require that noise emissions as experienced within neighbouring residential areas are free from distinct tone or impulsive character, or specified to a lower acoustic emission such that the BS 4142 rating level remains as stated in Table 7.13.

7.7.8 Notwithstanding this, best practicable means should be adopted to minimise noise emissions as far as is reasonably practicable.

7.7.9 It is noted that the operation of the steam release valves would generally occur only during emergency operation and not for an extended period. Where the valves are used in non-emergency operation (such as during commissioning or testing) this should be scheduled during the daytime period, and the duration of their use minimised.

7.8 Residual Effects

7.8.1 Residual effects are those that are predicted to remain after implementation of the any mitigation (as necessary). No significant adverse residual effects are predicted to result from the construction, operation or decommissioning of the Proposed Development.

7.9 Cumulative Effects

7.9.1 An assessment of the potential effects of the Proposed Development with other schemes that are operational, constructed, consented or for which planning permissions are currently being sought has been considered.

7.9.2 Twenty-one other external schemes have been identified, as shown in Figure 3.2 in Chapter 3. The cumulative schemes *'d fall wholly or partly within 1 km of this project's red line:

1*) 16/501484/COUNTY - The construction and operation of a gypsum recycling building

2*) 16/501228/FULL - Construction of new baling plant building

3*) 16/507687 - The construction and operation of an Incinerator Bottom Ash (IBA) recycling facility

4*) SW/10/444 - Development of a sustainable energy plant

5*) END10085 - DCD scoping opinion for power upgrade project

6) 15/510/589/OUT - Construction of Business Park

7*) SW/11/1291 - Anaerobic digester and associated ground profiling and landscaping

8*) 14/500327/OUT - Up to 8000 m^2 of class B1 and B2 floor space and country park

9*) SW/12/0816 - Relocation of Nicholls Transport depot from Lydbrook Close

10*) 16/506935/COUNTY - Application for steam pipeline connecting the Ridham Dock Biomass Facility to the DS Smith Paper Mill

11) SW/14/0224 - Application for solar farm

12) 14/502737/EIA - Scoping opinion for combined heat and power plant

13) SW/12/1211 - Construction of materials recycling facilities and waste transfer station

14*) 15/500348/COUNTY - Install advance thermal conversion and energy facility at Kemsley Fields Business Park

15) 17/503713/ENVSCR - EIA Screening Opinion for large residential development

16) 16/506193/ENVSCR - EIA Screening Opinion – Outline application for proposed residential development of 275 dwellings

17) 16/506014 - EIA Scoping Opinion - A sustainable urban extension comprising up to 1,100 new dwellings

18*) 17/505073/FULL - Erection of a tile factory including service yard, storage yard and parking area

19) 18/500393/FULL - Erection of a natural gas fuelled reserve power plant with a maximum export capacity of up to 12MW

20*) Forthcoming application by D S. Smith for a new southern boundary road for Kemsley Paper Mill

21) 18/500257 - Proposed Development of 153 Dwellings

7.9.3 It is considered that none of these projects introduce new or potential residential NSRs to the scoped study area of 1 km radius. Whilst four external schemes would introduce housing to the wider area, none are within the study area of this assessment, and would be separated by the development by existing NSRs, for which assessment has already been undertaken. No new residential NSRs would experience any adverse effect, beyond those already identified for existing NSRs.

7.9.4 A country park forms part of application 8) 14/500327/OUT, within 1 km of the K4 development. This potential receptor is considered to be of low sensitivity under the adopted assessment criteria.

Cumulative Construction Noise

7.9.5 The timescale for construction of these projects is set out in Chapter 4 of the ESs. Due to the variable nature of construction noise, the cumulative effects of construction are generally no greater than arise for individual projects. Most commonly, one of construction projects dominates the other in terms of noise immissions at any NSR; the cumulative effect is then very similar to that for the more noisy project alone. Hypothetically, where two projects are approximately equal in noise immissions, the cumulative increase in construction noise is limited to a maximum of 3 dB. Whilst this could affect a determination of impact, 3 dB is of the order of other uncertainties associated with construction noise prediction.

7.9.6 This results in the combined effects of construction works for different projects tending not to be greater than the effects associated with each project individually unless they are very close and similar in activity, i.e. it is most unlikely that any additional NSRs will be subject to a significant adverse effect due to the cumulative works, above those NSRs already identified for an adverse effect due to each work individually. Nor would NSRs predicted to experience an impact from the development alone be likely to experience an increased impact due to the cumulative developments.

7.9.7 The duration for which construction noise occurs may be extended if different projects are constructed non-concurrently. However if each development follows the guidance contained within BS 5228 and given the localised nature of noise impacts associated with the construction of each development it is unlikely that cumulative impacts will occur.

7.9.8 Consequently, the cumulative effects due to construction works overlapping with other projects would be unlikely to be greater than for the project alone.

7.9.9 With regards to the DS Smith proposal for the construction of a "southern boundary road" within their land; this would be completed prior to the works considered within this assessment but might bring forward the breaking out of concrete from the K4 site area and make use of this spoil as a substrate for the road. It is considered that the early breaking out of concrete would not result in additional noise; it would just occur sooner. The appropriate reuse of the spoil on site would also have the potential to reduce associated construction spoil haulage both for the road scheme and the K4 scheme. As such, no significant adverse cumulative effect is anticipated with regards to noise.

Cumulative Construction Vibration

7.9.10 Due to the short distances over which any vibration levels attenuate to baseline, there would be no cumulative vibration effects from construction or demolition.

Cumulative Construction Traffic

7.9.11 From Chapter 4 Traffic and Transport, the operational traffic associated with each of the committed developments is included within the committed traffic flows assessed. The cumulative effects of committed operational traffic with the proposed construction traffic associated with K4 are therefore considered within the traffic noise assessment above, summarised in Tables 7.10 to 7.12.

Cumulative Operational Noise

7.9.12 Given the spatial separation of these projects, it is considered that the cumulation of operational effects (either direct or arising from vehicle movements) would not result in any significant increase in cumulative effect for any of the cumulative schemes considered. The schemes considered in the cumulative assessment would also have to comply with similar operational noise requirements; and as such, there would be no increase in cumulative noise impact above that which may have been identified for individual schemes.

7.9.13 A country park forms part of application 8: 14/500327/OUT, within 1 km of the K4 development. The noise environment across this area would be expected to be comparable to that at present during normal operation of K4. The operational noise contours in Figure 7.4 indicates that specific noise levels (from K4) across the application 8 site vary between 35 – 45 dB L_{Aeq}. From the surveys in Table 7.8, the existing residual noise levels exceed 45 dB L_{Aeq}. Consequently the cumulative effect of introducing this NSR to within 1 km of the scheme is considered no greater than introducing that NSR to the area without the scheme.

Cumulative Operational Vibration

7.9.14 Due to the short distances over which any vibration levels attenuate to baseline, there would be no cumulative vibration effects from operation of the facility.

7.10 Summary

7.10.1 The area immediately surrounding the proposed K4 facility is industrial in nature, with residential properties well-separated from the development area. The immediate existing noise environment is characterised by industrial noise, meaning that additional industrial noise, provided it is not too great in magnitude, will not materially change the immediate existing noise environment.

7.10.2 The assessment of noise and vibration on ecological receptors is considered within the ecology chapter.

7.10.3 Noise or vibration from construction and the normal operation of the K4 facility will have no significant adverse impact on the surrounding NSRs.

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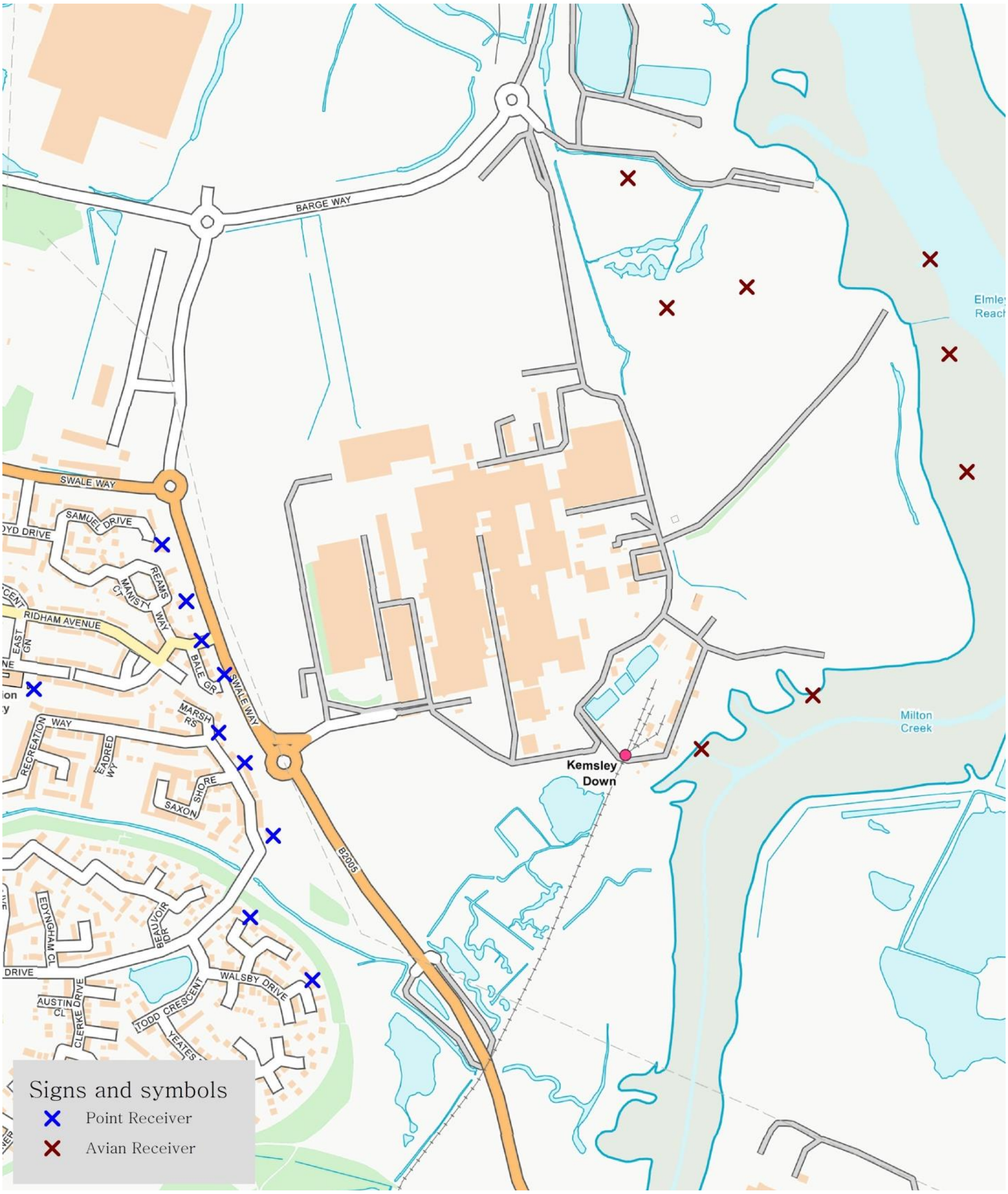

Figure 7.1: Noise Prediction Locations

Project Number	**JAE9664**	**Project Title**	**Kemsley Paper Mill (K4) CHP Plant**		
Client:	**D S Smith Paper Ltd**	**Rev :**	**2**	**Drawn By:**	**CB**
		Date:	**20180117**	**Checked By:**	**SCS**
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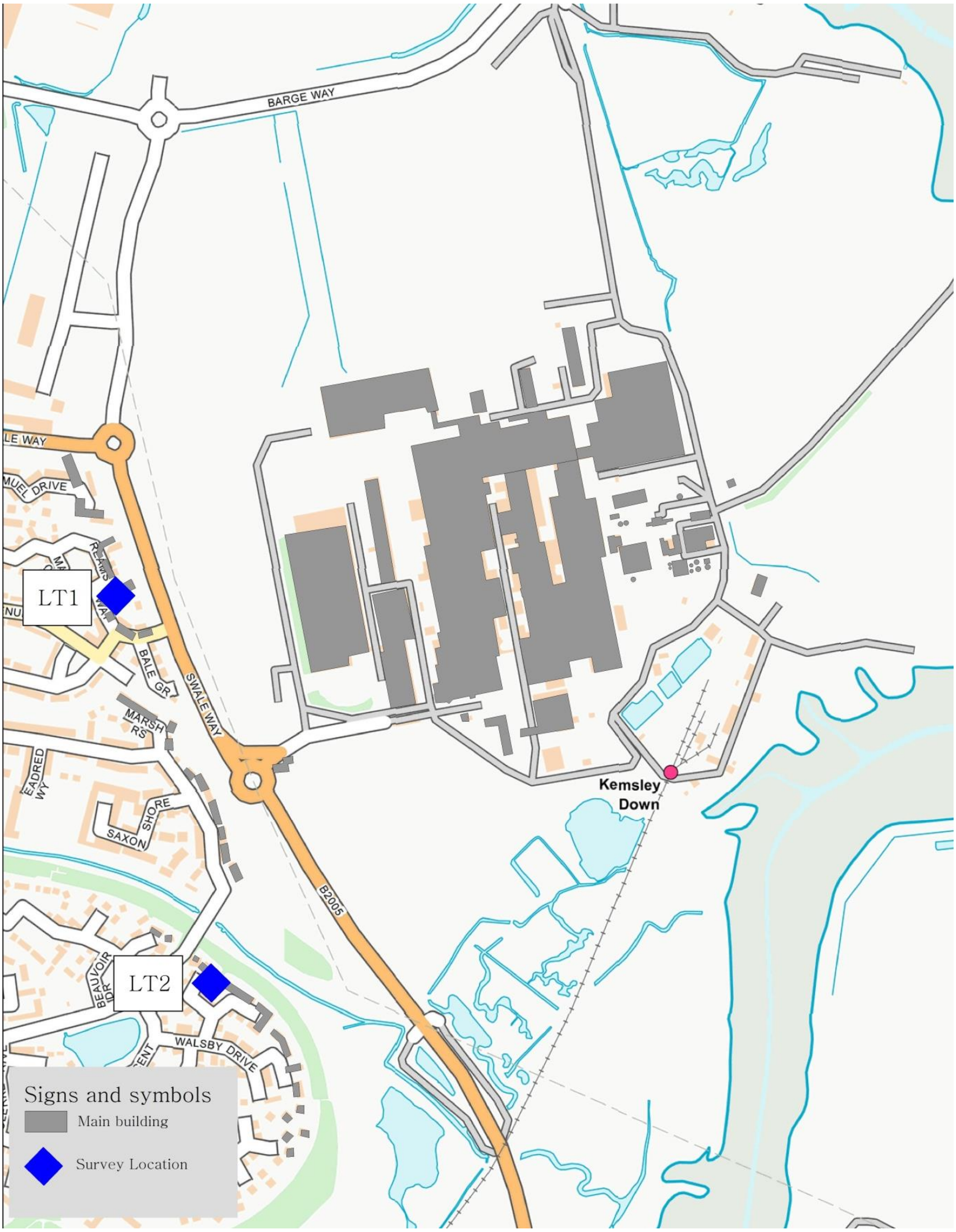

Figure 7.2: Noise Survey Locations

Project Number	**JAE9664**	**Project Title**	**Kemsley Paper Mill (K4) CHP Plant**		
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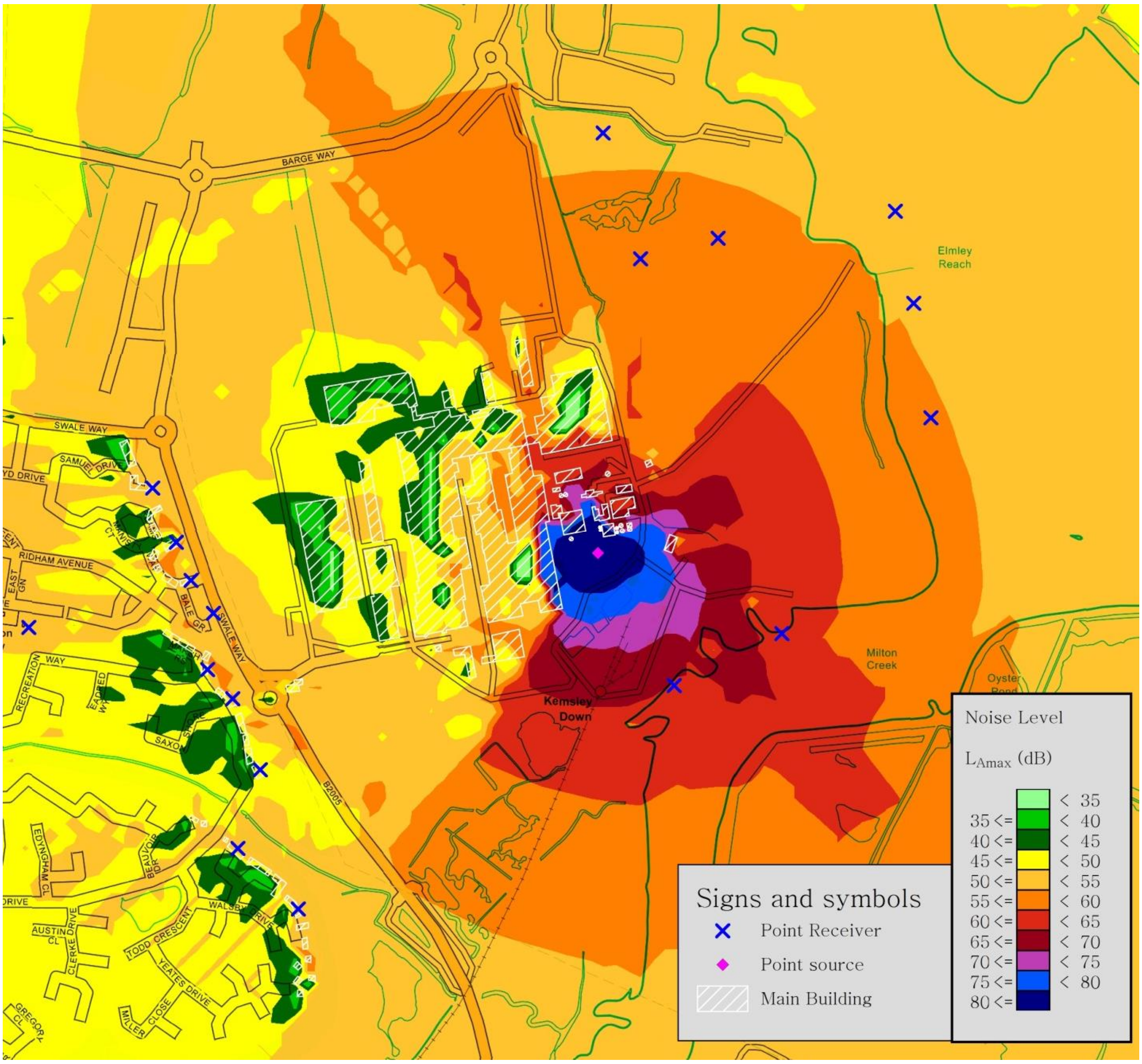

Figure 7.3: Construction Noise Contour

Project Number	**JAE9664**	**Project Title**	**Kemsley Paper Mill (K4) CHP Plant**		
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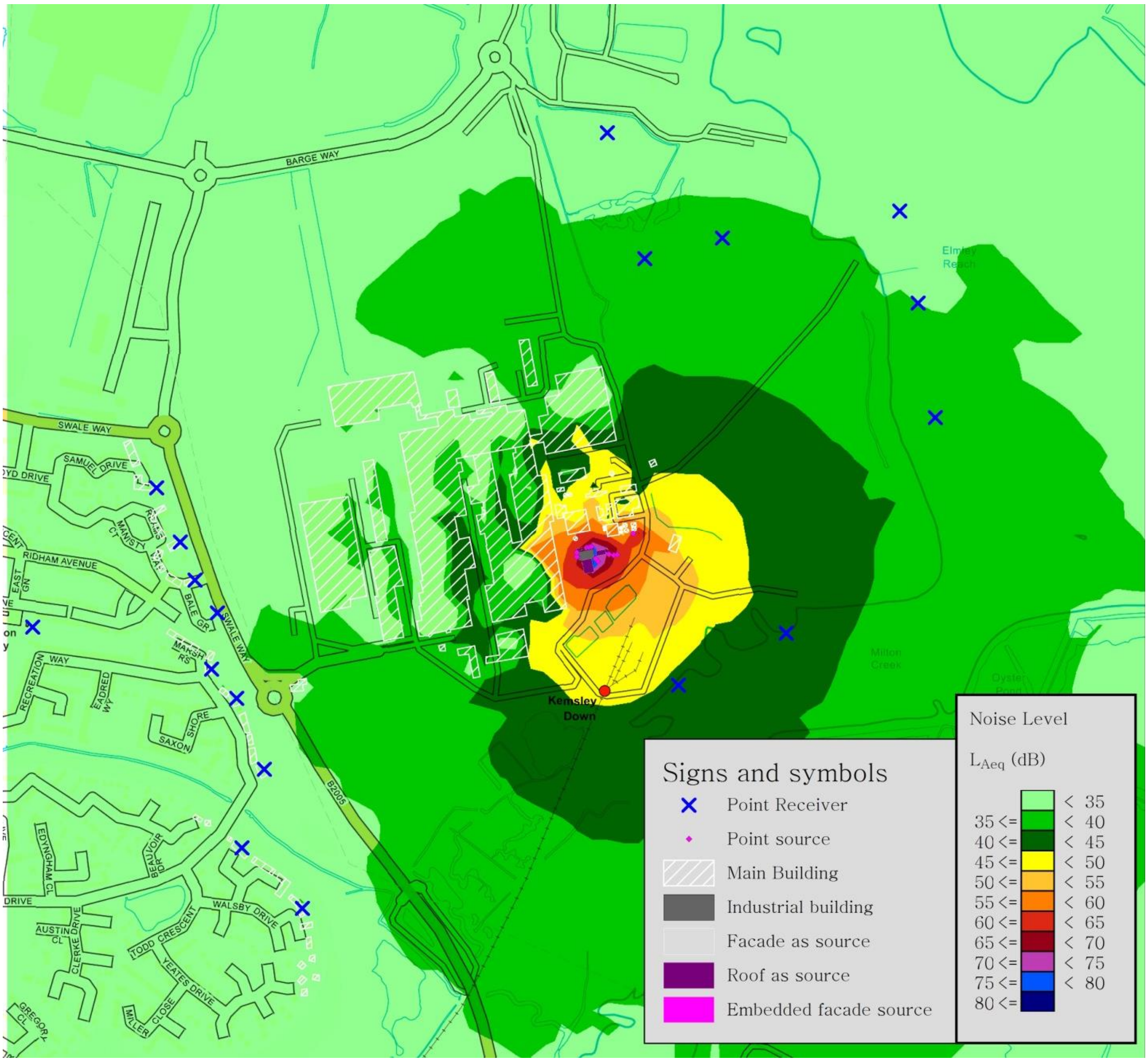

Figure 7.4: Operational Noise Contour – Normal Operation

Project Number	**JAE9664**	**Project Title**	**Kemsley Paper Mill (K4) CHP Plant**		
Client:	**D S Smith Paper Ltd**	**Rev :**	**2**	**Drawn By:**	**CB**
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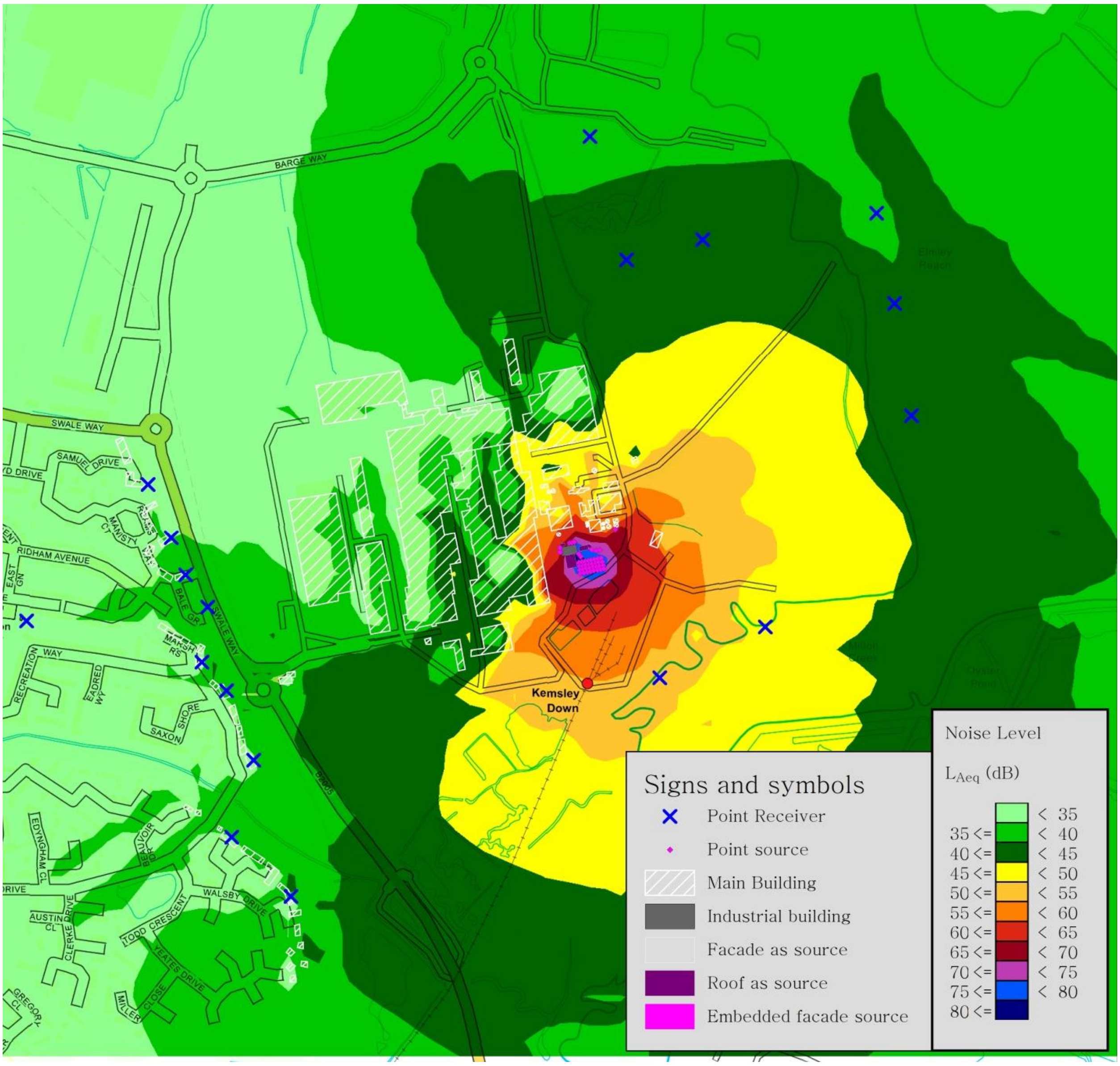

Figure 7.5: Operational Noise Contour – Normal Operation and Dump Condensers					
Project Number	**JAE9664**	**Project Title**	**Kemsley Paper Mill (K4) CHP Plant**		
Client:	**D S Smith Paper Ltd**	**Rev :**	**2**	**Drawn By:**	**CB**
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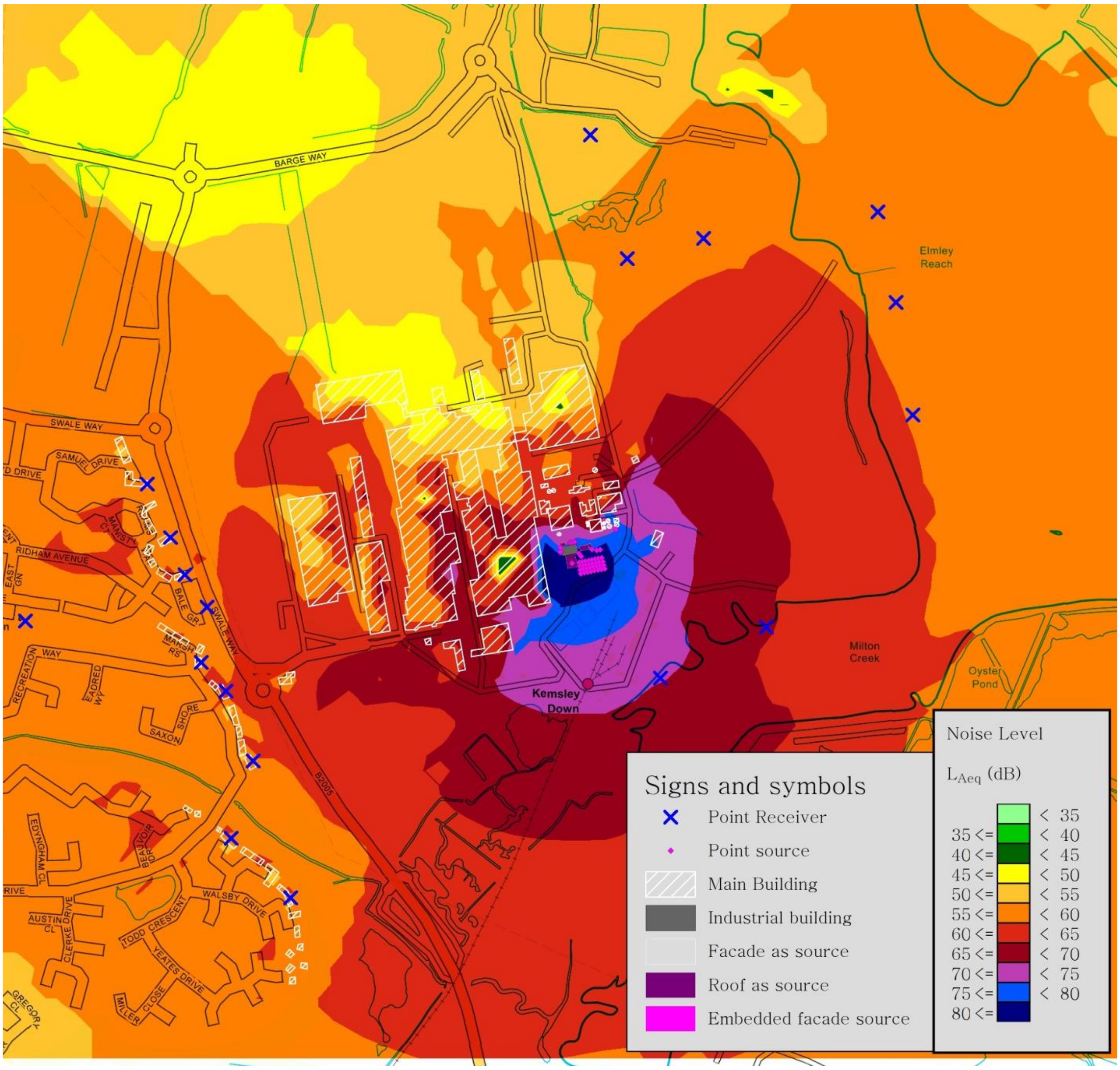

Figure 7.6: Operational Noise Contour – Normal Operation and Steam Release Valves			
Project Number	**JAE9664**	**Project Title**	**Kemsley Paper Mill (K4) CHP Plant**
Client:	**D S Smith Paper Ltd**	**Rev :** 2 / **Date:** 20180117	**Drawn By:** CB / **Checked By:** SCS
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8 Ground Conditions

8.1 Introduction

8.1.1 This chapter of the Environmental Statement (ES) assesses those effects that may arise from the Proposed Development with respect to ground conditions, ground stability, geology, hydrogeology and land contamination.

8.1.2 This chapter also provides a preliminary (qualitative) land contamination assessment to determine the need for remediation / mitigation of current ground conditions on the Site.

8.2 Regulatory and Policy Framework

Planning Policies

Legislation

8.2.1 The principal legislative drivers for managing risks to human health from historical land contamination are:

- Part IIA of the Environmental Protection Act (EPA) 1990 (as amended), i.e. the 'contaminated land' regime;
- Contaminated Land (England) Regulations 2006 (as amended 2012);
- Environmental Permitting (England and Wales) Regulations 2016 (as amended); and
- The Town and Country Planning Act 1990 (as amended).

8.2.2 The principal legislation regarding the protection of specific water resources, water quality standards and policy relevant to the Scheme is set out in the following primary European legislation

- Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy (Water Framework Directive);
- Directive 2006/118/EC of the European Parliament and of the Council of 12 December 2006 on the protection of groundwater against pollution and deterioration (daughter to 2000/60/EC) (Groundwater Daughter Directive); and
- Directive 2013/39/EU of the European Parliament and of the Council of 12 August 2013, amending Directives 2000/60/EC and 2008/105/EC as regards priority substances in the field of water policy.

8.2.1 The implementation of the Water Framework Directive (WFD) has resulted in the repeal and / or replacement of other European legislation of relevance to consideration of the water environment. Most notably, this includes the following:

- The Groundwater Directive (80/68/EEC), repealed in 2013;
- The Dangerous Substances Directive (76/464/EEC), repealed in 2013;
- The Freshwater Fish Directive (2006/44/EC) repealed in 2013; and
- The EC Shellfish Waters Directive (2006/113/EEC) repealed in 2013.

8.2.2 European legislation is implemented in the UK through specific Regulations. The following national legislation is considered relevant to this chapter:

- Part IIA of the Environmental Protection Act (1990);
- Environment Act (1995);
- Contaminated Land (Wales) Regulations (2006) and Amendment (2012);
- Environmental Permitting (England and Wales) Regulations (2010);
- Groundwater Regulations (1998);
- Groundwater (England and Wales) Regulations (2009);
- Water Resources Act (1991);
- Water Act (2003);
- Groundwater Regulations (1998), which transpose the EC Groundwater Directive 80/68/EC into UK law;
- Water Environment (Water Framework Directive) (England and Wales) Regulations (2003), which transpose the Water Directive 200/60/EC into UK law;
- Waste Framework Directive (2008) as transposed via Waste (England and Wales) Regulations 2011;
- Landfill (England and Wales) Regulations (2002); and
- Hazardous Waste (England and Wales) Regulations (2005).
-

8.2.3 In England, Part IIA of the EPA (Ref. 8.1), as introduced by Section 57 of the Environment Act 1995, came into effect in April 2000 with the implementation of the Contaminated Land Regulations 2000 (now superseded by the Contaminated Land (England) Regulations 2006). Under Part IIA of the EPA, sites are identified as 'contaminated land' if significant harm is being caused or there is a significant possibility of such harm being caused; or significant pollution of controlled waters is being caused, or there is a significant possibility of such pollution being caused. Controlled waters are defined as including both surface waters and groundwater in an aquifer (Ref. 8.2). Once a site is determined to be 'contaminated land' the enforcing authority must consider how it should be remediated and, where appropriate, issue a remediation notice to require such remediation. Where a company volunteers to remediate a site, the local authority should support this and publish a remediation statement.

National Planning Policy Framework (NPPF)

8.2.4 The National Planning Policy Framework (NPPF) (Ref 8.3) sets out how the planning system should contribute to and enhance the natural environment and local environment in a number of ways, including:

- Protecting and enhancing valued landscapes, geological conservation interests and soils;
- Preventing new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water, or noise pollution or land instability; and
- Remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate.

8.2.5 The NPPF requires that local planning authorities ensure that new development is appropriate for its location taking account of the effects (including cumulative effects) of pollution on health, the natural environment or general amenity, and the sensitivity of the area or proposed development to adverse effects from pollution.

8.2.6 NPPF paragraph 121 also requires planning decisions to ensure that:

'The site is suitable for its new use taking account of ground conditions and land instability, including 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.'

Swale Borough Council's Development Plan

8.2.7 The Swale Borough Council Local Plan 'Bearing Fruits' (Ref. 8.4) sets out the Council's vision to transform the Borough's economic, social and environmental prospects. The proposed development works would form part of a programme of improvement at the Mill which would help to ensure the continued contribution to the economy and management of the environmental impacts as a consequence of the manufacture of paper.

8.2.8 Policy ST 1 of the Local Plan states to:

'Conserve and enhance the natural environment by:

Applying the national planning policy in respect of pollution, despoiled, degraded, derelict, contaminated, unstable and previously developed land'.

Relevant Guidance

8.2.9 The following national guidance and accepted industry good practice is relevant to this assessment:

- Model Procedures for the Management of Land Contamination (CLR11) (Ref. 8.5);
- Environment Agency "Groundwater Protection Guidance, that includes – Groundwater protection technical guidance (Ref. 8.6);
- The Environment Agency's approach to groundwater protection, Version 1 (Ref. 8.7);
- Construction Industry Research and Information Association (CIRIA) 132: A Guide for Safe Working on Contaminated Sites (Ref. 8.8);
- CIRIA C665, Assessing Risks Posed by Hazardous Ground Gases to Buildings (Ref. 8.9);
- CIRIA 73: Role and Responsibility in Site Investigation (Ref. 8.10);
- BS5930: Code of Practice for Site Investigations (Ref. 8.11);
- BS10175: Investigation of Potentially Contaminated Sites: Code of Practice (Ref, 8.12);
- BSI BS1377:1990 Methods of Test for Soils for Civil Engineering Purposes (Ref. 8.13); and
- Guidelines for Environmental Impact Assessment (Ref. 8.14).

8.3 Methodology

Scoping and Consultation

8.3.1 The formal scoping exercise is summarised in Chapter 3. No significant issues were raised by the key Consultees as a result of the scoping exercise (P30 – 32 of the Scoping Opinion).

Establishing Baseline Conditions

8.3.2 The assessment of ground conditions has involved the review of available information pertaining to the current conditions of the soils and groundwater beneath the Site. This information has been used to develop an understanding of baseline conditions for the Site in the context of the Proposed Development to create a Conceptual Site Model (CSM) to assist in the evaluation of the short, medium and long term, permeannt and temporary adverse and beneficial effects associated with the Proposed Development.

8.3.3 A Desk Study and Preliminary Risk Assessment (Appendix 8.1) has been undertaken for the Site. This is based upon available information in relation to the ground conditions at the Site, obtained through published environmental and geological data from various sources including the Environment Agency, Envirocheck and the British Geological Survey.

8.3.4 The Desk Study provides a summary of the known ground conditions at the Site and defines the preliminary CSM. The CSM is then used to provide a qualitative assessment of potential risk to human health and controlled waters from chemical contaminants potentially present within the soil and groundwater underlying the Site.

8.3.5 No intrusive investigations have been undertaken on the Site in support of this submission. However, a number of historical ground investigations have been undertaken across the Mill site principally to the east of the Site. A summary of the previous ground investigations and other studies that are most relevant to the ground conditions at the Site are provided below:

- Enviros Aspinwall, 'IPPC Permit Application – PowerGen CHP Kemsley', February 2001, reference: 'BJ7395/BJ7395' (Ref. 8.15);
- RPS Group, 'Phase 1 Environmental Site Assessment, Kemsley Paper Mill, Sittingbourne, Kent', on behalf of E.ON, March 2009, reference: 'JER3773 R 090318 LW Kemsley Paper Mill P1'; (Ref. 8.16);
- RPS Group, 'Phase 2 Intrusive Site Investigation, Kemsley Paper Mill, Sittingbourne, Kent', on behalf of E.ON, September 2009, Reference: 'JER4418 R 090909 AP EON Kemsley Mill Phase II'; (Ref. 8.17);
- RPS Group, 'Development of a Sustainable Energy Plant, Kemsley Paper Mill, Environmental Statement, Chapter 11: Hydrogeology and Ground Conditions', prepared for St. Regis Paper Company Ltd, January 2010, Reference: 'DLE1726'; Ref. 8.18);
- URS Group, 'Geotechnical and Environmental Site Investigation', on behalf of John Sisk & Sons Ltd, January 2013, reference: '47064660'; (Ref. 8.19);
- RPS Group, 'Interpretative Ground Investigation Report, Pre-Commencement Works for the Sustainable Energy Plant, Kemsley Paper Mill, Sittingbourne, Kent', on behalf of EEW Energy from Waste UK Limited, June 2013, reference: 'JER5481 R 130613 DH Interpretative Report'; (Ref. 8.20); and
- RPS Group, 'Site Investigation Report, Kemsley Paper Mill' on behalf of Wheelabrator Technologies Inc. December 2015, reference: '151202 R JER6773 RH GI Report PT Review'. (Ref. 8.21).

8.3.6 Figure 8.1 shows the locations of the exploratory holes from the ground investigations detailed above.

8.3.7 Despite the extensive history of intrusive investigation on the Mill site, there is limited ground investigation data available for the area of the Proposed Development. However a number of exploratory holes from the above investigations have been advanced in the vicinity of the Site. Baseline conditions regarding chemical contamination have therefore been assessed using data available from the previous ground investigations and studies listed above for the Mill site.

8.3.8 The conclusions in this ES Chapter are drawn from the Desk Study and Preliminary Risk Assessment and are based upon data for adjacent areas of the Mill site and the author's experience and professional judgement.

Human Health Assessment of Soil Contamination

8.3.9 A Human Health Risk Assessment was undertaken by RPS Group as part of their Phase 2 Intrusive Site Investigation undertaken in September 2009 (Ref.8.17). The ground investigation was undertaken on land adjoining the north-eastern boundary of the Site.

8.3.10 URS undertook a Human Health Risk Assessment as part of their intrusive ground investigation undertaken in October 2012, and reported in January 2013 (Ref.8.19). This investigation was undertaken on land adjoining the eastern boundary of the Site.

8.3.11 A Human Health Risk Assessment was undertaken by RPS Group as part of their Interpretative Ground Investigation Report (Ref. 8.20) undertaken in June 2013. The investigation was focused on the eastern side of the Site, along the access road which extends between the Proposed Development area and the 'Laydown' area to the north.

8.3.12 A ground investigation undertaken by RPS Group in December 2015 (Ref. 8.21) included a Human Health Risk Assessment. The investigation was focused on land adjoining the north-eastern boundary of the Site, adjacent to the access road which extends between the Proposed Development area and the 'Laydown' area to the north.

Assessment of Groundwater Quality

8.3.13 A Controlled Waters Risk Assessment was undertaken by RPS Group as part of their Phase 2 Intrusive Site Investigation undertaken in September 2009 (Ref. 8.17). The ground investigation was undertaken on land adjoining the north-eastern boundary of the Site.

8.3.14 URS undertook a Controlled Waters Risk Assessment as part of their intrusive ground investigation undertaken in October 2012, and reported in January 2013 (Ref.8.19). This investigation was undertaken on land adjoining the eastern boundary of the Site.

A Controlled Waters Risk Assessment was undertaken by RPS Group as part of their Interpretative Ground Investigation Report (Ref. 8.20) undertaken in June 2013. The investigation was focused on the eastern side of the Site, along the access road which extends between the Proposed Development area and the 'Laydown' area to the north.

Soil Gas Assessment

8.3.15 A Ground Gas Risk Assessment was undertaken by RPS Group as part of their Phase 2 Intrusive Site Investigation undertaken in September 2009 (Ref. 8.17). The ground investigation was undertaken on land adjoining the north-eastern boundary of the Site.

8.3.16 A Ground Gas Risk Assessment was undertaken by RPS Group as part of their Interpretative Ground Investigation Report (Ref. 8.20) undertaken in June 2013. The investigation was focused on the eastern side of the Site, along the access road which extends between the Proposed Development area and the 'Laydown' area to the north.

Significance Criteria

8.3.17 The significance of possible effects resulting from the Proposed Development is dependent on the sensitivity of the receptor affected and the predicted magnitude of impact on the receptor, should an impact be realised.

8.3.18 The magnitude of any predicted impact has been determined by consideration of the following:

- The temporal scale of individual effects is described as either short, medium or long-term; where short term relates to the construction phase, medium term extends from 1-5 years from the end of works, and long-term extends beyond 5 years from the end of works;
- Adverse or beneficial: whether the nature of the effect increases or decreases potential contamination risks to sensitive receptors;
- Direct or indirect effect: whether the receptor will be affected directly or indirectly;
- Temporary or permanent: effects may occur over the life time of the project or may occur for a limited period of time e.g. whilst a specific activity is taking place;
- Reversible / irreversible effect: effects can be reversed by mitigation measures or by natural environmental recovery within reasonable timescales (5-10 years following cessation of construction); and
- Geographical scale: whether the effect would be experienced at the local, regional or national level.

<u>Receptor Sensitivity / Value</u>

8.3.19 The sensitivity of the receptors have been qualitatively described and categorised based upon the terminology in Table 8.1.

Sensitivity	Typical Descriptors	Examples
High	High importance and rarity, and limited potential for substitution.	On site future site occupants e.g. staff, through chronic exposure to contamination Principal aquifer with licensed groundwater abstractions Excellent quality surface water bodies
Medium	Medium importance and rarity, limited potential for substitution.	Off site future site occupants e.g. staff on adjacent sites Secondary A aquifer Good quality surface water bodies
Low	Low importance and rarity.	Secondary undifferentiated aquifer Satisfactory quality surface water bodies
Negligible	Very low importance and rarity.	Unproductive strata Poor quality surface water bodies

Table 8.1: Receptor Sensitivity Criteria

<u>Magnitude of Impact</u>

8.3.20 The magnitude of potential impacts during construction and the completed development has been qualitatively described and categorised based on the terminology in Table 8.2. These are equivalent to the significance categories defined in the Contaminated Land Statutory Guidance (Ref. 8.1). For planning purposes, following development, land should not fall into Categories 1 or 2 and be capable of being designated as ‘contaminated land’.

Magnitude	Criteria	Example / Description
High	Results in loss of attribute and likely to cause exceedance of statutory objectives and/or breaches of legislation.	Category 1 – Soil contamination that could result in a ‘contaminated land’ designation under Part IIA, i.e. significant possibility of significant harm to human health or controlled waters. Or A change of planning use deems that the concentrations of contaminants in the land may be harmful to receptors Remedial Action under Part IIA will be required Or Loss of resource or severe damage to characteristics, features or elements e.g. of a geologically designated site.
Medium	Results in impact on integrity of attribute or loss of part of attribute possibly with / without exceedance of Statutory objectives or with/ without breaches in legislation.	Category 2 - Soil contamination that could provide a strong case for considering that the risks are of significant concern so as to be designated as ‘contaminated land’ designation under Part IIA. Or A change of planning use deems that the concentrations of contaminants in the land may be harmful to receptors Remedial Action under Part IIA will be required on a precautionary basis. Or Partial loss of / damage to characteristics, features or elements e.g. of a geologically designated site.

Magnitude	Criteria	Example / Description
Low	Results in minor impact on attribute.	Category 3 – Soil contamination could arise but the concentrations would not be considered significant or there is a low likelihood of serious pollution. Or A change of planning use deems that the concentrations of contaminants in the land are not capable of harming receptors. It is unlikely that remedial action will be required, however land owners may consider remedial actions to reduce contamination outside of the Part IIA or planning regime. Or Minor damage to characteristics, features or elements e.g. of geological feature of interest.
Negligible	Results in no discernible change or an impact on attribute of insufficient magnitude to affect the use / integrity.	Soil contaminants present, but risk assessment suggests negligible / low risk to human health. Or Very minor damage to characteristics, features or elements e.g. of geological feature of interest.

Table 8.2: Impact Magnitude Criteria

Assessment of Effects

8.3.21 The significance of an effect has been determined from the predicted magnitude of an impact and sensitivity of the receptor affected using the matrix provided in Table 8.3.

8.3.22 The assessment does not take into account any mitigation measures included as part of the construction phase nor any mitigation measures included as part of the completed development. Mitigation measures are however detailed after the assessment and all predicted significant impacts are re-assessed to take into account the mitigation measures proposed.

Sensitivity	Magnitude of Impact			
	Negligible	Low	Medium	High
Negligible	Negligible	Negligible or Minor	Negligible or Minor	Minor
Low	Negligible or Minor	Negligible or Minor	Minor	Minor or Moderate
Medium	Negligible or Minor	Minor	Moderate	Moderate or Major
High	Minor	Minor or Moderate	Moderate or Major	Major

Table 8.3: Receptor Sensitivity Criteria

8.3.1 The broad definitions of these effects are as follows:

- Major: These beneficial or adverse effects are considered to be very important considerations and are likely to be material in the decision-making process.

- Moderate: These beneficial or adverse effects may be important, but are not likely to be key decision-making factors. The cumulative effects of such factors may influence decision-making if they lead to an increase in the overall adverse effect on a particular receptor.

- Minor: These beneficial or adverse effects may be raised as local factors. They are unlikely to be critical in the decision-making process, but are important in enhancing the subsequent design of the project.

- Negligible: No effects or those that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.

8.3.1 Where the matrix offers more than one significance option, professional judgement has been used to decide which effect is most appropriate.

8.3.2 Only those effects of moderate and above are considered significant.

Limitations and Assumptions

8.3.3 There is no site-specific ground investigation information available for the area of the Proposed Development and no site-specific investigation has been undertaken in support of the completion of this ES chapter. The information used to determine the significance of potential impacts of the Proposed Development is therefore based upon the Desk Study and ground investigation data for adjacent areas of the Mill site, where geological and hydrogeological conditions are anticipated to be similar. This is augmented by RPS experience on the Mill site and professional judgement.

8.4 Baseline Conditions

8.4.1 The baseline conditions within the Site are described in detail in the Desk Study and Preliminary Risk Assessment report (Appendix 8.1). A brief overview is given in this section.

Site Land Use

<u>Current Site Use</u>

8.4.2 The current land use on the Site is shown in Figure 8.1.

8.4.3 The northern part of the Site, where the proposed Laydown area is located, currently comprises an area of concrete hardstanding that is understood to have been used in the past for paper storage. A haulage road comprises the central part of the Site, linking the proposed Laydown area with the Proposed Development area to the south.

8.4.4 The southern part of the Site currently comprises the K1 CHP plant with a large area of concrete hardstanding present to the south. The hardstanding to the south of the K1 CHP is the location of the Proposed Development. The hardstanding is intact with localised areas of surface rutting and shallow potholes and is generally used for paper storage with a vehicle weighbridge, truck wash area and hazardous waste storage area also present. A vehicle refuelling area was noted to be present on the southern Site boundary, with fuel being stored in a bunded above ground storage tank.

8.4.5 A network of surface water drains was noted to be present within the area of hardstanding in the Proposed Development area, which manages surface water runoff in this part of the Site.

Historic Site Use

8.4.6 Ordnance Survey maps that detail the Site history are included within the Desk Study and Preliminary Risk Assessment Report.

8.4.7 The Ordnance Survey maps show that prior to development of the paper mill in the late 1930s the Site comprised undeveloped agricultural land. A Brick Works was recorded to be present in 1898 adjacent to the southern Site boundary and was recorded to have become disused by 1909 with all associated buildings no longer present.

8.4.8 The paper mill was constructed adjacent to the western boundary of the Site in the 1930s with numerous buildings associated with the mill having been constructed in the southern part of the Site. The remainder of the Site typically comprised areas of open land, traversed by railway lines with several small tanks recorded to be present.

8.4.9 The layout of the paper mill remains broadly the same, with a few minor changes in layout, until c. 2006. The map dated 2006 shows that buildings within the Site boundary had been demolished, with a number of new buildings being constructed at the location of the current K1 CHP plant shown in Figure 8.1. Minor changes to the layout at the location of the Proposed Development to the south of the K1 plant have been recorded.

8.4.10 Minor changes to this layout and the layout of the entire Site have taken place up until the latest map dated 2017.

8.4.11 Evidence of waste deposition / landfilling to the east of the Site is first recorded in the 1940s. The map dated 1966-1967 records a number of surface water features to be present that may be indicative of aggregate extraction activities. The extent of the landfilling activities is recorded to be expanding on later maps and the map dated 2017 records a large area to the east of the Site to be disused Heap.

8.4.12 The sewage treatment works that are currently situated to the south of the Site, at the location of the former Brick Works, is first shown on the map dated 1999.

Geology

8.4.13 The geological conditions at the Site detailed below are based upon the available ground investigation information (Refs. 8.17, 8.19, 8.20 & 8.21).

Made Ground

8.4.14 The Site is currently covered by concrete hardstanding. The historical industrial development of the Site suggests that Made Ground will be present across the Site, beneath the surface concrete hardstanding.

8.4.15 Ground investigation data (Ref. 8.20) for land adjoining the north-eastern boundary of the Site has identified Made Ground to be present to depths ranging between 0.45 to 4.7 metres below ground level (mbgl), apparently thickening further to the east where landfilled materials are present. Made Ground typically comprises brown and grey gravelly sands and clays with frequent infill materials including: ash, clinker, bricks, concrete, plastics, and wood. Peat was occasionally present locally within the Made Ground and was encountered as a peaty silt / clay layer (1.6 to 1.8 mbgl) or as occasional pockets.

Superficial Deposits

8.4.16 British Geological Survey (BGS) information does not indicate the presence of superficial deposits across the southern half of the Site, at the location of the Proposed Development.

8.4.17 Superficial deposits are however recorded to be present across the northern half of the Site. Head was identified across the centre of the Site, along the access road linking the Proposed Development area with the Laydown area (and inferred to be underlying the northern half of the Site), whilst superficial Alluvium was noted to overly the Head across the northern half of the Site at the location of the Laydown area.

8.4.18 Head deposits were noted by the BGS to consist of sand and gravel, with local lenses of silt, clay, or peat and organic material; and Alluvium was noted to comprise silty clay, with possible layers of silt, sand, peat, and basal gravel.

8.4.19 Ground investigation works (Ref. 8.20) undertaken on land adjoining the north-eastern site boundary (towards the Swale Estuary) identified superficial deposits that typically comprised grey brown orange mottled soft to firm clays of Alluvium above the stiff grey clays of the London Clay Formation. The maximum proven depth of Alluvium was 8.6 mbgl.

Bedrock

8.4.20 BGS information indicates that the Site is underlain by the bedrock of the London Clay Formation that comprises clay and silt deposits. BGS mapping shows the southern limit London Clay Formation to lie approximately 100m to the south-east of the Site. The London Clay Formation is anticipated to directly underlie any Made Ground at the Site.

8.4.21 The Lambeth Group (formerly referred to as the Woolwich Beds), comprising sand, silt and clay, underlies the London Clay Formation. Deposits of the Lambeth Group are present at the ground surface, to the south of the limit of the London Clay (approximately 100m to the south and south-east of the southern Site boundary). The Lambeth Group may be concealed beneath a thin horizon of London Clay Formation across much of the Site. The Thanet Formation, comprising sand, silt and clay underlies the Lambeth Group. Together the Lambeth Group and Thanet Formation constitute a complex unit comprising interbeded sands, sandstones, clays and silts.

8.4.22 The Seaford Chalk Formation is anticipated to underlie the Thanet Formation.

8.4.23 Intrusive investigation works undertaken on land adjoining the north-eastern site boundary identified London Clay at proven depths of between 7.4 and 15.7 mbgl (Refs

8.17 & 8.20), comprising a stiff grey clay with occasional sand, and sand bands present at depth. Previous ground investigation information (RPS 2013) to the north-east of the Proposed Development area has recorded the thickness of the stratum to be between 2.5 – 6.8m, with the depth to the London Clay Formation noticeably shallower towards to the south-west of the investigation area i.e. towards the north-eastern boundary of the Site. Given the anticipated absence of superficial deposits in the proposed development area, based upon previous ground investigation information, it is anticipated that the London Clay will be of the order of 4 – 5m in thickness at this location.

8.4.24 Stratum attributable to the Lambeth Group and Thanet Formation was encountered at depths of between 12.2 mbgl and 15.7 mbgl underlying the London Clay in deep boreholes drilled during the ground investigations. Geological logs for boreholes installed to the northeast of the Site (Refs 8.17 & 8.20) and BGS logs reviewed for the Site suggest that the Lambeth Group are predominantly sandy in nature with clay horizons present.

8.4.25 The depth to the Chalk has not been proven within any of the ground investigations undertaken to the in the vicinity of the Site.

<u>Geotechnical Failure</u>

8.4.26 The Desk Report indicates that natural ground stability hazards at the Site are considered to be low to moderate.

8.4.27 The moderate rating relates to the presence of compressible ground hazards and indicates the potential for differential settlement of the ground under loading.

<u>Coal Mining</u>

8.4.28 The Site is not in an area that is recorded as impacted by coal mining.

Hydrogeology

<u>Overview</u>

8.4.29 Alluvial deposits located in the northern part of the Site are classified as a Secondary (Undifferentiated) aquifer. Superficial Head deposits are classified as Unproductive Strata. Historical investigations have identified water with installations completed in the Made Ground and Alluvium.

8.4.30 The bedrock London Clay Formation is classified as Unproductive Strata and where present would support shallow perched water in overlying granular units, most notably contained within the Alluvium and/or Made Ground.

8.4.31 The Lambeth Group and Thanet Formation which are anticipated to underlie the London Clay Formation are classified as a Secondary A Aquifer. These geological units are expected to be groundwater bearing, likely to be confined by the stiff grey clays of the London Clay if present, although vertical flow paths will be complex and tortuous. Historical investigations have identified groundwater within the Lambeth Group and Thanet formation where encountered.

8.4.32 The Seaford Chalk Formation, anticipated to underlie the Lambeth Group and Thanet Beds is classified as a Principal Aquifer.

8.4.33 Previous ground investigation reports (Refs 8.17 and 8.20) have concluded that the low permeability London Clay Formation is likely to act as a confining unit to groundwater within the Lambeth Group / Thanet Formation and therefore groundwater flow between any perched groundwater and the Lambeth Group / Thanet Formation is likely to be negligible.

<u>Groundwater Flow</u>

8.4.34 The RPS ground investigation undertaken in 2009 (Ref. 8.17) indicated a groundwater flow within the 'shallow aquifer' (present within monitoring wells screened within the Made Ground / Alluvium) towards the Swale Estuary to the east of the Site. The same report noted that a groundwater flow direction within the deep boreholes, screened within the Lambeth Ground / Thanet Formation could not be determined.

8.4.35 Groundwater within both the shallow and deeper strata was noted to be tidally-influenced, indicating a degree of hydraulic continuity between the groundwater bodies present and the tidal Swale Estuary.

<u>Groundwater Abstractions</u>

8.4.36 There are 9 no. permits for groundwater abstraction listed within 1km of the Site, all referenced to be located 922m to the south of the Site: 1no.permit is for industrial cooling, 4no. permits for process water in construction and 4no. permits for non-evaporative cooling.

8.4.37 Based upon available information, it is considered that these groundwater abstractions are likely to be from the Chalk which underlies the Thanet Formation.

Hydrology

8.4.38 No surface water bodies are present on the Site. The nearest surface water feature is the Swale Estuary located approximately 120m to the south / south-east of the Site.

8.4.39 Several storage lagoons are present immediately to the south-east of the Site, however these lagoons are associated with operations at the Mill site and are anticipated to be hydraulically isolated from the surrounding groundwater bodies.

<u>Surface Water Abstractions</u>

8.4.40 There are 2no. Permits for surface water abstractions within 500 m of the Site, both of which are located 372m to the east of the Site. The permits are for non-evaporative cooling and direct spray irrigation with water believed to be abstracted from the Swale. 1no. permit is recorded to be operated by DS Smith Paper Ltd and the other permit is recorded to be operated by Grovehurst Energy Ltd.

Discharge Consents

8.4.41 There are no active discharge consents recorded within the boundaries of the Site, according to Environment Agency information. There a total of 10 no. active discharge consents listed within 500 m of the Site, recorded to be operated by Grovehurst Energy Ltd, Clogston Group Ltd, Niall Cormac Walsh and St Regis Paper Co. 3no. of these consents are referenced to the Mill.

8.4.42 These consents are: 3no. consents for Trade Discharges – Cooling/Process Water; 4no. for Trade Effluent discharge; 2no. for sewage discharges – final/treated effluent; and 1no. public sewage – storm sewage overflow.

8.4.43 These consents related to the discharge to a number of bodies, including: freshwater stream/river (1 no.); discharge into a tributary of the River Swale (2 no.); and discharges into The Swale / Saline estuary (7 no.)

Statutory and Non-Statutory Designations

8.4.44 The Swale Estuary situated approximately 120m to the south-east of the Site has been identified as a Marine Nature Reserve, a Ramsar Site, a Site of Special Scientific Interest (SSSI) and a Special Protection Area (SPA).

8.4.45 The North Kent Marshes situated approximately 85m to the north of the Site have been identified as an Environmentally Sensitive Area.

Soil and Groundwater Contamination

8.4.46 The human health and controlled waters risk assessments undertaken by RPS as part of their Phase 2 Intrusive Site Investigation undertaken in September 2009 (Ref. 8.17) identified:

- Laboratory analysis of 24no. soil samples did not identify any organic (TPH, PAH) or inorganic (heavy metals) contaminants in exceedance of the applied assessment criteria;

- Laboratory analysis identified the presence of asbestos at one location at the site, at a depth of between 0.8-1.2mbgl within Made Ground. The asbestos was identified as amosite (brown asbestos) and the likely source was attributed to anthropogenic material within the Made Ground; and

- Laboratory analysis of groundwater samples obtained from the Alluvium identified concentrations of nickel, sulphate, chromium, copper, PAH and TPH in exceedance of the applied assessment criteria (EQS or DWS). The identified exceedances within the deeper aquifer (Lambeth Group / Thanet Beds comprised elevated nickel and sulphate.

8.4.47 The findings of the human health risk assessment undertaken by URS as part of their intrusive ground investigation undertaken in October 2012 (Ref. 8.19) included:

- Concentrations of heavy metals, PAH, BTEX and TPH were not considered to pose an unacceptable risk to human health or controlled waters;

- Asbestos fibres were identified at one location which was considered to represent a potential risk to human health; and

- Material sampled was categorised as non-hazardous waste in accordance with waste management guidelines published by the Environment Agency (EA).

8.4.48 A Human Health Risk Assessment undertaken by RPS in June 2013 (Ref. 8.20) identified:

- The human health risk assessment undertaken as part of this ground investigation established that inorganic parameters, petroleum hydrocarbons, and other organic parameters did not represent an unacceptable risk to human health.

8.4.49 The controlled waters risk assessment undertaken by RPS in June 2013 (Ref. 8.20) identified the following:

- Perched groundwater was in steady state with Made Ground and patterns of contamination do not suggest significant potential to pollute wider controlled waters;

- The generally limited occurrence of groundwater contamination by organic parameters;

- The absence of significant sources of soil contamination that were resulting in ongoing contamination of groundwater the site; and

- The concentrations of aliphatic and aromatic hydrocarbons identified in groundwater did not represent an unacceptable risk to groundwater quality at the site boundary.

8.4.50 The ground investigation undertaken by RPS Group in December 2015 (Ref. 8.21) identified:

- Made Ground was identified within all of the intrusive investigation locations, and had a maximum proven thickness of 4.2m. This stratum was noted to contain concrete fragments, brick fragments, glass, metal, ash and clinker;

- Limited olfactory evidence of contamination was identified during the investigation works; and

- An oily sheen was observed on the groundwater encountered at one investigation location.

8.4.51 The human health risk assessment was undertaken and concluded that the identified contaminant concentrations were unlikely to present an unacceptable risk to human health.

Pollution Incidents

8.4.52 There is 1no. recorded incident of a pollution incident on-site:

- Pollutant: Chemicals – Detergents/Surfactant

  Incident Date: 25/03/1998

  Receiving Water: Not Given

  Severity: Category 3 – Minor Incident

8.4.53 The following are recorded pollution incidents to have occurred within 250m of the Site:

Category 2 –Significant

- There have been 4no. pollution incidents categorised at Category 2 – Significant since 1998 (with all 4no. occurring between 1998 and 1999).
- The incidents included discharges of: Contaminated water – firefighting run-off (to the Estuary); organic wastes; and general biodegradable: biological/non-sewage microbiological effluent (to a potential river).

Category 3 –Minor

- There were 6 no. pollution incidents categorised as Category 3-Minor since 1992.
- The incidents included discharges of unknown chemicals; organic wastes; treated effluent; and biodegradable sewage.

Landfill Sites

8.4.54 There are 2no. recorded active landfill sites within 500m of the Site:

- 198m East, License Holder; Grovehurst Energy Ltd

  Site Location: Kemsley Mill extension, Kemsley, Sittingbourne, Kent

  Max input rate: 'Large' (75,000-250,000 tonnes per year)

  Date started: 18/04/1994

  Authorised waste includes: bio sludge; dewatered effluent sludge cake; flood sweepings not contaminated; primary sludge cake; pulverised fuel ash; and uncontaminated used fuel containers. The western boundary of this landfill is recorded to lie just to the east of the Site.

- 203m East, License Holder: New Thames Paper Co Ltd

  Site Location: Kemsley Mill, Kemsley, Sittingbourne, ME10 3ET

  Max input rate: 'Medium' (25,000-75,000 tonnes per year)

  Date started: 14/10/1977

  Authorised waste includes: Inert/Non-hazardous/non-toxic; paper-making wastes; wet fly ash.

8.4.55 There are 5no. records of historical landfill sites within 500m of the Site:

- 0m Southeast

  License held by Bowaters UK.

  Dates of operation: 31/12/1977-31/12/1993

  The type of landfill was recorded as 'waste and liquid sludge', whilst the specified accepted waste included: inert, industrial, commercial, and household waste.

  Although this landfill is referenced to be located at the Site, historical records between 1977 and 1993 do not indicate that landfilling operations ever took place within the boundaries of the site. It is therefore considered that this reference is more likely to be associated with landfilling to the east of the Site.

- 119m Northeast, License held by: Kemsley Paper Mill.

  Dates of operation were not available.

  The type of landfill was not recorded; however the specified accepted waste was inert waste.

- 259m North, License held by: Paper Mill.

  Dates of operation: Unknown – 31/12/1973.

  The type of landfill was not recorded, but the specified accepted waste was recorded as Inert Waste.

- 366m Southeast, License held by: Milton Creek Works

  Dates of operation are unknown.

  The type of landfill and the accepted wastes types are unknown.

- 411m North, License held by Paper Mill.

  Dates of Operation: Unknown – 31/12/1973

  The type of landfill was not recorded; however the specified accepted waste was inert waste.

Ground Gas

8.4.56 The Ground Gas Risk Assessment undertaken by RPS Group in September 2009 (Ref. 8.17) to the east of the Site identified broadly-low concentrations of ground gas within the shallow soils; however a concentration of carbon dioxide was recorded as 5.5% in single location during the gas monitoring.

8.4.57 The Ground Gas Risk Assessment undertaken by RPS Group in June 2013 (Ref. 8.20) classified the site as 'Characteristic Situation 2 – 'Low Risk'' as per CIRIA C665 guidance (Ref. 8.9).

8.4.58 This classification was due to elevated concentrations of methane and carbon dioxide (>5%w/w) identified during the course of the post-works monitoring.

8.4.59 A review of historical and environmental records has identified several potential sources of ground gas which could impact the Site, namely the areas of landfill to the east the Site and the superficial Alluvium deposits located across the north of the Site (due to the potential presence of peat within this stratum) within the proposed Laydown area.

Industrial Sites

8.4.60 There are several industrial sites situated within 500m of the Site. They include the following:

South

- Sewage Treatment site with filter beds and water reservoirs (0m)
- Sittingbourne and Kemsley Light Railway (125m)

East

- Sewage treatment beds (200m)

North-east

- Sewage Treatment Lagoon (100-250m)
- Works (400-500m)

North

- Works (250m)

North-west

- Warehouses (480-600m)

West

- Kemsley Paper Mill (0-500m)

Conceptual Site Model

8.4.61 Based upon the baseline information outlined above, a Conceptual Site Model has been developed for the Site that identifies potential contamination sources, sensitive receptors and exposure pathways present at the Site.

Potential Contamination Sources

8.4.62 The potential contamination sources listed in Table 8.4 below have the potential to impact sensitive receptors present at and in the vicinity of the Site as a consequence of the Proposed Development.

Potential Contamination Source	Comments
Historical Site Activities	No significant sources of contamination identified across the Site. Historical records only suggest localised sources to be present within the Proposed Development area i.e. tanks, small railway lines. Paper mill buildings recorded to be present at location of current K1 plant, however no significant contamination sources identified
Presence of Made Ground and / or perched waters in the Made Ground	Made Ground likely to be present at the Site due to the general industrial history of the Site and surrounding area. Localised perched water in the Made Ground is considered to be a potential source of contamination.
Current Site Activities	Only localised sources identified e.g. fuel tank, truck wash area, but located on hardstanding in good condition with surface water drainage system present
Adjacent Site Activities	Current paper mill and sewage works. Historical Brick Works recorded to the south of the Site, however the presence of these activities is not considered to pose a significant contamination source. Landfilling to the east of the site is considered to pose a contamination source to the Site.
Ground Gas	Historical landfilling has been recorded to the east of the Site that may be a source of ground gas migrating on to the Site. In addition, the presence of Alluvium in the northern part of the Site may represent a gas source. No development is proposed however in the northern part of the Site as it will be a construction laydown area only.

Table 8.4: Potential Contamination Sources

Sensitive Receptors

8.4.63 The sensitive receptors listed in Table 8.5 below have the potential to be affected by effects arising from the Proposed Development. The assessment in this Chapter has considered the effects listed in the table upon the identified sensitive receptors.

Receptor	Importance/sensitivity/vulnerability to change
Future Site Users	High
Construction Workers	High
Adjacent Site Users	High
Secondary Undifferentiated Aquifer (Alluvium)	Low
Secondary A Aquifer (Lambeth Group and Thanet Formation)	Medium
Principal Aquifer (Chalk)	High
Surface Water Quality (the Swale)	High
Ecological Receptors e.g. SPA, SSSI (the Swale)	High

Table 8.5: Potentially affected sensitive receptors

Exposure Pathways

8.4.64 The exposure pathways listed in Table 8.6 below have the potential to allow contamination to migrate from potential contamination sources to sensitive receptors as a consequence of the Proposed Development.

Exposure Pathway	Sensitive Receptor Potentially Impacted
Inhalation / ingestion dermal contact with contaminated soil / dust	Future Site Users / Construction Workers
Inhalation of organic vapours	Future Site Users / Construction Workers
Inhalation of asbestos fibres	Future Site Users / Construction Workers
Leaching of soil contaminants in the Made Ground into perched waters and downward migration directly to underlying groundwater.	Secondary Undifferentiated Aquifer (Alluvium)
Leaching of soil contaminants in the Made Ground into perched waters and downward migration through London Clay to underlying groundwater in the Lambeth Group / Thanet Formation	Secondary A Aquifer (Lambeth Group / Thanet Formation)
Leaching of soil contaminants in the Made Ground into perched waters and downward migration through London Clay to underlying groundwater in the Lambeth Group / Thanet Formation and into the Chalk aquifer at depth.	Principal Aquifer (Chalk)
Lateral migration of shallow contaminated perched water in Made Ground and/or groundwater in the underlying aquifer units to adjacent surface water courses.	Surface Water Quality and Ecological Receptors (the Swale)
Lateral migration of potentially contaminated groundwater in deep aquifer units	Surface Water Quality and Ecological Receptors (the Swale)
Lateral migration and accumulation of ground gas within structures	Future Site Users

Table 8.6: Potentially affected sensitive receptors

8.5 Future Baseline

8.5.1 Assuming that there is no further development at or in the vicinity of the Site that introduces new sources of potential contamination to the Site, including potential upgrades to the K1 facility, it is anticipated that there will be no change to baseline conditions at the Site in the future, on the basis that risks from any new potential contamination sources are suitably mitigated in accordance with the requirements of the relevant environmental and construction legislation.

8.5.2 No changes to contamination levels are predicted on this basis.

8.6 Predicted Effects

8.6.1 Based upon the available information in the vicinity of the Site and utilising experience and professional judgement, the predicted effects of the proposed development on human, controlled waters and ecological receptors are outlined below.

8.6.2 A summary of the proposed development works is provided in Chapter 2.

Construction Effects

8.6.3 Ground Contamination Effects on Human Health – Construction Workers

8.6.4 The presence of concrete hardstanding across much of the Site is in a reasonable state of repair. Made Ground is likely to be present underneath the concrete hardstanding, however high levels of contaminants within the soil are not anticipated to be present based upon previous ground investigation information.

8.6.5 All current potential sources of contamination appear to be suitably managed and maintained, thus minimising the potential for contamination migration into the underlying soils as a result of current site activities.

8.6.6 Previous ground investigations undertaken in the vicinity of the Site have not identified any unacceptable risks to human health from the presence of chemical contamination in Made Ground and shallow soils. Available information indicates that potential sources of contamination relating to historical land-use should they occur are likely to be localised rather than being widespread across the Site.

8.6.7 Asbestos fibres have been noted to be present in localised areas and have the potential to pose a risk to human health if encountered.

- Receptor Sensitivity : High (construction workers).
- Impact magnitude: Low – (short-term and temporary exposure)

  Spatial: Site effect only.

  Temporal: Short-term, temporary during construction phase, intermittent and decreasing in intensity during construction programme.

  Nature: Effect is reversible, possible and direct.

- Significance of effect: Minor adverse, on the basis of short exposure duration during construction and likely localised areas of chemical and / or asbestos contamination within soils, if present.

Ground Contamination Effects on Human Health – Adjacent Site Users

8.6.8 Previous ground investigations undertaken in the vicinity of the Site have not identified any unacceptable risks to human health from the chemical contamination of Made Ground and shallow soils. Asbestos fibres have been noted to be present in localised areas and have the potential to pose a risk to human health. Available information indicates that all potential sources of contamination from historical and current site uses are likely to be localised and thus any contamination present within the soil is likely to be localised, rather than being widespread across the Site.

8.6.9 Concrete hardstanding in an intact condition is present across much of the Site and all current potential sources of contamination appear to be suitably managed and maintained, thereby minimising the potential for contamination migration into the underlying soils.

8.6.10 Made Ground is likely to be present underneath the concrete hardstanding, however high levels of contaminants are not anticipated to be present based upon previous ground investigation information and the site history.

8.6.11 Adjacent site activities are industrial in nature and therefore no highly sensitive human health receptors i.e. children will not be exposed to potential contamination from airborne contaminants.

- Receptor Sensitivity : High (adjacent site users).
- Impact magnitude: Low (short-term and temporary exposure)

  Spatial: Site effect only.

  Temporal: Short-term, temporary during construction phase, intermittent and decreasing in intensity during construction programme.

  Nature: Effect is reversible, possible and direct.

- Significance of effect: Minor adverse, on the basis of short exposure duration during construction, likely localised areas of contamination within soils (if present) and industrial nature of adjacent site activities.

<u>Ground Contamination Effects on Groundwater</u>

Shallow Groundwater

8.6.12 Previous ground investigations undertaken in the vicinity of the Site have identified localised areas of elevated concentrations of inorganic and organic contaminants in shallow perched water within the Made Ground. The risk assessments conclude that there were no unacceptable risks to deep groundwater in the Lambeth Group / Thanet Formation or the Chalk at depth.

8.6.13 It is understood that the Proposed Development will likely have piled foundations and no substantial basement structures are proposed. Excavations will therefore be restricted to relatively shallow depth for pile caps, floor slabs, utilities etc. Any such excavations may encounter shallow perched water within the Made Ground and there is potential for localised areas of contamination within the Made Ground and shallow soil to be remobilised. Given the presence of hardstanding and a surface water drainage system in the Proposed Development area, it is anticipated that the presence of shallow perched water will be limited and likely discontinuous in nature, thereby having limited continuity with groundwater within the superficial deposits (Alluvium, Secondary Undifferentiated aquifer) to the east.

8.6.14 The northern part of the Site (Laydown area) is located in an area where Alluvium is believed to be present, however no excavations are proposed to be undertaken in this area. On this basis therefore, there is minimal risk of any contamination present within the soils being remobilised by construction activities. Construction activities in this area e.g. waste storage, fuel storage have the potential to impact shallow groundwater if not suitably managed and therefore appropriate measures to manage potential construction impacts to shallow groundwater must be suitably implemented.

- Receptor Sensitivity : Low (Secondary Undifferentiated aquifer).
- Impact magnitude: Low (likely limited continuity of perched water with groundwater within aquifer in Proposed Development area. Contamination as a consequence of construction activities, if it occurs, likely to be limited in extent).

Spatial: Wider area (groundwater within Secondary Undifferentiated aquifer present outside of Site boundary).

Temporal: Short-term, temporary during construction phase, intermittent and decreasing in intensity during construction programme.

Nature: Effect is reversible, possible and indirect.

- Significance of effect: Minor adverse, on the basis of the likely discontinuous nature of shallow perched water within the Made Ground within the Proposed Development area, the limited hydraulic continuity with groundwater within the superficial deposits in this area and the absence of excavations within the northern part of the Site (Laydown area) where superficial deposits are believed to be present.

Deep Groundwater

8.6.15 Deep groundwater is present within the Lambeth Group, Thanet Formation and the underlying Chalk. The Lambeth Group and Thanet Formation are classified as Secondary A aquifers and the Chalk is classified as a Principal Aquifer by the Environment Agency. The Site lies outside of a Source Protection Zone and there are no recorded potable groundwater abstractions within the vicinity of the Site.

8.6.16 The Lambeth Group is overlain by the low permeability London Clay Formation, anticipated to be of the order of 4 - 5m in thickness, which is considered to hydraulically isolate shallow groundwater from the deeper aquifers.

8.6.17 The potential impact as a result of construction would be deterioration in groundwater quality in the Secondary A aquifers and the Chalk aquifer.

8.6.18 Groundwater quality within the Secondary A aquifers is unlikely to be affected by construction activities and shallow excavations due to the presence of the low permeability London Clay Formation. Piling activities for the construction of foundations for the Proposed Development will however provide a pathway for the downward migration of shallow contamination into the Secondary A aquifers, should the installation of piles fully penetrate the London Clay Formation.

- Receptor Sensitivity : Medium (Secondary A aquifer).
- Impact magnitude: Low (gross contamination not anticipated to be present within soil and shallow perched water).

Spatial: Wider area (groundwater within Secondary A aquifer present outside of Site boundary).

Temporal: Potentially long term due to installation of contamination migration pathway into Secondary A aquifer, permanent, continuous and increasing in intensity during construction programme.

Nature: Effect is reversible, possible and direct.

- Significance of effect: Minor adverse, on the basis of gross contamination not being anticipated to be present within soil and shallow perched water and that the Lambeth Group and Thanet Formation aquifer is not considered to be a highly sensitive receptor.

8.6.19 Groundwater quality within the Chalk aquifer is unlikely to be affected by construction activities and shallow excavations given the presence of the overlying groundwater bearing units.

8.6.20 Piling activities for the construction of foundations for the Proposed Development will however provide a pathway for the downward migration of shallow contamination into the overlying Secondary A aquifers, should the installation of piles fully penetrate the London Clay Formation. Groundwater quality in the Chalk aquifer is unlikely to be affected by piling activities however due to the likely tortuous nature of groundwater flow in the overlying Secondary A aquifers.

- Receptor Sensitivity : High (Principal aquifer).

- Impact magnitude: Low (gross contamination not anticipated to be present within soil and groundwater)

  Spatial: Wider area (groundwater within Chalk aquifer present outside of Site boundary).

  Temporal: Potentially long term due to installation of contamination migration pathway into Secondary A aquifer, permanent, continuous and increasing in intensity during construction programme.

  Nature: Effect is reversible, possible and direct.

- Significance of effect: Minor adverse based upon the presence of groundwater bearing units above (Lambeth Group and Thanet Formation) and the tortuous nature of groundwater flow in these units.

<u>Ground Contamination Effects on Surface Water Quality and Ecological Receptors</u>

8.6.21 Previous ground investigations (Ref. 8.17 & 8.20) have indicated that groundwater within the shallow (Alluvium) and deep (Lambeth Group / Thanet Formation) groundwater is likely to be in hydraulic continuity with the Swale Estuary.

8.6.22 Shallow excavations within the Made Ground may lead to the disturbance and remobilisation of contaminants present within the soil and shallow perched water in Made Ground at the Site. Investigations elsewhere on the Mill site suggest that shallow perched water is of limited extent and discontinuous in nature, thereby having limited continuity with groundwater within the superficial deposits (Alluvium, Secondary Undifferentiated aquifer) to the east and ultimately the Swale Estuary.

8.6.23 The construction of piled foundations that fully penetrate the underlying London Clay Formation may provide a pathway for the downward migration of contamination into the Lambeth Group and Thanet Formation (Secondary A aquifers). Due to the perceived hydraulic connectivity between the Secondary A aquifers and the Swale Estuary, there is a potential for any contamination within groundwater to migrate to the surface water body.

8.6.24 Migration of contamination to the Swale Estuary would adversely impact on surface water quality and the ecological receptors present.

- Receptor Sensitivity : High (Surface Water Quality and Ecological Receptors).
- Impact magnitude: Negligible (gross contamination not anticipated to be present within soil and shallow perched water. Any contamination would likely be diluted in Secondary A aquifer).

  Spatial: Wider area (the Swale Estuary).

  Temporal: Potentially long term due to installation of contamination migration pathway into Secondary A aquifer, permanent, continuous and increasing in intensity during construction programme.

  Nature: Effect is irreversible, possible and indirect.
- Significance of effect: Minor adverse, on the basis of gross contamination not anticipated to be present within soil and shallow perched water and likely dilution of contamination within the Secondary A aquifer.

<u>Ground Gas Effects on Human Health</u>

8.6.25 Although potential sources of ground gas have been identified in the vicinity of the Site, due to the temporary nature of the construction works and the absence of significant excavations, ground gas risks to human health are considered to be negligible and the significance of the effect would be minor adverse.

Operational Effects

<u>Ground Contamination Effects on Human Health – Future Site Users</u>

8.6.26 Previous ground investigations undertaken in the vicinity of the Site have not identified any unacceptable risks to human health from the presence of chemical soil contamination. Asbestos fibres have been noted to be present in localised areas and have the potential to pose a risk to human health. Available information indicates that all potential sources of contamination from historical and current site uses are likely to be localised and thus any contamination present within the soil is likely to be localised, rather than being widespread across the Site.

8.6.27 The Proposed Development will comprise hardstanding across the entire area that is to be developed with minimal areas of landscaping / exposed ground. The hardstanding will thus minimise exposure to future site users from the presence of any contaminants within the soil.

- Receptor Sensitivity : High (future site users).
- Impact magnitude: Negligible

  Spatial: Site effect only.

  Temporal: Long-term, permanent during site operation, continuous and no change in intensity during operational lifetime.

  Nature: Effect is reversible, possible and direct.

- Significance of effect: Minor adverse, on the basis of the presence of hardstanding across the Proposed Development area minimising exposure to future site users from the presence of any contaminants within the soil.

Ground Contamination Effects on Human Health – Adjacent Site Users

8.6.28 Previous ground investigations undertaken in the vicinity of the Site have not identified any unacceptable risks to human health from the presence of chemical soil contamination. Asbestos fibres have been noted to be present in localised areas and have the potential to pose a risk to human health. Available information indicates that all potential sources of contamination from historical and current site uses are likely to be localised and thus any contamination present within the soil is likely to be localised, rather than being widespread across the Site.

8.6.29 The Proposed Development area will comprise hardstanding across the entire area that is to be developed with minimal areas of landscaping / exposed ground. The hardstanding will thus minimise exposure to adjacent site users from the presence of any contaminants within the soil.

- Receptor Sensitivity : High (adjacent site users).
- Impact magnitude: Negligible

  Spatial: Site effect only.

  Temporal: Long-term, permanent during site operation, continuous and no change in intensity during operational lifetime.

  Nature: Effect is reversible, possible and direct.

- Significance of effect: Minor adverse, on the basis of the presence of hardstanding across the Proposed Development area minimising exposure to adjacent site users from the presence of any contaminants within the soil.

Ground Contamination Effects on Groundwater

Shallow Groundwater

8.6.30 Previous ground investigations undertaken in the vicinity of the Site have identified localised elevated concentrations of inorganic and organic contaminants within shallow perched groundwater within the Made Ground. The conclusions of the risk assessments have indicated that there were no unacceptable risks to groundwater.

8.6.31 The Proposed Development will comprise hardstanding across the entire area that is to be developed with minimal areas of landscaping / exposed ground. A surface water drainage system will also be constructed to manage surface water runoff from the Site (refer to Chapter 9).

8.6.32 The presence of a significant quantity of hardstanding and suitable management of surface water runoff will minimise the potential for leaching of soil contamination and migration of any shallow perched water.

- Receptor Sensitivity : Low (Secondary Undifferentiated aquifer).

- Impact magnitude: Negligible

Spatial: Wider area (groundwater within Secondary Undifferentiated aquifer present outside of Site boundary).

Temporal: Long-term, permanent during site operation, continuous and no change in intensity during operational lifetime.

Nature: Effect is reversible, possible and indirect.

- Significance of effect: Negligible, on the basis that hardstanding will be present across the Proposed Development area and the implementation of a surface water drainage system, minimising the potential for leaching of soil contamination and migration of any shallow perched water.

Deep Groundwater

8.6.33 Deep groundwater is present within the Lambeth Group, Thanet Formation and the underlying Chalk. The Lambeth Group and Thanet Formation are classified as Secondary A aquifers and the Chalk is classified as a Principal Aquifer by the Environment Agency. The Site lies outside of a Source Protection Zone and there are no known potable groundwater abstractions within the vicinity of the Site.

8.6.34 The Lambeth Group is overlain by the low permeability London Clay Formation, anticipated to be of the order of 5m in thickness, which is considered to hydraulically isolate shallow groundwater from the deeper aquifers.

8.6.35 Piled foundations that fully penetrate the London Clay Formation will provide a pathway for the downward migration of shallow contamination into the Secondary A aquifers.

- Receptor Sensitivity : Medium (Secondary A aquifer).
- Impact magnitude: : Low (gross contamination not anticipated to be present within soil and groundwater)

Spatial: Wider area (groundwater within Secondary A aquifer present outside of Site boundary).

Temporal: Long term due to installation of contamination migration pathway into Secondary A aquifer, permanent, continuous and no change in intensity.

Nature: Effect is reversible, possible and direct.

- Significance of effect: Minor adverse, on the basis of gross contamination not being anticipated to be present within soil and shallow perched water and that the Lambeth Group and Thanet Formation aquifer is not considered to be a highly sensitive receptor.

8.6.36 Piling activities for the construction of foundations for the Proposed Development may provide a pathway for the downward migration of shallow contamination into the overlying Secondary A aquifers, should the installation of piles fully penetrate the London Clay Formation. Groundwater quality in the Chalk aquifer is unlikely to be affected by piling activities however due to the likely tortuous nature of groundwater flow in the overlying Secondary A aquifers.

- Receptor Sensitivity : High (Principal aquifer).
- Impact magnitude: Low (gross contamination not anticipated to be present within soil and groundwater).

Spatial: Wider area (groundwater within Chalk aquifer present outside of Site boundary).

Temporal: Potentially long term due to installation of contamination migration pathway into Secondary A aquifer, permanent, continuous and increasing in intensity during construction programme.

Nature: Effect is reversible, possible and direct.

- Significance of effect: Minor adverse based upon the presence of groundwater bearing units above (Lambeth Group and Thanet Formation) and the tortuous nature of groundwater flow in these units.

<u>Ground Contamination Effects on Surface Water Quality and Ecological Receptors</u>

8.6.37 Previous ground investigations (Ref. 8.17 & 8.20) have indicated that groundwater within the shallow (Alluvium) and deep (Lambeth Group / Thanet Formation) groundwater is in hydraulic continuity with the Swale Estuary.

8.6.38 The Proposed Development will comprise hardstanding across the entire area that is to be developed with minimal areas of landscaping / exposed ground. A surface water drainage system will also be constructed to manage surface water runoff from the Site.

8.6.39 The presence of a significant quantity of hardstanding and suitable management of surface water runoff will minimise the potential for leaching of soil contamination and migration of any shallow groundwater.

8.6.40 The construction of piled foundations that fully penetrate the underlying London Clay Formation may provide a pathway for the downward migration of contamination into the Lambeth Group and Thanet Formation (Secondary A aquifers). Due to the perceived hydraulic connectivity between the Secondary A aquifers and the Swale Estuary, there is a potential for any contamination within groundwater to migrate to the surface water body.

8.6.41 Migration of contamination to the Swale Estuary may adversely impact on surface water quality and the ecological receptors present.

- Receptor Sensitivity : High (Surface Water Quality and Ecological Receptors).
- Impact magnitude: Negligible (gross contamination not anticipated to be present within soil and groundwater. Any contamination would likely be diluted in Secondary A aquifer).

  Spatial: Wider area (the Swale Estuary).

  Temporal: Long term due to installation of contamination migration pathway into Secondary A aquifer, permanent, continuous and no change in intensity.

  Nature: Effect is irreversible, possible and indirect.

- Significance of effect: Minor adverse, on the basis of gross contamination not anticipated to be present within soil and shallow perched water and likely dilution of contamination within the Secondary A aquifer.

<u>Ground Gas Effects on Human Health</u>

8.6.42 Potential sources of ground gas have been identified at the Site comprising the presence of landfills to the east of the Site and Alluvium in the northern part of the Site.

8.6.43 The Ground Gas Risk Assessment undertaken by RPS Group in June 2013 (Ref. 8.20) classified ground gas risks within the vicinity of the Site as'Characteristic Situation 2 – 'Low Risk'' as per CIRIA C665 guidance (Ref. 8.9). Given the presence of the landfill adjacent to the Site boundary however, there is the potential for ground gas to migrate on to Site from the landfill and accumulate in structures.

8.6.44 The presence of Alluvium within the northern part of the Site is unlikely to pose a risk to human health given that no permanent structures are proposed to be constructed in this area; rather this area is to be used as a laydown area during construction.

- Receptor Sensitivity : High (Future Site Users).
- Impact magnitude: Low (contamination source located close to Proposed Development and potential for ground gas migration and accumulation. Ground investigation information indicates a 'Low Risk' ground gas scenario in the vicinity of the Site).

Spatial: Site effect only.

Temporal: Long term due to presence of structures, permanent, continuous and no change in intensity.

Nature: Effect is reversible, possible and indirect.

- Significance of effect: Moderate adverse, given the proximity of landfills to the east of the Proposed Development and potential for gas migration and accumulation. In addition, previous ground gas assessments have derived a 'Low Risk' (Characteristic Situation 2) for ground gas adjacent to the Site.

Decommissioning Effects

8.6.45 Assuming that the Proposed Development is decommissioned in the future and all equipment is removed from the Site, it is not anticipated that there will be any changes to baseline conditions, assuming that the hardstanding and surface water drainage systems are maintained and all hazardous substances are appropriately removed in line with industry best practice.

8.7 Mitigation

8.7.1 The following paragraphs provide a summary of measures that are proposed to be implemented to mitigate the effects from the construction phase from the completed development.

Mitigation of Construction Effects

8.7.2 Although the impact assessment has not identified any significant effects to human health and the environment as a consequence of the construction phase of the Proposed Development, there are a number of measures that should be implemented during construction to minimise potential impacts associated with the Proposed Development. These measures are standard in construction projects and are in line with current industry good practice for construction on brownfield sites.

8.7.3 As a minimum, the Contractor would ensure that his statutory obligations under environment, health and safety legislation are fulfilled. Measures would include the following:

- Provision of a Construction Environmental Management Plan (CEMP) that outlines the measures that will be implemented to manage risks to the environment duration the construction phase.

- Stockpiling of contaminated materials would be avoided where practicable. Where it is necessary, stockpiles would be located on areas of hard-standing or plastic sheeting to prevent contaminants infiltrating into the underlying ground.

- The implementation of dust suppression measures during construction to minimise nuisance dust emissions during the works.

- Any necessary licences would be obtained for the storage, treatment and disposal of waste.

- Where significant unforeseen contamination is identified e.g. hydrocarbons, fibrous asbestos, during the course of the work, work would stop and further investigation would be undertaken to establish level of contamination. Where remediation is required, on-site treatment, including bioremediation would be carried out wherever practicable.

- Suitable management and control of shallow groundwater during excavation works to minimise the potential for the spread of contamination contained with the water.

- The disposal of solid waste, including surplus spoil, would be managed to maximise the environmental and developmental benefits from the use of surplus material and to minimise any adverse effects of disposal. In general, the principles of the waste management hierarchy, reduce-reuse-recycle would be applied.

- Prior to commencement of construction works, a Site Waste Management Plan would be produced. This would predict all waste streams to be produced including volumes expected and to identify the waste management action proposed for each different waste type in line with the waste hierarchy.

- Potential waste arising from excavation would be sampled and analysed to determine the waste classification required to establish relevant waste streams, suitability for reuse/recycle and disposal/storage requirements.

- Excavation works would be carried out in such a way to enable effective segregation of clean materials for reuse on site wherever practicable. It is anticipated that 'clean' concreate and masonry would be crushed for reuse for backfilling and other purposes, or would be sent offsite for recycling or recovery with disposal only as a final resort. Material would only be re-used on site in accordance with the Environmental Permitting Regulations or appropriate approved Code of Practice e.g. Contaminated Land: Application in Real Environments (CL:AIRE) or Waste Resource Action Plan (WRAP).

- Storage of hazardous materials, including fuel, during the construction phase should utilised industry best practice e.g. storage in bunded areas, to minimise the potential for spills / leakages to impact soil and groundwater.

- The implementation of suitable measures in line with the Construction Design Management Regulations (2015) would manage any risks posed to human health. These measures should include the provision of suitable Personal Protective Equipment (PPE) and welfare facilities.

8.7.4 A piling risk assessment should be undertaken to determine the most suitable piling technique to be implemented, to minimise the potential for the downward migration of contamination within the Made Ground into the Secondary A aquifers (Lambeth Group and Thanet Formation). This risk assessment should also be cognisant of the requirement to minimise disturbance to ecological receptors through noise and / or vibration impacts.

Mitigation of Operational Effects

8.7.5 The proposed development design will mitigate operational effects to human health and shallow groundwater from any soil contamination, through the presence of hardstanding across the Proposed Development area.

8.7.6 Construction of suitable piles, as determined by the piling risk assessment, that prevent the downward migration of contamination into the Secondary A aquifer will also mitigate completed development effects to deep groundwater.

8.7.7 To mitigate completed development effects to human health from the presence of ground gas (determined as a moderate adverse effect), ground gas protection measures should be implemented within new structures to minimise the potential for the migration into and accumulation of ground gas within these structures. The design of ground gas protection measures should be undertaken in accordance with CIRIA C665 (Ref. 8.9) and BS8485 (Ref. 8.22).

8.7.8 Through the implementation of appropriate ground gas protection measures the following effects to human health have been determined:

- Receptor Sensitivity : High (Future Site Users).

- Impact magnitude: Negligible (ground gas measures are in place to prevent ground gas ingress into new structures)

  Spatial: Site effect only.

  Temporal: Long term due to presence of structures, permanent, continuous and no change in intensity.

  Nature: Not applicable due to implementation of ground gas protection measures.

- Significance of effect: Minor adverse, on the basis of the high sensitivity of the receptor. The implementation of ground gas protection measures however mitigate ground gas risk to human health.

8.8 Residual Effects

8.8.1 After the implementation of the mitigation measures detailed within this chapter, no significant residual effects have been identified.

8.9 Cumulative Effects

8.9.1 The list of developments included for the assessment of potential cumulative environmental effects in the EIA is provided in Chapter 3.

8.9.2 Given the cumulative developments considered are likely to have similar geological conditions and will be of similar end use, the risks both in terms of contamination, groundwater and ground gases are likely to similar.

8.9.3 It is assumed that similar mitigation measures will be incorporated for these developments in accordance with the requirements of the relevant legislation set out herein and construction best practice and as such the effects associated with the redevelopment of neighbouring sites are considered unlikely to alter the level of the effects identified above.

8.9.4 The exception to the above is the proposed new road development just to the south of the Site. It is understood that this development will include the removal of the hardstanding present within the Site area to be used as part of the road construction. Should the hardstanding be removed, there is a potential for rainfall to leach any contaminants present within the soil and to allow migration of potentially contaminated shallow water off site. It is anticipated that the breaking up and removal of the hardstanding will be completed before the construction of the Proposed Development. It is further anticipated however that these works will be accompanied by a contamination assessment and it is assumed that appropriate mitigation measures will be implemented as part the road development, if the development comes forward. On this basis, it is considered that there will be no cumulative effect on the site from the proposed road development.

8.10 Summary

8.10.1 The baseline ground conditions in the vicinity of the Site have been considered. This involved reviewing the history, geology, hydrogeology and hydrology of the Site as well as well as available ground investigation from investigations undertaken in the vicinity of the Site. No specific ground investigation has been undertaken at the Site, therefore the assessment is based upon available data and RPS' experience and professional judgement.

8.10.2 A conceptual site model has been developed that identified potential contamination sources, sensitive receptors and contamination exposure pathways.

8.10.3 Based upon the available data, it is anticipated that during the construction phase there would be potential minor adverse effects to human health (construction workers, adjacent site users and from the presence of ground gas), shallow groundwater (within the Alluvium), deep groundwater (within the Lambeth Group and Thanet Formation), surface water quality (the Swale) and ecological receptors.

8.10.4 Upon completion of the development, it is anticipated that there would be potential moderate significant adverse effects to human health from the presence of ground gas. Minor potential adverse effects are anticipated to human health (construction workers and adjacent site users), deep groundwater (within the Lambeth Group and Thanet Formation and Chalk aquifer), surface water quality (the Swale) and ecological receptors. Negligible effects are anticipated to shallow groundwater (within the Alluvium).

8.10.5 It is recommended that a number of mitigation measures are implemented during construction to mitigate effects to human health and controlled waters. These measures are in line with industry best practice and include the appropriate segregation, storage and disposal of waste, the appropriate storage of hazardous materials during construction, undertaking a piling risk assessment to identify the most appropriate piling techniques to prevent the downward migration of contamination into the Secondary A aquifer and the implementation of suitable measures in line with the CDM Regulations (2015) to manage exposure risks to humans.

8.10.6 The proposed development design, comprising hardstanding, will mitigate effects of soil contamination to human health and shallow groundwater and the implementation of ground gas protection measures within new structures will mitigate the effects of ground gas to human health upon completion of the development.

8.10.7 Once ground gas measures have been implemented in new structures, a minor adverse effect is anticipated to be present to human health.

8.10.8 No significant residual effects have been identified in this assessment and no cumulative impact with other developments have been identified on the assumption that the mitigation measures outlined within this assessment have been implemented and that the other developments do not impact on groundwater quality.

References

8.1 Planning and Compulsory Purchase Act 2004. (c5), London: HMSO

8.2 Water Act 2003 (c37), London: HMSO

8.3 Department for Communities and Local Government (DCLG) (2012): National Planning Policy Framework, London: DCLG

8.4 The Swale Borough Local Plan, Full Council Item (2017): Bearing Fruits 2031

8.5 Department for Environment, Food and Rural Affairs (Defra) and Environment Agency (EA) (2004) Model Procedures for the Management of Land Contamination, CLR11.

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8.8 Construction Industry Research and Information Association (CIRIA) (1996) CIRIA Report 132; A guide for safe working on contaminated sites

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8.11 British Standards Institute (BSi) (2015) BS5930: Code of Practice for Site Investigations.

8.12 British Standards Institute (BSi) (2011) BS10175; Code of Practice for Investigation of Potentially Contaminated Sites

8.13 British Standards Institute (BSi) (1990) BS1377; Methods of Test for Soils for Civil Engineering Purposes

8.14 Institute for Environmental Management and Assessment (IEMA) (2004): Guidelines for Environmental Impact Assessment, Lincoln: IEMA.

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8.18 RPS Group, Development of a Sustainable Energy Plant, Kemsley Paper Mill, Environmental Statement, Chapter 11: Hydrogeology and Ground Conditions, prepared for St. Regis Paper Company Ltd, January 2010, Reference: DLE1726

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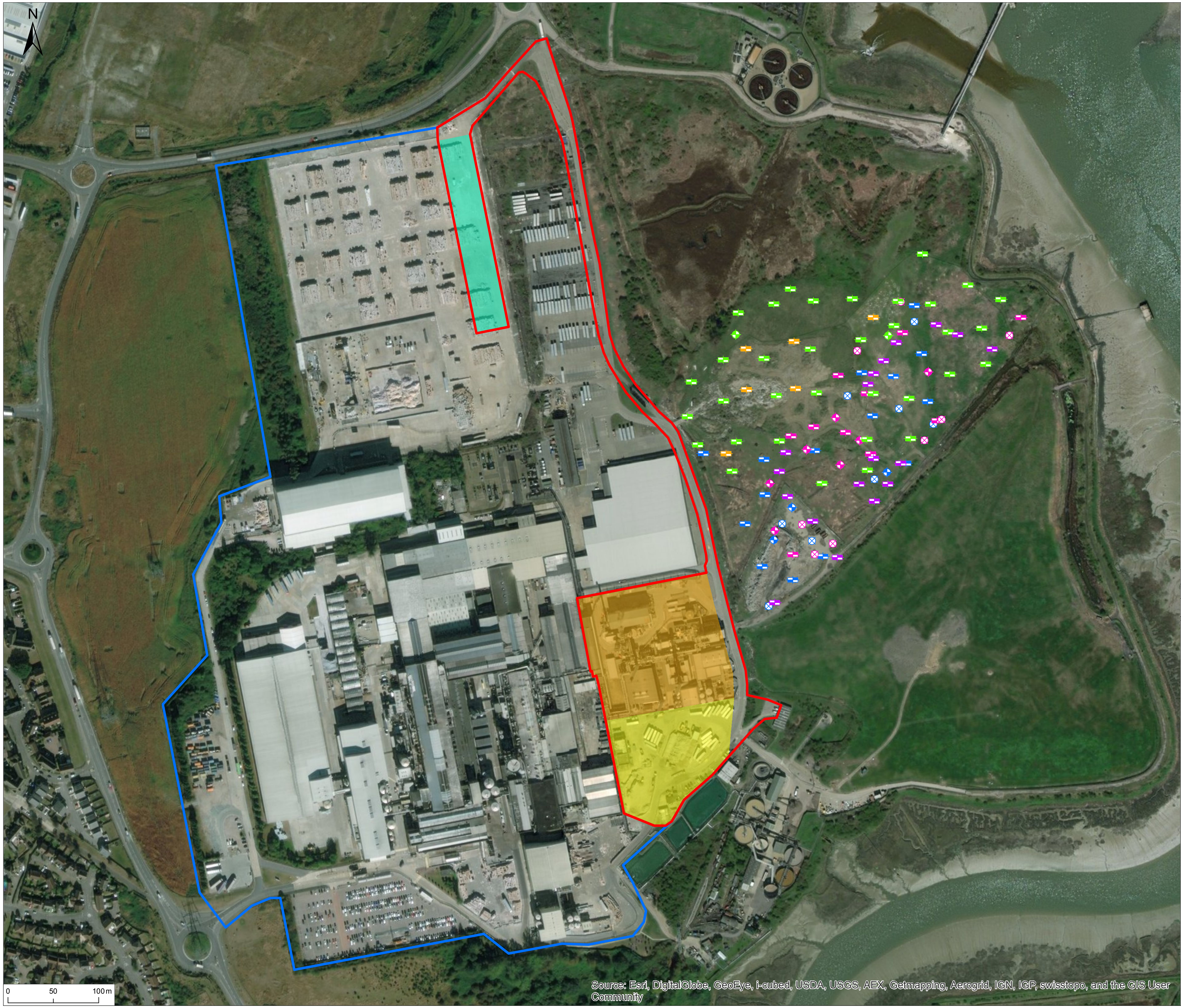
8.20 RPS Group, Interpretative Ground Investigation Report, Pre-Commencement Works for the Sustainable Energy Plant, Kemsley Paper Mill, Sittingbourne, Kent, on behalf of EEW Energy from Waste UK Limited, June 2013, reference: JER5481 R 130613 DH Interpretative Report

8.21 RPS Group, Site Investigation Report, Kemsley Paper Mill on behalf of Wheelabrator Technologies Inc. December 2015, reference: 151202 R JER6773 RH GI Report PT Review



Notes

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Legend

- The Kemsley Mill
- The Site
- K1 CHP Facility
- Proposed K4 CHP Facility
- Laydown Area

Historic Investigation Locations

RPS (2015)
- Trial Pit

URS (2013)
- Trial Pit

RPS (2011, referenced in RPS 2013 report)
- Borehole
- Window Sample
- Trial Pit

RPS (2009)
- Borehole
- Window Sample
- Trial Pit

CMW (1995, referenced in RPS 2013 report)
- Borehole
- Trial Pit

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Client DS SMITH

Project KEMSLEY K4

Title HISTORIC GROUND INVESTIGATION LOCATIONS

Status	Drawn By	PM/Checked By
PRELIMINARY	RJ	GM
Job Ref	Scale @ A3	Date Created
JER1201	1:4,000	JAN 18

Figure Number 8.1

Rev -

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9 Water Environment

9.1 Introduction

9.1.1 This chapter assesses the likely significant water environment effects resulting from the Proposed Development.

9.2 Regulatory and Policy Framework

Legislation

9.2.1 The main legislative drivers for assessing and managing risks to human health and the environment, including controlled waters, groundwater and land contamination are:

English/UK Legislation

- Coast Protection Act 1949 [Ref 9.4];
- Environment Act 1995 [Ref 9.5];
- Environmental Damage and Liability (Prevention and Remediation) Regulations 2009 [Ref 9.5];
- Environmental Protection (Duty of Care) Regulations 1991 (as amended 2003) [Ref 9.7];
- Floods and Water Management Act 2010 [Ref 9.8];
- Land Drainage Act 1991 [Ref 9.9];
- The Environmental Permitting (England and Wales) Regulations 2010 (as amended 2016) [Ref 9.10];
- The Groundwater (Water Framework Directive) (England) Direction 2016 [Ref 9.11];
- The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 [Ref 9.12]; and
- Water Resources Act 1991 [Ref 9.13].

National Planning Policies

National Policy Statements (NPS) [Ref 9.14]

9.2.2 Planning policy on renewable energy Nationally Significant Infrastructure Projects (NSIPs), specifically in relation to hydrology and flood risk, is contained in the Overarching National Policy Statement (NPS) for Energy (EN-1) (Department of Energy and Climate Change (DECC), 2011a) and the NPS for Renewable Energy Infrastructure EN-3 (DECC, 2011b).

9.2.3 The key test set out within EN-1 is that inappropriate development should be avoided in areas at risk of flooding and to that development should be directed away from the areas at the highest risk. Where new energy infrastructure is necessary in such areas that should be seen as an exception and should be made safe without increasing flood risk elsewhere and if possible by reducing flood risk overall.

9.2.4 Paragraph 4.8.6 (NPS EN-1) specifically identifies that applicants should have regard to climate change and should assess the resilience of their project to climate change.

National Planning Policy Framework (NPPF) [Ref 9.16]

9.2.5 Paragraphs 99 to 108 of the NPPF outline the development requirements in terms of flood risk, water quality and resources and the impact of climate change, stipulating that a site specific Flood Risk Assessment (FRA) is required for proposals for new development in Flood Zones 2 and 3 and for any proposal for developments on 1 ha or greater in Flood Zone 1

9.2.6 The NPPF requires the application of a sequential risk-based approach to determining the suitability of land for development in flood risk areas, and that flood risk assessment should be carried out to the appropriate degree, at all levels of the planning process.

9.2.7 Footnote 20 of the NPPF states that a site-specific FRA is required for all proposals for new development in Flood Zones 2 and 3 and for any proposal of 1 hectare or greater in Flood Zone 1. An FRA should consider vulnerability to flooding from other sources as well as from river and sea flooding, and also the potential for any increased risk of flooding elsewhere resulting from a development.

9.2.8 On 6th March 2014 the Department for Communities and Local Government (DCLG) launched Planning Practice Guidance ID7 as a web-based resource. The Planning Practice Guidance ID7 (DCLG, 2014) for Flood Risk and Coastal Change (Ref: 19.5) provides additional guidance for the implementation of the NPPF in relation to development and flood risk.

Planning Practice Guidance, online [Ref 9.17].

9.2.9 PPG ID7 Flood Risk and Coastal Change provides guidance to ensure the effective implementation of the NPPF planning policy for development in areas at risk of flooding.

Environment Agency - Flood risk assessments: climate change allowances [Ref 9.18]

9.2.10 In February 2016 the EA updated advice on climate change allowances to support NPPF. New guidance requires that flood risk assessments and strategic flood risk assessments take into account, where appropriate, increases in rainfall intensity, peak river flows and sea level rise.

9.2.11 Table 9-1 below identifies the range of increase per epoch for peak rainfall intensity. Assessment should assess both the central and upper end allowances to understand the range of impact.

Applies across all of England	Total potential change anticipated for 2010 to 2039	Total potential change anticipated for 2040 to 2059	Total potential change anticipated for 2060 to 2115
Upper End	10%	20%	40%
Central	5%	10%	20%

Table 9-1: Peak rainfall intensity allowance in small and urban catchments (use 1961 to 1990 baseline)

9.2.12 Table 9.2 outlines the anticipated sea level rise associated with climate change per defined epoch. The Environment Agency expect sea level rise to increase the rate of coastal erosion.

Area of England	1990 to 2025	2026 to 2055	2056 to 2085	2086 to 2115	Cumulative rise 1990 to 2115 / metres (m)
East, east midlands, London, south east	4 mm/yr. (140 mm)	8.5 mm/yr. (255 mm)	12 mm/yr. (360 mm)	15 mm/yr. (450 mm)	1.21 m
South West	3.5 mm/yr. (122.5 mm)	8 mm/yr. (240 mm)	11.5 mm/yr. (345 mm)	14.5 mm/yr. (435 mm)	1.14 m
North west, north east	2.5 mm/yr. (87.5 mm)	7 mm/yr. (210 mm)	10 mm/yr. (300 mm)	13 mm/yr. (390 mm)	0.99 m

Table 9-2: sea level allowance for each epoch (mm) per year (use 1990 baseline)

9.2.13 The climate change guidance notes that the allowances provided have been derived from national scale research. There may be cases where local evidence supports the use of other local climate change allowances. With specific reference to changes to extreme rainfall LIT 5707 [Ref 9.19] notes that UKCP09 provides useful information on change to rainfall across the UK.

Local Planning Policies

9.2.14 The relevant development plan at the local level comprises the Swale Local Plan (Bearing Fruits 2031) which was adopted on July 2016.

9.2.15 Policy DM1 requires development proposals to avoid inappropriate development in areas at risk of flooding or where development would increase flood risk elsewhere.

9.3 Methodology

Scoping and Consultation

9.3.1 The formal scoping exercise including Pins formal Scoping Opinion is set out in Chapter 3 and its accompanying appendices.

9.3.2 Table 9-3 summarises additional consultation undertaken directly with relevant statutory and non-statutory consultees outside of the formal scoping process with PINS in relation to water resources and hydrology and outlines how and where this has been addressed in subsequent chapters of the ES.

Consultee	Nature of consultation	How/ Where Addressed
Environment Agency	Data request	Data utilised to inform Baseline Conditions Paragraphs 9.4.8 to 9.4.41.
Upper Medway Internal Drainage Board	Telephone conversation with Mike Watson with respect to current and proposed runoff.	Advice provided by the IDB has been incorporated into the FRA (Appendix 9.1) and associated concept drainage plan.

Table 9-3: Consultation undertaken to date for Hydrology and Flood Risk

Establishing Baseline Conditions

Scope of Assessment

9.3.3 The assessment methodology is based on guidance provided within the Institute of Environmental Management and Assessment (IEMA) Guidelines for Environmental Impact Assessment (2004) [Ref 9.23] and the Design Manual for Roads and Bridges (DMRB), Volume 11, Part 10, (November 2009) [Ref 9.24]. Whilst the DMRB is not specific to the assessment of hydrology and flood risk, it provides an accepted approach to the assessment of development impacts.

9.3.4 The assessment of likely effects on water resources has taken account of the impacts from the Proposed Development on the prevailing hydrological, surface water drainage, flooding and water quality environments.

Study Area

9.3.5 A 500m buffer for the Proposed Development has been selected for data collection purposes to allow for variance in final location and alignments and to identify any existing assets or infrastructure that might affect or be affected by the Proposed Development. A 500 m radius is considered appropriate for data collection taking into account the nature of the development and likely zone of influence on hydrological receptors. Given the landscape surrounding the development and ongoing anthropogenic activities it will be difficult to ascertain the exact source of any impacts on water quality beyond 500 m.

9.3.6 Determination of the baseline conditions at the Site has been established through a review of literature and data from publicly available sources including the EA [Ref 9.25], British Geological Survey (BGS) [Ref 9.26] and Kent County Council (KCC).

9.3.7 Data was obtained from the following sources:

- British Geological Survey (BGS) 1:50,000 geological mapping [Ref 9.26];
- BGS Geoindex Onshore [http://mapapps2.bgs.ac.uk/geoindex/home.html] [Ref 9.26];
- BGS Aquifer Designation Maps [Ref 9.26];
- Environment Agency (EA) Flood Hazard Mapping [Ref 9.25];

- EA website (2017) [www.environment-agency.gov.uk] [Ref 9.25];
- EA North Kent Rivers Catchment Flood Management Plan (2009) [Ref 9.29];
- Landmark Information Group, Envirocheck 143098702_1_ (17 October 2017) [Ref 9.28];
- Kent County Council (KCC): Strategic Flood Risk Assessment (2013) [Ref 9.29];
- Medway Estuary and Swale Shoreline Management Plans (2010) [Ref 9.30];
- Met Office: Climate data (2016) (www.metoffice.gov.uk) [Ref 9.31];
- Ordnance Survey (OS) Landranger 1:50,000 Sheet 178: Thames Estuary [Ref 9.32];
- River Basin Management Plan Thames River Basin District (2015) [Ref 9.33]; and
- The Centre for Ecology and Hydrology (CEH) [www.ceh.ac.uk] [Ref 9.34];

9.3.8 In addition to the above site-specific hydrological data has been obtained via consultation with the EA, LLFA, Drainage Board and site reconnaissance. An environmental data request was submitted to KCC and the EA with the responses attached within the supporting Flood Risk Assessment (Appendix 9.1).

Significance Criteria

9.3.9 The baseline characterisation set out above enables the identification of the nature of potential impacts. The assessment considers the potential impacts to environmental receptors and the pathways by which the receptors may be affected. The following terms have the following meanings in this section.

- Source: increase in low permeable surfacing, potential surface water contaminant sources, ground/channel disturbance;
- Pathway: the mechanism by which the source may affect a receptor i.e. run-off; and
- Receptor: identified features that may be affected, based on the sensitivity of the Site.

9.3.10 This includes consideration of the probability of harm occurring, taking into account potential sources of flooding, including changes in surface water runoff / quality characteristics and receptor that may be affected by changes to baseline conditions.

9.3.11 The potential impacts likely to occur due to the Proposed Development has been determined by consideration of the sensitivity of the hydrological and flood risk key attributes that may be affected and the magnitude of the predicted impacts.

<u>Determining the sensitivity of the receptor</u>

9.3.12 The sensitivity or value of a hydrological receptor or attribute is largely determined by its quality, rarity and scale. The determination of value or sensitivity takes into account the scale at which the attribute is important. This can be defined as being at a local level (the Site), district level (Swale District), County level (Kent), regional level (South East of England), national level (United Kingdom) or international level (Europe).

9.3.13 For the purpose of this ES, 'flood risk' is defined as the permanent removal of or increase in low permeability surfacing leading to an alteration in pre-development surface water run-off rates or a derogation of floodplain storage. 'Temporary' flood risk is the temporary removal or alteration in permeable surfacing leading to a temporary increase in surface water run-off or derogation of floodplain storage (for example during construction).

9.3.14 The definitions set out in Table 9-4 below have been followed in the consideration of sensitivity for this project. This table takes into account guidance provided in Table 2.1 A4.3 of the Design Manual for Roads and Bridges (DMRB) (Highways Agency et al., 2009) [Ref 9.24].

Sensitivity	Typical Descriptors
Very High	Receptor is high value or critical importance to local, regional or national economy. Receptor is highly vulnerable to impacts that may arise from the project and recoverability is long term or not possible. Surface water: WFD Current Overall Status of High. Flood risk: Land within Flood Zone 3 or more than one hundred residential properties protected from flooding by flood defence infrastructure or by natural floodplain storage.
High	Receptor is of moderate value with reasonable contribution to local, regional or national economy. Receptor is generally vulnerable to impacts that may arise from the project and recoverability is slow and/or costly. Surface water: WFD Current Overall Status of Good. Flood risk: Land within Flood Zone 3 and/or 2 or between one and one hundred residential properties or industrial premises protected from flooding by flood defence infrastructure or by natural floodplain storage.
Medium	Receptor is of minor value with small levels of contribution to local, regional or national economy. Receptor is somewhat vulnerable to impacts that may arise from the project and has moderate to high levels of recoverability. Surface water: WFD Current Overall Status of Moderate. Flood risk: Flood plain within Flood Zone 2 and/or 1 or limited constraints and a low probability of flooding of residential and industrial properties.
Low	Receptor is of low value with little contribution to local, regional or national economy. Receptor is not generally vulnerable to impacts that may arise from the project and/or has high recoverability. Surface water: WFD Current Overall Status of Poor. Flood risk: Flood plain within Flood Zone 2 and/or 1 or limited constraints and a very low probability of flooding of residential and industrial properties.
Negligible	Receptor is of negligible value with no contribution to local, regional or national economy. Receptor is not vulnerable to impacts that may arise from the project and/or has high recoverability. Surface water: WFD Current Overall Status of Bad. Flood risk: Area outside flood plain (Flood Zone 1) or flood plain with very low probability of flooding industrial properties.

Table 9-4: Definition of terms relating to the sensitivity of hydrological receptors

Magnitude of Impact

9.3.15 The magnitude of any predicted impact is dependent on its size, duration, timing (e.g. seasonality) and frequency (permanent, seasonal etc.). A qualitative appraisal of the likely magnitude of the predicted impact is provided within this assessment, taking into account the measures proposed to be adopted as part of the development to control such impacts. The magnitude of the predicted impact has been described using the criteria outlined in Table 9-5 below. This table takes into account guidance provided in Table 2.1, A4.4 of DMRB (Highways Agency et al., 2009) [Ref 9.24].

Magnitude	Typical Descriptors
High	Total loss of ability to carry on activities. Impact is of extended temporal or physical extent and of long term duration (i.e., approximately 50 years duration).
	Significant observable degradation in water resource quality and/or increase in flood risk (i.e., approximately 50 years duration).
Medium	Loss or alteration to significant portions of key components of current activity. Impact is of moderate temporal or physical extent and of medium term duration (i.e., less than 20 years).
	Observable degradation in water resource quality and/or increase in flood risk (i.e., less than 20 years).
Low	Minor shift away from baseline, leading to a reduction in level of activity that may be undertaken. Impact is of limited temporal or physical extent and of short term duration (i.e., less than two years).
	Degradation in water resource quality and/or slight increase in flood risk (i.e., up to two years).
Negligible	Very slight change from baseline condition. Physical extent of impact is negligible and of short term duration (i.e., less than two years).
	No observable degradation in water resource quality and/or flood risk (i.e., less than 2 years).
No change	No change from baseline conditions.

Table 9-5: Definition of terms relating to the magnitude of an impact upon hydrology and flood risk

9.3.16 Impact magnitude must take into account the impact duration. The following definitions have been used in the assessment:

- Temporal scale
- Short term: A period of months, up to one year;
- Medium term: A period of more than one year, up to five years;
- Long term: A period of greater than five years.
- Direct or indirect effect: whether the receptor will be affected directly or indirectly;
- Reversible/irreversible effect: effects can be reversed by mitigation measures or by natural environmental recovery within reasonable timescales (5-10 years following cessation of construction);

- Temporary or permanent: effects may occur over the life time of the project or may occur for a limited period of time e.g. whilst a specific activity is taking place;

- Adverse or beneficial: whether the nature of the effect increases or decreases potential contamination risks to sensitive receptors; and

- Geographical scale: whether the effect would be experienced at the local, regional or national level

Significance of Effects

9.3.17 The significance of predicted effects has been determined using publically available environmental data to take into account the sensitivity of the receptor and the magnitude of each impact. Table 9-6 below is used to inform the evaluation of the significance of effects. The Table is based on guidance provided within the DMRB (Highways Agency et al, 2008) [Ref 9.24].

Sensitivity	Magnitude of Impact				
	No Change	Negligible	Low	Medium	High
Negligible	No change	Negligible	Negligible or Minor	Negligible or Minor	Minor
Low	No change	Negligible or Minor	Negligible or Minor	Minor	Minor or Moderate
Medium	No change	Negligible or Minor	Minor	Moderate	Moderate or Major
High	No change	Minor	Minor or Moderate	Moderate or Major	Major or Substantial
Very high	No change	Minor	Moderate or Major	Major or Substantial	Substantial

Table 9-6: Matrix for determining significance of effect from magnitude of impact and sensitivity.

9.3.18 For consistency between disciplines the overall significance of an effect is expressed as Negligible, Minor, Moderate, Major or Substantial based on the definitions below:

- **Substantial**: Only adverse effects are normally assigned this level of significance. They represent key factors in the decision-making process. These effects are generally, but not exclusively, associated with sites or features of international, national or regional importance that are likely to suffer a most damaging impact and loss of resource integrity. However, a major change in a site or feature of local importance may also enter this category.

- **Major**: These beneficial or adverse effects are considered to be very important considerations and are likely to be material in the decision-making process.

- **Moderate**: These beneficial or adverse effects may be important, but are not likely to be key decision-making factors. The cumulative effects of such factors may influence decision-making if they lead to an increase in the overall adverse effect on a particular resource or receptor.

- **Minor**: These beneficial or adverse effects may be raised as local factors. They are unlikely to be critical in the decision-making process, but are important in enhancing the subsequent design of the project.
- **Negligible**: No effects or those that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.

9.3.19 For the purpose of this assessment any effect that is moderate, major or substantial is considered to be significant. Any effect that is minor or below is not significant.

Assessment of Effects

Design Parameters

9.3.20 This section presents the basis of assessment in relation to the Proposed Development during its construction and operation on the water environment.

9.3.21 The assessment is based on the physical characteristics of the Proposed Development described in Chapter 2.

9.3.22 The assessment developed a base scheme design to provide sufficient information for which consideration of a realistic worst case scenario, based on the maximum scale of the elements, was undertaken. As a result no effects of greater significance than those assessed are likely.

Base Scheme Design	Dimensions / Realistic Worst Case Scenario
CHP	1 ha represents the maximum dimensions of the Proposed Development required and would result in the largest possible area of disturbance and therefore, the greatest potential impact on water resources and flood risk.
Temporary construction access road	0.66 ha represents the maximum dimensions for construction access and programme timeframe of the works area and would result in the largest possible area of disturbance and therefore, the greatest potential impact on water resources and flood risk.
Temporary construction compound	2.05 ha represents the maximum dimensions and programme timeframe of the works area and would result in the largest possible area of disturbance and therefore, the greatest potential impact on water resources and flood risk.

Table 9-7: Proposed engineering design assumptions.

9.3.23 The study area for the Proposed Development will comprise the CHP, associated infrastructure and surrounding areas as appropriate. The study area will also include any surface water features and resources elsewhere, which could be potentially affected within the confines of the defined study area via hydrological connectivity. A detailed baseline study has been undertaken to establish the current conditions of the water environment. Information has been drawn from a variety of sources as detailed in 9.3.7.

9.3.24 The assessment of impacts on water resources has been undertaken using a source-pathway-receptor model and a risk based assessment. This is based on combining assessments of both the likelihood and consequence of any potential impact in line with the IEMA guidance. This approach embraces principles of the WFD.

9.3.25 The evaluation of the significance of potential effects on the water environment will be in accordance with the EIA methodology. Criteria such as the Environment Agency's water quality ratings and ecological designations have been drawn upon in order to define the sensitivity of the water environment.

9.3.26 Flood risk will be assessed in line with the NPPF (DCLG, 2012) [Ref 9.16] and associated Planning Practice Guidance ID7 (Online) [Ref 9.17] as well as local planning policy. The assessment has included a desk study of maps and published information, consultation with the EA and local water authorities, and a walkover survey.

9.3.27 A Flood Risk Assessment (FRA) has been prepared (Appendix 9.1), to take into account changes to hard stand/low permeable surfacing footprint which may affect the surface water run-off regime. Since the development footprint exceeds 1 ha and a FRA will be required in line with the NPPF (DCLG, 2012) [Ref 9.16], the government's spatial planning policy on assessing the appropriateness of developments in the context of flood risk. The FRA has looked at the vulnerability to flooding from other sources as well as from river and sea flooding and the potential to increase flooding risk elsewhere.

9.3.28 As noted in 9.3.3 The Design Manual for Roads and Bridges (DMRB) [Ref 9.24] has been used as it is considered to be the most appropriate methodology as it is designed for assessing the effects of the Proposed Development. The assessment methodology is based on guidance provided in the DMRB, Volume 11, Part 10 [Ref 9.24].

9.3.29 The assessment of potential effects on water resources takes account of the impacts from the Proposed Development on the prevailing hydrological, surface water drainage, flooding and water quality environments.

9.3.30 The list below sets out the main documents used, where appropriate, to inform the impact assessment including the identification of sensitivity or value of receptors and the magnitude of impacts.

<u>European</u>

- Water Framework Directive (Directive 2000/60/EC of the European Parliament and of the Council of 23, October 2000) [Ref 9.3].

<u>National</u>

- National Planning Policy Framework (2012) [Ref 9.16*]*;
- Planning Practice Guidance ID7 Flood Risk and Coastal Change, online (http://planningguidance.communities.gov.uk/blog/guidance/flood-risk-and-coastal-change/) [Ref 9.15*]*; and
- Water Environment (Water Framework Directive) (England and Wales) Regulations (2017), which transport the Water Directive 200/60/EC into UK law [Ref 9.12*]*.

Guidance

- Environment Agency (February 2016) Guidance Flood risk assessments: climate change allowances [Ref 9.18];
- National SuDS Working Group, Interim Code of Practice for Sustainable Drainage Systems, 2004 [Ref 9.36];
- CIRIA C532 Control of Water Pollution from Construction Sites [Ref 9.37];
- CIRIA 753 The SUDS Manual, 2015 [Ref 9.38]; and
- CIRIA Report C741 Environmental Good Practice on Site [Ref 9.39].

Limitations and Assumptions

9.3.31 The assessment is primarily based on publicly available data obtained from the EA, local authorities (Las) and commercial data supply companies, as well as additional information supplied from stakeholders during the scoping and consultation stages.

9.3.32 However the assessment is limited by a lack of:

- Flow data for watercourses and drainage channels; and
- Water quality data for specific ordinary watercourses in close proximity to the Proposed Development.

9.3.33 Overall a moderate to high level of certainty has been applied to the assessment. Where available catchment data regarding water quality has been used to inform the assessment, with an engineering site walkover undertaken to identify surface watercourses within the Applicant's land ownership.

9.3.34 The information accessible and provided by consultees in order to complete the assessment is considered sufficient to establish the baseline. Therefore, there are no data limitations that would affect the conclusions of this assessment.

9.4 Baseline Conditions

9.4.1 The baseline data sets have been collated to inform the assessment of the potential environmental effects for the Proposed Development. Current baseline conditions were ascertained through a desk based assessment utilising publicly available data including OS mapping, EA data and utility plans. This provided an insight into surface water features and the existing land use of the hydrological features within the immediate vicinity of the Proposed Development.

9.4.2 A topographical survey indicates that the existing site is relatively level elevations ranging from c.8.80 mAOD to c.9.20 mAOD.

9.4.3 The nearest watercourses to the Proposed Development are a number of drain networks, which lie to the east and south. OS data and information obtained from a site visit by an RPS hydrologist notes a culverted drain beneath the construction access road on the northwest edge of the Site. The drain flows south to north and converges with a number of other drainage networks and then flows east into The Swale, the watercourse that separates the Kent mainland from the Isle of Sheppey.

9.4.4 The tidally dominated Swale is approximately 300 m to the south at the closest orientation to the Proposed Development and has been classified by the EA as the main risk of flooding. No fluvial flood risk sources have been have identified and therefore has not been assessed further within this report.

9.4.5 Clean surface water from the existing K1 site is directed via a drainage pipe network to an outfall located on the eastern extent of the access road (Appendix 9.2). Water then flows within an open channel northwards discharging into the Swale via a consented outfall.

9.4.6 Responsibility for ordinary watercourses which discharge into the Swale fall under the jurisdiction of Kent County Council as the Lead Local Flood Authority (LLFA) and Lower Medway Internal Drainage Board (IDB) under the Water and Flood Management Act 2010 [Ref 9.8] and Land Drainage Act 1991[Ref 9.9]. The IDB and LLFA are required to exercise general supervision over all matter relating to water level management within their districts.

9.4.7 Further descriptions of the key hydrological and flood risk characteristics within the study areas are set out below.

<u>Flood Risk and Flood Defences</u>

9.4.8 All potential sources of flooding for the Proposed Development have been assessed in detail within the associated FRA (Appendix 9.1) and the sources are summarised below

<u>Fluvial and Tidal Flooding</u>

9.4.9 The EA notes The Swale as the only source of flooding within the Site area; therefore the risk of flooding is determined to be tidally dominant.

9.4.10 The EA flood map for planners and Swale Borough Council SFRA (2010) [Ref 9.40] indicates the entire Proposed Development site lies within Flood Zone 1 (FZ1), with low probability of flooding, assessed as land having a less than 1 in 1,000 annual probability of river or sea flooding.

9.4.11 Data supplied by the EA (Appendix 9.2) extracted from the North Kent coast modelling and mapping study (JBA Consulting August 2013) indicates that during all modelled tidal flood scenarios the Proposed Development would remain flood free.

9.4.12 The construction access road and laydown area are located within Flood Zone 3 (FZ3), and has a 'high' probability of tidal flooding. The southern extent of the access road (Node 9 and 10 within EA modelled node location map) development is located within Flood Zone 1 (FZ1) with less than 1 in 1,000 annual probability of flooding from river or sea in any year.

9.4.13 Model outputs record that the undefended 0.5% AEP 2115 event tidal levels would reach 6.015 mAOD within the construction road boundary. Topographical survey data records that the construction road slopes from 5.37 mAOD within the southern extent (Node 8 within EA modelled node location map) to 2.78 mAOD heading north (Node 5 within EA modelled node location map)

9.4.14 A comparison against topographical survey data and EA model outputs (Table 9-8 below) indicates the construction access road is potentially at risk of flooding to depths ranging from 3.05 m within the northern extent reducing to 0.65 m at the southern extent.

Node	Topography (m AOD)	0.5% AEP 2115 Modelled Tidal Flood Levels (m AOD)			Max Flood Depth (m)
		Undefended Levels	*Defended - Still Water*	*Defended - Wave Overtopping*	
1	-	6.013	5.435	5.432	-
2	-	6.011	5.431	5.428	-
3	-	6.010	5.428	5.425	-
4	2.96	6.009	5.426	5.424	3.05
5	2.78	6.009	5.425	5.423	3.23
6	2.79	6.011	5.427	5.424	3.22
7	4.42	6.013	5.430	5.427	1.59
8	5.37	6.015	5.432	5.431	0.65

Table 9-8: Topographic and EA tidal model comparison

<u>Flood Defence Details</u>

9.4.15 Existing flood defences located c. 400 m to the east of the Site are made up of raised walls and embankments. These flood defences provide a 1 in 1,000 year standard of protection.

9.4.16 The EA indicate that no improvements of existing flood defences are being presently considered.

<u>Groundwater Flooding</u>

9.4.17 Full details of the ground conditions of the development area can be found in Chapter 8: Hydrogeology, Ground Conditions and Contamination. No site specific data is available, however publicly available ground investigation reports submitted as part of the adjacent Kemsley 3 application in 2009, 2011 and 2016 note a shallow water table within the underlying superficial deposits (Alluvium – clay Silty, Peaty and sandy), which may be in hydraulic continuity with nearby watercourses and may therefore fluctuate with the tide. The superficial soils are underlain by a bedrock geology comprising Eocene-aged London Clay, a negligibly permeable non-aquifer.

9.4.18 The EA has confirmed that they have no record of groundwater flooding within the Proposed Development.

<u>Surface Water Flood Risk</u>

9.4.19 Surface water flood mapping produced by the EA indicates that the majority of the Proposed Development area is at 'very low' risk with a chance of flooding each year of less than 1 in 1,000 (0.1%). Localised areas within the Proposed Development are defined as being at 'low risk' between 1 in 1000 (0.1%) and 1 in 100 (1%) chance of surface water flooding each year.

9.4.20 An increase in impermeable area associated with the Proposed Development would increase the potential risk of uncontrolled surface water flood risk within the development area and to adjacent sites.

Flooding from Infrastructure/Sewer Failure

9.4.21 No potential sources of flooding from artificial drainage systems, sewers, ponds or reservoirs have been identified and none have been reported.

Historical Flood Events

9.4.22 No historical flooding has been recorded within the Proposed Development.

9.4.23 The EA records a flood event in February 1953, which affected land to the east of the Site. During the event tidal defences were overtopped and breached at Sheerness and all along the western border of the Isle of Sheppey, either side of the Swale near Sittingbourne at Warden and around the Isle of Harty. No records for either the level or depth of flooding have been made available.

Current Flood Risk

9.4.24 The Proposed Development by virtue of current elevations is located above the worst-case flood event scenario considered at low risk of flooding situated within Flood Zone 1.

9.4.25 The construction access track is situated within Flood Zone 1, 2 and 3 and is therefore at 'low to high' risk of flooding from The Swale. EA flood model outputs indicated that the southern extent of the construction access road is located within the worst-case undefended 2115 0.5% AEP flood event extents and would be subject to flood depths ranging from 3.05 m within the northern extent to 0.65 m within the middle to southern extent.

9.4.26 The main risk of flood is associated with surface water ponding in localised low lying areas of the Proposed Development.

Surface Water Resources

Surface Watercourses

9.4.27 The nearest watercourses to the Proposed Development include a number of unnamed surface water drainage networks, which lie to the north and south of the Proposed Development. OS data and information obtained from a site visit by an RPS hydrologist notes a culverted drain beneath the Proposed Development's access road on the northwest edge of the site. The drain flows south to north and converges with a number of other drainage networks and then flows east into The Swale, the watercourse that separates the Kent mainland from the Isle of Sheppey.

9.4.28 The Milton Creek flows in an easterly direction approximately 200 m to the southeast of the Proposed Development site and is a tributary of The Swale. A number of unnamed ditches and ponds are present within the 500 m study area of the Sites and are tributaries of The Swale.

Surface Water Quality

9.4.29 No water quality data is available for the Sites or the surrounding area within the catchment data explorer or the Envirocheck report [Ref 9.28].

Groundwater Water Abstraction

9.4.30 The Envirocheck report (2017) [Ref 9.28] indicates that there is one licensed surface water abstractions within the 500 m study area of the Proposed Development (Table 9-9).

Name of Holder	Licence Number	Grid Reference	Distance from Site (m)	Permitted Annual Yield (m3/year)
DS Smith Paper Limited	9/40/02/0114/A/SR	592380 166680	0	79,555,000

Table 9-9: Surface water abstraction licence within a 500 m search area of the Site.

Discharge Consents

9.4.31 The Envirocheck report (2017) [Ref 9.28] indicates that there are four discharge consents within the 500 m study area of the Proposed Development (Table 9-10).

Name of Holder	Permit Number	Grid Reference	Distance from Site (m)	Purpose	Start Date
Grovehurst Energy Ltd	K00025	592000, 166640	3	Trade discharge – cooling water	Decembe r 1971
Southern Water Services	A06000	592200, 166150	203	Storm sewage overflow	Novembe r 1992
Clugston Group Ltd	Epred3792ny	592332, 166832	385	Site discharge	August 2016
Niall Cormac-Walsh	P21638	592120, 167420	435	Sewage discharge – treated effluent	January 2008

Table 9-10: Surface Water Discharge Consents within a 500m search area of the Site.

9.4.32 In addition to the above the Applicant has an active licence for the discharge of treated process water to the Swale Estuary under licence EPR BJ7468IC-V009.

9.4.33 The Proposed Development would continue to operate in accordance with the existing licence EPR BJ7468IC-V009 which details the following requirements specific to point source emissions to water (other than sewer). A number of key parameters associated with the Effluent Treatment Plant (W1) have been extracted from Table S3.2 of the licence and presented below.

- Flow – 720 l/s

- Maximum daily flow – 40,500 m^3/day
- pH (water via interceptor) – Limit 6-9
- Temperature - 30°C (hourly average) 35°C (instantaneous)
- Oil & grease (water via interceptor) – No visible oil or grease in the discharge.

9.4.34 Parameters are to be monitored in line with schedule identified within the licence.

9.4.35 Emission limits associated with rain water and surface water run-off locations (W2 to W12) key monitoring parameter is:

- Oil & grease – No visible oil or grease in the discharge.

9.4.36 No flow rate limitations are given for outflows from points W2 to W12.

9.4.37 Table S3.3 of the licence defines the point source emissions to sewer, effluent treatment plant or other transfers off-site limits and monitoring requirements. No limits are defined for; Flow (m3), pH, Mercury (kgs) or Cadmium (kgs). However, the licence stipulates that both flow and pH should be monitored continually with flow monitoring standards to follow those agreed with the EA.

Environment Agency Pollution Incidents to Controlled Waters

9.4.38 The Envirocheck report (2017) [Ref 9.28] provides records for a number of pollution incidents to controlled Waters within the 500 m study area of the Proposed Development (Table 9-11).

Location	Distance from Site (m)	Grid Reference	Pollutant Description	Incident Reference	Date
Kemsley Mill	59	591700, 166700	Firefighting runoff	2414	May 1999
Grovehurst Energy Ltd	153	592160, 166180	Organic wastes	198363	September 1998
Grovehurst Energy Ltd	157	592160, 166175	Organic wastes	198362	November 1998
Old Effluent pipe	162	592200, 166200	General Biodegradable	3855	December 1999
Kemsley Mill	336	592200, 167095	Other	2167	March 1999
Kemsley Mill	338	592200, 167100	Other	2166	March 1999
-	369	592200, 167195	Other	198970	December 1998
Kemsley Mill	434	592400, 166800	Organic wastes	197020	October 1997

Table 9-11: Pollution incidents within a 500 m search area of the Site

Environment Agency Substantiated Pollution Incidents

9.4.39 The Envirocheck report (2017) [Ref 9.28] indicates that one Category 2 (significant incident) substantiated pollution incident has occurred within the 500 m study area of the Proposed Development (Table 9-12).

Pollutant	Distance from Site (m)	Grid Reference	Pollutant Description	Incident Identification	Date
Suspended solids	326	592198, 167065	Contamination of water	341901	August 2005

Table 9-12: Pollution incidents within a 500 m search area of the Site.

Designated Environmentally Sensitive Area

9.4.40 The site itself is not located within the extents of a designated area.

9.4.41 The adjacent Swale however forms a Site of Special Scientific Interest (SSSI), a National Nature Reserve, a Ramsar site, RSPB Reserve, Special Protection Area (SPA), and a Marine Conservation Zone (MCZ).

Sensitive Receptors

9.4.42 The sensitive receptors listed in Table 9-13 below have the potential to be affected by effects arising from the Proposed Development. The assessment in this Chapter has considered the effects listed in the table upon the identified sensitive receptors.

Receptor	Importance/sensitivity/vulnerability to change
The Swale	High
Milton Creek	Medium
Groundwater resources	High

Table 9-13: Potentially affected sensitive receptors

9.5 Future baseline

9.5.1 The likely future baseline conditions of the Site in the absence of the Proposed Development are considered below.

Proposed Development

9.5.2 In the absence of the Proposed Development, DS Smith would be required to invest significantly in K1 through upgrades to the facility. As a consequence it is unlikely that there would be any change in the less permeable surfacing and/or additional built development at the site. The only change in the future baseline in flood risk terms in the absence of the Proposed Development would be caused by Climate Change outlined below.

Climate change

9.5.3 The Proposed Development lies within Flood Zone 1, and therefore considered to be at low risk of flooding from all sources. This would remain the case for EA modelled period 2115 (Appendix 9.2). Surface water runoff within the Proposed Development would be directed towards a suitably designed drainage network discharging to The Swale at an agreed upon rate.

9.5.4 The constructional access road is shown to be situated within Flood Zone 1, 2 and 3 and therefore at 'low to high' risk of flooding from The Swale, whilst the laydown area is assessed to be located within Flood Zone 2 and 3 at 'medium to high' risk of flooding. The constructed access road has its own surface water drainage system with two retention ponds which treats the surface water before discharging to local watercourses.

9.6 Standard Mitigation Measures

9.6.1 In relation to Hydrology and Flood Risk, potential impacts to the water environment will be avoided where practicable through implementation of a number of industry standard mitigation measures, and careful consideration of the drainage design, construction techniques and operational best practice of the Proposed Development. The construction mitigation measures are outlined below and featured in the Construction Environmental Management Plan (CEMP).

Mitigation from Decommissioning and Construction Effects

9.6.2 Standard construction and decommissioning measures would reduce any potential adverse impacts associated with the Proposed Development through careful consideration of the hydrological environment, construction techniques and materials.

9.6.3 Table 9-14 below presents a list of general industry guideline and best practice measures to be incorporated into the decommissioning and constructional phases of the Proposed Development.

Standard construction mitigation measures to be adopted during the construction of the Proposed Development
Decommissioning and Construction
Best practice measures All construction work would be undertaken in accordance with the Construction Method Statement and good practice documentation including: • CIRIA – SuDS Manual [Ref 9.38]; • Prevent surface water being affected during earthwork operations. No discharge to surface watercourses will occur without permission from the EA (SuDS Manual) [Ref 9.38]; • Environment Agency, Pollution Prevention Guidance Note 6 (PPG6): Pollution Prevention Guidelines – Working at Construction and Demolition Sites [Ref 9.41]; • Environment Agency, Pollution Prevention Guidance Note 5 (PPG5):– Working in, near or liable to affect watercourses [Ref 9.42]; • CIRIA (C741) Environmental good practice on site guide [Ref 9.39]; • Prevent surface water being affected during earthwork operations. No discharge to surface watercourses will occur without permission from the EA (SuDS Manual); • Wheel washers and dust suppression measures to be used as appropriate to prevent the migration of pollutants (SuDS Manual); • Regular cleaning of roads of any construction waste and dirt to be carried out (SuDS Manual); and

Standard construction mitigation measures to be adopted during the construction of the Proposed Development
• A construction method statement to be submitted for approval by the responsible authority (SuDS Manual).
Water Quality monitoring Water quality monitoring will be carried out throughout the construction phase to ensure no discharge of pollutants or increase in suspended sediments occurs in accordance with the existing licence EPR BJ7468IC-V009 . Pollution prevention measures Refuelling of machinery would be undertaken within designated areas where spillages can be easily contained. Machinery would be routinely checked to ensure it is in good working condition. Any tanks and associated pipe work containing substances included in List 1 of the Groundwater Directive would be double skinned and be provided with intermediate leak detection equipment. The following specific mitigation measures for the protection of surface water during construction activities would be implemented: • Management of construction works to comply with the necessary standards and consent conditions as identified by the EA; • A briefing highlighting the importance of water quality, the location of watercourses and pollution prevention included within the site induction; • Areas with prevalent run-off to be identified and drainage actively managed, e.g. through bunding and/or temporary drainage; • Areas at risk of spillage, such as vehicle maintenance areas and hazardous substance stores (including fuel, oils and chemicals) to be bunded and carefully sited to minimise the risk of hazardous substances entering the drainage system or the local watercourses. Additionally the bunded areas will have impermeable bases to limit the potential for migration of contaminants into groundwater following any leakage/spillage. Bunds used to store fuel, oil etc. to have a 110% capacity; • Disturbance to areas close to watercourses reduced to the minimum necessary for the work; • Excavated material to be placed in such a way as to avoid any disturbance of areas near to the banks of watercourses and any spillage into the watercourses; • Construction materials to be managed in such a way as to effectively minimise the risk posed to the aquatic environment; • All plant machinery and vehicles to be maintained in a good condition to reduce the risk of fuel leaks; • Drainage works to be constructed to relevant statutory guidance and approved via the LLFA prior to the commencement of construction; and • Consultation with the EA to be ongoing throughout the construction period to promote best practice and to implement proposed mitigation measures.
A Decommissioning Plan (including Decommissioning Environmental Management Plan) would be produced and agreed with the Environment Agency as part of the environmental permitting and site surrender process. The Decommissioning Environmental Management Plan would consider in detail all potential environmental risks on the site and contain guidance on how risks can be removed or mitigated. This would include details of how surface water drainage should be managed on the Site during the decommissioning. The Plan would also consider how the attenuation pond should be managed and whether there would be environmental benefits from retaining this feature. Decommissioning practices to incorporate measures to prevent pollution and increased flood risk, to include emergency spill response procedures, and clean up and remediation of contaminated soils.

Table 9-14: Standard decommissioning and Construction management measures adopted.

Mitigation from Completed Development Effects

Standard mitigation measures adopted as part of the Proposed Development
Operation and Maintenance
Operational practices to incorporate measures to prevent pollution and increased flood risk, to include: • Emergency spill response procedures; • Clean up and remediation of contaminated water run-off; • Operational drainage gullies to prevent run-off from site; • Surface water management plan including maintenance and/or monitoring procedures of drains and gullies; • Operational management plan (including site storage procedures).

Table 9-15: Standard Operational and Management measures adopted.

9.7 Predicted Effects

9.7.1 A range of potential impacts on water resources & hydrology have been identified which may occur during the construction and operation / maintenance of the Proposed Development. The impacts have been assessed based on a realistic worst case Proposed Development design as outlined in Table 9-7 of this chapter and described in more detail Chapter 2: Project Description, and incorporate standard mitigation measures set out in Table 9-16 and Table 9-17 of this chapter.

Construction Effects

9.7.2 The effects of the Proposed Development have been assessed in relation to hydrology and flood risk within the defined study area. The identified potential environmental impacts arising from the construction of the Proposed Development are listed below.

9.7.3 The temporary impacts of the Proposed Development occur during the construction phase. These impacts are mainly due to the increase in less permeable areas of the Proposed Development and access road. The temporary impacts assessed within this chapter are as follows:

- Impacts which may affect temporary (construction) flood risk;
- The impact of construction on surface water resources; and
- The impact of construction on-site drainage network.

9.7.4 A description of the significance of impacts upon hydrology and flood risk receptors caused by each identified impact is given below.

<u>Impact of construction on temporary flood risk</u>

9.7.5 The Proposed Development area has been assessed as being at ‘low’ risk of Tidal flooding from the Swale due to the existing topography of the CHP Development Area ranging from c.8.80 mAOD to c.9.20 mAOD.

9.7.6 As outlined in the current baseline conditions, the Proposed Development area is currently entirely hardstand. A temporary increase in less permeable area may occur due to the construction compounds potentially increasing the temporary flood risk to the surrounding area.

9.7.7 Any increase in permanent low permeability surfacing within the development area (asphalt pavement, concrete pavement and building area etc.) will increase site specific run-off rates, increasing the surface water flood risk within the Site and to adjacent land area.

9.7.8 The access road and laydown area are existing development no construction works are anticipated within these areas therefore no change in current flood risk baseline is expected. The access road and laydown area have been identified to be at risk of tidal flooding, however appropriate flood mitigation techniques to manage the risk posed to stored equipment will be implemented in line with measures outlined in Table 9-16.

Sensitivity of receptor

9.7.9 The land adjoining the Proposed Development consists of industrial units (Paper Mill) therefore sensitive receptors include staff and workers within these units. These receptors are considered to be of low vulnerability, low recoverability and high value. The sensitivity of the receptor is therefore, considered to be **high**.

Magnitude of impact

9.7.10 Impacts on flood risk would arise from any temporary change in less permeable areas, in turn changing run-off rates/characteristics over areas affected during construction. The excavation of foundations associated with the development is likely to change the natural hydrological characteristics of the Site. Impacts on flood risk from the temporary change in run-off characteristics are predicted to affect the local surrounding receptors, be of short to medium term duration and intermittent occurrence. The magnitude is therefore considered to be medium adverse.

9.7.11 The construction methodologies will ensure that offsite surface water flows during construction are not increased during development. Design mitigation measures will be implemented to reduce the flood risk caused by the construction phase. This includes a suitable drainage network which will be constructed to discharge any surface water falling on the Site to an attenuation pond prior to out falling into the Swale.

9.7.12 The impact is predicted to be of local spatial extent, short term duration, intermittent and reversibility. With the above construction engineering methods adopted as part of the project it is predicted that the impact will not affect surrounding local receptors directly. The magnitude is therefore, considered to be **low** adverse.

Significance of effect

9.7.13 The overall significance of effect on flood risk without the incorporation of any management measures is assessed as moderate adverse, which is deemed significant.

9.7.14 The overall significance of the effect on flood risk based on the situation which includes the integration of construction measures adopted in Table 9-16 and Table 9-17 is assessed as **minor** adverse significance, which is not significant.

The impact of construction on surface water resources.

9.7.15 During construction, there is a potential risk of accumulation of standing water on site and accidental discharges of untreated run-off whilst the development and the operational surface water drainage system are being constructed. The Swale forms a Site of Special Scientific Interest (SSSI) and a Special Protection Area (SPA), a Ramsar site and a Marine Conservation Zone (MCZ).

9.7.16 The sensitivity of watercourses is dependent on the nature of the specific watercourse. There are a number of potential pollutants which could arise during construction, and hence which may affect the water quality of receiving watercourses. These are outlined below:

- Fine particulate materials (e.g. silts and clays);
- Cement;
- Oil and chemicals (from plant machinery and processes); and
- Other wastes such as wood, plastics, sewage and rubble.

9.7.17 These pollutants may be present as a result of normal site activities, incorrect storage of oils and chemicals and/or accidental spillage. The significance of the incident would be dependent on the nature of the pollutant, on the mitigation measures adopted and their timing and effectiveness, and on the sensitivity of the receiving watercourse.

Sensitivity of receptor

9.7.18 Surface water resources (including The Swale) are considered to be highly vulnerable and high value. The sensitivity of the receptor is therefore, considered to be **high**.

Magnitude of impact

9.7.19 Activities associated with machinery during the construction could lead to an increase in turbid run-off and spillages/leaks of fuel, oil etc. that could affect nearby watercourses and tidal bodies. This could cause a direct loss, disturbance or other effects on aquatic habitats and species of nature conservation value. Based on the distance to the Swale SSSI the magnitude of impact has been assessed as high.

9.7.20 The construction process would include measures to intercept run-off and ensure that discharges from the Site are controlled in quality and volume, as well as water quality monitoring carried out throughout the construction phase to ensure no discharge of pollutants or increase in suspended sediment occurs. The impact is predicted to be of local spatial extent, short term duration, intermittent and high reversibility. The magnitude is therefore, considered to be **low** adverse.

Significance of effect

9.7.21 The level of effect in relation to run-off from construction sites and spillages without the incorporation of management measures would be major adverse, which is significant in EIA terms. The significance of effects in relation to run-off from construction sites and spillages, including the integration of construction measures adopted in Table 9-14 would be of **minor** adverse significance, which is not significant.

<u>The impact of construction on on-site drainage network</u>

Sensitivity of receptor

9.7.22 On-site drains are considered to be of moderate vulnerability, moderate to high recoverability and minor value. The sensitivity of the receptor is therefore, considered to be **medium**.

Magnitude of impact

9.7.23 The construction of the development may remove / disrupt the on-site drainage network within the Site boundary, in turn increasing the flood risk to the Site and the surrounding receptors. The effect within the incorporation of construction methods is predicted to be of local spatial extent with a minor shift away from the hydrological of the local receptors, short term duration and intermittent occurrence. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be low adverse.

9.7.24 Construction methodologies incorporated into the development design would look to limit the disruption of the on-site drainage network and/or include temporary construction drainage within the Site boundary. The impact is predicted to have a negligible impact on surrounding receptors, short term duration, intermittent and reversible with construction drainage to be incorporated into the design. The magnitude is therefore, considered to be **low** adverse.

Significance of effect

9.7.25 The significance of effect on on-site drainage networks without any construction methods is assessed minor and deemed not significant.

9.7.26 The significance of effects on on-site drainage networks which includes the integration of construction measures adopted in Table 9-14 is considered to be **minor** adverse, which is not significant.

Operational Effects

9.7.27 The effects of the operation and maintenance of the Proposed Development has been assessed in relation to hydrology and flood risk within the defined study area. The environmental impacts arising from the operation and maintenance of the Proposed Development are listed below and have been assessed.

9.7.28 Operational, longer term and permanent impacts are those which would occur as a result of the Proposed Development operation. The longer term impacts assessed within this chapter are as follows:

- Impact of operation on flood risk;
- Impact of operation on surface watercourses;
- Impact potential of hot water discharge to the Swale.

- Impact on water resources

9.7.29 A description of the significance of impacts upon hydrology and flood risk receptors caused by each identified impact is given below.

Impact of operation on flood risk

9.7.30 Due to the existing topography of the CHP Development Area ranging from c.8.80 mAOD to c.9.20 mAOD the development to effectively Flood Zone 1, therefore at low risk of tidal flooding.

9.7.31 No increase in permanent area of low permeability surfaces is anticipated. Site operational and maintenance works could lead to an increase in flood risk.

9.7.32 The access road and laydown area are existing development no construction works are anticipated within these areas therefore no change in current flood risk baseline is expected. The access road and laydown area have been identified to be at risk of tidal flooding, however appropriate flood mitigation techniques to manage the risk posed to stored equipment will be implemented in line with measures outlined in Table 9 16.

Sensitivity of receptor

9.7.33 The land adjoining the Proposed Development consists of industrial units (Paper Mill etc.) therefore sensitive receptors include staff and workers within these units. These receptors are considered to be of low vulnerability, medium recoverability and high value. The sensitivity of the receptor is therefore, considered to be **high**.

Magnitude of Impact

9.7.34 Site operational and maintenance works could lead to an increase in flood risk. The impact is predicted to be of local spatial extent affecting the Site and local receptors, short to medium term duration with potential to cause significant proportional damage to key components surrounding units and intermittent occurrence.

9.7.35 However, operational activities would incorporate appropriate drainage solutions in the design of the development, with any disruption to on-site drainage being restored to the existing surface water drainage regime as set out in Table 9-15 ; therefore any increase in surface water runoff (flooding) would be managed.

9.7.36 The Proposed Development will retain the existing surface water drainage regime, whereby surface water flows are conveyed, by an internal drainage network, to a current outflow into an isolated open channel forming within Kemsley Marshes. By virtue of gravity channel water is directed through the marshes parallel with the access track/ Barge Way. At the south west corner of the Country Style Recycling the stream abruptly turns east discharging into The Swale via an existing outflow.

9.7.37 The Proposed Development has been subject to an FRA (Appendix 9.1) in order to meet the requirements of planning policy and best practice. As the Proposed Development will retain the existing drainage regime directing flows into The Swale, via Applicant owned land, the EA and Medway IDB have not stipulated a requirement to reduce existing run-off rates.

9.7.38 Therefore the impact of the Proposed Development subject to the implementation of the standard mitigation measures set out in Table 9-15 is predicted to be of local spatial extent, short term duration, intermittent and highly reversible. With the operational measures proposed, it is predicted that the impact will not affect surrounding local receptors directly. The impact of the Proposed Development is therefore considered to be negligible.

Significance of effect

9.7.39 The significance of effect of the Proposed Development on flood risk is therefore minor and not significant.

Impact of operation on surface water quality

9.7.40 During the operation of K4, there are a number of potential pollutants, which may give rise to water quality effects on the surrounding surface watercourses. These include:

- Fine particulate materials (e.g. silts and clays);
- Hydrocarbons;
- Oils and chemicals (from plant machinery and processes); and
- Process waste water.

Sensitivity of receptor

9.7.41 These pollutants may be present as a result of normal operations, traffic and emergency or accidental spillage. Surface water resources are considered to be moderately vulnerable, slow recoverability and medium value. The significance of any such incident would be dependent on the nature of the pollutant, on the operational measures adopted and their timing and effectiveness, and on the sensitivity of the receiving watercourse (The Swale). The sensitivity of the receptor is therefore, considered to be **high**.

Magnitude of Impact

9.7.42 Pollution arising from accidental spillages on site such as road traffic accidents could result in a range of impacts on watercourses from negligible to high. Activities associated with machinery during the operation could lead to an increase in turbid run-off and spillages/leaks of fuel, oil etc. that could affect nearby watercourses and tidal bodies. Based on the distance to the Swale SSSI the magnitude of impact has been assessed as high.

9.7.43 The provision of operational measures, including on-site drainage networks, as outlined in Table 9-15 would reduce the range of potential impacts to **low** adverse.

Significance of effect

9.7.44 The provision of permanent operational measures as outlined in Table 9-15 would reduce the range of potential effects should they occur to **minor** adverse, which is not significant.

Impact on water temperature discharges into the Swale.

9.7.45 During the operation of K4, hot water will be used/produced as part of the CHP process, which if discharged to the Swale may give rise to water quality and ecological effects. These include:

- Decrease level of dissolved oxygen of water;
- Increase in bacteria levels; and
- Decrease in water quality.

Sensitivity of receptor

The Swale is considered to be moderately vulnerable, slow recoverability and high value. The significance of the incident would be dependent on the operational measures adopted and their timing and effectiveness, and on the sensitivity of the receiving watercourse (The Swale). The sensitivity of the receptor is therefore, considered to be **high**.

Magnitude of Impact

9.7.46 Hot water discharge arising from operational activities would cause significant impact on surrounding watercourses. Discharges may alter the water quality of the surrounding watercourses and change the water environment through alteration of water chemistry and water temperature, in turn causing adverse effects on water ecology.

9.7.47 Based on the distance to the Swale SSSI the magnitude of impact with no operational measures has been assessed as **high** adverse.

9.7.48 The discharge from The Proposed Development would continue to operate in accordance with the existing licence EPR BJ7468IC-V009. All requirements of the discharge permit will be met before discharging to the Swale including water temperature:

- Temperature - 30°C (hourly average) 35°C (instantaneous)

9.7.49 As a smaller more efficient plant K4 will produce a lower volume of waste water and therefore K4 will be able to continue to operate with the existing permit limits of the Waste Water Treatment Works without variation.

Significance of effect

9.7.50 The significance of effects of hot water discharge with the incorporation of operational management measures to bring discharge in line with the existing permit is considered to result in a **minor** effect on off-site water temperature, which is not significant.

Impact on ground water resources

9.7.51 K4 will continue to use abstracted groundwater stored in the lagoons immediately south of the Site. Due to increasing pressures on groundwater in the region and continuous low groundwater levels any increase in abstraction could result in a significant effect on ground water resources.

Sensitivity of receptor

9.7.52 Ground water, as a significant source of potable water for the region and due to decreasing levels is considered to be a receptor of high value/sensitivity.

Magnitude of Impact

As a smaller more efficient plant K4 will use less water per annum than the existing K1 facility. Therefore there will be no impact on ground water levels as a result of the proposed development and DS Smith can continue to operate the Paper Mill in accordance with existing ground water extraction licence without variation (EA Permit No. 9/40/02/0021/GR).

Significance of effect

9.7.53 The Proposed Development will have a slight beneficial effect on ground water resources compared to the existing K1 facility resulting in a minor beneficial effect that is not significant.

Decommissioning Development Effects

9.7.54 Decommissioning impacts are those which would occur as a result of the decommissioning of the Proposed Development and associated infrastructure. The decommissioning impacts assessed within this chapter are as follows:

- Impact of decommissioning on flood risk; and
- Impact of decommissioning on surface watercourses.

9.7.55 The decommissioning impacts have been determined to be similar and no worse than construction impacts in relation to hydrology and flood risk, and therefore are at worse **minor** adverse and unlikely to be significant subject to implementation of standard construction practice.

9.8 Mitigation

9.8.1 In relation to Hydrology and Flood Risk, potential impacts to the water environment will be avoided where practicable through a number of standard construction mitigation measures as outlined in Section 9.6.

9.8.2 As part of the development process and in line with industry standard guideline, a number of further development specific mitigation measures will be incorporated, where practicable, to reduce further the potential for impacts on water resources & hydrology. These mitigation measures are considered to be standard industry practice for this type of development and would include, but not limited to, a surface water management strategy, flood management plan, which summarised below.

Water Quality / Flood Risk Mitigation

9.8.3 Temporary drainage mitigation techniques including, but not limited to, run-off interceptor channels would be installed prior to the construction of the formal drainage to ensure that discharges from the Proposed Development are controlled in quality and volume. This may include the use of settling tanks and / or ponds to remove sediment, temporary interceptors and hydraulic brakes.

9.8.4 Construction material and / or spoil within construction compounds will be positioned away from drainage systems or surface watercourses / field drainage and no hazardous substances will be stored within close proximity of the drainage network.

9.8.5 An outline drainage strategy forms part of the application and the detailed drainage strategy will be finalised by the contractor and agreed with the EA and LLFA. The strategy will incorporate the use of appropriate SuDS techniques, interceptors and separators as required, treating surface water run-off generated from the Proposed Development, prior to either infiltrating into the underlying geology or discharging into the local surface water network at an agreed rate.

9.8.6 Any area at risk of spillage, such as vehicle maintenance areas and hazardous substance stores (including fuel, oils and chemicals) will be bunded and carefully sited to minimise the risk of hazardous substances entering the drainage system or the local watercourses. Additionally the bunded areas will have impermeable bases to limit the potential for migration of contaminants into groundwater following any potential leakage / spillage event.

9.8.7 Table 9-16 below presents a list of general industry guideline and best practice measures to be incorporated into the decommissioning and constructional phases of the Proposed Development and set out in the CEMP.

Mitigation measures adopted as part of the Proposed Development	Justification
Construction	
Surface Water Management Strategy The Proposed Developments would result in the construction of low permeability surfacing, increasing the rate of surface water run-off from the Site. A surface water management plan (Appendix 9.2) would be present which will ensure that any increase in surface water run-off would be handled on-site and a run-off rate to the surrounding water environment (Swale Estuary) is maintained at the agreed upon rate. This would highlight potential contaminants and suspended sediment originating from the Site, which may affect the receiving watercourse. Monitoring would be carried out during the construction phase and continue throughout the lifetime of the development. **Flood Management Plan** This plan is applicable throughout the construction phase, and should include flood-warning measures for safe site evacuation.	To address the NPS, NPPF, EA and LLFA surface water run-off requirements.

Mitigation measures adopted as part of the Proposed Development	Justification
Measures to mitigate against water pollution would also apply and would include procedures as set below.	

Table 9-16: Decommissioning and Construction mitigation measures adopted.

Mitigation from Completed Development Effects

Mitigation measures adopted as part of the Proposed Development	Justification
Operation	
Drainage maintenance plan This plan is applicable throughout the lifetime of the development for the drainage within the Proposed Development, and any connections to the surface water, or foul sewer and trade waste networks. **Flood management plan** This plan is applicable throughout the lifetime of the development, and should include flood-warning measures. This plan applies to the Site on a regional basis. **Emergency spillage management plan** This plan is applicable throughout the lifetime of the development, and should include emergency measures. This plan applies to the Site on a regional basis. **Water quality monitoring strategy** Ongoing water quality monitoring should be undertaken throughout the lifetime of the development. This will apply to the drainage ditches within and surrounding the Site. **Flood Evacuation Plan** A flood evacuation plan will be developed for the construction and operational phases of the Proposed Development, with staff training provided, to ensure in the event of the plan be activated staff are aware of the procedures upon receipt of the flood warning, together with evacuation routes. The flood evacuation plan should be practiced regularly.	To reduce the risk of surface water pollution and to maintain the drainage network in order that flood risk does not increase temporarily.
Decommissioning	
No additional mitigation measures are needed for the decommissioning phase of the development	

Table 9-17: Operational and Decommissioning designed-in mitigation measures adopted.

9.9 Residual Effects

9.9.1 Residual effects are those that are predicted to remain after implementation of the measures outlined in Table 9-14 and Table 9-15 and Table 9-16 and Table 9-17 above. With reference to the assessment set out in this Chapter and the significance matrix present in Table 9-6 no significant residual effects on the water environment are envisaged to occur as a result of the Proposed Development subject to the mitigation measures set out herein.

9.10 Cumulative Effects

9.10.1 This section considers the inter-project cumulative effects of the Proposed Development on water resources & hydrology in conjunction with other projects / developments.

9.10.2 The potential cumulative impacts with other major developments have been identified outlining likely significant effects (if any) and assessing against the baseline position, including the built and operational development. In assessing cumulative impacts, other major developments identified through consultation with the local planning authorities and other relevant authorities on the basis of those that are:

- Under construction;
- Permitted application(s), but not yet implemented;
- Submitted application(s) not yet determined;
- Projects on the Planning Inspectorate's Programme of Projects;
- Identified in the relevant Development Plan (and emerging Development Plans - with appropriate weight being given as they move closer to adoption) recognising that much information on any relevant proposals will be limited; and
- Identified in other plans and programmes (as appropriate) which set the framework for future development consents/approvals, where such development is reasonably likely to come forward.

9.10.3 A review of approved and proposed developments within a 500 m search area from the Proposed Development has been undertaken.

9.10.4 A 500 m search area is considered appropriate for data collection taking into account the nature of the development and likely zone of influence on hydrological receptors. Given the landscape surrounding the development, current and ongoing activities, as well natural baseline fluctuations it will be difficult to ascertain the exact source of any impacts on flood risk and / or water quality beyond 500 m.

9.10.5 The review of approved and proposed development established that there are 4 cumulative developments within the defined 500 m study area of the Proposed Development outlined below.

- 16/501484/COUNTY County matter - The construction and operation of a gypsum recycling building with plant and machinery to recycle plasterboard and the reconfiguration of the existing lorry park to include office/welfare facilities and ancillary supporting activities, including rain water harvesting tanks, container storage, new weighbridges, fuel tanks, hardstanding, safe lorry sheeting access platform and automated lorry wash. Country style Recycling Storage Land Ridham Dock Road Sittingbourne Kent ME9 8SR. Permitted April 2016.16/501228/FULL - Construction of new baling plant building

- 16/507687/COUNTY County matters application for the construction and operation of an Incinerator Bottom Ash (IBA) Recycling Facility on land adjacent to the Kemsley Sustainable Energy Plant. Kemsley Mill Ridham Avenue Sittingbourne Kent ME10 2TD. Permitted February 2017.SW/10/444 - Development of a sustainable energy plant END10085 - DCD scoping opinion for power upgrade project

- SW/11/1291 - Anaerobic digester and associated ground profiling and landscaping. Land To The North Of The DS Smith Paper Mill, Kemsley, Sittingbourne, Kent, ME9 8SR. Permitted July 2012.

- 16/506935/COUNTY - County Matters application for steam pipeline connecting the Ridham Dock Biomass Facility to the DS Smith Paper Mill14/501181/COUNTY KCC Regulation 13 - Scoping opinion as to the scope of an environmental impact assessment for a proposed combined heat and power plant at Ridham B. Ridham Dock, Sittingbourne, Kent. July 2014. Ridham Docks, Sittingbourne. Permitted October 2016.

- Forthcoming application by D S. Smith for a new southern boundary road for Kemsley Paper Mill.

- SW/10/444 - Development of a Sustainable Energy Plant to serve Kemsley Paper Mill, comprising Waste Fuel Reception, Moving Grate technology, Power Generation and Export Facility, Air Cooled Condensers, Transformer, Bottom Ash Handling Facility, Office Accommodation, Vehicle Parking, Landscaping Drainage and Access. Land to the North East of Kemsley Paper Milll, Kemsley, Sittingbourne, Kent. St Regis Paper Company Ltd and E. ON Energy From Waste Ltd. (MR. 922 665).

- 14/500327/OUT - Up to 8000m2 of class B1 and B2 floor space and country park

- END10085 - DCD scoping opinion for power upgrade project.

- 16/501228/FULL - Construction of new baling plant building. Variation of Condition (4) of planning permission (Removal of operating hours restriction).

9.10.6 It is assumed, where relevant, in accordance with the NPS and/or NPPF and Planning Practice Guidance ID7 – Flood Risk and Coastal Change, any new development is required to attenuate surface water run-off, where practicable, to the greenfield run-off rate and provide appropriate management techniques to treat potentially contaminated run-off prior to discharge into the local drainage network.

9.10.7 Any works undertaken within 8 m of a watercourse and / or flood defence will require consent from either the EA, LLFA or IDB depending on whether the waterbody is designated a Main River or Ordinary watercourse. For the consent to be provided the developer is required to demonstrate that the risk of flooding during the lifetime of the development could be mitigated to a level acceptable to the EA, LLFA and / or IDB's. Therefore, the cumulative impacts on water resources & hydrology are predicted to not be significant.

9.10.8 Therefore, it has been determined that no significant cumulative effects on water resources & hydrology receptors are likely.

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10 Ecology

10.1 Introduction

10.1.1 This chapter assesses the likely significant ecological effects resulting from the Proposed Development.

10.2 Regulatory and Policy Framework

Legislation

Wildlife and Countryside Act 1981 (as amended)

10.2.1 The Wildlife and Countryside Act (WCA) 1981 (as amended) is the principal legislative protection for wildlife within England. It establishes protection for certain species of plant and animals and allowed for the protection in law of various designated sites. It also consolidated and amended earlier national legislation to implement the European Directive 2009/147/EC on the conservation of wild birds – (The Birds Directive) in the UK. Individual species receive different levels of protection under the act. Special Protection Areas (SPAs) were designated under the WCA 1981 where sites and their habitats support significant numbers of wild birds.

Conservation of Habitats and Species Regulations 2017

10.2.2 The WCA 1981 is complemented by the Conservation of Habitats and Species Regulations 2017 (hereafter referred to as The Habitat Regulations). This is the most recent legislation to implement in law the European Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora - (Habitats Directive) adopted in 1992. The 2017 legislation supersedes the earlier legislation from 2010 and 1994 which were subject to a series of amendments.

10.2.3 Individual species (such as otter *Lutra lutra* and dormouse *Muscardinus avellanarius*) and species groups (all native UK bat *Chiroptera* species) receive a high level of protection under the Habitat Regulations.

10.2.4 The regulations require the potential effects on European Protected Habitats to be a key consideration in planning decisions. If it is likely that the designated features have the potential to be impacted then an appropriate assessment is required under Article 6(3) of the Habitats Directive with consideration of mitigation options to avoid adverse effects. If uncertainty remains over a potentially significant effect, then alternative solutions need to be considered.

Countryside and Rights of Way Act 2000

10.2.5 The WCA 1981 has been amended and reinforced in England and Wales by the Countryside and Rights of Way Act (CRoW) Act 2000 (as amended). The CRoW Act increases protection for Sites of Special Scientific Interest (SSSI) as well as strengthening wildlife enforcement legislation.

10.2.6 The CRoW Act places a duty on the Government to have regard for the conservation of biodiversity and to maintain lists of species and habitats for which conservation action should be taken or promoted, in accordance with the Convention on Biological Diversity. Schedule 9 of the CRoW Act amends the WCA 1981 by altering the notification procedures for SSSIs and providing increased powers for their protection and management.

Natural Environment and Rural Communities Act 2006

10.2.7 The Natural Environment and Rural Communities (NERC) Act 2006 places a duty on all public authorities to have regard to the purpose of conserving biodiversity.

10.2.8 Section 40 of the NERC Act 2006 imposes a duty on all public bodies including local and national government to have regard to biodiversity in the exercise of all of their functions, with particular regard to the species of conservation priority and is often referred to as 'the biodiversity duty'.

10.2.9 In England, Section 41 (S41) of the Act lists the species and habitats of highest importance for conserving biodiversity (derived from the original UK Biodiversity Action Plan (BAP) priorities). The S41 list is a definitive reference for all public bodies in England (statutory and non-statutory) and is a guide for decision-makers when implementing their statutory duties to have regard to the conservation of biodiversity. This ‘biodiversity duty’ includes taking steps to promote the restoration and enhancement of the populations of S41 species.

10.2.10 Section 41 species include a number of native bat species (including greater horseshoe bat *Rhinolophus ferrumequinum* and lesser horseshoe bat *Rhinolophus hipposideros*, noctule *Nyctalus noctula*, soprano pipistrelle *Pipistrellus pygmaeus*, and brown long-eared bat *Plecotus auritus*), dormouse *Muscardinus avellanarius*, hedgehog *Erinaceus europaeus*, brown hare *Lepus europaeus*, a number of bird species associated with grassland and woodland habitats, and slow-worm *Anguis fragilis*, and great crested newt *Triturus cristatus* amongst others. All these species are of conservation concern and have suffered long-term population declines.

Marine and Coastal Access Act (MCAA) 2009

10.2.11 As well as replacing consents under the Food and Environment Protection Agency (FEPA) 1985 and the Coast Protection Act (CPA) 1949, the MCAA 2009 also introduced a new planning system for marine environmental management and a requirement to obtain Marine Licences for works at sea.

10.2.12 The MCAA also enable the designation of Marine Conservation Zones (MCZs) in the territorial waters adjacent to England and Wales and UK offshore waters. The purpose of these conservation measures is to halt the deterioration of the state of the UK’s marine biodiversity and promote recovery where appropriate, support healthy ecosystem functioning and provide the legal mechanism to deliver our current European and international marine conservation commitments, such as those laid out under the Marine Strategy Framework Directive (MSFD), OSPAR Convention and Convention on Biological Diversity.

Planning Policies

Overarching National Policy Statement (NPS) for Energy (EN-1)

10.2.13 Section 5.3 of the Overarching National Policy Statement for Energy (EN-1) *Biodiversity and geological conservation* sets out the potential impacts associated with infrastructure development, what should be included in an ES and the role of the IPC (now the Secretary of State) in decision making and mitigation.

10.2.14 Section 5.2 of the NPS *Air quality and emissions* sets out that infrastructure development should take account of the potential effects from emissions to air on ecological receptors.

National Planning Policy Framework (NPPF)

10.2.15 The National Planning Policy Framework (NPPF) was published on 27th March 2012 after a consultation period, and provides a simplified and streamlined single document to replace previous national planning policy [Ref 10.1].

10.2.16 The principle of sustainable development enshrined in the NPPF acknowledges the environmental role of planning in protecting and enhancing the natural environment, and helping to improve biodiversity. The NPPF recognises that achieving sustainable development involves pursuing positive improvements in the natural environment including: '…*moving from a net-loss of biodiversity to achieving net gains for nature*'.

10.2.17 Chapter 11 of the NPPF 'Conserving and enhancing the natural environment' contains provisions for ensuring that planning can be sustainable from an environmental perspective. Specifically, Chapter 11 states that: '...*the planning system should contribute to and enhance the natural and local environment by*:

- Protecting and enhancing valued landscapes, geological conservation interests and soils;
- Recognising the wider benefits of ecosystem services; minimising impacts on biodiversity and providing net gains in biodiversity where possible, contributing to the Government's commitment to halt the overall decline in biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressure;
- Preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability; and,
- Remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate.'

10.2.18 The NPPF encourages planning authorities to develop criteria based policies for development affecting protected sites taking into consideration the geographical hierarchy of nature conservation designations. Such policies should aim to conserve and enhance biodiversity when considering planning applications, and to encourage opportunities to incorporate biodiversity in and around developments.

10.2.19 The NPPF is supported by the Government Circular: Biodiversity and Geological Conservation – Statutory Obligations and their Effect within the Planning System, jointly issued by the Office of the Deputy Prime Minister and the Department of Food and Rural Affairs [Ref 10.2]. This joint circular aims to provide 'guidance on the application of the law in relation to planning and nature conservation as it applies in England'. Additional guidance is provided in Planning for Biodiversity and Geological Conservation: A Guide to Good Practice [Ref 10.3] which provides case studies and examples to help comply with the legal requirements set out in the circular.

10.2.20 The Government Circular makes reference to the UK BAP, England Biodiversity Strategy and Local Biodiversity Partnerships. These documents outline strategic actions for biodiversity at both the national and local level, and are considered further below under Wildlife Legislation.

National Planning Practice Guidance (NPPG)

10.2.21 The National Planning Practice Guidance (NPPG) was issued on-line in March 2014 and is updated periodically by government as a live document. The Natural Environment section of the guidance provides information on when biodiversity should be considered in an application: *Information on biodiversity impacts and opportunities should inform all stages of development (including, for instance, site selection and design including any pre-application consultation as well as the application itself).*

10.2.22 It also makes clear that development should deliver enhancement for biodiversity by:

- habitat restoration, re-creation and expansion;
- improved links between existing sites;
- buffering of existing important sites;
- new biodiversity features within development; and
- securing management for long term enhancement

10.2.23 The NPPG also provides guidance on action with respect to the application of the mitigation hierarchy:

- in cases where biodiversity may be affected, is any further information needed to meet statutory obligations as signposted in guidance published by Defra/Natural England
- where an Environmental Impact Assessment has been undertaken, what evidence on ecological effects has already been provided in the Environmental Report and is this sufficient without having to undertake more work?
- is the significance of the effects clear? And
- is relevant internal or external expertise available?
- Avoidance – can significant harm to wildlife species and habitats be avoided for example through locating on an alternative site with less harmful impacts?

- Mitigation – where significant harm cannot be wholly or partially avoided, can it be minimised by design or by the use of effective mitigation measures that can be secured by, for example, conditions or planning obligations?

- Compensation – where, despite whatever mitigation would be effective, there would still be significant residual harm, as a last resort, can this be properly compensated for by measures to provide for an equivalent value of biodiversity?

<u>Local Plan- Bearing Fruits 2031: The Swale Borough Local Plan</u>

10.2.24 Swale Borough Council adopted the Swale Borough Local Plan in 2017 [Ref 10.5], following publication for comment to the general public in mid-2015 and further modifications made in 2016 and 2017. There are a number of policies which relate to biodiversity/ecology:

10.2.25 Policy CP4 – Requiring Good Design:

- Conserve and enhance landscape, biodiversity and local environments by:

- retaining trees where possible (including old orchards and fruit trees, hedgerows, shelter belts, woodland and scrub) particularly those that make an important contribution either to the amenity, historic, landscape character or biodiversity value of the site or the surrounding area;

- provide features and management intended to encourage biodiversity.

10.2.26 Policy CP7: Conserving and Enhancing the Natural Environment – Providing Green Infrastructure:

- The Council will work with partners and developers to ensure the protection, enhancement and delivery, as appropriate, of the Swale natural assets and green infrastructure network and its associated strategy.

- 'Ensure that there is no adverse effect on the integrity of a SAC, SPA or Ramsar site, alone or in combination with other plan and projects, as it would not be in accordance with the aims and objectives of this Local Plan'

- 'Require the completion of project specific Habitats Regulations Assessment, in accordance with Policy DM28, to ensure there are no likely significant effects upon any European designated site.

- Contribute to the objectives of the Nature Partnerships and Nature Improvement Areas in Kent

- Make the enhancement of biodiversity and landscape as their primary purpose

10.2.27 Policy DM 19- Sustainable Design and Construction:

- Demonstration of a contribution to the network of green infrastructure and biodiversity, including through tree planting, green roofs and walls, soft landscaping and sustainable drainage systems as appropriate in accordance with Policy CP 7

10.2.28 Policy DM22- The Coast:

- The protection, enhancement or management as appropriate of biodiversity, landscape, seascape, and coastal processes.

10.2.29 Policy DM28 – Biodiversity and Geological Conservation:

- Policy DM 28 seeks to reflect the relative weight to be applied to the range of international, national and local designations and irreplaceable habitats present within Swale with the aim of requiring development to include the conservation and enhancement of biodiversity. In line with national planning policy it looks for any harm from development to be avoided, mitigated or as a last resort, compensated for. The Council will consider whether to roll out Biodiversity Offsetting once national pilots are completed and assessed.

Swale Biodiversity Action Plan

10.2.30 The Swale Biodiversity Action Plan (BAP) [Ref 10.6] identifies habitats and species of conservation importance with the aim of enabling the conservation and enhancement of biodiversity within the Swale Borough and so contributes to the maintenance of national and global biodiversity. The Swale BAP priority habitats found at Kemsley include Built-up areas and Gardens, with Priority species including birds and bats.

Local Nature Partnerships

10.2.31 Following the Nagoya UN Biodiversity Summit in October 2010 the UK government published the white paper 'The Natural Choice: Securing the Value of Nature' [Ref 10.7] which introduced the institutional framework for the enhancement of the benefits of nature through Local Nature Partnerships (LNPs). The Governments strategy for the delivery of Biodiversity in England 'Biodiversity 2020' [Ref 10.8] including specific actions and targets was subsequently published in 2011.

10.2.32 Following the publication of the white paper in 2011, the Kent LNP was established and officially recognised by Defra in July 2012.

10.2.33 The LNP has a number of objectives, set out in three distinct categories, advocacy, support and influence. Each of these categories have a number of 'strategic priorities' to ensure that the natural environment in considered, enhance and maintained within Kent. Some of the key priorities include:

- seeking to help and enable Kent to meet national and local targets for the Natural Environment;
- working with healthcare partnerships to provide opportunities for the natural environment to aid social health and wellbeing; and
- to support the economic growth of the region by engaging with a number of stakeholders, including the South East Local Enterprise Partnership

10.3 Methodology

Scoping and Consultation

10.3.1 The formal scoping exercise is summarised in Chapter 3.

10.3.2 Follow-up consultation with the KCC Ecologists via e-mail (on the 24th October 2017 and 1st November 2017 – see Appendix 10.1) addressed the approach to wintering/breeding bird surveys. Given the large body of existing recent wintering bird survey data (from 2016) relating to the foreshore adjacent to the Paper Mill site (supported by previous surveys in 2009 and 2012), the KCC Ecologists were satisfied that this would provide a robust data set to base the assessment of effects on SPA receptors. Also, while breeding bird surveys have not been undertaken in the wider area, Cetti's warbler has been recorded in the majority of suitable habitat around the Paper Mill. Given the scrub habitat to the south of the K4 site, around the Light Railway Station, is suitable for this species, it was agreed that the assessment would assume this species will be present in this area and will assess impacts accordingly.

10.3.3 All the issues raised within the consultee responses to the ES Scoping opinion are addresses within this chapter.

Establishing Baseline Conditions

Data Search

10.3.4 A desk-based study was conducted in 2017 to gather information with respect to existing background information. This involved contacting statutory and non-statutory groups for information on species and sites of nature conservation interest. The organisations contacted were:

- Kent and Medway Biological Records Centre (KMBRC);
- The Kent Field Club;
- Kent Ornithological Society (KOS); and
- The Kent Wildlife Trust.

10.3.5 A review of existing statutory sites of nature conservation interest, such as Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Area of Conservation (SACs), MCZs and National Nature Reserves (NNRs), and non-statutory sites, such as Sites of Nature Conservation Interest (SNCIs) was carried out to help indicate any existing nature conservation interest within 2 km of the proposed development.

10.3.6 All information received on species in the search area was reviewed and is summarised in this report.

Phase 1 Habitat Survey

10.3.7 A habitat survey was conducted in accordance with The Handbook for Phase 1 habitat survey [Ref 10.9], and included searches for signs of protected species, as described in the Guidelines for Preliminary Ecological Assessment [Ref 10.10].

10.3.8 A walkover of the Site and surrounding area was undertaken on 24th October 2017 by an experienced ecologist, Nicholas Betson CEnv MCIEEM. Habitats within the site were classified, mapped and described, with respect to their structure and floristic composition.

10.3.9 In addition, the habitats within the survey area were assessed for their potential to support legally protected or otherwise notable flora and fauna. Where suitable habitat was identified on site, a search was conducted for signs indicating the presence of protected species such as droppings, burrows, tracks and evidence of feeding. Where species are not specifically evaluated, this indicates that no habitat of potential value for these species was identified during the survey.

10.3.10 Consideration was also given to habitats outside the site, in order to evaluate the ecological context of the site within the wider landscape. Adjacent habitats were also considered with respect to their own ecological value and their potential to enhance the ecological value of habitats within the site.

10.3.11 Searches were made for invasive non-native plant species focussing on those species currently listed in the revised Schedule 9 of the Wildlife and Countryside Act 1981 (as amended).

10.3.12 Buildings were assessed for their potential to support bat roosts, following the methodology/criteria set out in the Bat Conservation Trust's Bat Surveys: Good Practice Guidelines [Ref 10.11].

10.3.13 The buildings' suitability for bat roosting was assessed by examining structural features. Structural features that may influence the suitability of a building to support roosting bats include the presence of a roof void, the presence of access points into the building (including gaps beneath barge boards, soffits and fascia boards, gaps under lead flashing, gaps within masonry and under loose tiles, gaps between mortise and tenon joints), complexity and size of roof voids and daytime light levels within roof voids.

10.3.14 The buildings' suitability for roosting bats was also assessed by examining the surrounding habitat. Important habitat features surrounding the structure which may influence bat roost potential include whether the structure is in a semi-rural or parkland location, its proximity to significant linear habitat features such as a watercourse, mature hedgerow, wooded lane or an area of woodland.

10.3.15 Taking account of these architectural and habitat features, the building was then assigned a level of roost suitability based the criteria given in the Bat Conservation Trust's Bat Surveys: Good Practice Guidelines [Ref 10.11] and professional judgement. Table 10.1 provides a summary of the categories used. The primary objective of this exercise was to identify the need for further detailed bat survey, or alternatively to obtain sufficient information that would dismiss the need for further assessment.

Suitability	Description Roosting Habitats
Negligible	A structure or tree with negligible habitat features on site likely to be used by roosting bats.
Low	A structure with one or more potential roost sites that could be used by individual bats

	opportunistically. However, these potential roost sites do not provide enough features* to be used on a regular basis or by larger numbers of bats. A tree of sufficient size and age to contain potential roost features but with none seen from the ground or features seen with only very limited roosting potential.
Moderate	A structure or tree with one or more potential roost sites that could be used by bats due to their features* but unlikely to support a roost of high conservation status.
High	A structure or tree with one or more potential roost sites that are obviously suitable for the use by larger numbers of bats on a more regular basis and potentially for longer periods of time due to their features*.

Table 10.1: Criteria used for assessing the potential suitability of proposed development sites for bats

10.3.16 The external search around the perimeter of the buildings recorded any possible access points i.e. gaps and crevices.

10.3.17 The plant species nomenclature follows that of Stace [Ref 10.12]. Plant species observed within each habitat type were recorded using the DAFOR system which stands for Dominant, Abundant, Frequent, Occasional or Rare.

<u>Noise Impacts</u>

10.3.18 Noise created by the operation of machines and vehicles during the construction phase has the potential to disturb birds, causing them to cease feeding or fly away from the area of influence. The occurrence of disturbance though will depend upon the nature or type of noise, the strength of the noise at its source and the loss in strength of the noise as it propagates toward and reaches the feature, in this case birds using habitat around the site. It is recognised that very loud and short, sharp 'percussive' noises that can mimic gunshot have the greatest potential to cause disturbance to birds. Some birds have been shown to habituate to similar noises occurring at repeated intervals.

10.3.19 A disturbance event may cause birds to take flight (either returning to the same area or departing), to cease feeding or roosting and to temporarily abandon eggs or chicks, leaving them susceptible to chilling and predation. Taking flight or ceasing to feed does not have immediate effects on the survival or productivity of that bird. The increased energy expenditure or reduction in energy intake (feeding interrupted) if repeated, or occurring over an extended period, can place individual birds at risk of starvation/exposure during adverse weather or being in a weakened state preventing successful fattening before migration or preventing that bird coming in to breeding condition. The result can be an effect on survival or productivity.

10.3.20 Loud but discontinuous noises, as can be produced by machinery during construction processes, have been shown to cause disturbance when that noise is above certain recorded levels.

10.3.21 Studies (full details provided in Appendix 10.2 – Information to Inform a Habitats Regulations Assessment) provide an evidence base for a threshold to be set for disturbing effects on waterbirds to occur at >80 dBA and suggest that such a figure would also apply to breeding passerines and birds of prey. However, Natural England, in their S42 response, requested that an initial screen for potential effects is undertaken at noise levels >55 dBA. This threshold figure is therefore used in the assessment section of this ES. When maximum noise levels are predicted to occur above 55 dBA where an ecological feature occurs then this is identified as an effect. It should be noted that although an effect is identified, this does not automatically mean that an adverse impact should be concluded [Ref 10.13]. In the absence of scientific evidence to determine if the identified effect results in an adverse impact, a precautionary approach is taken and such effects are treated as if there were adverse effect resulting in an impact.

Disturbance from people and plant movements

10.3.22 The movement of people and plant during the construction phase of the development may be visible to a small proportion of the SPA cited bird species using the intertidal areas of the SPA/Ramsar south-east (towards Milton Creek). This may have the potential to disturb birds, causing them to cease feeding or fly away from the area of influence.

Air Quality Impacts

10.3.23 Full details of the methodologies used to assess the effects of air quality impacts are provided in Chapter 5 Air Quality. The assessment of effects is based on a comparison of the emissions (Process Contribution (PC)) from a development with established Environmental Quality Standards, known as critical levels and critical loads (or critical load functions).

10.3.24 Critical levels are maximum atmospheric concentrations of pollutants for the protection of vegetation and ecosystems and are specified within relevant European air quality directives and corresponding UK air quality regulations. Process Contributions (PCs) and Predicted Environmental Concentrations (PECs) of NO_x and NH_3 have been calculated for comparison with the relevant annual-mean critical level. Background concentrations of NO_x and NH_3 at each designated site have been derived from the UK Air Pollution Information System (APIS) database.

10.3.25 Critical loads (and critical load functions) refer to the quantity of pollutant deposited, below which significant harmful effects on sensitive elements of the environment do not occur, according to present knowledge.

10.3.26 The PCs and PECs have been compared against the relevant critical level/load for the relevant habitat type/interest feature for all the designated sites within the study area. Based on current Environment Agency guidelines [Ref 10.25] and the Institute of Air Quality Management Position Statement [Ref 10.26].

10.3.27 The following criteria have been used to determine if the impacts are significant:

- If the PC does not exceed 1% of relevant critical level/load the emission is considered not significant; and

- If the PC exceeds 1% but the resulting PEC is below 100% of the relevant critical level/load, the emission is not considered significant.

10.3.28 Where potentially significant impacts have been identified, the likely effect has been determined based on current scientific knowledge.

10.3.29 In order to ensure that the assessment of potential effects is conservative, no reduction in the baseline air quality data obtained from APIS, which will contain a contribution from K1, has been made.

Significance Criteria

<u>Receptor Sensitivity – Identification of Ecological Receptors</u>

10.3.30 Several factors are taken into consideration when assessing the value of an ecological feature and whether it is considered important and therefore requires detailed assessment of potential impacts.

10.3.31 In assessing the value of habitats or species populations, a subjective assessment is made, based on a range of factors that influence overall ecological value. Amongst other factors, a series of criteria are considered for habitats and populations of species [Ref 10.13], including: fragility, rarity, extent, diversity, position in the landscape, naturalness, and recorded history. The legal protection of species is not a primary consideration in determining conservation value but it is an important consideration in the impact assessment process.

10.3.32 Other resources that are used to inform the assessment of value and importance include but are not limited to:

- EU Directives;
- Habitats and Species of Principal Importance (Section 41);
- Birds of Conservation Concern (BoCC) Red and Amber lists [Ref 10.14];
- National and County Red Data Book species.

10.3.33 The resources used to assess the value and importance of features also helps to define the importance in the context of geographical scale. The CIEEM guidelines state that significance of effects of ecological features should be qualified with reference to the appropriate geographic scale. Therefore, to provide a framework that is consistent for both assessing the importance of ecological features and determining the significance of effects, the importance of ecological features is described at one of the following geographic scales:

- International;
- National;
- Regional;
- Local; and

- Site and immediate surroundings.

10.3.34 While the current CIEEM guidelines discourage the use of a matrix with respect to impact assessment, this approach has been adopted here for the sake of consistency across the ES, with the CIEEM geographical scale included as far as possible within this method as set out in Table 10.2.

Value of Ecological Receptors	Description
Negligible	Including site level importance Commonplace feature of little or no habitat/historical significance. Loss of such a feature would not be seen as detrimental to the ecology of the area.
Low	Including local importance. A feature (e.g. habitat or population) that is of nature conservation value in a local context only, with insufficient value to merit a formal nature conservation designation.
Medium	Including regional or county importance. A feature (e.g. habitat or population), which is either unique or sufficiently unusual to be considered as being of nature conservation value from a county to regional level. Habitats or species that form part of the cited interest of a Local Nature Reserve (LNR), or some local-level designated sites, such as a Local Wildlife Site (LWS), also referred to as a non-statutory Site of Importance for Nature Conservation (SINC) or the equivalent, e.g., Ancient Woodland designation. Presence of Local Biodiversity Action Plan (LBAP) habitats or species, where the action plan states that all areas of representative habitat or individuals of the species should be protected.
High	Including national importance. Habitats or species that form part of the cited interest within a nationally designated site, such as an SSSI or a (National Nature Reserve (NNR). A feature (e.g., habitat or population) which is either unique or sufficiently unusual to be considered as being one of the highest quality examples in a national context for which the site could potentially be designated as a SSSI. Presence of UKBAP habitats or species, where the action plan states that all areas of representative habitat or individuals of the species should be protected.
Very high	Including international importance Habitats or species that form part of the cited interest within an internationally protected site, such as those designated under the Habitats Directive (e.g., SACs) or other international convention (e.g., Ramsar site). A feature (e.g. habitat or population) which is either unique or sufficiently unusual to be considered as being one of the highest quality examples in an international/national context, such that the site is likely to be designated as a site of European importance (e.g., SAC).

Table 10.2: Value of Ecological Receptors

Magnitude of Impact

10.3.35 The significance of important impacts is assessed in the context of the baseline.

10.3.36 Impacts may be described in terms of changes to the structure or function of ecological resource and are characterised according to a number of parameters where these are relevant to understanding ecological effect. These parameters include:

- Beneficial or adverse – impacts may be either, depending on the nature of the impact.
- Extent- the geographical range over which the impact occurs.
- Magnitude – the size of the impact in terms of amount of a feature affected.
- Duration and timing – when the effect will occur and how long it will last.
- Frequency – whether the effect will be a single event or multiple events.
- Reversibility – the effect may be permanent, or may naturally reverse without mitigation, or may be reversible with appropriate mitigation.

10.3.37 Table 10.3 below indicates how the magnitude of impacts has been described within this assessment.

Magnitude	Criteria
High	Adverse - Loss of resource and/or quality and integrity of resource: severe damage to key characteristics, features or elements. Detrimental effect on conservation status. Beneficial - Large scale or major improvement of resource quality: extensive restoration or enhancement: major improvement of attribute quality. Notable improvement in conservation status.
Medium	Adverse – Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements. Some detriment to conservation status. Beneficial – Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality. Some improvement to conservation status.
Low	Adverse – Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements. Beneficial – Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact or attribute or a reduced risk of negative impact occurring.
Negligible	Adverse – Very minor loss or detrimental alteration to one or more characteristics, features or elements. Beneficial – Very minor benefit to or positive addition of one or more characteristics, features or elements.
No change	No loss or alteration of characteristics, features or elements; no observable impact in either direction

Table 10.3: Magnitude of Impacts

Significance of Effects

10.3.38 A subjective judgement of significance is made based on the interaction between the importance of the ecological feature (at the geographical scale) and the characterisation of the effect (such as magnitude, extent, reversibility, etc.).

10.3.39 Broadly, effects are considered significant where they affect the structure of sites, habitats and ecosystems or the conservation status of habitats and species with the scale of that significance dependent upon the balance between the sensitivity of the feature and the magnitude of impact (Table 10.4).

Value	Magnitude of impact				
	No Change	Negligible	Low	Medium	High
Negligible	No change	Negligible	Negligible or Minor	Negligible or Minor	Minor
Low	No change	Negligible or Minor	Negligible or Minor	Minor	Minor or Moderate
Medium	No change	Negligible or Minor	Minor	Moderate	Moderate or Major
High	No change	Minor	Minor or Moderate	Moderate or Major	Major or Substantial
Very high	No change	Minor	Moderate or Major	Major or Substantial	Substantial

Table 10.4: Assessment Matrix for the Significance of Ecological Effects

10.3.40 An effect that is moderate, major or substantial, is generally considered significant.

10.3.41 Several impacts of varying magnitudes could act on a feature simultaneously. Therefore, for each feature, a single overall level of impact significance is presented for the construction, operation and decommissioning phases based on the most significant effect identified for that feature.

10.3.42 For consistency between disciplines the overall significance of an effect is expressed as Negligible, Minor, Moderate, Major or Substantial based on the definitions below:

- Substantial: Only adverse effects are normally assigned this level of significance. They represent key factors in the decision-making process. These effects are generally, but not exclusively, associated with sites or features of international, national or regional importance that are likely to suffer a most damaging impact and loss of resource integrity. However, a major change in a site or feature of local importance may also enter this category.

- Major: These beneficial or adverse effects are considered to be very important considerations and are likely to be material in the decision-making process.

- Moderate: These beneficial or adverse effects may be important, but are not likely to be key decision-making factors. The cumulative effects of such factors may influence decision-making if they lead to an increase in the overall adverse effect on a particular resource or receptor.

- Minor: These beneficial or adverse effects may be raised as local factors. They are unlikely to be critical in the decision-making process, but are important in enhancing the subsequent design of the project.

- Negligible: No effects or those that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.

Assessment of Effects

10.3.43 The Ecological Impact Assessment (EcIA) in this chapter follows the most recent published guidance from the Chartered Institute of Ecology and Environmental Management [Ref 10.16]. The updated guidance aims to promote good practice in the assessment of ecological impacts in terrestrial, freshwater and marine environments in the UK.

Limitations and Assumptions

10.3.44 The ecology of the Mill site has been studied by RPS for over 10 years and the issues present are well known to both RPS and consultees. Surveys have been undertaken at appropriate times of the year such that any potential protected species would be identified.

10.3.45 Therefore, the assessment is considered to be based on sound ecological data and, as such, suitably robust.

10.4 Baseline Conditions

10.4.1 The zone of influence of the Proposed Development is assumed to be 10 km to ensure that all sites of international importance that could be subject to effects from the proposed development are included in the assessment, in line with EA guidance on the consideration of air quality effects on designated sites [Ref 10.25]. The smaller 2 km radius used for the nationally-designated sites is in line with industry best-practice.

Desk Study

<u>Designated Sites</u>

10.4.2 There are eight internationally-designated sites within 10 km of the assessment boundary (Figure 10.1):

- The Swale Special Protection Area (SPA) – 0.3 km south east;

- The Swale Ramsar – 0.3 km south east;

- Medway Estuary and Marshes SPA – 2.7 km north;

- Medway Estuary and Marshes Ramsar – 2.7 km north;

- Thames Estuary and Marshes SPA – 8.4 km north west;

- Thames Estuary and Marshes Ramsar – 8.4 km north west;

- Queensdown Warren SAC – 9.2 km south west; and
- Outer Thames Estuary SPA – 8.9 km north-east.

10.4.3 There are four nationally-designated sites located within 2 km:

- The Swale Marine Conservation Zone (MCZ) – 0.02 km south;
- The Swale Site of Special Scientific Interest (SSSI) – 0.3 km south east;
- Medway Estuary and Marshes SSSI - 2.9 km north;
- Elmley National Nature Reserve (NNR) – 1.0 km north-east.

10.4.4 The Swale SPA, Ramsar and SSSI are located on the south side of the outer part of the Thames Estuary in south-eastern England. The Swale is an estuarine area that separates the Isle of Sheppey from the Kent mainland. To the west it adjoins the Medway Estuary. It is a complex of brackish and freshwater, floodplain grazing marsh with ditches, and intertidal saltmarshes and mud-flats. It has received its' designation for supporting populations of European important species, including breeding populations of Avocet *Recurvirostra avosetta*, Marsh Harrier *Circus aeruginosus* and Mediterranean gull *Larus melanocephalus*, and over-wintering populations of Bar-tailed Godwit *Limosa lapponica*, Golden Plover *Pluvialis apricaria* and Hen Harrier *Circus cyaneus*.

10.4.5 Medway Estuary and Marshes SPA, Ramsar and SSSI feed into and lie on the south side of the outer Thames Estuary in Kent, southeast England. It forms a single tidal system with The Swale and joins the Thames Estuary between the Isle of Grain and Sheerness. It has a complex arrangement of tidal channels, which drain around large islands of saltmarsh and peninsulas of grazing marsh. The mud-flats are rich in invertebrates and also support beds of *Enteromorpha* and some Eelgrass *Zostera* spp. Small shell beaches occur, particularly in the outer part of the estuary. Grazing marshes are present inside the sea walls around the estuary. The complex and diverse mixes of coastal habitats support important numbers of waterbirds throughout the year. In summer, the estuary supports breeding waders and terns, whilst in winter it holds important numbers of geese, ducks, grebes and waders. The site is also of importance during spring and autumn migration periods, especially for waders.

10.4.6 The Thames Estuary and Marshes SPA is located on the south side of the Thames Estuary in southern England. The marshes extend for about 15 km along the south side of the estuary and also include intertidal areas on the north side of the estuary. To the south of the river, much of the area is brackish grazing marsh, although some of this has been converted to arable use. At Cliffe, there are flooded clay and chalk pits, some of which have been infilled with dredgings. Outside the sea wall, there is a small extent of saltmarsh and broad intertidal mud-flats. The estuary and adjacent grazing marsh areas are wetlands of international importance as they support an important assemblage of wintering waterbirds including: redshank *Tringa totanus*, Black-tailed Godwit *Limosa limosa islandica*, Dunlin *Calidris alpina alpina*, Lapwing *Vanellus vanellus*, Grey Plover *Pluvialis squatarola*, Shoveler *Anas clypeata*, Pintail *Anas acuta*, Gadwall *Anas strepera*, Shelduck *Tadorna tadorna*, White-fronted Goose *Anser albifrons albifrons*, Little Grebe *Tachybaptus ruficollis*, Ringed Plover *Charadrius hiaticula*, Avocet *Recurvirostra avosetta*, Whimbrel *Numenius phaeopus*. In addition to the waterbird species the site also supports Hen Harrier *Circus cyaneus*, seven individuals representing at least 0.9% of the wintering population in Great Britain. The site is also important in spring and autumn migration periods.

10.4.7 The Thames Estuary and Marshes Ramsar site comprises the same area as the Thames Estuary and Marsh SPA and all the bird species named within the special features. In addition to the bird species, the saltmarsh and grazing marsh are of international importance for their diverse assemblage of wetland plants and invertebrates. The site supports one endangered plants species and at least 14 nationally scarce plants of wetland habitat. The site also supports more than 20 British Red Data Book invertebrates.

10.4.8 The Queendown Warren SAC is located south of Rainham and the M2 motorway in Kent. The site consists mostly of dry grassland steppes, with some broad-leaved deciduous woodland and small areas of scrub and heath. The site hosts the priority habitat type "orchid rich sites" and consists of CG3 *Bromus erectus* grassland. It contains an important assemblage of rare and scarce plant species, including early spider-orchid *Ophrys sphegodes*, burnt orchid *Orchis ustulata* and man orchid *Aceras anthropophorum*.

10.4.9 The Outer Thames Estuary SPA lies along the east coast of England in the southern North Sea and extends northward from the Thames Estuary to the sea area off Great Yarmouth, Norfolk. The site crosses the 12-nautical mile boundary and therefore lies partly in terrestrial and partly in offshore waters. It is home to the largest aggregation of wintering Red-throated Diver *Gavia stellate* in the UK. The proposed extension to the SPA boundary will afford protection for Little Tern *Sternula albifrons* and Common Tern *Sterna hirundo* foraging areas, enhancing the protection already afforded to their feeding and nesting areas in the adjacent coastal SPAs.

10.4.10 The Swale Estuary MCZ was designated in January 2016. The area designated is an inshore site and covers the Swale Estuary from the point at which it meets the Medway Estuary, south of the Isle of Sheppey, and extends towards the end of The Street at Whitstable. The site is considered to be highly diverse, and is important as a spawning and nursing ground for various fish species. The main channel of the Swale Estuary contains several important seabed habitats, such as sand and sediments. The coarse sediment is home to fauna such as bristleworms, sand mason worms, small shrimp-like animals, burrowing anemones, and cockles. Broad scale habitat features of the Swale Estuary MCZ include intertidal habitats (i.e. estuarine rocky habitats, low energy intertidal rock, intertidal mixed sediment, intertidal coarse sediment and intertidal sand and muddy sand) and subtidal habitats (i.e. subtidal coarse, mixed, sand and muddy sediments).

10.4.11 Elmley NNR is home to large numbers of wintering wildfowl and breeding waders. This wide expanse of grazing marsh, divided by ditches and frequent shallow surface flooding, is at or below sea level.

10.4.12 There is one non-statutory designated site within 2 km of the application boundary, Milton Creek Local Wildlife Site (LWS). This site includes a mosaic of habitats along the western edge of Milton Creek, such as saltmarsh, with Sea Purslane *Halimione portulacoides* and Common Saltmarsh-grass *Puccinellia maritima* co-dominant, although other species such as Sea Wormwood *Artemisia maritima*, Sea Lavender *Limonium vulgare*, Sea Aster *Aster tripolium* and Scurvygrass *Cochlearia anglica* are quite common. A small amount of thrift *Armeria maritima* also occurs. Golden Samphire *Inula crithmoides* is present along the banks all the way to Crown Quay.

10.4.13 The site is also locally important for a number of bird species, with several Red Book Data species present; Redshank *Tringa totanus* is the dominant winter wader. Other species of note within the LWS include Grass Snake *Natrix natrix*, Slow-worm *Anguis fragilis* and Marsh Frog *Rana ridibunda*, as well as several invertebrate species, such as the Holly Blue *Celastrina argiolus*, Common Blue *Polyommatus icarus* and Wall Brown *Lasiommata megera* butterflies.

<u>Protected species</u>

10.4.14 See Figures 10.2a-10.2f for the locations of records of protected species.

Amphibians

10.4.15 There are 66 records of protected or notable amphibian species occurring within 2 km of the assessment boundary. Largely, these are associated with Milton Creek LWS.

Birds

10.4.16 There are 97 records of protected or notable bird species occurring within 2 km of the assessment boundary site over the last ten years. The majority of these are associated with designated sites such as or The Swale Ramsar, SPA and SSSI, or Milton Creek LWS.

Flora

10.4.17 There are 20 records of protected and/or notable flora species occurring within 2 km of the assessment boundary. Similar to other protected species, these are associated with designated sites, such as The Swale SPA, Ramsar and SSSI, as well as Milton Creek LWS.

Invertebrates

10.4.18 There are 28 records of protected and/or notable invertebrate species occurring within 2 km of the assessment boundary site over the last ten years. Again, these records are largely associated with The Swale SPA, Ramsar and SSSI.

Mammals

10.4.19 There are 251 records of protected bat species occurring within 5 km of the assessment boundary; including several maternity roosts. The majority of these are located south of the application boundary, associated with the towns of Murston and Sittingbourne; there are also a number of records associated with the more rural areas surrounding the towns.

10.4.20 There are 1,565 records of water vole *Arvicola amphibius* within recorded within 2 km of the application site over the last ten years. These are all associated with the series of ditches within the wider area that form part of the grazing marsh within The Swale SPA, Ramsar and SSSI.

10.4.21 Other records of protected and/or notable mammals include European hedgehog *Erinaceus europaeus*, brown hare *Lepus europaeus* and a number of species of shrew.

Reptiles

10.4.22 There are 12 records of protected and/or notable reptile species occurring within 2 km of the application site over the last ten years. These are associated with Milton Creek LWS and The Swale SPA, Ramsar and SSSI.

On-Site Survey

10.4.23 The Phase 1 Habitat Survey of the Site and the surrounds found it to comprise almost exclusively hard standing in the form of roads, lorry parks, and industrial buildings comprising the existing K1 and K2 CHP plants and a recently-constructed water treatment works (Figure 10.3).

10.4.24 Several other buildings were present within the boundary. Building A (Figure 10.3) was a two-storey Fire Pump House to pump water where needed around the Mill site in the event of a fire. It was brick built with a flat, brick roof, all of which were generally in good condition. It was not considered to have any bat roost potential.

10.4.25 Building B (Figure 10.3) comprised the former fire station and associated garage for the Mill now in use as storage and welfare. The building and garage were both brick-built, single storey with flat, concrete roofs in good condition; neither were considered to have any bat roost potential.

10.4.26 Building C (Figure 10.3) was an existing sub-station connection building housing transformers for the Mill electricity grid connection. It was brick-built, single storey with a flat roof, all of which were in good condition. It was not considered to have any bat roost potential.

10.4.27 The only small areas of vegetation on Site comprised a small area of short-mown improved grassland, dominated by Perennial Rye-grass *Lolium perenne* and an area of dense scrub, dominated by Hawthorn *Crataegus monogyna*, adjacent to the Effluent Treatment Plant offices.

Off-site (Zone of influence) Survey Work

10.4.28 Extensive survey work of the off-site intertidal habitat surrounding the Mill, including that at the closest point to the site 100 m to the south east of the Site, has been undertaken over the last 10 years to inform the K3 project (in 2009, 2012 and 2016) [Ref 10.17 & 10.18]. These surveys have highlighted that the stretch of The Swale adjacent to the wider Mill site is of particular importance for intertidal species, including citation species for both the SPA and Ramsar.

10.4.29 The closest intertidal area to the site lies within the Milton Creek LWS 200 m to the south east; this area has been included in all the previous intertidal survey work and therefore data generated from this work has been used to inform the current assessment. The most recent surveys in 2016 [Ref 10.18] found that the LWS supported good numbers of a range of SPA/Ramsar interest species over winter both at low and high tide, including Black-tailed Godwit, Curlew, Greenshank, Grey Plover, Red Shank and Teal.

10.4.30 A reedbed 450 m to the north of the main construction site (65 m to the east of the laydown haul road – see Figure 10.4) has been found to support breeding Marsh Harrier every year that surveys have been undertaken [Ref 10.17 & 10.18]. Marsh Harrier is one of the species listed within the breeding bird assemblage for which The Swale is designed as an SPA. Although no specific surveys have been undertaken, for the purposes of this assessment, it is assumed that the reedbed still supports this species.

10.4.31 South of the site, associated with Kemsley Light Railway, is an area of scrub. This area has the potential to support Schedule 1 species, such as Cetti's Warbler. Previous survey work around the Mill site [Ref 10.17, 10.18 & 10.19] have identified this species around the wider Mill site in areas of dense scrub that this species favours for nesting. Therefore, while specific surveys have not been undertaken to inform the current project, given that this species has been identified in the majority of suitable habitat around the wider Mill site, it is also possible that this species is present also in the dense scrub to the south (Figure 10.4).

Sensitive Receptors

10.4.32 The sensitive receptors listed in Table 10.5 below have the potential to be affected by effects arising from the Proposed Development. The assessment in this Chapter has considered the effects listed in the table upon the identified sensitive receptors.

Receptor	Importance/sensitivity/vulnerability to change
The Swale SPA/Ramsar	Very High
The Medway Estuary and Marshes SPA/Ramsar	Very High
Other international designated sites in the surrounding 10 km	Very High
The Swale SSSI	High
The Medway Estuary and Marshes SSSI	High
Breeding Schedule 1 birds (non-SPA), inc. Cetti's Warbler	High
Milton Creek LWS	Medium

Table 10.5: Potentially affected sensitive receptors

10.5 Future baseline

10.5.1 In the absence of K4, it would be expected that the existing K1 facility would continue to operate but modified to comply with IED. Therefore, the future ecology baseline of the site in the absence of the Proposed Development would remain hard standing and buildings relating to the Mill and K1.

10.5.2 A future baseline would need to account for climate change over the Proposed Development's operational lifetime. For example, increases in sea level may place increased stress on nearby ecosystems within designated sites in the local area, potentially reducing their resilience to any environmental impacts from the development (e.g. nitrogen deposition). However, such changes are likely to be extremely small within the operational lifetime of the Proposed Development(i.e. less than 40 years) . Therefore, the potential effects of climate change on ecological receptors, as modified by the Proposed Development are not considered further in this chapter.

10.6 Predicted Effects – Construction

10.6.1 Standard, best practice dust-suppression methods will be used throughout construction of the development, thereby avoiding any impacts as a result of dust settlement on habitats and species. Chapter 5, Air Quality, addresses the impacts of dust settlement resulting from the development and concludes that such impacts would not be significant.

10.6.2 Along with this, Chapter 5 (Section 5.8) sets out several mitigation measures which should be employed, in order to ensure that the residual construction dust effects will not be significant. Given that all mitigation measures are employed in line with Chapter 5, the potential effect of dust generation is therefore not considered further in this assessment

10.6.3 Additionally, as set out in Chapter 5, the number of HGV movements associated with such construction is below the 100-movement threshold that would necessitate such an assessment. Therefore, impacts on surrounding off-site habitats (such as the reedbed to the north – see Figure 4.14b) due to changes in air quality from emissions by construction traffic is not considered further.

10.6.4 Within the context of a site that does not support any habitat used by protected or notable species and comprises only hardstanding and industrial buildings, construction activities may potentially cause:

- Temporary disturbance to wildlife, e.g. from noise, vibration or light pollution, human activity and vehicular movements, and overshadowing of bird habitats; and/or
- Accidental release of pollution from the proposed development site.

<u>The Swale Estuary SPA/Ramsar</u>

<u>Light spill</u>

10.6.5 While there will be task-specific lighting necessary during construction of K4, there is no potential for light spill from the construction site to impact the birds using the SPA/ Ramsar. This is because the site is over 0.3 km from the SPA/Ramsar, and the land in-between is currently the construction site of the K3 development, which has its own lighting, and further industrial buildings/offices, all with their own lighting. Therefore, any task-specific lighting during construction will not be visible to birds using the SPA/ Ramsar, as it will either be obscured by the existing industrial buildings, or will not be at levels above that which is present currently.

10.6.6 The lighting from the proposed K4 is not going to be above that which currently exists on site, is currently present on the adjacent K3, nor the surrounding industrial plots. All lighting will be installed in accordance with best practice and will be directed inward, toward the development. Although the lighting strategy has not been finalised, it is expected that there will be an increase of no more than 1 lux or the equivalent to a bright, moon-lit night with this decreasing with distance. The operational lighting strategy for the generating station will follow the same principles as set out in Appendix 6.8 for the IBA (planning ref SW/16/507687). The magnitude of the impacts of changes to lighting during operation on a feature of very high value would therefore be negligible.

10.6.7 Therefore, it is considered likely that the magnitude of the impacts of changes to lighting during construction on a feature of very high value would be negligible. This would result in a minor effect and is therefore not significant.

Disturbance from people and plant movements

10.6.8 The movement of people and plant during the construction phase of the development may be visible to a small proportion of the SPA cited bird species using the intertidal areas of the SPA/Ramsar south-east (towards Milton Creek). It is considered there is limited potential for disturbance of birds using the intertidal areas to be caused by people when account is taken of the fact that:

- The SPA cited bird species feeding on the intertidal area adjacent to the proposed development Site are already habituated to people using the Knauf Jetty (to the north east of the proposal site), industrial areas behind the seawall and public footpath along the seawall itself.

- The bird distribution studies have shown the limited presence of SPA/Ramsar cited bird species on the intertidal area nearest to the proposed development Site. The majority of SPA/Ramsar cited bird species on the intertidal area during all phases of the tide will be screened from people movement by the sea wall, buildings and topographical features (especially the former landfill area to the north east of the proposed development site) and the highest concentrations of birds occurring on the opposite bank of the River Swale are circa 1 km from the proposed area of construction and separated by the river channel and seawall.

10.6.9 Therefore, it is not anticipated that SPA cited birds using the intertidal areas of the Swale will be disturbed by plant or people movement during the construction phase of the development.

10.6.10 Whilst Marsh Harrier have generally been considered susceptible to disturbance, especially during the breeding season, the increase in the population in North Kent has resulted in them using what would formerly have been regarded as unsuitable sites on the basis of the level of disturbance to which they are subjected. The reedbed to the east of the existing road leading to the laydown (for example) is subject to lorry movements due to both the activities of the Mill and those related to the construction of K3. The reedbed is also subject to regular disturbance from activity on the track way immediately to the north running to the Knauf gypsum jetty. No impact (in the form of flight from nest) of such lorry movement on the breeding pair of Marsh Harrier was observed during surveys in either 2009 or more recently in 2016 [Ref 10.18].

10.6.11 The effects of human disturbance on parental care by Marsh Harrier and the nutritional condition of nestlings have been studied at Dos Reinos Lake, Spain [Ref 10.20]. Whilst the effects of severe human disturbance were considered to limit Marsh Harrier parental care, male behaviour was considered only affected during food provisioning in the incubation stage. Overall, breeding success was unaffected between disturbed and undisturbed pairs, suggesting Marsh Harriers have developed coping mechanisms for increased disturbance. This would seem to apply at the Kemsley site where the nest is also close to considerable HGV movements within 50 m of the nest associated with the existing Mill, construction of K3 and construction of the AD Plant.

10.6.12 The proposed construction site is over 400 m from the southern-most edge of the reedbed where Marsh Harrier have been recorded breeding, with significant existing industry in between. While construction traffic associated with the Proposed Development would move within 50 m of the nest to and from the laydown area, the

Marsh Harrier have not reacted to the other construction traffic in the same area, using the K3 access road, 10 m closer to the nest that the K4 haul road.

10.6.13 Therefore, there is minimal potential for disturbance of this species from people and plant movement during construction from activities on site.

10.6.14 The laydown access road will run on the existing Mill northern access road which is separated from the reedbed by the segregated K3 access road. While construction activities will increase HGV movement along the northern access road, it is considered highly unlikely that such movement would result in disturbance effects on the Marsh Harrier using the reedbed due to the high levels of current HGV movement that exist on this road currently and the lack of apparent disturbance.

10.6.15 Consequently, it is also concluded that activity disturbance on breeding Marsh Harrier in the form of plant (machinery) or people movement during the construction of the proposed development can be screened out as not likely to have a significant effect.

10.6.16 It is considered likely that the magnitude of the impacts of disturbance during construction on a feature of very high value would be negligible. This would result is a minor effect and is therefore not significant.

<u>Recreational disturbance</u>

10.6.17 The potential for disturbance to SPA/Ramsar cited bird species from recreational use of the surrounding habitats by the construction staff is considered low. Whilst there is an access route via the Light Railway to the south of the development site there is no current use of this access route by Kemsley Mill staff. The operational nature and characteristics of the wider Kemsley Mill Site mean access is restricted and measures are already in place to prevent incursion of the Swale outside of defined areas. Therefore, it is not anticipated that any of the construction staff will access the Swale SPA.

10.6.18 There will be no impact from recreational disturbance from members of the public, as there is no public access via the site.

10.6.19 It is considered likely that the magnitude of the impacts of recreational disturbance during construction on a feature of very high value would be negligible. This would result in a minor effect and is therefore not significant.

<u>Noise and vibration</u>

10.6.20 Due to the short distances over which any vibration levels attenuate to baseline and the distance to the Swale from the development site (see Chapter 7), no effects from vibration are considered likely. Vibration is therefore not considered further in this assessment chapter.

10.6.21 Noise created during the construction phase from HGV movements, use of percussive piling methods and other construction activities has the potential to disturb birds wintering within the SPA/Ramsar, causing them to cease feeding or fly away from the area of influence. It is recognised that loud and 'percussive' noises have the greatest potential to cause disturbance and a threshold has been identified from the published scientific literature of 80dB L_{Amax}. However, following Natural England's advice, an initial screening threshold of 55 dB is used. The main intertidal areas of the Swale Ramsar/SPA used by wintering citation birds recorded by the foreshore monitoring are over 275 m from the areas of the site where significant noise events may occur. Modelling of the noise generated by the loudest events during construction (percussive piling) has been undertaken (see Chapter 7 – Noise for details of the methods employed). Such piling would only take place for a period of six weeks in total. The resulting noise contours have been plotted with the nearby designated sites shown (Figure 10.5); the highest noise that would be received by birds using the SPA/Ramsar is between 65 and 70 dBL_{Amax}, covering an area of some 20 ha within the designated site, essentially at the mouth of the Milton Creek. This equates to 0.32% of the 6,514 ha site.

10.6.22 While this area has been recorded as supporting SPA/Ramsar interest bird species, including both dunlin and grey plover, the very small total area and very short temporal nature of works means that the potential for disturbance of birds using the SPA foreshore is limited.

10.6.23 It is therefore considered that the magnitude of the impacts of noise during construction on a feature of very high value would be negligible. This would result in a minor effect and is therefore not significant.

Overshadowing/line of sight

10.6.24 During the construction phase of the development it is likely that there will be cranes on site. However, these will be set over 275+ m back from the SPA/Ramsar. Therefore, there is no potential for overshadowing/blocking of line of sight on the foreshore and all such effects would be not significant.

Flight lines

10.6.25 Observations as part of the intertidal bird surveys and general observations on Site during the breeding bird survey have shown that the main flight lines for SPA/Ramsar species in the vicinity of the proposal site are offshore, with no waterbirds being noted to fly over the proposal site in any of the surveys completed to date. The site, at present, is hardstanding with existing CHP/effluent plants. The surrounding area is already heavily industrialised to the south and north, and areas of conurbation exist to the west. Immediately to the east, K3 is currently under construction.

10.6.26 These factors, combined with the fact that the site is not en route to any other nearby wetland areas, to/from the SPA/Ramsar, make it unlikely that waterbirds would pass through the proposal site. As the proposal site lies entirely on the landward side of the sea wall and birds do not fly over the sea wall and onto/over the site in any significant numbers, it will not affect the flight lines of SPA/Ramsar birds using the Swale.

10.6.27 Therefore, the magnitude of the impact of changes to flight lines during construction on a feature of very high value, would be negligible. This would result is a minor effect and is therefore not significant.

Medway Estuary and Marshes Ramsar and SPA

10.6.28 The impact of the development during construction on the Medway Estuary and Marshes Ramsar and SPA is described in Appendix 10.2: Information to Inform a Habitats Regulations Assessment (HRA).

10.6.29 Broadly, the HRA details that the Site does not support any species or habitats for which the Ramsar/SPA has been designated, nor would it be suitable for foraging/breeding by

SPA interest birds. As a result, there will be no direct loss of habitat, nor direct impacts to any SPA / Ramsar designated species.

10.6.30 Given the distance involved between the Site and the Medway Estuary and Marshes (> 2 km), and with suitable mitigation measures being employed (limited task lighting/dust suppression etc.) no construction impacts are anticipated from air quality, lighting, construction noise, traffic, or recreation.

10.6.31 Therefore, the magnitude of the impacts of construction on a feature of very high value, would be negligible. This would result in a minor effect and is therefore not significant.

Thames Estuary & Marshes Ramsar and SPA

10.6.32 The impact of the development during construction on the Thames Estuary and Marshes Ramsar and SPA is described in Appendix 10.2: Information to Inform a Habitats Regulations Assessment.

10.6.33 The Site does not support any species (plant, invertebrate, or bird) or habitats for which the Ramsar/SPA has been designated, nor would it be suitable for foraging/breeding by interest features. As a result, there will be no direct loss of habitat, nor direct impacts to any SPA / Ramsar designated species.

10.6.34 Given the distance involved between the Site and the Thames Estuary and Marshes (> 9 km), and with suitable mitigation measures being employed (limited task lighting/dust suppression etc.) no construction impacts are anticipated from air quality, lighting, construction noise, traffic, or recreation.

10.6.35 Therefore, the magnitude of the impacts of construction on a feature of very high value, would be negligible. This would result in a minor effect and is therefore not significant.

Outer Thames Estuary SPA (and pSPA)

10.6.36 The impact of the development during construction on the Outer Thames Estuary SPA is described in Appendix 10.2: Information to Inform a Habitats Regulations Assessment.

10.6.37 The Site does not support any species or habitats for which the Ramsar/SPA has been designated, nor would it be suitable for foraging/breeding, as a result there will be no direct loss of habitat, or impacts to any SPA / Ramsar designated species.

10.6.38 Given the distance involved between the Site, and the Outer Thames Estuary SPA (and pSPA) (>9 km), no construction impacts are anticipated. Therefore, the magnitude of the impacts of construction on a feature of very high value, would be negligible. This would result in a minor effect and is therefore not significant.

Queensdown Warren SAC

10.6.39 The impact of the development during construction on the Queensdown Warren SAC is described in Appendix 10.2: Information to Inform a Habitats Regulations Assessment. Given the distance involved between the Site and the Queensdown Warren SAC (>9 km), no construction impacts are anticipated. Therefore, the magnitude of the impacts of construction on a feature of very high value, would be negligible. This would result in a minor effect and is therefore not significant.

Swale Estuary MCZ

10.6.40 The Swale MCZ is located (at its closest) 25 m south-east of the Site. It is a sub-tidal designated site and therefore there is no potential for disturbance of interest features. Site drainage during construction (both surface water and foul) will be managed through the existing Mill drainage network, as outlined in Chapter 9. Therefore, there is no potential for changes to surface water to impact the MCZ. All good-practice pollution prevention mechanisms will be implemented during construction and a strict waste management system will be incorporated to prevent the disposal of construction or domestic rubbish entering the nearby intertidal areas.

10.6.41 This affords protection to the Swale from any spills or other pollutants. Whilst changes to the drainage network are proposed, mechanisms will be implemented to avoid any pollution incidents in accordance with legislative requirements and Environment Agency guidance

10.6.42 It is considered likely that the magnitude of the impacts of the development on this feature of high value, would be negligible. This would result in a minor effect which is not significant.

Swale SSSI

10.6.43 Noise created during the construction phase has the potential to disturb birds causing them to cease feeding or fly away from the area of influence. The assessment of construction noise effects on the SSSI is the same as that detailed in relation to the SPA above.

10.6.44 It is therefore considered likely that the magnitude of the impacts of the development on this feature of high value, would be negligible. This would result in a minor effect which is not significant.

Medway Estuary and Marshes SSSI

10.6.45 The Medway Estuary and Marshes SSSI (circa 2.6 km north of the Site) was notified for its large area of intertidal habitats, holding internationally important populations of wintering and passage birds and is also of importance for its breeding birds. An outstanding assemblage of plant species also occurs on the SSSI.

10.6.46 The development will cause no direct impact to the Medway Estuary and Marshes SSSI via habitat loss, given no part of the SSSI falls within the site boundary.

10.6.47 The present baseline noise, lighting and disturbance from human activity are such that further disturbance due to construction at a minimum distance of over 2 km would not have significant impact.

10.6.48 The issues dealing with impacts to breeding and wintering waterbirds have been discussed previously with relation to the Medway Estuary and Marshes Ramsar/SPA.

10.6.49 Therefore it is considered likely that the magnitude of the impacts from the construction phase of the development on this feature of high value would be negligible. This would result in a minor effect which is not significant.

Elmley Island NNR

10.6.50 Elmley Island NNR is located 1 km to the east of the Site on the other side of The Swale.

10.6.51 Elmley Island NNR is important for large numbers of wintering waterfowl and for birds of prey. Many different bird species also breed at Elmley Island. The watercourses, seasonally wet grassland and saltmarsh are also important for invertebrates and plants.

10.6.52 The only potential impacts to Elmley Island NNR from the construction phase would be dust and noise. However, the distances involved (~1 km) and the intervening Swale make this impact negligible.

10.6.53 It is considered likely that the magnitude of the impacts of the Proposed Development on this feature of high value would be negligible. This would result in a minor effect which is not significant.

Breeding birds (non-SPA)

10.6.54 Surveys of the wider Mill site have found good numbers of Cetti's Warbler breeding in appropriate habitat. The Site does not include any habitat that could be used by breeding birds of conservation interest.

10.6.55 Although no specific surveys have been undertaken for breeding birds, it is assumed that suitable off-site habitat will be used by breeding birds and that the assemblage is likely to include Cetti's Warbler. The nearest area of suitable scrub habitat was approximately 100 m south of the development site meaning direct impacts from habitat loss etc., are unlikely. This area of scrub was cleared during winter 2018 (i.e. out with the breeding bird season) in advance of an application for a new access road (see 10.12.34 *et seq*.). This loss of habitat will be mitigated through new planting elsewhere on the wider Paper Mill site, as described in that application. Modelling of the noise generation during percussive impact piling (Figure 10.5) shows this closest area of habitat would be subject to noise levels during piling of circa 55-60 dBL_{Amax}. However, this would only be for a very limited period (circa six weeks).

10.6.56 Therefore, it is considered likely that the magnitude of the impacts of the development on this feature of high value would be negligible. This would result in a minor effect which is not significant.

Milton Creek Local Wildlife Site

10.6.57 Milton Creek Local Wildlife Site (LWS), located 165 m south east, contains a mosaic of habitats including saltmarsh, larger areas of rougher, unmanaged grassland, some unimproved pasture, and freshwater dykes with good aquatic and marginal flora. Although not designated as such, Milton Creek forms an extension to the Swale SPA. Given this level of pollution, it is only considered to be of medium value.

Habitat Loss

10.6.58 No part of the LWS falls within the assessment boundary, therefore there will be no direct impact on Milton Creek via habitat loss.

Drainage

10.6.59 Chapter 9 describes the proposed drainage for the site, making use of the existing drainage on site. Therefore, the site will not drain into the LWS, and therefore, the resulting effect would be no change and is therefore not significant.

Lighting

10.6.60 As described above for the Swale SPA, the light scheme for the construction phase will follow best practice to minimise light impacts. Task specific lighting may also be required; however, through careful positioning and planning this will have minimal effect on the areas outside the site.

10.6.61 Milton Creek is 165 m south-east of the site boundary, with further industrial buildings and The Swale in-between. Given this, and the fact that there is already lighting associated with the in-between buildings, there would be no impact to the LWS from changes to light levels. The resulting effect would therefore be 'no change'.

Air Quality

10.6.62 Although K4 will replace K1, the two plant may run simultaneously for a short period, likely to be a matter of months during the commissioning of K4. Therefore, as described in Chapter 5, K1 has explicitly been included as a point source within the emissions model. In order to predict the annual-mean NO2 concentration for this scenario, it has been assumed that K4 and K1 will operate simultaneously in every hour of the year. Also, the PECs can be considered conservative as emissions from K1 are already included to an extent within the ambient concentration and, by including K1 explicitly within the model, there is potential for double-counting of the impacts. Therefore, the most accurate modelling is that presented within Appendix 5.3 and, as such, there would be no additional effect, above those described within Appendix 5.3 from K4 and K1 operating simultaneously.

Disturbance from people and plant movements

10.6.63 The movement of people and plant during the construction phase of the development which may be visible to a small proportion of the SPA cited bird species using the intertidal areas of Milton Creek. It is considered there is a limited potential for disturbance to be caused by people when account is taken of the fact that:

- The bird distribution studies have shown the limited presence of SPA/Ramsar cited/review bird species on the intertidal area closest to the proposed development site.
- The bird species feeding on the intertidal area adjacent to the proposed development site are already habituated to people.
- Therefore, it is not anticipated that SPA cited birds using Milton Creek will be disturbed by plant or people movement during the construction phase of the development.

Noise

10.6.64 Noise created during the construction phase from HGV movements and other construction activities has the potential to disturb birds wintering within Milton Creek, causing them to cease feeding or fly away from the area of influence. It is recognised that loud and 'percussive' noises have the greatest potential to cause disturbance and a precautionary threshold for further investigation of 50dB L_{Amax} has been suggested by Natural England. The main intertidal areas of Milton Creek used by wintering citation birds from the Swale SPA recorded by the foreshore monitoring are at their closest point over 165 m from the areas of the Proposal Site where significant noise events will occur.

10.6.65 The maximum noise has been modelled at the main intertidal area of Milton Creek to be no more than 70dB L_{Amax} (see Figure 10.5) with the majority of the Creek subject to much less. The area covered by the 55dB L_{Amax} threshold within the wider SPA is circa 22 ha or 0.32% of the total site area.As a result, no effect is predicted due to construction noise.

10.6.66 Overall, therefore, it is considered likely that the impacts of the development on this feature of medium value, would be of negligible magnitude. This would result in a negligible effect and is therefore of not significant.

Operational Effects

10.6.67 The operational stage is assumed to be once the facility has been commissioned i.e. 2020, the effects described below include the zone of influence.

10.6.68 Operational activities may potentially cause:

- changes in air quality;
- degradation and loss of habitats, e.g. from pollution;
- degradation to and loss of habitats that support species of conservation importance, e.g. from pollution; and
- disturbance to wildlife, e.g. from noise or light pollution, human activity and vehicular movement.

Designated sites

<u>The Swale Ramsar and SPA</u>

<u>Drainage</u>

10.6.69 The Proposed Development will not significantly change the total area of impermeable surface compared to pre-development. It will therefore retain the existing surface water drainage regime, where by surface water flows are conveyed, by an internal drainage network, to a current outflow into an isolated open channel forming within Kemsley Marshes. By virtue of gravity channel water is directed through the marshes parallel with the access track/ Barge Way. At the south west corner of the Country Style Recycling the stream abruptly turns east discharging into The Swale via an existing outflow.

10.6.70 Appropriate pollution prevention measures (e.g. class 1 interceptors, such as shut off valves with regular monitoring to ensure compliance) will be provided to prevent polluted flows from being discharged via the ditch network into the SPA / Ramsar.

10.6.71 Process water from the Proposed Development will be neutralised in a desiccated sump and transferred to the existing AD Plant within the Mill site. This is operated under an existing permit which sets pH and water temperature limits for discharge into The Swale; i.e. any discharge (including both composition and temperature of that discharge) will be regulated under the existing permit for the AD Plant.

10.6.72 Therefore, it is considered likely that the magnitude of the impacts of changes to drainage during operation on a feature of very high value would be negligible. This would result in a minor effect and is therefore not significant.

Light spill

10.6.73 The light scheme for the operational phase will follow best practice to minimise light impacts. At this stage, the operational lighting strategy for the facility has not been finalised. However, the Mill site runs a 24/7 operation and there is therefore process-necessary lighting on site currently. Therefore, the magnitude of the impact of any additional lighting on a feature of very high value would be negligible.

10.6.74 This would result in a minor effect and is therefore not significant.

Disturbance from people and plant movements.

10.6.75 The movement of people during the operational phase of the development may be visible to a small proportion of the SPA cited bird species using the intertidal areas of the SPA/Ramsar. It is considered there is a limited potential for disturbance to be caused by people when account is taken of the fact that:

- The SPA cited/review bird species feeding on the intertidal area adjacent to the proposed development Site are already habituated to people using the Knauf Jetty, industrial areas behind the seawall and public footpath along the seawall itself.

- The bird distribution studies have shown the limited presence of SPA/Ramsar cited/review bird species on the intertidal area adjacent to the proposed development. The majority of SPA/Ramsar cited/review bird species on the intertidal area during all phases of the tide will be screened from people movement by the sea wall, buildings and topographical features and the concentrations occurring on the opposite bank of the River Swale are over 1 km from the proposed area of construction and separated by the river channel and seawall.

10.6.76 Therefore, it is not anticipated that SPA cited birds will be disturbed by plant or people movement during the operational phase of the development. As such, the magnitude of the impacts of disturbance from people and plant movement during operation on a feature of very high value would be negligible. This would result is a minor effect and is therefore not significant.

Recreational disturbance

10.6.77 The potential for disturbance to SPA/Ramsar cited bird species from recreational use of the operational staff is considered low. The operational nature and characteristics of the wider Kemsley Mill Site mean that access is restricted and measures are already in place to prevent incursion outside of defined areas. It is estimated that no more than 10 staff will be present at any one time during the operational phase. Therefore, it is not anticipated that large numbers, if any, of the staff will access the sea wall overlooking the

Swale SPA, causing disturbance to birds. As such, the magnitude of the impacts of recreational disturbance during operation on a feature of very high value would be negligible. This would result is a minor effect and is therefore not significant.

Operational noise

10.6.78 It is considered that there is a low potential for sudden noises during the operational phase of the development to cause disturbance impacts on SPA cited/review birds.

10.6.79 Sudden noise created during the operational phase from the emergency release valve associated with the boiler, HGV movements and other plant activities has the potential to disturb birds wintering in the area to cause them to cease feeding or fly away from the area of influence. It is recognised that loud and 'percussive' noises have the greatest potential to cause disturbance and a threshold has been identified from the published scientific literature of 80dB L_{Amax}.

10.6.80 Waterbirds occurring on the intertidal area are at their closest, circa 275 m from the boundary, and the maximum noise has been modelled here using the indicative source point of noise for emergency release valve at the northern end of the site to be no more than 69.7 dB LA_{eq}. The majority of waterbirds however occur in the wider Swale in areas where the maximum noise has been modelled as <60dB LA_{eqx} or less (as per data in Chapter 5). As a result there is no predicted effect due to sudden noises during the operational phase.

Air quality

10.6.81 Appendix 5.3 provides an analysis of the impacts of emissions to air of the Proposed Development on the features of interest of the SPA. For all pollutants (NO_x, NH_3, nutrient nitrogen deposition and acid deposition), as per the assessment criteria described in above (10.3.27) either the PEC did not exceed the EQS or the PC was <1% of the EQS for all interest features of the SPA.

10.6.82 Therefore, no impacts on the SPA interest features as a result of the operation of the Proposed Development are predicted.

Overshadowing/line of sight

10.6.83 During the operational phase of the development there is no potential for K4 to overshadow the SPA/Ramsar and block clear lines of sight for the bird species utilising the intertidal area, thereby causing them to abandon current feeding and roosting areas.

10.6.84 No impacts are anticipated.

Flight lines

10.6.85 Observations as part of the intertidal bird surveys and general observations on during the breeding bird survey have shown that the main flight lines for SPA/Ramsar species in the vicinity of the proposal are offshore, with no waterbirds being noted to fly over the site.

10.6.86 Given that the application site (and surrounding area) is already heavily industrialised, and that there are no wetland waterbodies within the vicinity of the SPA where the flight path would be across the development site; it is considered that the development will not impact the flight lines of SPA/Ramsar bird using the Swale.

10.6.87 As such, the magnitude of the impacts of disturbance from people and plant movement during operation on a feature of very high value would be negligible. This would result is a minor effect and is therefore not significant.

Medway Estuary and Marshes Ramsar and SPA

10.6.88 The main intertidal areas of the Medway Estuary and Marshes Ramsar/SPA are over 2.6 km from the Proposed Development. The development will continue to use the current drainage which is in place for K1 and K2, and therefore will not have any impact on the SPA/Ramsar.

10.6.89 At a minimum distance of 2.6 km, with considerable developed land between the proposal site and the Medway, any overshadowing, operational noise, lighting and disturbance from human activity from the operational phase of the development are unlikely to have significant impacts.

10.6.90 Appendix 5.3 provides an analysis of the impacts of emissions to air of the Proposed Development on the features of interest of the SPA. For all pollutants (NO_x, NH_3, nutrient nitrogen deposition and acid deposition), either the Predicted Environmental Concentration (PEC) did not exceed the Environmental Quality Standard (EQS) or the Process Contribution (PC) was <1% of the EQS for all interest features of the SPA. Therefore, no impacts on the SPA interest features as a result of the operation of theProposed Development are predicted.

10.6.91 Observations as part of the intertidal bird surveys and general observations on site during the breeding bird survey have shown that the main flight lines for SPA/Ramsar species in the vicinity of the proposal site are offshore, with no waterbirds being noted to fly over the proposal site. The site, and the surrounding area is already heavily industrialised, thus making it unlikely that waterbirds would pass through the proposal site on route to/from the Medway Estuary.

10.6.92 As the proposal site lies entirely on the landward side of the sea wall and birds do not fly over the sea wall and onto/over the Site in any significant numbers, it will not affect the flight lines of SPA/Ramsar birds using the Medway.

10.6.93 As such, the magnitude of the impacts of changes to flight lines during operation on a feature of very high value would be negligible. This would result is a minor effect and is therefore not significant.

Thames Estuary and Marshes Ramsar and SPA

10.6.94 The impact of the operational phase of the development on the Thames Estuary and Marshes SPA/Ramsar is described in detail in Appendix 10.2: Information to Inform a Habitats Regulations Assessment.

10.6.95 The main intertidal areas of the Thames Estuary and Marshes Ramsar/SPA are over 9 km from the Proposed Development. The development will continue to use the current drainage which is in place for K1 and K2, and therefore will not have any impact on the SPA/Ramsar.

10.6.96 At a distance of >9 km, with considerable developed land between the proposal site and the Thames, any overshadowing, operational noise, lighting and disturbance from human activity from the operational phase of the development are unlikely to have significant impacts.

10.6.97 Appendix 5.3 provides an analysis of the impacts of emissions to air of the Proposed Development on the features of interest of the SPA. For all pollutants (NO_x, NH_3, nutrient nitrogen deposition and acid deposition), either the Predicted Environmental Concentration (PEC) did not exceed the Environmental Quality Standard (EQS) or the Process Contribution (PC) was <1% of the EQS for all interest features of the SPA. Therefore, no impacts on the SPA interest features as a result of the operation of the Proposed Development are predicted.

10.6.98 As such, the magnitude of the impacts of changes to flight lines during operation on a feature of very high value would be negligible. This would result is a minor effect and is therefore not significant.

Outer Thames Estuary SPA (and pSPA)

10.6.99 The impact of the operational phase of the development on the Outer Thames Estuary SPA and pSPA is described in detail in Appendix 10.2. Information to Inform a Habitats Regulations Assessment.

10.6.100 The Site does not support any species or habitats for which the SPA has been designated, nor would it be suitable for foraging/breeding, as a result there will be no direct loss of habitat, or impacts to any SPA / Ramsar designated species.

10.6.101 Given the distance involved between the Site and the Outer Thames Estuary (> 9 km), and with suitable mitigation measures being employed (limited task lighting/dust suppression etc.) no operational impacts are anticipated from air quality, lighting, construction noise, traffic, or recreation.

10.6.102 The overall conclusion of this is that, once avoidance mechanisms are taken account of, the magnitude of the impacts of the operation of the facility on a feature of very high value, would be negligible. The resulting effect would be minor and therefore not significant.

Swale Estuary MCZ

10.6.103 The Swale MCZ is located (at its closest) 25 m south-east of the Site. It is a sub-tidal designated site and therefore there is no potential for disturbance of interest features during the operation of the Proposed Development.

10.6.104 The Proposed Development will not significantly change the total area of impermeable surface compared to pre-development. It will therefore retain the existing surface water drainage regime, where by surface water flows are conveyed, by an internal drainage network, to a current outflow into an isolated open channel forming within Kemsley Marshes. By virtue of gravity channel water is directed through the marshes parallel with the access track/ Barge Way. At the south west corner of the Country Style Recycling the stream abruptly turns east discharging into The Swale via an existing outflow.

10.6.105 Appropriate pollution prevention measures (e.g. class 1 interceptors, such as shut off valves with regular monitoring to ensure compliance) will be provided to prevent polluted flows from being discharged via the ditch network into the MCZ.

10.6.106 Process water from the Proposed Development will be neutralised in a desiccated sump and transferred to the existing AD Plant within the Mill site. This is operated under an existing permit which sets pH and water temperature limits for discharge into The Swale.

10.6.107 Therefore, it is considered likely that the magnitude of the impacts of changes to drainage during operation on a feature of high value would be negligible. This would result in a minor effect and is therefore not significant

Swale SSSI (high value)

10.6.108 Details of the analysis of impacts of emissions to air from the Proposed Development on habitats within the SSSI are provided in Appendix 5.3. The PC for NO_x, NH_3, acid deposition and nutrient nitrogen deposition is <1% of the EQS for all the habitats within the SSSI. Therefore, no impacts are predicted on the SSSI as a result of these pollutants.

10.6.109 As such, the magnitude of the impacts during operation on a feature of high value would be negligible. This would result in a minor effect and is therefore not significant.

Medway Estuary and Marshes SSSI

10.6.110 The Proposed Development is 2.6 km south of the SSSI, therefore, the only potential impact on the Medway Estuary and Marshes SSSI during operation would be via changes to air quality. Details of the analysis of impacts of emissions to air from the Proposed Development on habitats within the SSSI are provided in Appendix 5.3.

10.6.111 The PC for NO_x, NH_3, acid deposition and nutrient nitrogen deposition is <1% of the EQS for all the habitats within the SSSI. Therefore, no impacts are predicted on the SSSI as a result of these pollutants.

10.6.112 Consequently, the magnitude of the impacts during operation on a feature of high value would be negligible. This would result in a minor effect and is therefore not significant.

Elmley Island NNR (high value)

10.6.113 Elmley Island NNR is located 1.0 km to the east of the proposal site on the other side of the Swale and forms part of The Swale SPA/Ramsar. Given the distance, the only potential impacts to Elmley Island NNR from the operational phase would be noise and air quality.

Noise

10.6.114 It is considered that there is a low potential for sudden noises during the operational phase of the development to cause disturbance impacts on SPA cited birds using the habitats within the NNR.

10.6.115 Sudden noise created during the operational phase from emergency release valve associated with the boiler, HGV movements and other plant activities has the potential to disturb birds wintering in the area to cause them to cease feeding or fly away from the area of influence. It is recognised that loud and 'percussive' noises have the greatest potential to cause disturbance and a threshold has been identified from the published scientific literature of 80dB L_{Amax}.

10.6.116 The maximum noise has been modelled here using the indicative source point of noise for the emergency release valve at the northern end of the site to be <60 dB LA_{eq}. As a result there is no predicted effect due to sudden noises during the operational phase (Full details to be found in Chapter 7, Noise).

10.6.117 As such, the magnitude of the impacts of noise during operation on a feature of high value would be negligible. This would result in a minor effect and is therefore not significant.

Air quality

10.6.118 Elmley NNR is wholly within the Swale SPA. Therefore, although no specific modelling has been undertaken with respect to the habitats etc present in the NNR, these will be the same as for the SPA and therefore no significant impact from operational emissions to air are predicted.

10.6.119 Therefore, the magnitude of the impacts during operation on a feature of high value would be negligible. This would result in a minor effect and is therefore not significant.

Milton Creek LWS

Drainage

10.6.120 The Proposed Development will drain into The Swale to the north, following the existing drainage system. Process water from the Proposed Development will be neutralised in a desiccated sump and transferred to the existing AD Plant for the Paper Mill. This is operated under an existing permit which sets pH and water temperature limits for discharge into The Swale, approximately 900 m to the north of the LWS. Further to this, there will be no increase in the water volume generated on site.

10.6.121 Therefore, the magnitude of the impacts during operation on a feature of medium value would be negligible. This would result in a minor effect and is therefore not significant.

Light spill

10.6.122 The light scheme for the operational phase will follow best practice to minimise light impacts. The operational lighting design incorporates street lighting and flood lighting located on the site buildings to provide illumination to roads, car parks and hard standing areas.

10.6.123 Given the boundary of Milton Creek is 165 m from the site, combined with the current existing lighting on site, and surrounding the Mill and associated roads there will be a negligible impact magnitude on this medium value feature, resulting in a negligible/minor effect which is not considered significant.

Disturbance from people and plant movement

10.6.124 The movement of people and plant during the operational phase of the development may be visible to a small proportion of the SPA cited bird species using the intertidal areas of Milton Creek. It is considered there is a limited potential for disturbance to be caused by people when account is taken of the fact that:

- The SPA cited/review bird species feeding on the intertidal area adjacent to the proposed development Site are already habituated to people using the Knauf

Jetty, industrial areas behind the seawall and public footpath along the seawall itself.

- The bird distribution studies have shown the limited presence of SPA/Ramsar cited/review bird species on the intertidal area adjacent to the proposed development Site. The majority of SPA/Ramsar cited/review bird species on the intertidal area during all phases of the tide will be screened from people movement by the sea wall, buildings and topographical features.

10.6.125 Therefore, it is not anticipated that SPA cited/review birds will be disturbed by plant or people movement during the construction phase of the development. As such, the magnitude of the impacts of disturbance during operation on a feature of medium value would be negligible. This would result is a negligible effect and is therefore not significant.

<u>Noise</u>

10.6.126 It is considered that there is a low potential for sudden noises during the operational phase of the development to cause disturbance impacts on SPA cited/review birds.

10.6.127 Sudden noise created during the operational phase from the emergency release valve associated with the boiler, HGV movements and other plant activities has the potential to disturb birds wintering in the area to cause them to cease feeding or fly away from the area of influence. It is recognised that loud and 'percussive' noises have the greatest potential to cause disturbance and a threshold has been identified from the published scientific literature of 80dB L_{Amax}.

10.6.128 A noise modelling exercise with respect to the emergency release valve release showed that, at the nearest points within the LWS, the noise level would be between approximately 69 and 79 dBL_{Amax}. While this level is towards the upper end of any impact threshold, it would only occur very infrequently as the steam valve being released is an emergency event to prevent over-pressure building up within the system. K4 will include an oversized dump condenser that is not present within K1. This will decrease the need to operate the emergency release valve compared to the current situation for K1 in terms of frequency and duration. Therefore, given the infrequency of occurrence (and decrease in relation to the frequency of use for K1), the magnitude of the impacts of operational noise on a feature of medium value would be negligible. This would result is a negligible effect and is therefore not significant.

<u>Air quality</u>

10.6.129 Details of the analysis of impacts of emissions to air from the Proposed Development on habitats within the LWS are provided in Appendix 5.3.

10.6.130 The PC for NO_x, NH_3, acid deposition and nutrient nitrogen deposition is <1% of the EQS for all the habitats within the LWS. Therefore, no impacts are predicted on the LWS as a result of these pollutants.

10.6.131 As such, the magnitude of the impacts of changes to air quality during operation on a feature of medium value would be negligible. This would result in a negligible effect and is therefore not significant.

10.7 Decommissioning

10.7.1 While exact details of the decommissioning of K4 are not available, it is likely that this will require removal of plant and demolition of buildings. Such works could give rise to dust generation and noise from demolition works.

10.7.2 Assuming all good-practice methods are employed with respect to dust suppression, the potential for impacts on nearby receptors due to dust generation is considered low.

10.7.3 While the potential noise generation during demolition has not been specifically modelled, demolition works would be timed to avoid sensitive over-wintering/bird breeding periods, therefore reducing the potential for such impacts to occur.

10.8 Future Monitoring

10.8.1 As the site is not significantly impacting any ecological features, species or habitats, no strict mitigation is required with respect to this development. Therefore, no future monitoring is proposed.

10.9 Mitigation – Construction Phase

General mitigation – Dust impacts on designated sites

10.9.1 As set out in Chapter 5 (Section 5.8), standard, best practice dust-suppression methods will be used throughout the construction phase of the development, thereby avoiding any impacts as a result of dust settlement on habitats and species.

On-site habitats

10.9.2 There were no habitats (or habitat which could support protected species) on site pre-development that were of any ecological value, and therefore, there are no mitigation aims/objectives/measures necessary in regard to habitats.

10.10 Mitigation – Operational Phase

General mitigation – Dust impacts on designated sites

10.10.1 Standard, best practice dust-suppression methods will be used throughout the operational phase of the development, thereby avoiding any impacts as a result of dust settlement on habitats and species.

On-site habitats

10.10.2 There were no habitats (or habitat which could support protected species) on site pre-development that were of any ecological value, and therefore, there are no mitigation aims/objectives/measures necessary in regard to habitats.

10.11 Residual Effects

10.11.1 The residual effects of the proposed scheme once the above mitigation measures have been applied are not significant.

10.12 Cumulative Effects

10.12.1 The purpose of this section is to assess the cumulative effects of the Proposed Development with other developments near the site that are currently in the planning process or have been approved but are not yet constructed, as set out in Chapter 3. These have been reviewed for relevance with respect to ecology with the following considered further (planning references given before each project):

- SW/10/444 and EN010083: Development of a sustainable energy plant to serve Kemsley Paper Mill, comprising pre-treated waste fuel reception, moving grate technology, power generation and export facility, air cooled condenser, 2 no. stacks (90 metres high), transformer, bottom ash facility, steam pipe connection, office accommodation, vehicle parking, landscaping, drainage and access. Land to the East of Kemsley Paper Mill, Kemsley, Sittingbourne, Kent, ME10 2TD. Permitted April 2011;

- 16/507687/COUNTY County matters application for the construction and operation of an Incinerator Bottom Ash (IBA) Recycling Facility on land adjacent to the Kemsley Sustainable Energy Plant. Kemsley Mill Ridham Avenue Sittingbourne Kent ME10 2TD. Permitted February 2017.

- 16/501484/COUNTY County matter - The construction and operation of a gypsum recycling building with plant and machinery to recycle plasterboard and the re-configuration of the existing lorry park to include office/welfare facilities and ancillary supporting activities, including rain water harvesting tanks, container storage, new weighbridges, fuel tanks, hardstanding, safe lorry sheeting access platform and automated lorry wash. Countrystyle Recycling Storage Land Ridham Dock Road Sittingbourne Kent ME9 8SR. Permitted April 2016.

- SW/11/1291 Anaerobic digester and associated ground profiling and landscaping. Land To The North Of The DS Smith Paper Mill, Kemsley, Sittingbourne, Kent, ME9 8SR. Permitted July 2012.

- 14/500327/OUT Outline (Access not reserved) - Up to 8000m2 of Class B1 and B2 floor space and all necessary supporting infrastructure including roads, parking, open space, amenity landscaping, biodiversity enhancement and buffer to proposed extension to Milton Creek Country Park. Detailed approval for Phase 1 including (i) vehicular and pedestrian access to Swale Way; (ii) 30 space (approximately) informal car park to serve extension to Milton Creek Country Park; Change of use of approximately 13.31 ha of Kemsley Marshes as an extension to Milton Creek Country Park with footpath connections to the proposed informal car park. Land South Of Kemsley Mill, Swale Way Sittingbourne. Permitted July 2016.

- 14/502737/EIASCO Request for Scoping Opinion to determine the extent of an application for a combined heat and power plant at Ridham Docks. Ridham Docks, 3 Kemsley Fields Business Park, Ridham Dock Road, Sittingbourne. July 2014.

- 16/506935/COUNTY County Matters application for steam pipeline connecting the Ridham Dock Biomass Facility to the DS Smith Paper Mill14/501181/COUNTY KCC Regulation 13 - Scoping opinion as to the scope of an environmental impact assessment for a proposed combined heat and power plant at Ridham B. Ridham Dock, Sittingbourne, Kent. July 2014. Ridham Docks, Sittingbourne. Permitted October 2016.

- EN010083 Proposed application by K3 CHP Ltd., for an Order Granting Development Consent for the Wheelabrator Kemsley Power Upgrade Project. Scoping Opinion submitted December 2016.

- SW/15/500348 – Construction of advanced thermal conversion and energy facility (4Evergreen Technologies Ltd.)

- 17/505073/FULL Erection of a tile factory including service yard, storage yard and car parking area.

- 16/506193/ENVSCR EIA Screening Opinion - Outline application for proposed residential development of 275 dwellings including affordable housing with open spaces, appropriate landscaping and minor alterations to the surrounding highway network (access).

- 17/503713/ENVSCR | EIA Screening Opinion | Land East Of Iwade Woodpecker Drive Iwade Kent ME9 8ST.

- 16/501228/FULL – Construction of a new baling plant building - Construction of a new baling plant building within an existing waste paper storage yard.

- 15/510/589/OUT – Construction of a Business Park-

- SW/12/0816 – Relocation of Nicholls Transport depot from Lydbrook Close - iRelocation of Nicholls Transport depot from Lydbrook Close, Sittingbourne to land north of Swale Way (accommodating a notional 15% increase in the size of the company) with access to Swale Way; strategic landscaping buffer to A249; ancillary offices/amenity block; vehicle workshop; ancillary warehouse; vehicle wash-down and refuelling facilities; tractor and trailer parking area; surface water attenuation ponds and biodiversity enhancement; strategic footpath/cycleway link; staff parking; safeguarding of land fronting Swale Way and all necessary infrastructure.

- SW/14/0224 – Application for a solar farm - Solar farm, comprising the erection of solar arrays of photovoltaic panels, inverter and transformer sheds, fencing, site storage cabin, combined DNO and EPC switchgear housing, internal gravel access road, and associated equipment.

- SW/12/1211 – Construction of materials recycling facilities and waste transfer station - Construction and operation of a Materials Recycling Facility (MRF) and Waste Transfer Station (WTS) for Commercial and Industrial and Municipal Solid Waste and ancillary staff and fleet vehicle parking, vehicle workshop, 2 x weighbridges, fuel tank, sprinkler tank, pump house, substation, fencing and improved access and office and welfare facility.

- In preparation – access road at Kemsley Paper Mill to south of K4 site. (DS Smith Paper ltd.)

10.12.2 The potential for cumulative effects between the proposed development and the other proposals is dependent on those developments resulting in residual effects for the same habitats, species and populations as those using the development site.

10.12.3 Given the distance of the majority of these developments from the site (see Figure 3.2, Chapter 3), potential cumulative impacts with the proposals are limited to:

- The Swale Ramsar, SPA and SSSI;
- The Medway Estuary and Marshes Ramsar, SPA and SSSI; and
- Birds including Marsh Harrier, Bearded Tit and Cetti's Warbler

SW/10/444 and EN010083 Kemsley K3 SEP Plant

10.12.4 The proposed Kemsley SEP Plant (known as K3) is located 85 m north east of the proposed development. In-combination impacts to the Swale/Ramsar could occur via increased disturbance during construction, and the effects of urbanisation on the breeding Marsh Harrier using the reedbed.

10.12.5 A detailed consideration of these impacts is provided in the ES that accompanied the K3 planning application [Ref 10.21]. Following the reasoning presented there, it is possible that the general construction activity within the Proposed Development could further make the reedbed unattractive to this species. However, the existing proposed mitigation for this (1 ha of new reedbed habitat in an appropriate location on the Isle of Sheppey to provide alternative breeding habitat during the development) would also provide sufficient mitigation for any further disturbance/urbanisation associated with the Proposed Development in combination with the AD Plant.

10.12.6 To further avoid any activity disturbance related to human activity during the K3 construction, a 2.4 m closed-board wooden fence has been erected along the northern site boundary, as per the requirements of the K3 EcolMMP. This is still in place, and will be for the remaining construction of the development; therefore, it is considered that the reedbed is appropriately screened from the construction traffic travelling to and from the laydown area and therefore no in-combination effects are likely.

10.12.7 The assessment of cumulative impacts due to the operation of both K3 and K4 has been assessed within Chapter 5 (Appendix 5.3); no significant effects are predicted as the PEC NO_x is significantly less than the EQS (PEC = 14.2 $\mu g.m^{-3}$).

16/507687/COUNTY IBA Recycling Facility

10.12.8 County matters application for the construction and operation of an Incinerator Bottom Ash (IBA) Recycling Facility on land adjacent to the Kemsley Sustainable Energy Plant. Kemsley Mill Ridham Avenue Sittingbourne Kent ME10 2TD. Permitted February 2017. A detailed consideration of these impacts is provided in the Ecology Statement that accompanied the planning application. Following the reasoning presented there, it is possible that the general construction activity within the Proposed Development could further make the reedbed unattractive to Marsh Harrier, in combination with the IBA. However, the existing proposed mitigation for this (1 ha of new reedbed habitat in an appropriate location on the Isle of Sheppey to provide alternative breeding habitat during the development) would also provide sufficient mitigation for any further disturbance/urbanisation associated with the Proposed Development in combination with IBA Facility. No other in combination effects are considered possible.

16/501484/COUNTY Gypsum Recycling Building

10.12.9 Various developments have been proposed or are being constructed at the Countrystyle Recycling Ltd. site 650 m to the north of the proposed development. The largest of these includes 16/501484/COUNTY - Gypsum Recycling Building for which the Habitats Regulations Assessment submitted [Ref 10.23] identified potential impacts from the development with respect to changes in water quality and disturbance of wintering birds during impact piling. The proposed mitigation to avoid such impacts included a detailed surface water management plan and the timing of piling works to occur between May and September.

10.12.10 Given this, the lack of impacts associated with either of these pathways identified above from the proposed development and that all other developments on the site are minor and not considered to have any effect on The Swale, it is concluded that no in-combination effects with the Proposed Development or associated activities are likely.

SW/11/1291 - Kemsley AD Plant (DS Smith Paper)

10.12.11 The proposed Kemsley AD Plant is located on the far side of the reedbed 700 m to the north of the proposed development. In-combination impacts to the Swale SPA/Ramsar could occur via increased disturbance during construction and the effects of urbanisation on breeding Marsh Harrier using the reedbed.

10.12.12 A detailed consideration of these impacts is provided in the ES that accompanied the planning application [Ref 10.22]. Following the reasoning presented there, it is possible that the general construction activity within the Proposed Development could further make the reedbed unattractive to this species. However, the existing proposed mitigation for this (1 ha of new reedbed habitat in an appropriate location on the Isle of Sheppey to provide alternative breeding habitat during the development) would also provide sufficient mitigation for any further disturbance/urbanisation associated with the proposed development in combination with the AD Plant.

10.12.13 The maximum PC NO_x for the AD Plant at The Swale SPA was modelled as 1.38 $\mu g.m^{-3}$ (taken from Table 4.1 in Appendix 10.2 of the ES that accompanied the application [Ref 10.22]). Using the data in Appendix 5.3, the estimated PEC, in combination with K2, K3 and K4 would be 15.58 $\mu g.m^{-3}$, below the critical level of 30 $\mu g.m^{-3}$. Therefore, on the basis that the EQS is not exceeded, no effects are predicted.

SW /12/1001 - New rear access road and extension to trailer park to serve Kemsley Paper Mill (DS Smith Paper).

10.12.14 In addition to the AD Plant, DS Smith Paper has also submitted an application to extend their current trailer park 100 m to the north east of the proposal site. This application includes designs for the main access road into the K3 generating station and, therefore, impacts associated with it have been assessed above (10.12.4 *et seq.*) and no additional in-combination effects are considered likely.

14/500327/OUT New Offices

10.12.15 The proposed creation of up to 8,000 m^2 of new Class B1 and B2 floor space along with the extension of the Milton Creek Country Park 600 m to the south of the Proposed Development is in close proximity to The Swale SPA/SSSI/Ramsar. However, potential impacts associated with the development on these sites derive from an increased recreational use of the foreshore area by visitors to the Country Park. Since there are no such increases in recreational use associated with the proposed development, there are no overlapping pathways for effects to occur and therefore no in-combination effects.

14/502737/EIASCO and 16/506935/COUNTY – Works at Ridham Docks

10.12.16 Ridham Docks is 1.8 km to the north of the proposed development and comprises a range of industrial uses including a biomass incinerator (constructed), Materials Recycling Facility (MRF) and various storage facilities (including wood for the biomass incinerator). All of the current applications (submitted and not determined) relate to variations to existing permissions, none of which are considered likely to have an in-combination effect with the Proposed Development.

<u>SW/15/500348 – Construction of advanced thermal conversion and energy facility (4Evergreen Technologies Ltd.)</u>

10.12.17 The proposed energy facility will pyroloyse refuse-derived fuel to generate syngas that can then be burnt to generate heat and, subsequently, electricity. The process of burning the syngas leads to the emission to air of a range of chemicals, similar to those emitted by the Proposed Development. As part of the planning application, an assessment of the potential ecological effects of these emissions was completed [Ref 10.24]. This included an assumed in-combination assessment with the original K1 included in the background on nearby sensitive receptors that concluded such effects were unlikely to be significant. Since the emissions from the current application are less than those data included in the Argus Ecology assessment (Table 5.23), it can be concluded that in-combination effects as a result of emissions to air from the Proposed Development with the 4Evergreen facility are unlikely.

<u>17/505073/FULL Erection of a tile factory including service yard, storage yard and car parking area.</u>

10.12.18 The application is for a new tile factory, along with a storage yard, car park and associated landscaping features. As part of the planning application, a suite of ecological surveys were undertaken, including reptile, GCN, bird, otter and water vole. The assessment also looked at impacts on the nearby designated sites, however, it was concluded that, given the site was already highly disturbed, that the slight increase in noise would not negatively impact the birds using the SPA/Ramsar, especially given the mitigation measures, such as the creation of a bund. Therefore, although the site is located 1.2 km from the K4 site, no in-combination impacts are anticipated.

<u>16/506193/ENVSCR EIA Screening Opinion - Outline application for proposed residential development of 275 dwellings including affordable housing with open spaces, appropriate landscaping and minor alterations to the surrounding highway network (access).</u>

10.12.19 An EIA screening opinion has been requested on the above site. Limited information (apart form an illustrative masterplan) is available at this stage. However, given that the site is 2km from the Paper Mill, and the SPA/Ramsar, no in-combination impacts are anticipated.

<u>17/503713/ENVSCR | EIA Screening Opinion | Land East Of Iwade Woodpecker Drive Iwade Kent ME9 8ST.</u>

10.12.20 The proposals include a new residential housing development, of circa 440 new dwellings. To support the planning application, a suite of ecological surveys were carried out. The development is located within proximity to a number of designated sites, including The Swale SPA and Ramsar, The Thames Estuary and Marshes SPA and the Medway SPA and Marshes. However, the main pathway through which impacts were anticipated were via recreational pressure. It was considered that there was a large enough buffer between the site and the designated sites that noise and air impacts could be sufficiently ruled out with a Construction Environmental Management Plan (CEMP). On this basis, no in-combination impacts are expected between this development and K4.

<u>17/505073/FULL Erection of a tile factory including service yard, storage yard and car parking area.</u>

10.12.21 The application is for a new tile factory, along with a storage yard, car park and associated landscaping features. As part of the planning application, a suite of ecological surveys were undertaken, including reptile, GCN, bird, otter and water vole. The assessment also looked at impacts on the nearby designated sites, however, it was concluded that, given the site was already highly disturbed, that the slight increase in noise would not negatively impact the birds using the SPA/Ramsar, especially given the mitigation measures, such as the creation of a bund. Therefore, although the site is located 1.2 km from the K4 site, no in-combination impacts are anticipated.

<u>16/506193/ENVSCR EIA Screening Opinion - Outline application for proposed residential development of 275 dwellings including affordable housing with open spaces, appropriate landscaping and minor alterations to the surrounding highway network (access).</u>

10.12.22 An EIA screening opinion has been requested on the above site. Limited information (apart form an illustrative masterplan) is available at this stage. However, given that the site is over 2km from the Paper Mill, and the SPA/Ramsar, no in-combination impacts are anticipated.

<u>17/503713/ENVSCR | EIA Screening Opinion | Land East Of Iwade Woodpecker Drive Iwade Kent ME9 8ST.</u>

10.12.23 The proposals include a new residential housing development, of circa 440 new dwellings. To support the planning application, a suite of ecological surveys were carried out. The development is located within proximity to a number of designated sites, including The Swale SPA and Ramsar, The Thames Estuary and Marshes SPA and the Medway SPA and Marshes.

10.12.24 However, the main pathway through which impacts were anticipated were via recreational pressure. It was considered that there was a large enough buffer between the site and the designated sites that noise and air impacts could be sufficiently ruled out with a Construction Environmental Management Plan (CEMP). On this basis, no in-combination impacts are expected between this development and K4.

<u>18/500257/EIFUL Proposed development of 155 dwellings</u>

10.12.25 Proposed development of 155 dwellings (9 x 2 bed flats, 13 x 2 bed houses, 66 x 3 bed houses, and 67 x 4 bed houses) together with associated new access road, car parking, linear park with acoustic barrier to the A249, dedicated LEAP, allotments, areas of surface water drainage attenuation and ecological enhancement, and new planting, including an area planted in the style of an orchard.

10.12.26 This development, was subject to a suite of ecological surveys, which found limited protected species to be using the site. The main ecological impacts identified were on the SPA / Ramsar, focusing in particular on recreational pressures due to the increased residential properties. However, it was concluded and agreed with Natural England, that through providing an alternative area of greenspace, and via S.106 agreements, that these recreational impacts could be offset.

10.12.27 Air and noise quality impacts were not considered as an issue, due to the distance between the site and the development site; given this, no in-combination impacts are anticipated.

<u>15/500348/COUNTY | Install advance thermal conversion and energy facility at Kemsley Fields Business Park</u>

10.12.28 To produce energy and heat, including construction of new buildings to house thermal conversion and energy generation plant and equipment; construction of associated offices; erection of external plant including storage tanks; and erection of discharge stack (KCC planning application KCC/SW/0010/2015 refers).

10.12.29 An air quality assessment was undertaken for the site (Environmental Compliance 2014), which found that the proposed development would not negatively impacts The Swale SPA / Ramsar, as the nitrogen, sulphur dioxide and ammonia levels were not modelled to be above the critical loads.

10.12.30 Therefore, given that background concentrations/deposition rates are well below the relevant thresholds, no in combination effects are anticipated.

<u>18/500393/FULL Erection of a natural gas fuelled reserve power plant with a maximum export capacity of up to 12MW.</u>

10.12.31 Natural England have recently provided a response to this application, requiring more information on the air quality impacts on the SPA and Ramsar sites prior to a decision being issued. However, given that the Proposed Development replaces the older K1 and that background concentrations/depositions are well below relevant thresholds, it is unlikely that any in combination effects would occur.

<u>16/506014/EIASCO EIA Scoping Opinion - A sustainable urban extension comprising up to 1,100 new dwellings</u>

10.12.32 A sustainable urban extension comprising up to 1,100 new dwellings, of a range of sizes, types and tenures, including affordable housing), a site of 10.50 ha for a secondary and primary school, and public open and amenity space, together with associated landscaping, access, highways (including footpaths and cycle ways), parking, drainage (including a foul water pumping station), utilities and service infrastructure works.

10.12.33 The main pathway for impacts to the designated sites considered here from the proposed urban extension would be via increased recreational pressure, an issue screened out from the Proposed Development. Therefore, no in combination assessments are likely.

In preparation – access road at Kemsley Paper Mill (DS Smith Paper ltd.)

10.12.34 DS Smith Paper are proposing to provide a new access to the south of the paper mill site that has included the removal of the scrub habitat to the south of the K4 site and will also include the breaking out of concrete on the K4 site for use as hardcore in the new road construction (if permitted). The removal of scrub habitat was completed in winter 2017 (i.e. outside of the breeding bird season) and will be mitigated through the planting of a similar area of new scrub habitat elsewhere within the wider paper mill site to ensure that the total area of breeding Cetti's Warbler habitat is maintained. Therefore, in-combination impacts with K4 on this species are unlikely.

10.12.35 The breaking out of concrete will be undertaken using all best-practice dust suppression methods. The effects of noise disturbance have not yet been specifically assessed for the application. However, concrete peckers have a lower noise power level than percussive piling. Therefore, overall noise levels will be less than assessed for K4 in isolation and will not overlap in a temporal sense. As such, in-combination impacts are considered unlikely.

16/501228/FULL – Construction of a new baling plant building;

10.12.36 The proposed baling plant building is within the existing Kemsley Mill, the proposal is for a new building to house equipment to bale loose waste paper which is presently stored on site.

10.12.37 The building is to be constructed on land that is entirely hardstanding, and no protected species surveys were undertaken as part of the application. Natural England were consulted in conjunction with this application, and concluded that it is not likely to have a significant effect on the interest features for which The Swale Ramsar and SPA have been classified. Natural England advised that an Appropriate Assessment was not necessary.

10.12.38 Given that no noise/air impacts are anticipated from the operation of the new baling house, no in-combination impacts are considered likely. Traffic levels are not considered to increase either, and so, no in-combination impacts are considered further.

15/510/589/OUT – Construction of a Business Park;

10.12.1 Outline application (now with reserved matters consent) for the development of a new business park north of Swale Way in Sittingbourne. No potential pathways for effects on nearby designated sites from the application were identified by Natural England in their consultation response to the application. Therefore, in combination effects with the Proposed Development are considered unlikely.

SW/12/0816 – Relocation of Nicholls Transport depot from Lydbrook Close;

10.12.2 Relocation of Nicholls Transport depot from Lydbrook Close, Sittingbourne to land north of Swale Way (accommodating a notional 15% increase in the size of the company).

10.12.3 A range of ecological surveys and a screening assessment were undertaken as part of the planning application. Noise impacts were screened out on the basis that the site is closer to the much louder A249 road, and so the expected noise levels associated with the development are going to be lower than that of the road.

10.12.4 Any air quality issues have been mitigated via using appropriate mitigation measures, such as dust suppression and limits on traffic. Further to this, it is expected that the railway embankment will be acting as a significant barrier between the site and SPA, ultimately limiting any negative impacts, and by association, ruling out any in-combination impacts.

SW/14/0224 – Application for a solar farm;

10.12.5 An application for a solar farm, on 38 hectares of arable farmland on the Tonge Corner Farm, near Sittingbourne, Kent.

10.12.6 Wintering bird surveys found that the arable fields provided occasional opportunities for curlew and golden plover. Redshank and Lapwing were also recorded within the arable land but in very low numbers and on only a small number of occasions (Michael Woods and Associates, 2014). Other species associated with the nearby SPA and Ramsar site were recorded in adjacent habitats, in particular over the sheep grazed pasture to the north of the application area.

10.12.7 In order to ensure that no negative impacts occur on the SPA / Ramsar, all good-practise dust suppression measures were used during the construction phase of the development. Noise was not considered to be an issue, during either the construction or the operational phase. The increased ecological landscaping, aimed at providing habitat for wintering birds, will also increase the carrying capacity of the site.

10.12.8 Given this, the lack of impacts associated with any of these pathways identified above from the proposed development and that all other developments on the site are minor and not considered to have any effect on The Swale, it is concluded that no in-combination effects with the Kemsley generating station or associated activities are likely.

SW/12/1211 – Construction of materials recycling facilities and waste transfer station.

10.12.9 Construction and operation of a Materials Recycling Facility (MRF) and Waste Transfer Station (WTS) for Commercial and Industrial and Municipal Solid Waste and ancillary staff and fleet vehicle parking, vehicle workshop, 2 x weighbridges, fuel tank, sprinkler tank, pump house, substation, fencing and improved access and office and welfare facility.

10.12.10 Prior to development, the land comprised hardstanding with a thin strip of ruderal vegetation present (SLR Consulting, 2012). The application site was located nearby to The Swale SPA and Ramsar, and so a HRA was undertaken.

10.12.11 Given the distance of the site from the SPA / Ramsar, no impacts from air quality/noise are anticipated (as no dust etc. would settle within the SPA / Ramsar). Therefore, no in-combination impacts are anticipated.

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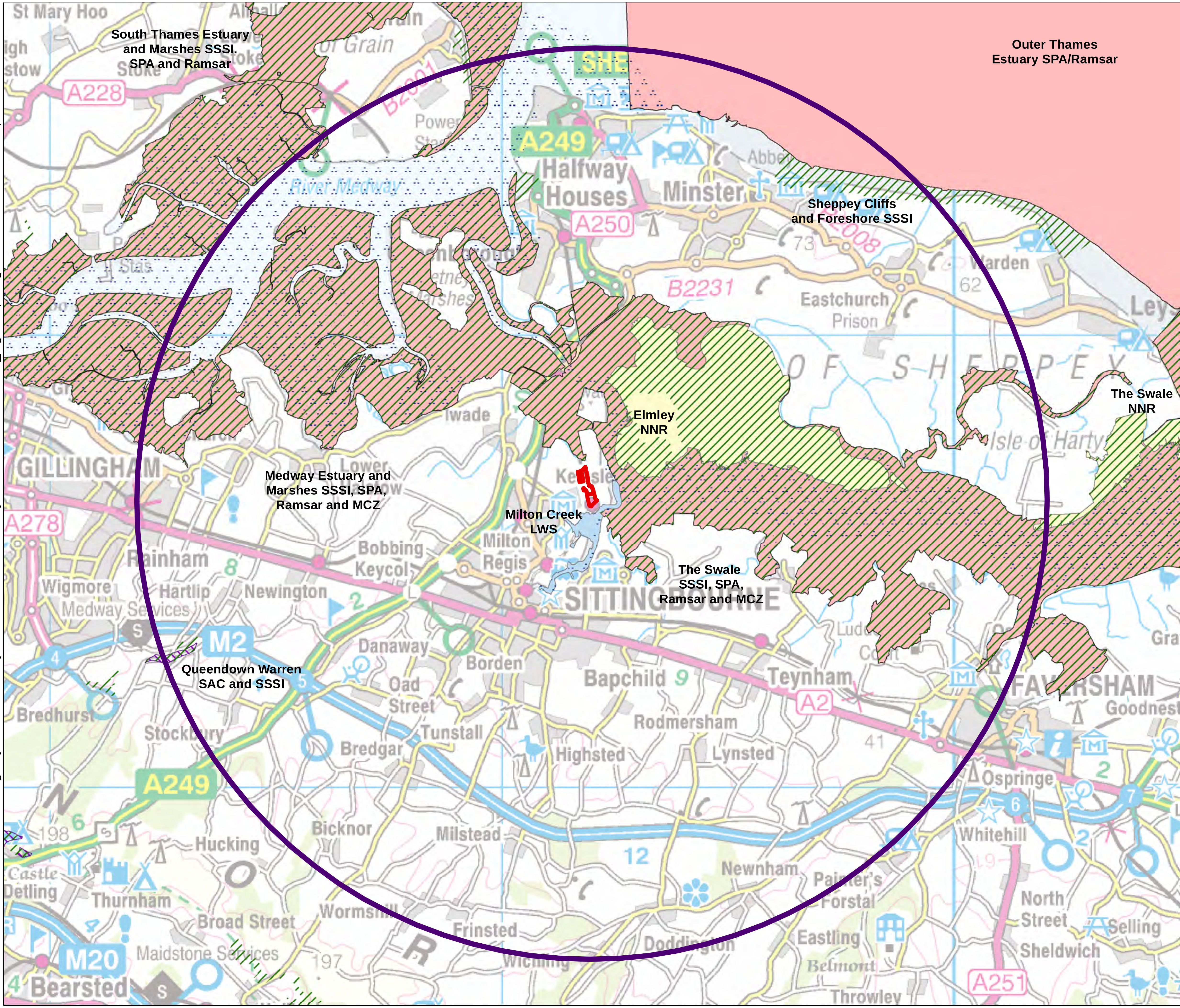

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Legend

- Application boundary
- 10 km radius from boundary
- SPA/Ramsar
- MCZ
- SAC
- SSSI
- NNR
- LWS

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Client DS Smitth

Project Kemsley K4

Title Designated Sites Location Plan

Status	Drawn By	PM/Checked By
Information	HK	NB
Job Ref	**Scale @ A3**	**Date Created**
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Figure Number **10.1**

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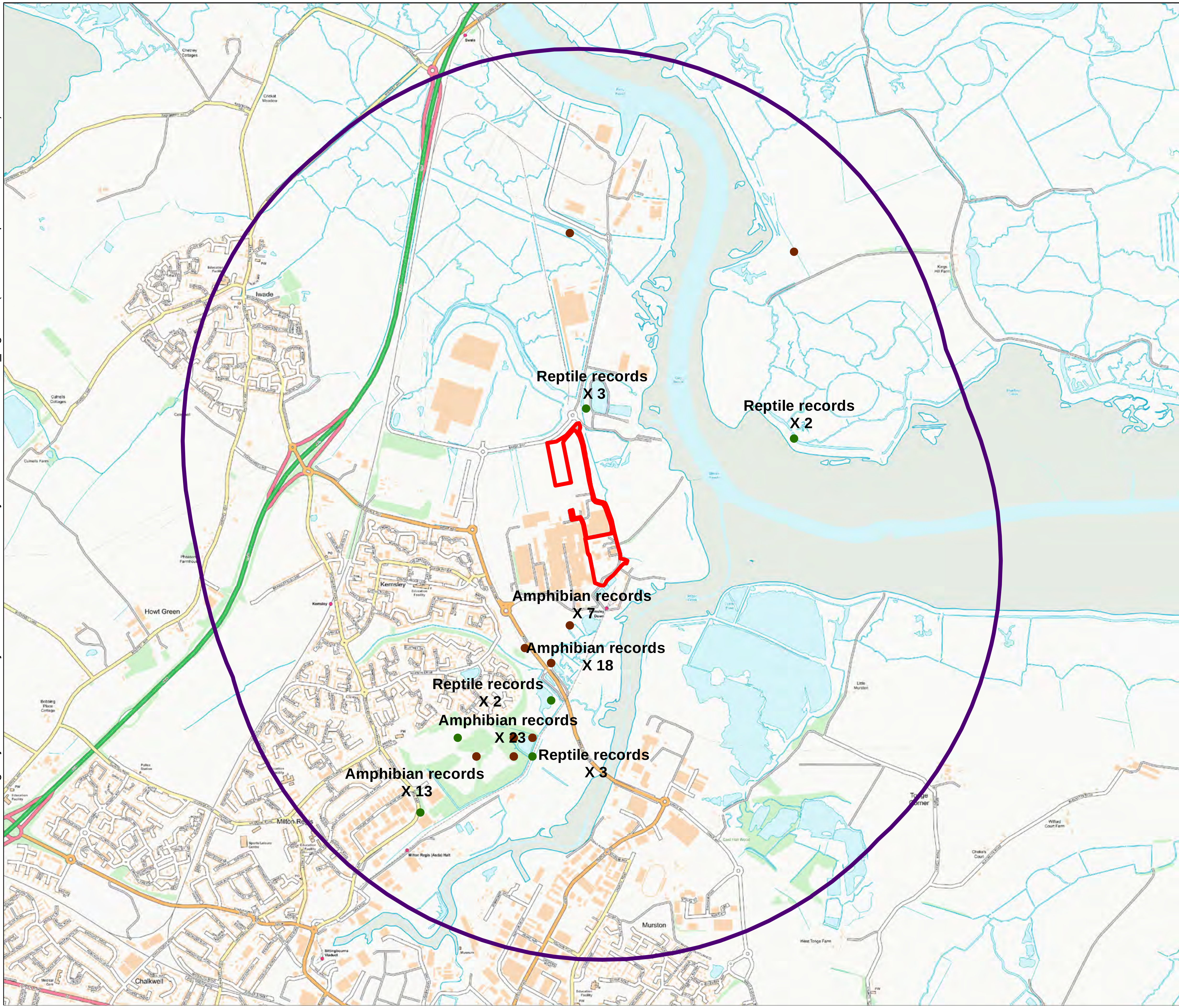

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Legend

Application boundary

2 km radius from site

Species

Amphibian

Reptile

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Title Protected Species Distributions - Amphibians and Reptiles

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Figure Number **10.2a**

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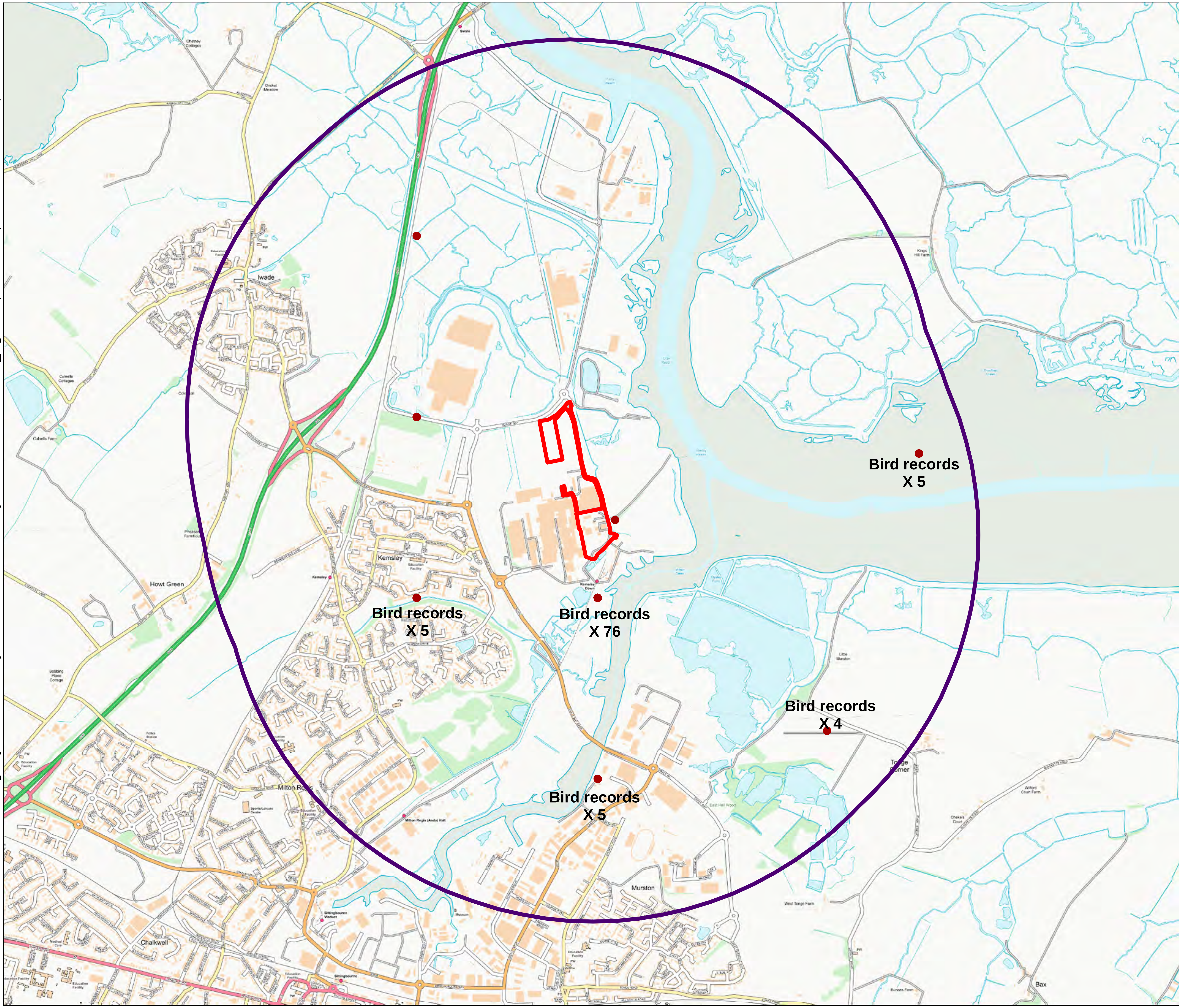

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Legend

Application boundary

2 km radius from site

Species

Bird

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Title Protected Species Distributions -Birds

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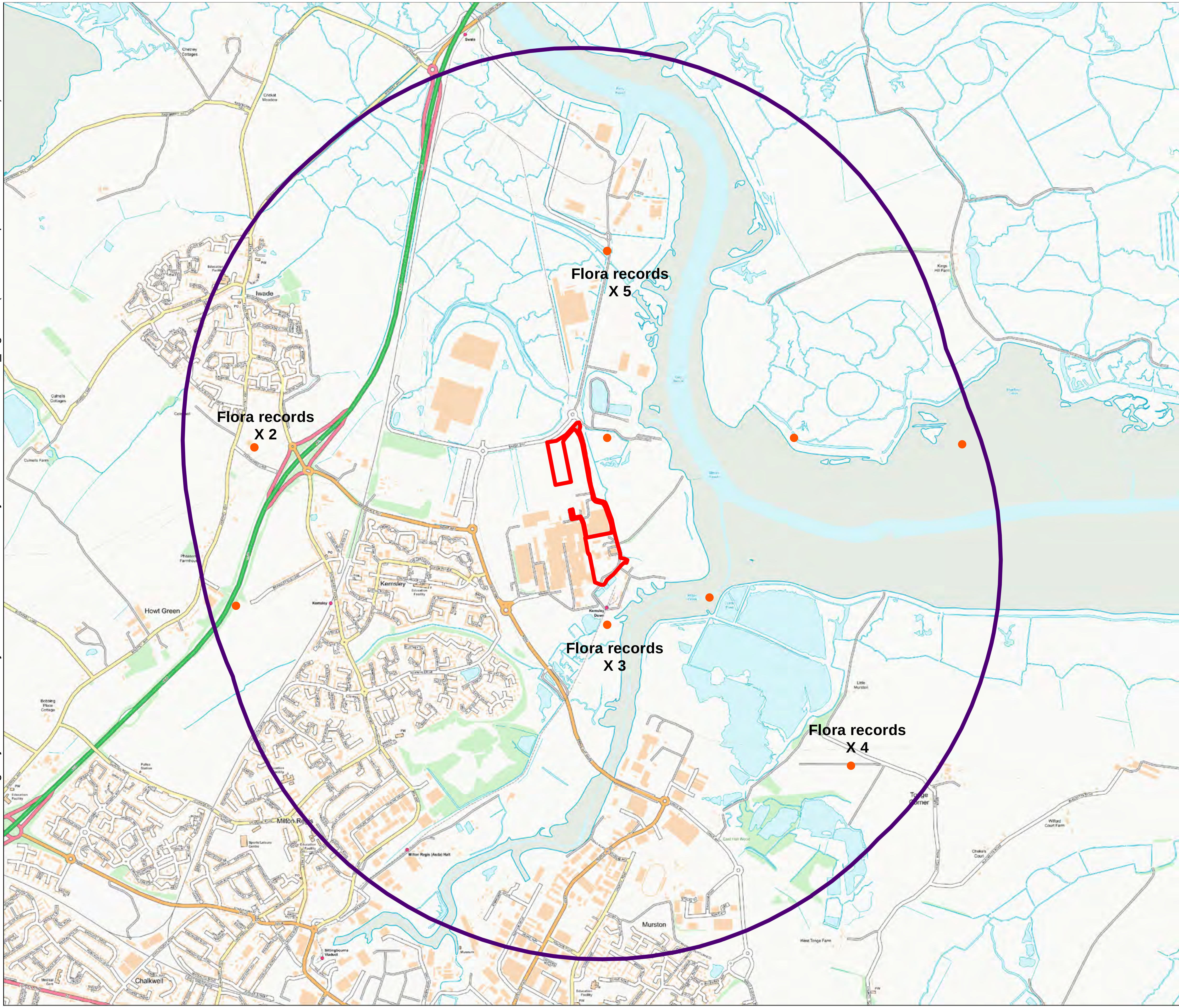

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Legend

2 km radius from site

10392D_180119RM_RedLine

Species

Flora

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Title Protected Species Distributions -Flora

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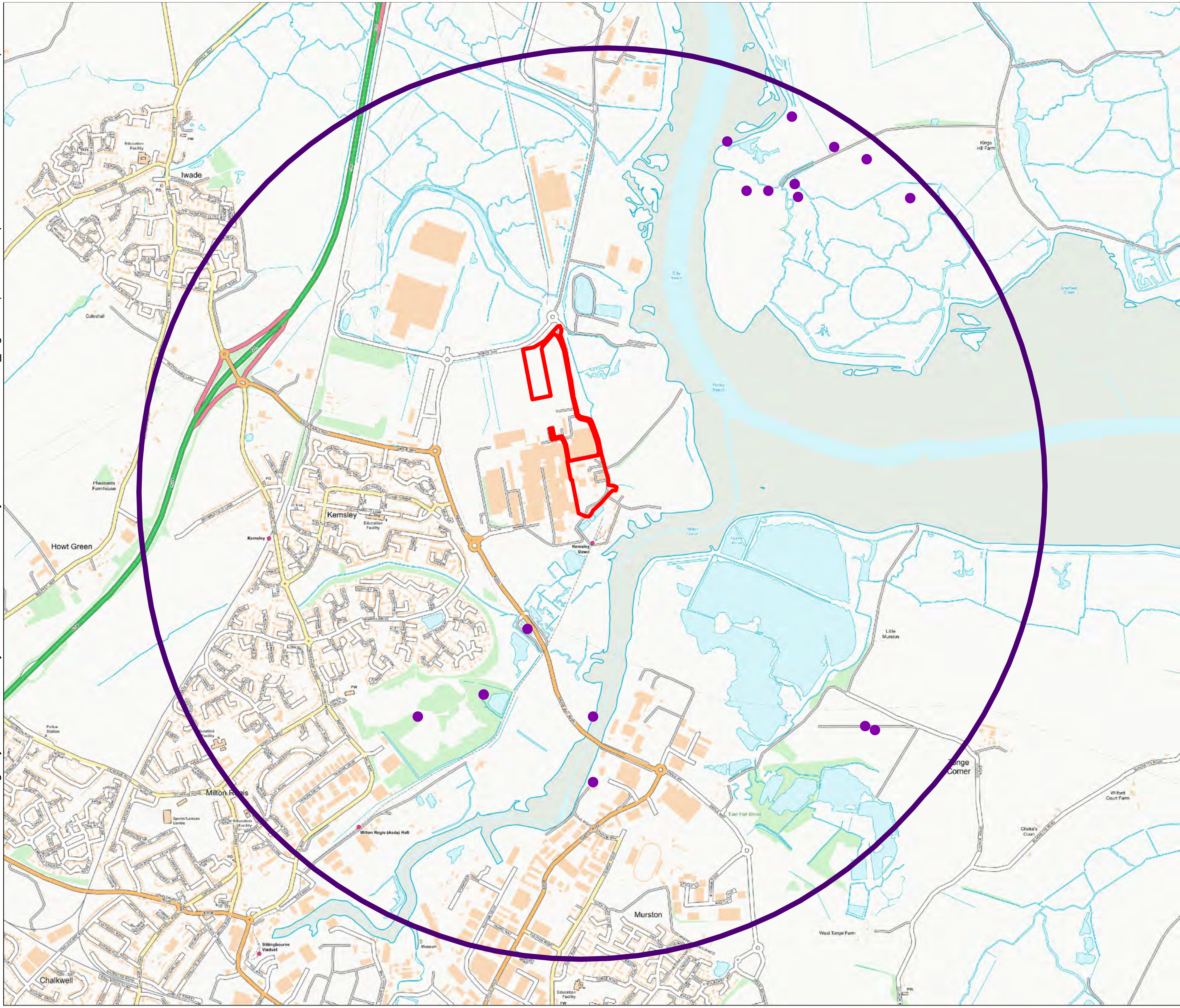

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Legend

Application boundary

Species

Invertebrate

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Title Protected Species Distributions - Invertebrates

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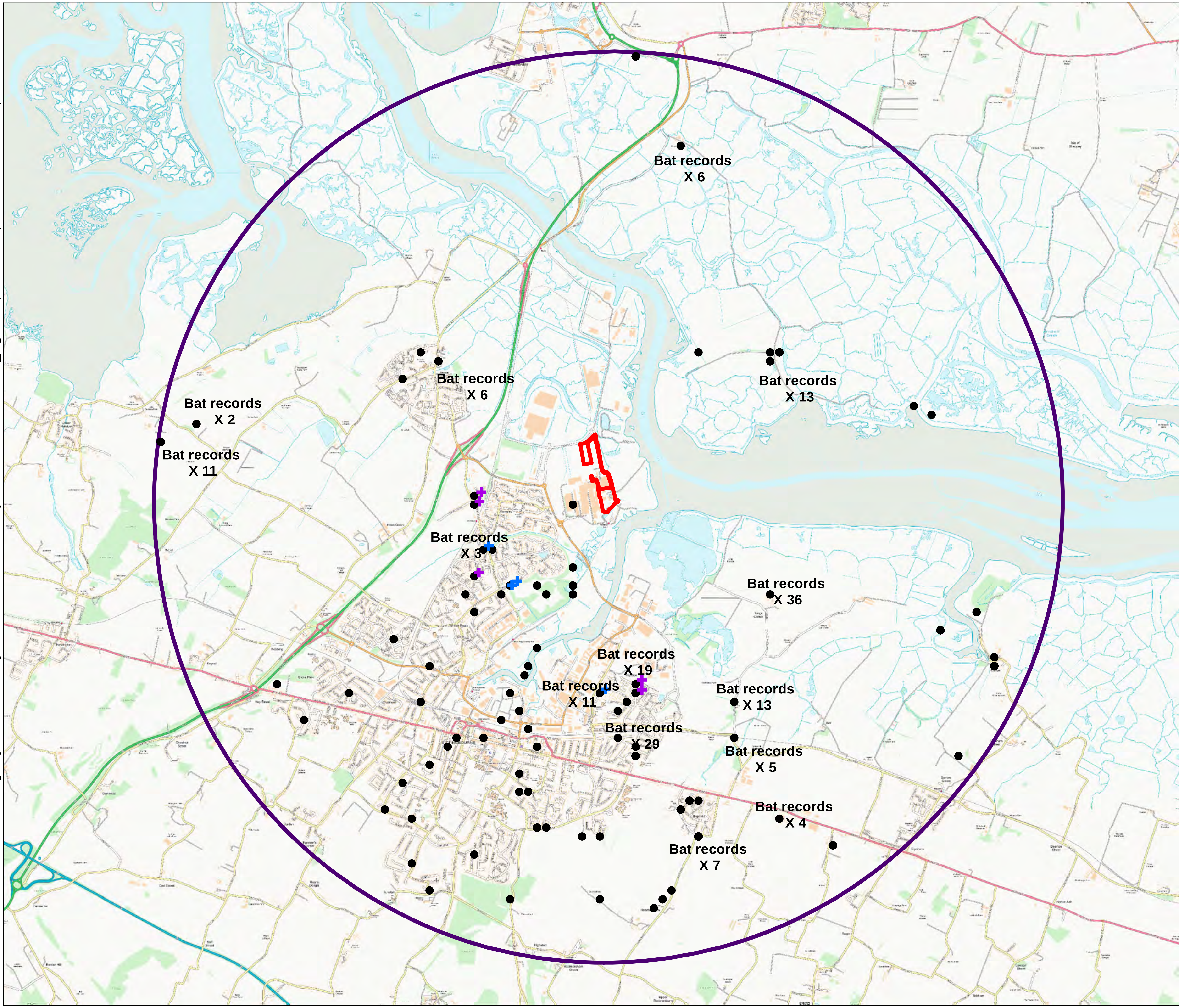

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Legend

- Application boundary
- 5 km radius from site

Species

- Mammal (bat)
- Known bat roost
- Maternity roost

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Title Protected Species Distributions - Bats

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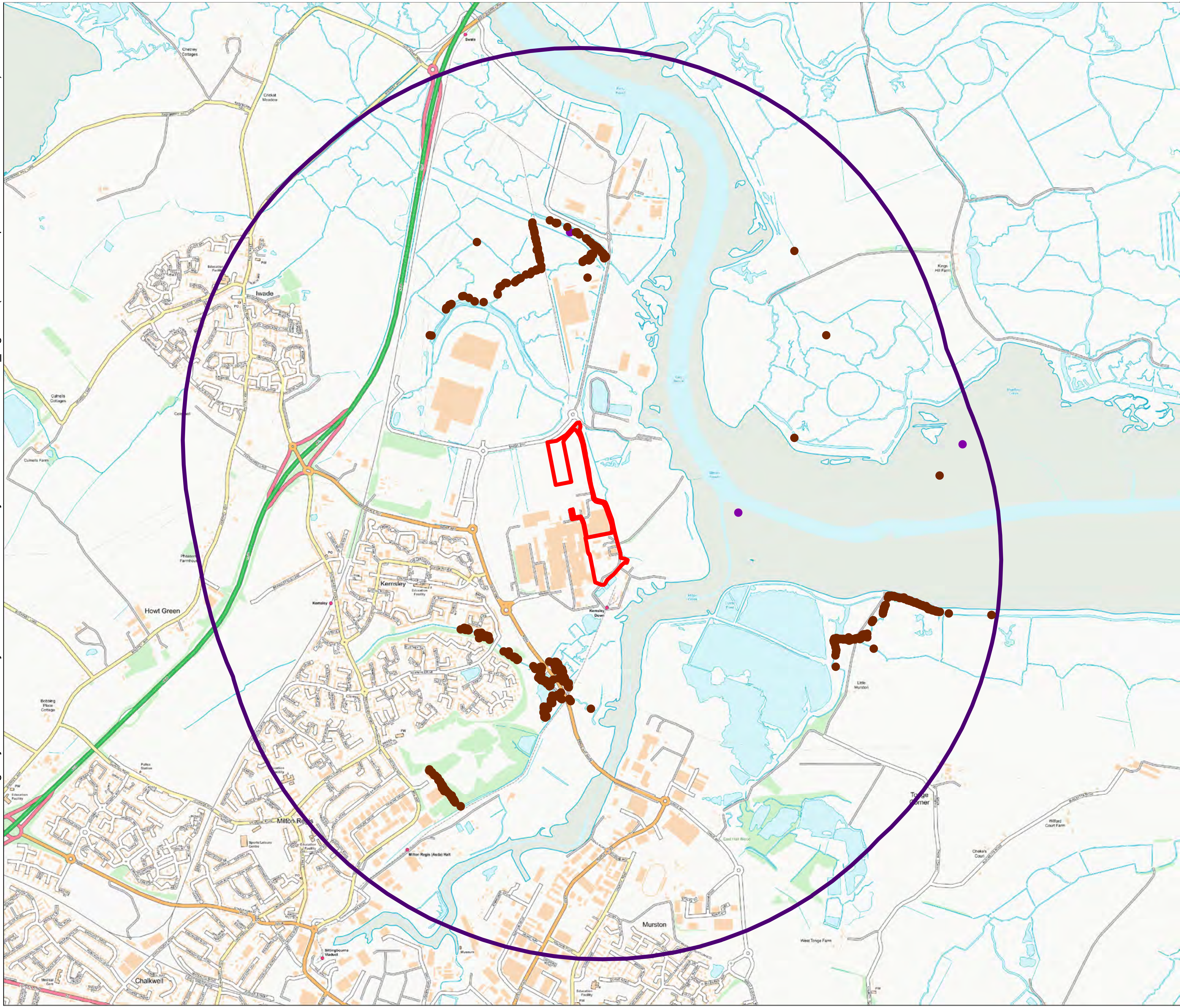

Legend

- Application boundary
- 2 km radius from site
- Mammal (shrew)
- Mammal (water vole)

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Client DS Smith

Project Kemsley K4

Title Protected Species Distributions - Mammals

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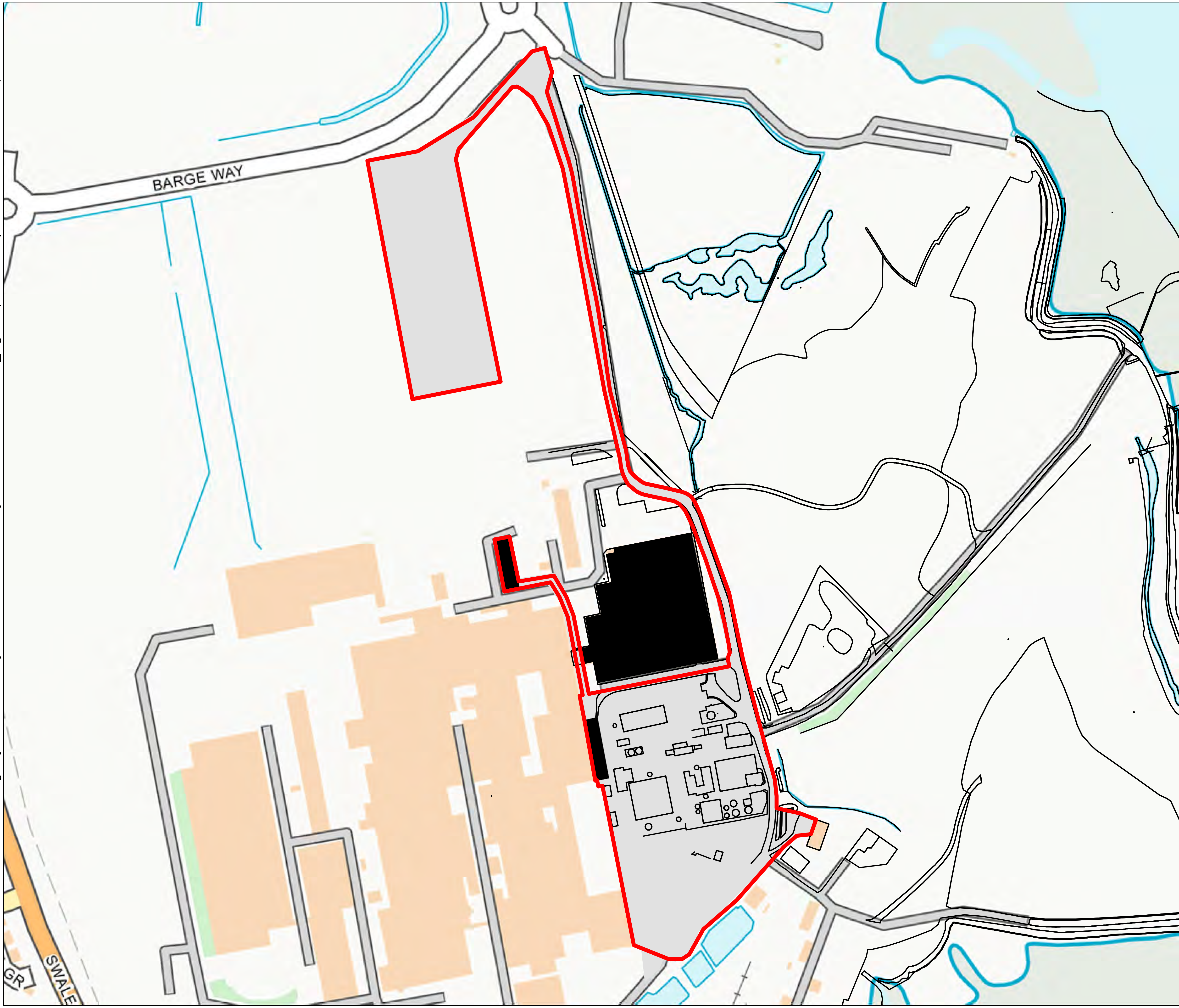

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Legend

- Application boundary
- Hardstanding
- Buildings

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Project Kemsley K4

Title Phase 1 Habitat Survey Map

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Figure Number **10.3** Rev **-**

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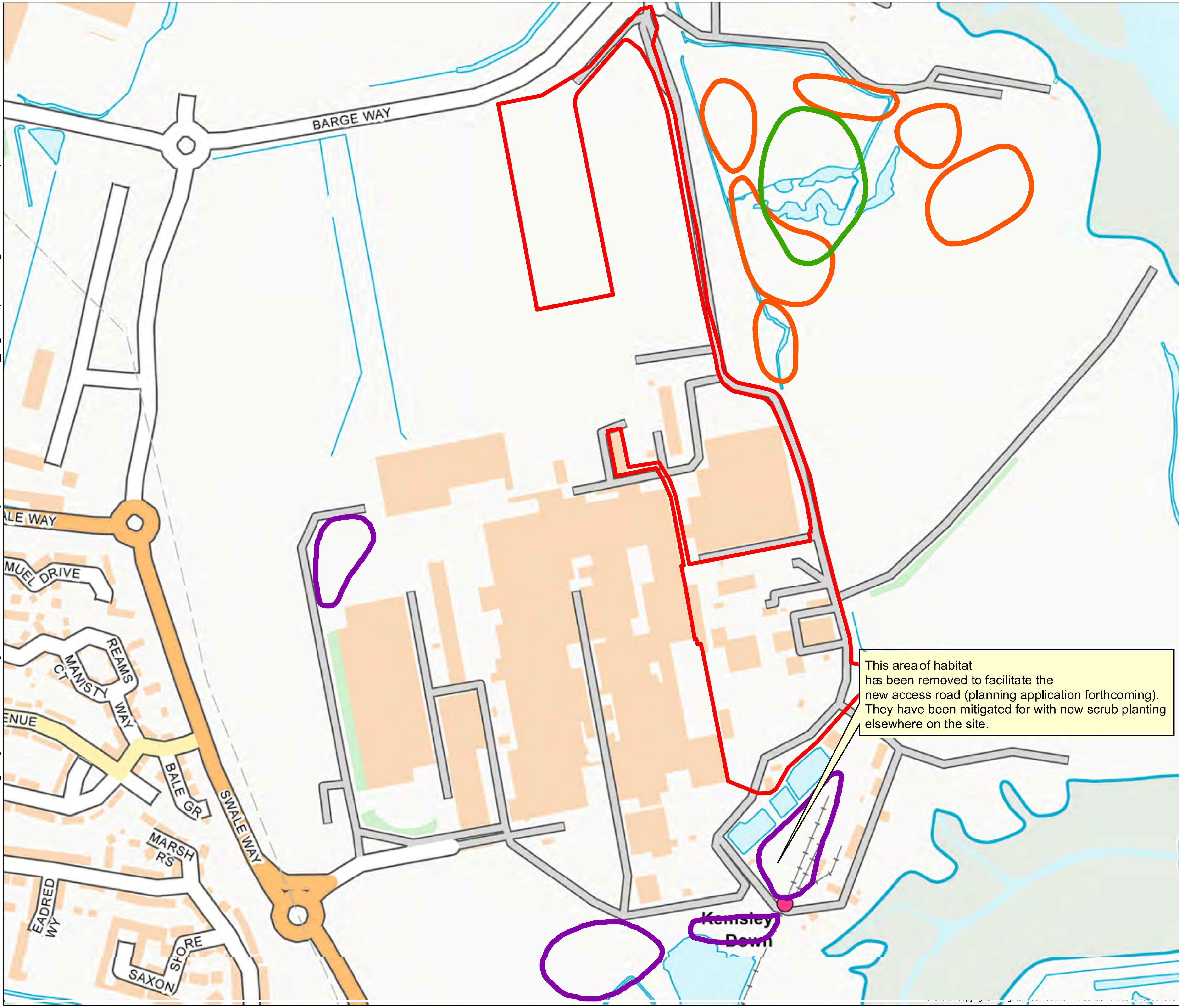

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Legend

- Application boundary
- CW (Cetti's Warbler)
- MR (Marsh Harrier)
- CW (Cetti's Warbler - assumed territories)

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Client DS Smith

Project Kemsley K4

Title Breeding Bird Territories

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Information	HK	NB
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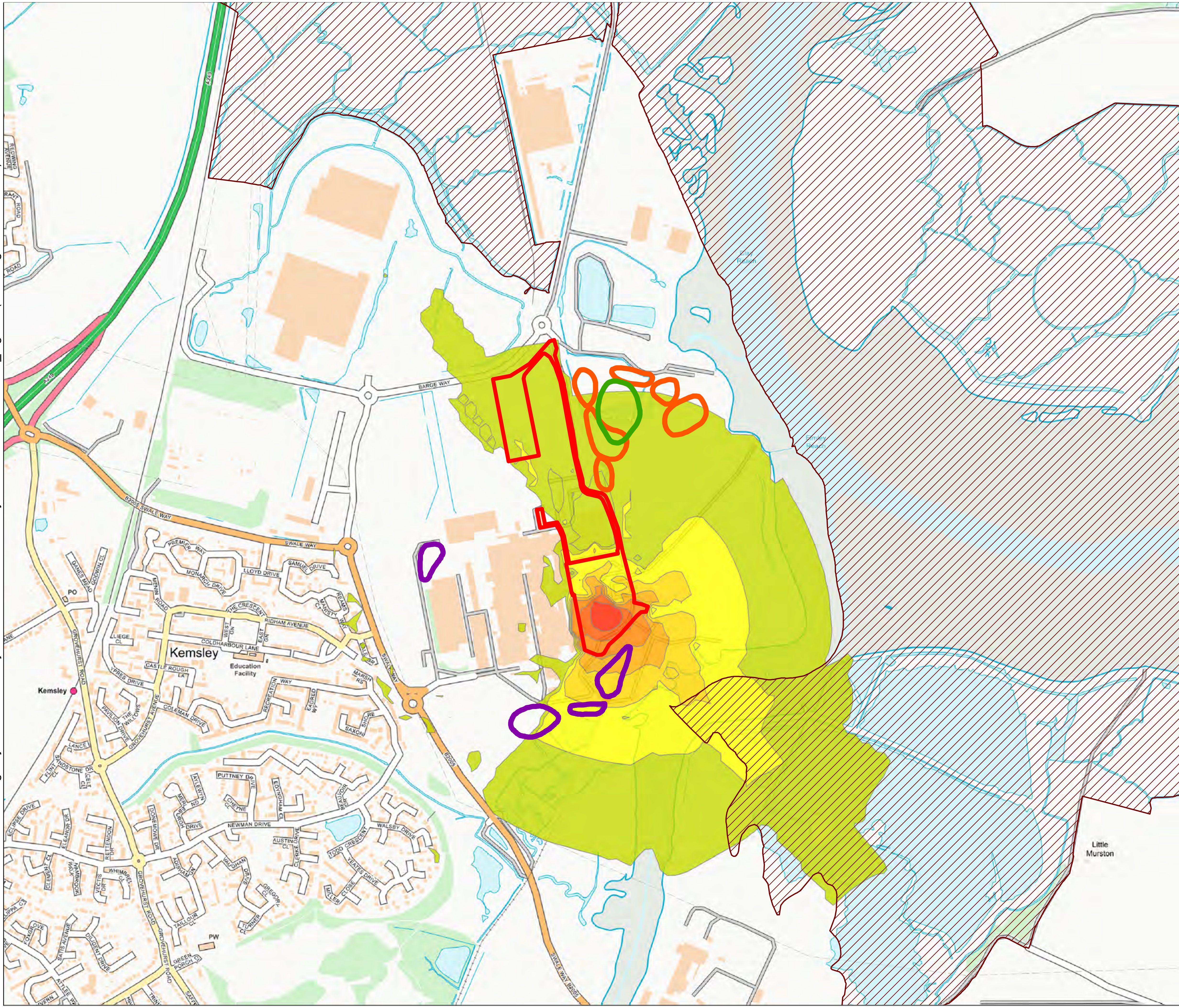

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Legend

- Application boundary
- CW (Cetti's Warbler)
- MR (Marsh Harrier)
- CW (Cetti's Warbler - assumed territories)
- SPA / Ramsar

Noise level LAmax (dB)

- 55<=60
- 60<=65
- 65<=70
- 70<=75
- 75<=80
- 80<=85
- 85 <

Rev	Description	Date	Initial	Checked
A	Updated to show contours above 55dB	03.18	HK	NB

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Client DS Smith

Project Kemsley K4

Title Construction Noise Contours & Birds

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Job Ref	**Scale @ A3**	**Date Created**
OXF10392	1:10,000	03.2018

Figure Number **10.5**

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11 Landscape and visual resources

11.1 Introduction

11.1.1 This chapter assesses the likely significant landscape and visual effects resulting from the Proposed Development. This includes identification of the character and features of the landscape and townscape and consideration of the changes that would result as a consequence of the Proposed Development. In addition, it considers the potential visual effects arising as a result of the Proposed Development. The chapter reports on studies, including a combination of field surveys and desktop research, to describe, classify and evaluate the existing resource.

11.1.2 The principal objectives of the assessment are:

- to describe, classify and evaluate the existing landscape and townscape likely to be affected by the Proposed Development during its construction and operational phases;
- to identify visual receptors with views of the Proposed Development; and
- to identify the likely significant effects on landscape, townscape and views, taking into account measures proposed to reduce or avoid any effects identified.

11.2 Regulatory and Policy Framework

Planning Policies

National Policy Statement for Energy (EN-1)

11.2.1 The overarching National Policy Statement for Energy at Section 5.9 states:

"The landscape and visual assessment should include reference to any landscape character assessment and associated studies as a means of assessing landscape impacts relevant to the proposed project. The applicant's assessment should also take account of any relevant policies based on these assessments in local development documents in England and local development plans in Wales. The applicant's assessment should include the effects during construction of the project and the effects of the completed development and its operation on landscape components and landscape character. The assessment should include the visibility and conspicuousness of the project during construction and of the presence and operation of the project and potential impacts on views and visual amenity. This should include light pollution effects, including on local amenity, and nature conservation (Department of Energy and Climate Change (DECC), 2011a)."

National Planning Policy Framework (NPPF)

11.2.2 The Department for Communities and Local Government published the National Planning Policy Framework (NPPF) in March 2012. The document sets out broad aims to achieve sustainable development.

11.2.3 Paragraph 17 of the NPPF includes 12 core land-use planning principles which are considered important to plan-making and decision-taking. The fifth principle has relevance to landscape character and states that planning should *'take account of the different roles and character of different areas …recognising the intrinsic character and beauty of the countryside and supporting thriving communities within it'*.

11.2.4 There are general policies about achieving high quality and inclusive design for all development (Paragraph 57). This is to ensure that developments will function well and add to the overall quality of the area, establish a strong sense of place and create an attractive and comfortable place to visit. Proposals should optimise the potential of the Site to accommodate development. Developments should respond to the local character and history and reflect the identity of local surroundings and materials whilst not discouraging innovative design. The development should create safe and accessible environments that are visually attractive with appropriate landscaping (Paragraph 58).

11.2.5 The Government attaches great importance to good design. New development should take into consideration the overall scale, density, massing, height, height, landscape, layout, materials and access arrangements in relation to neighbouring buildings and the local area more generally (Paragraph 59).

11.2.6 Local planning authorities should not refuse planning permission for buildings or infrastructure which promote high levels of sustainability because of concerns about incompatibility with existing townscape, if those concerns have been mitigated by good design (Paragraph 65).

11.2.7 Chapter 11: Conserving and Enhancing the Natural Environment. Paragraph 109 highlights the importance of "*protecting and enhancing valued landscapes*". Paragraph 115 states that "*Great weight should be given to conserving landscape and scenic beauty in National Parks, the Broads and Areas of Outstanding Natural Beauty, which have the highest status of protection in relation to landscape and scenic beauty.*"

11.2.8 The use of previously developed land should be encouraged and the remediation and mitigation of despoiled, degraded or derelict land. The creation, protection, enhancement and management of networks of biodiversity and green infrastructure should be planned for (Paragraph 114).

<u>Kent County Council</u>

11.2.9 The Kent Minerals and Waste Local Plan 3013 – 2030 was adopted in July 2016. Policy DM1 is concerned with Sustainable Development. The policy states that proposals should demonstrate that they have been designed to *'protect and enhance the character and quality of the Site's setting'*. The surrounding rural marshland and The Swale will be taken into consideration within this assessment.

<u>Swale Borough Council</u>

11.2.10 The Bearing Fruits 2031: The Swale Borough Local Plan was adopted in July 2017 and provides the policy baseline for the following issues relevant to the assessment:

- Policy ST1: Delivering Sustainable development in Swale

9e. maintaining the individual character, integrity, identities and settings of settlements.

11b. using landscape character assessments to protect, and where possible, enhance, the intrinsic character, beauty and tranquillity of the countryside, with emphasis on the estuarine, woodland, dry valley, down-land and horticultural landscapes that define the landscape character of Swale.

- Policy ST 5: The Sittingbourne Area Strategy.
- Policy DM 14: General Development Criteria
- Policy DM 19: Sustainable Design and Construction
- Policy DM 22: The Coast
- Policy DM 24 Conserving and Enhancing Valued Landscapes
- Policy CP 4: Requiring Good Design
- Policy CP 7: Conserving and Enhancing the Natural Environment – Providing for Green Infrastructure

Relevant Guidance

11.2.11 As a matter of best practice, this assessment has been undertaken based on the relevant guidance on landscape and visual assessment. This includes:

- Guidelines for Landscape and Visual Impact Assessment 3rd Edition (Landscape Institute and Institute of Environmental Management and Assessment, 2013); and
- Landscape Character Assessment – Guidance for England and Scotland (The Countryside Agency and Scottish Natural Heritage, 2002).

11.3 Methodology

Scoping and Consultation

11.3.1 The formal scoping exercise is set out in Chapter 3 of the Environmental Statement with a summary of consultation responses set out in Appendix 3.1.

11.3.2 The landscape and visual resources sections of the scoping report to a commitment to consult with Kent County Council and Swale Borough Council regarding the choice of representative photographic viewpoint locations to inform the landscape, townscape and visual impact assessment. An email was sent to these two consultees on 11th December 2017 including a location plan with ZTV's and viewpoint locations and a set of corresponding photographs which included a required focus on users of the Saxon Shore Way public footpath ZU1/ZU2, as defined in the scoping opinion. Kent County Council responded by email on 9th January 2018 confirming that the proposed viewpoints are approved (See Appendix 11.1).

Establishing Baseline Conditions

Study Area

11.3.3 The landscape, townscape and visual resources study area is defined by the Proposed Development 's Zone of Theoretical Visibility (ZTV). This is based on two key elements of the Proposed Development including a stack height of 70 m (above existing ground level)the tallest element of infrastructure within the Proposed Development) and main generating station building height of 35.2 m above existing ground levels (the tallest building within the Proposed Development). Two elements of the proposed scheme have been used to generate ZTV's as, although the stack is the tallest element it is slender and relatively unobtrusive at long distances. The buildings, although shorter, have greater bulk and massing and could potentially be visible at greater distances than the stack. A maximum 10 km radius study area has been applied to capture all key receptors (See Figure 11.1).

Proposed Approach

11.3.4 As set out in the GLVIA3, the LVIA assesses landscape and visual effects separately, although the procedure for assessing each of these is closely linked. A clear distinction has been drawn between landscape and visual effects as described below:

- Landscape effects relate to the effects of a Proposed Development on the physical characteristics of the landscape and townscape and its resulting character and quality; and
- Visual effects relate to the effects on views experienced by visual receptors (e.g. residents, footpath users, tourists etc.) and on the visual amenity experienced by those people.

11.3.5 The LVIA assesses the short-term effects of the construction and decommissioning phases and the long-term effects relating to the operation and maintenance phase.

11.3.6 Consideration has been given to the likely seasonal variations in the visibility of the development, including variations in weather conditions and deciduous vegetation.

11.3.7 The assessment is illustrated by photographs towards the existing site from 14 publicly accessible viewpoints. Photomontages have been prepared for three key viewpoint locations on the Saxon Shore Way (future England Coast Path) and on the Swale Way bridge over the Saxon Shore Way at Milton Creek to reflect responses received during consultation from PINS and Kent County Council, and to illustrate the Proposed Development within the existing context of the surrounding landscape and townscape.

Assessment of Effects

Receptor Sensitivity

11.3.8 The sensitivity or susceptibility of a landscape or townscape to change varies according to the nature of the existing resource and the nature of the proposed change. Considerations of value, integrity and capacity are all relevant when assessing sensitivity. For the purpose of this assessment, these terms are defined as follows:

- Value: the relative value that is attached to different landscapes by society. A landscape may be valued by different stakeholders for a whole variety of reasons. Landscapes can be recognised through national, regional or local designation. Views tend not to be designated, but value can be recognised through a named location shown on a map, or through the creation of a parking lay-by or location of a bench to appreciate a view;

- Integrity: the degree to which the value has been retained, the condition and integrity of the landscape or the view; and

- Capacity: the ability of a landscape, townscape or view to accommodate the proposed change while retaining the essential characteristics which define it.

11.3.9 Sensitivity, or susceptibility, is not readily graded in bands. However, in order to provide both consistency and transparency to the assessment process, Tables 11.2 and 11.3 below define the criteria which have guided the judgement as to the sensitivity of the receptor and the susceptibility to change.

11.3.10 The sensitivity of the landscape and townscape character areas to the type of change associated with the Proposed Development has been considered, based on guidance contained within GLVIA3. Table 11.3 below summarises criteria used to assess the sensitivity of the landscape to change.

Sensitivity	Typical Descriptors
High	Landscape/ townscape value recognised by national designation. The landscape/ townscape resource has little ability to absorb change of the type proposed without fundamentally altering its present character and/or is of High importance or value. Sense of tranquillity or remoteness specifically noted in Landscape Character Assessment. High sensitivity to disturbance specifically noted in Landscape Character Assessment. The qualities for which the landscape/townscape is valued are in good condition, with a clearly apparent distinctive character and absence of detractors.
Medium	Landscape/townscape value is recognised or designated locally. The landscape/townscape resource has moderate capacity to absorb change of the type proposed without significantly altering its present character and/or is of Medium importance or value. The landscape/townscape is relatively intact, with a distinctive character and few detractors; and is reasonably tolerant of change.
Low	The landscape/townscape resource is tolerant of change of the type proposed without detriment to its character and/or is of Low importance or value. Landscape/townscape integrity is low, with a poor condition and a degraded character with the presence of detractors such as dereliction; and the landscape/townscape has the capacity to potentially accommodate considerable change.

Table 11.1: Landscape or Townscape Sensitivity to Change

11.3.11 The sensitivity of visual receptors has been assessed, based on guidance contained within GLVIA3. Sensitivity is dependent upon a number of factors including the location and context of the viewpoint, whether views are continuous, fragmented, or intermittent (i.e. the dynamic nature of a view gained while travelling through an area), the importance of views and the occupation and activity of the visual receptor. Influences such as the number of receptors affected, popularity of views and the significance of the views in relation to valued landscapes or features also determines the importance of views.

Sensitivity	Typical Descriptors
High	Large number or high sensitivity of viewers assumed. Viewers' attention very likely to be focused on landscape. E.g. Residents experiencing views from dwellings; users of strategic recreational footpaths and cycleways; people experiencing views from important landscape features of physical, cultural or historic interest, beauty spots and picnic areas.
Medium	Viewers' attention may be focused on landscape, such as users of secondary footpaths, and people engaged in outdoor sport or recreation. e.g. horse riding or golf. Occupiers of vehicles in scenic areas or on recognised tourist routes.
Low	May include people at their place of work, or engaged in similar activities, whose attention may be focussed on their work or activity and who may therefore be potentially less susceptible to changes in view. Occupiers of vehicles whose attention may be focused on the road.

Table 11.2: Visual Receptor Sensitivity to Change

Magnitude of Impact (Change)

11.3.12 The next stage of the assessment process has identified the potential magnitude of change to landscape or townscape character and views arising from the Proposed Development. The assessment distinguishes between landscape or townscape impacts and impacts upon views, based on guidance contained within GLVIA3. The former considers the impact upon landscape or townscape character taking account of direct impacts upon the physical resource (landform, vegetation, pattern, etc.) and also any indirect impacts arising from the Proposed Development, which would be sufficient to impact on the inherent character of a landscape or townscape area. The latter considers the direct impact on views perceived by people from publicly accessible locations. Potential impacts are also considered in terms of their duration i.e. whether they are permanent or temporary.

11.3.13 The magnitude or scale of change brought about by the Proposed Development upon both the existing landscape or townscape resource and upon views, both beneficial and adverse, has been assessed as set out in Table 11.4 below.

Magnitude	**Typical Descriptors**
Large	The proposed change may form a dominant or immediately apparent feature that would significantly alter and change view. Where there are substantial changes affecting the character of the landscape/townscape, or important elements through loss of existing features. Proposed Development within or close to affected landscape/townscape. Scale, mass and form of development out of character with existing elements.
Medium	The proposed change may form a prominent new element that would affect and change the view. The Proposed Development forms a visible and recognisable feature in the landscape/townscape. Proposed Development is within or adjacent to affected character area/type.

	Scale of development fits with existing features.
Small	The proposed change may constitute only a minor component of wider views, which might be missed by the casual observer or receptor. Awareness of the proposed change would not have a marked effect on the overall view. Changes to the physical landscape/townscape, its character and the perception of the landscape/townscape are slight. Long distance to affected landscape/townscape with views toward the character area/type the key characteristic.
Negligible	Only a very small part of the proposed change would be discernible and / or it is at such a distance that it would be scarcely appreciated. Consequently it would have very little effect on view. The effect of change on the perception of the landscape/townscape, the physical features or the character is barely discernible or there is no change.

Table 11.4: Magnitude of Impact

11.3.14 Significance Criteria

11.3.15 GLVIA3 states that the level of effects is ascertained by professional judgement based on consideration of the intrinsic sensitivity of the baseline landscape, townscape or visual receptor, the receptors susceptibility to the development and the magnitude of change as a result of the proposal. A significance matrix provided in Table 11.4 summarises this process. This process has enabled the potential significance of landscape, townscape and visual effects to be made.

Landscape, Townscape and Visual Sensitivity or Susceptibility	**Magnitude of Change**			
	Negligible	**Small**	**Medium**	**Large**
Low	Negligible	Slight or Negligible	Slight	Moderate
Medium	Slight or Negligible	Slight	Moderate or Slight	Substantial
High	Slight or Negligible	Moderate or Slight	Substantial	Very Substantial

Table 11.4: Significance Matrix

11.3.16 The effect of relevant aspects of the Proposed Development on the landscape and townscape has been described and evaluated against the following criteria, defined as:

- **Very Substantial adverse:** Where the proposed changes cannot be mitigated; would be completely uncharacteristic and would substantially damage the integrity of a valued and important landscape or townscape.

- **Substantial adverse**: Where the proposed changes cannot be fully mitigated; would be uncharacteristic and would damage a valued aspect of the landscape or townscape.

- **Moderate adverse**: Where some elements of the proposed changes would be out of scale or uncharacteristic of an area.

- **Slight adverse:** Where the proposed changes would be at slight variance with the character of an area.

- **Negligible adverse:** Where the proposed changes would be barely discernible within the landscape/townscape or have a barely discernible influence over a landscape/townscape.

- **Neutral:** Where the Proposed Development would be in keeping with the character of the area and/or would maintain the existing quality or where on balance the Proposed Development would maintain quality (e.g. where on balance the adverse effects of the Proposed Development are offset by beneficial effects).

- **Negligible beneficial:** Where the proposed changes would be barely discernible within the landscape/townscape.

- **Slight beneficial:** Where the proposed changes would reflect the existing character and would slightly improve the character and quality of the landscape or townscape.

- **Moderate beneficial:** Where the proposed changes would not only fit in well with the existing character of the surrounding landscape or townscape, but would improve the quality of the resource through the removal of detracting features.

- **Substantial beneficial:** Where the proposed changes would substantially improve character and quality through the removal of large scale damage and dereliction and provision of far reaching enhancements.

11.3.17 The effect of relevant aspects of the Proposed Development on views has been described and evaluated as follows:

- **Very Substantial adverse:** Where the proposed changes would form the dominant feature, or would be completely uncharacteristic and substantially change the scene in highly valued views.

- **Substantial adverse:** Where the proposed changes would form a major part of the view, or would be uncharacteristic, and would alter valued views.

- **Moderate adverse:** Where the proposed changes to views would be prominent, out of scale or uncharacteristic with the existing view.

- **Slight adverse:** Where the proposed changes to views would be recognisable or at slight variance with the existing view.

- **Negligible adverse:** Where the proposed changes would be barely discernible within the existing view.

- **Neutral:** Where the Proposed Development would be imperceptible or would be in keeping with and would maintain the existing views or, where on balance, the Proposed Development would maintain the quality of the views (which may include adverse effects of the Proposed Development which are offset by beneficial effects for the same receptor).

- **Negligible beneficial:** Where the proposed changes would be barely discernible within the existing view.
- **Slight beneficial:** Where the proposed changes to the existing view would be in keeping with and would improve the quality of the existing view.
- **Moderate beneficial:** Where the proposed changes to the existing view would not only be in keeping with, but would greatly improve the quality of the scene through the removal of visually detracting features.
- **Substantial beneficial:** Where the proposed changes to existing views would substantially improve the character and quality through the removal of large scale damage and dereliction and provision of far reaching enhancements.

11.3.18 The level of effects is described as very substantial, substantial, moderate, slight or negligible. Where negligible adverse and beneficial effects occur within the same view or same landscape/townscape, the effect can be described as neutral on balance. In the assessment those levels of effect indicated as being 'very substantial' or 'substantial' may be regarded as significant effects. An accumulation of individual 'moderate' effects, for instance experienced by a visual receptor during a journey, may also be regarded as a significant sequential effect.

11.3.19 The assessment matrix at Table 11.4 provides a framework for the assignment of levels of effect for each impact identified, together with professional judgement. Long term, day time operational effects form the primary focus of this assessment as these are most likely to result in significant effects. To avoid the need to include separate matrices for assessing the different nature of short term or temporary effects of the construction phase and the relatively limited effects of night time light sources, the same matrix is used to base the assessment on and the assessor has the opportunity to downgrade the level of effect to reflect the reduced duration of the effect or the reduced visibility of the night time context. All assessment conclusions are supported by reasoned justification.

11.3.20 The following considerations are relevant when evaluating the magnitude of visual change:

- Distance: the distance between the receptor and the development. Generally, the greater the distance, the lower the magnitude of change;
- Extent: the extent of the Proposed Development which is visible;
- Proportion: the arc of view occupied by the development in proportion to the overall field of view. A panoramic view, where the development takes up a small part of it, will generally be of lower magnitude than a narrow, focussed view, even if the arc of view occupied by the Proposed Development is similar;
- Duration: the duration of the effect. An effect experienced in a single location over an extended period of time is likely to result in a higher magnitude of change than an effect which is of a short duration, such as a view from a road;

- Orientation: the angle of the view in relation to the main receptor orientation, where there is a dominant direction to the vista; and,

- Context: the elements, which in combination provide the setting and context to the Proposed Development.

Limitations and Assumptions

11.3.21 No limitations have been identified that would affect the robustness of the assessment for EIA purposes. Maximum design parameters have been adopted for buildings and infrastructure to ensure a worst case scenario has been assessed. As a final design freeze has not been achieved at this stage, which would identify material finishes and colours, it has been assumed that the K4 CHP would be pale grey to reflect adjacent infrastructure at Kemsley Mill.

11.4 Baseline Conditions

11.4.1 The area delineated by assessment boundary consists of approximately 5.55 hectares (ha) of land at the Kemsley Paper Mill site on the northern edge of Sittingbourne. This land lies near the shores of The Swale, the body of water which separates north Kent from the Isle of Sheppey (See Figure 2.1 for oblique aerial view).

11.4.2 The majority of the main site area comprises concrete hardstanding for the storage and movement of waste materials and the circulation of associated vehicles and plant. The newly constructed water treatment works building and storage tank lie on the northern edge of this main open area with fire protection and pump house buildings on the western edge. The K1 CHP comprises a large area of visually complex energy infrastructure including buildings, tanks, pipework and four slender stacks up to 4m diameter and up to 75 m high in the northern half of the main site area. East Road lies to the south and east of the Site and links north to Barge Way. The temporary laydown area is located within an area of hard standing for paper storage.

11.4.3 The context of the Site is divided between the contrasting environments of the industrial townscape of Sittingbourne and the natural estuary landscape of The Swale. Large scale industrial buildings and stacks at the Kemsley Paper Mill site form the northern and western assessment boundary, separating the location from the residential districts of Sittingbourne. To the south lies the infrastructure associated with a water treatment plant. To the east lies the extensive landform of the restored landfill site at the confluence of The Swale and Milton Creek. To the north-east lies the extensive construction site for the Kemsley K3 Generating Station. The Saxon Shore Way long distance footpath follows the top of the earth bund sea defences beside The Swale and Milton Creek. A waste water treatment works, Morrison's distribution centre, Knauf facility and Ridham Docks including the MVV Biomass Power Plant together with further ongoing industrial development are currently expanding in the area to the north of Kemsley Paper Mill.

Landscape Designations

11.4.4 There are no designated landscapes within the Site (See Figure 11.3). The North Kent Marshes Special Landscape Area (SLA) extends over the Swale and nearby coastal landscape. This area includes the Chetney and Greenborough Marshes which lie to the east and south of the Site and extend along Milton Creek. The Swale Borough Local Plan recognises that the open coastal landscapes and coastal margins enhance the value of the borough's landscape.

11.4.5 Other designated landscapes within the borough include an Area of High Landscape Value approximately 1 km to the south-east of the Site. This area of landscape lies inland of the marshes and includes the Teynham Fruit Belt. The Kent Downs Area of Outstanding Natural Beauty (AONB) lies on high land approximately 10 km to the south east of the Site.

Scheduled Ancient Monuments

11.4.6 There are no Scheduled Ancient Monuments which lie within the Site area. The nearest site lies at Castle Rough, which comprises earthworks approximately 500 m to the south-west. Another site within the vicinity of the Proposed Development is the remains of the Old Murston Church approximately 1.6 km to the south.

Conservation Areas

11.4.7 There are no conservation areas which are covered by the ZTV within the immediate vicinity of the Site.

Topography

11.4.8 The main part of the Site and the majority of its surroundings comprise a flat area of concrete hardstanding and lie at approximately 9 m AOD within the coastal plain of The Swale estuary. The restored landfill site immediately to the east rises to approximately 15 m high. This man-made landform forms an uncharacteristic and distinctive feature in the flat estuarine landscape. The land rises gradually over the Kent plains to the south before rising more steeply to form the North Downs, which rise to approximately 200 m AOD 10 km to the south.

Vegetation

11.4.9 There is no significant vegetation within the majority of the Site. A small clump of shrub and tree planting is located on the eastern edge of the Site between the access road and the Effluent Plant Office building.

Settlement

11.4.10 The Site lies on the industrial northern edge of Sittingbourne, which forms the largest settlement within the district of Swale. Development dates mainly from the 19th and 20th centuries, clustered around the A2 road and railway which pass through the centre of the town. The rapidly expanding industrial and commercial district which extends from the edge of Sittingbourne north to Ridham Docks forms the immediate context to the Site.

Public Rights of Way

11.4.11 The Saxon Shore Way long distance path passes approximately 200m to the south of the Site and 400m to the east as it follows the top of the sea defences which line The Swale and Milton Creek. The path extends along the Kent coastline throughout the Swale District. The footpath is defined as ZU1 north of Milton Creek and ZU2 south of Milton Creek. KCC is currently working in partnership with Natural England to develop the England Coast Path in this region. The national trail is likely to follow the alignment of the Saxon Shore Way in the vicinity of the proposed scheme.

Views

11.4.12 The Site is currently concealed in views from the majority of the settlement of Sittingbourne by industrial development on the edge of the town and the restored landfill mound. To the south of the Site, where views are slightly less constrained, the Saxon Shore Way long distance footpath forms the location for the closest visual receptors as they follow the alignment of the sea defences. However, views are generally limited to the stacks and tops of taller infrastructure in the northern half of the paper mill Site. There are no views into the open area of the Site due to intervening fences, vegetation and industrial infrastructure. Views can be gained from a section of path which extends approximately 1 km north along the edge of the Swale from the Site. Users of this path potentially form receptors of the highest sensitivity. Industrial development, the light railway, Swale Way road and over ground pipelines provide physical barriers between the settlement and the Swale, making access to the path difficult. The footpaths at Milton Creek and the Church Marshes Country Park provide the most obvious points for direct public access to the Saxon Shore Way. The industrial edge of Sittingbourne forms a dominant urban influence for walkers using this section of the path and a physical barrier and, as a result, may be less accessible and attractive to the local community and to visitors to the area.

11.4.13 Views of the Site from the premises along the industrial edge of Sittingbourne would be fragmented by intervening development and gained by people at their place of work, who are of low sensitivity. The gently rising, open landscape of the Isle of Sheppey to the north east contains several small settlements, public rights of way and roads which provide vantage points for receptors to gain long views back to the Site. The industrial townscape of Sittingbourne is visible as an expanse of development along The Swale, of which the Site forms a small fragment of industrial land.

11.4.14 The Swale and Milton Creek form transport corridors which define the edge of Sittingbourne and divides the towns' industrial edge from the salt marsh, mudflats and open water of the estuary at Elmley Reach and Clay Reach. Views by occupants of vessels would be gained towards the Site with a backdrop of dominant industry at DS Smith's Kemsley Paper Mill. Receptors use the Swale and Milton Creek for both leisure and commercial purposes and would range in sensitivity from medium to low.

11.4.15 Photographs have been taken from various viewpoints which are representative of views gained by visual receptors. Some of these viewpoints are the same as those assessed for the adjacent Kemsley K3 Generating Station in December 2016 and have been reused for the purposes of this assessment. The closest viewpoint locations to the Site were visited on 25th October 2017 to enable new photography to be undertaken and concentrate on the Saxon Shore Way/ Footpath ZU1 and ZU2 to address comments received during consultation from Natural England and PINS, Swale Way and the Site access road on Barge Way. Figure 11.4 shows the location of the 12 photograph viewpoints, with the associated photographs provided at Figures 11.5 to 11.10. No photographic viewpoints have been identified within areas of the ZTV where only the stack would be visible, where intervening landform of buildings would obscure the proposed buildings and infrastructure. The top of the new stack would be visible in the immediate vicinity of four existing stacks and any change in view would not be immediately perceptible and would not be sufficient to result in significant effects on visual receptors or landscape character. Viewpoints have been chosen which coincide with the ZTV for the tallest proposed building, which would also include the proposed stack.

Viewpoints

<u>Viewpoint 1. Saxon Shore Way/Footpath ZU1, south of the Site</u>

11.4.16 Near filtered view through palisade fence, looking north (170m to site) from the long-distance path. Development at the effluent treatment works south of the Site obscures views into the Site itself. The tops of stacks at the K1 CHP are visible, although the Site is not. The right side of the view extends along the marshland on the bank of Milton Creek to the landfill beyond. There is a strong contrast between the natural wetland of the estuary and industrial edge in this view.

<u>Viewpoint 2. Saxon Shore Way/Footpath ZU1, east of the Site</u>

11.4.17 Near, partly filtered view through palisade fencing, looking west (160m to site) from the long-distance path. Only the tops of stacks within the K1 CHP are visible. Coastal vegetation, the security fence and restored landfill obscure most views of Kemsley Paper Mill however, the tops of some industrial buildings and overhead power lines are visible on the skyline. Salt marsh on the shores of Milton Creek is visible to the left of the view. The natural landscape of Milton Creek is the predominant character in this view.

<u>Viewpoint 3. Saxon Shore Way/Footpath ZU1, south of the Site</u>

11.4.18 Near open view looking north-east (330m to site) from the long-distance footpath as it follows the western edge of Milton Creek. The flat expanses of salt marsh, reed bed and scrub occupy the foreground through which passes the raised, vegetated earth landform of the sinuous sea wall on which the Saxon Shore Way is located. The open water of the creek curves towards the Swale in the distance. The tall slender stacks of the K1 CHP and the large blocks of the DS Smith buildings dominate the skyline to the left of the view. The grassed landform of the restored landfill site forms a prominent change in topography, with the strong vertical forms of the K3 Generating Station under construction beyond. The land within the Site is not visible in this view however, the tops of infrastructure and stacks in the K1 CHP are visible against the sky. There is a strong contrast between relatively wild landscape and industrial townscape in this view.

<u>Viewpoint 4. Saxon Shore Way/Footpath ZU2, south-east of the Site</u>

11.4.19 Near open view across Milton Creek looking north-west (360m to site) from the long-distance path. The extensive industrial development at Kemsley Paper Mill forms the focus of urban form in this estuarine view. The cluster of slender stacks at the K1 CHP are prominent in the centre of the view, beyond the development area within the Site. The cranes and structures associated with the K3 Generating Station construction phase are also prominent above the domed landform of the restored landfill. Scrubby vegetation forms a narrow fringe between the development and the edge of the creek, screening low level activities at the paper mill beyond. Grassland, marsh and the open water of the creek occupy the foreground.

Viewpoint 5: Saxon Shore Way/Footpath ZR200 north of the Site

11.4.20 Near open views looking south (490m to site) from the long-distance footpath which follows the top of the sea defences. The view comprises a combination of industry and natural habitats in the estuarine landscape of The Swale. The large-scale buildings and stacks of the K1 CHP form the focus of the view and together with the cranes and the jetty, form strong vertical elements in the relatively flat landscape. The grassy mound of the restored landfill creates an uncharacteristic landform in the estuary. Mud flats and salt marshes are typical features of The Swale in the foreground. Overhead power lines cross the landscape in the middle distance. The area of the Site to be developed is not visible due to intervening structures at K1 CHP. As this photograph was taken in December 2016, construction works at the K3 Generating Station site will now obscure much of the view beyond.

Viewpoint 6. Swale Way

11.4.21 Near open view looking north-east (540m to site) from the road as it crosses the Church Marshes Country Park on embankment. The Kemsley Paper Mill and neighbouring buildings and infrastructure form a prominent cluster of industrial developments which dominate the skyline. The top of the restored landfill mound and high mast lighting columns are also visible beyond the trees. The earth works of the Castle Rough ancient monument are covered with scrub in the middle distance and are not obvious in the view. The land within the Site is not visible in this view, although the tops of stacks at the K1 CHP are visible above development. Rough grassland, scrub and marshland occupy much of the intervening landscape, contrasting with the backdrop of large built forms.

Viewpoint 7. Swale Way overbridge

11.4.22 Mid-distance open view from the elevated section of Swale Way which bridges over Milton Creek, looking north (1.05km to site) to industrial development at Kemsley Paper Mill. Large buildings, slender stacks, pylons and overhead power lines and the K3 Generating Station construction site all form prominent vertical elements in this low lying coastal landscape. The sinuous form of the open water and open space at the Country Park occupy the foreground. Industrial buildings at Sittingbourne frame the right side of the view.

Viewpoint 8. Church Marshes Country Park

11.4.23 Mid-distance open view looking north east (720m to site) from a man-made landform within public open space. Rough grassland, ruderal vegetation and scrub occupy much of the foreground providing a naturalistic context for the industrial development in the distance. Large pale building blocks and tall slender stacks at the K1 CHP lie prominently on the horizon. Houses on the edge of a large residential district sit at a lower level to the left of the view. Pylons and overhead power lines dominate the view. Belts of trees frame the right-hand side of the view and partly obscure the restored landfill site beyond. The Site is concealed within the view behind the paper mill.

Viewpoint 9. Saxon Shore Way/Footpath ZU2, east of the Site

11.4.24 Mid-distance open views looking west (1.38km to site) from the long-distance footpath which follows the top of the sea defences. The view is predominantly of a natural landscape which focuses on the prominent buildings and stacks of Kemsley K1. The flat expanses of Little Murston Nature Reserve to the left and the open water of the Swale contrast with the mound of the restored landfill and the numerous vertical accents of stacks, pylons and cranes. The long low buildings of the Morrisons distribution centre are visible in the distance in the right of the view. The residential edge of Sittingbourne is visible through trees in the left of the view, with rising ground within the North Downs AONB beyond. Only the extreme southern part of the Site is visible in this view to the left of the K1 CHP. The remainder is screened by the man-made land form.

Viewpoint 10: Church Road at Tonge Corner (representative of views from residential properties)

11.4.25 Mid-distance open view looking north-west (2.27km to site) from a low ridge of land adjacent to the hamlet. A foreground of arable farmland is subdivided by tree belts and woodland blocks. Overhead power lines crossing the landscape in the middle distance and the buildings and stacks of Kemsley Paper Mill form prominent elements in the view. A narrow band of dark solar panels is visible in the middle distance. Infrastructure at the K1 CHP, including the slender pale stacks, is visible. Trees and garden vegetation filter views to the right of the Swale and the Isle of Sheppey.

Viewpoint 11: Elmey Marshes Nature Reserve, public right of way

11.4.26 Mid-distance open view looking south-west (2.11km to site) from the footpath at the public car park on the Isle of Sheppey. The view is a combination of the simple open expanses of grassland and sky. The Swale cuts through the middle of the view with the industry that lines it extending across the whole view. The stacks and buildings at Kemsley Paper Mill and the MVV biomass power plant, buildings at Ridham Docks and Knauf and numerous pylons form vertical elements in the landscape. The man-made landform of the restored landfill forms an uncharacteristic mound in the flat landscape. The wooded ridge of the North Downs forms a distant horizon. Infrastructure at the K1 CHP, including the stacks, is visible.

Viewpoint 12. Barge Way near site access

11.4.27 Near, partly concealed view looking south (25m to site) from the roundabout on Barge Way to the vehicular entrance to the Site. Pallisade fencing, post and rail fencing, signage, gates and cranes form a visually cluttered foreground. Large scale industrial development at Kemsley Paper Mill lies beyond, including the strong vertical forms of stacks at the K1 CHP, cranes at the K3 Generating Station construction site and high mast lighting. The location of the temporary laydown area lies within ruderal vegetation and an area of hardstanding beyond, to the right of the view. This is a typical industrial townscape of the north Kent coast.

Existing Landscape and Townscape Character

National Landscape Character

11.4.28 The Proposed Development site lies within National Character Area 81: Greater Thames Estuary, as defined in Natural England's (formerly the Countryside Agency and English Nature) National Character Area Profiles which divides England in to 159 Joint Character Areas. Other character areas within the 10 km radius study area include 113 North Kent Plain and 119 North Downs (see Figure 11.3). The national character areas provide a broad character context for the analysis of the baseline conditions.

11.4.29 The key characteristics of these areas are as follows;

Greater Thames Estuary

- *Low lying coastal landscape of salt marshes and reclaimed farmed marshland, dominated by wide open skies.*
- *Mixed arable and grazed pasture subdivided by a network of reed filled drainage ditches.*
- *Beaches and mudflats often separated from the farmland by sea walls.*
- *Hedgerows and trees limited to margins of the character area further inland.*
- *Small settlements and hamlets associated with historically important fishing and boat building locations.*

North Kent Plain

- *Gently undulating fertile land occupied by a mix of intensively farmed open fields, grazing marsh and reed beds.*
- *Large fields are exposed with few hedgerows or trees.*
- *Orchards and horticultural areas sub-divided by shelter belts provide contrast.*
- *Overhead power lines and pylons are prominent in the open landscape.*
- *Settlements often dominate the landscape due to the lack of vegetation on urban edges.*

Local Landscape Character Assessment

11.4.30 The character of the local landscape within the Borough of Swale has been assessed as part of the *Swale Landscape Character Assessment and Guidelines, March 2005*. This assessment has identified 42 landscape character areas within the district. This assessment has been updated through the preparation of the *Swale Landscape Character and Biodiversity Appraisal Supplementary Planning Document* in September 2011. The appraisal retains the same character areas from the 2005 assessment, whilst providing additional detail regarding landscape sensitivity and condition. A local level study area has been established to assess the character of the landscape at greater detail in close proximity to the Site, where the potential for significant effect on receptors exists. See Figure 11.11. Eight character areas coincide with the ZTV within this study area as follows;

- *2 Elmley Marshes*
- *14 Elmley Island*
- *11 South Sheppey Marshes and Mudflats*
- *1 Chetney and Greenborough Marshes*
- *25 Lower Halstow Clay Farmlands*
- *24 Iwade Arable Farmlands*
- *31 Teynham Fruit Belts*
- *8 Luddenham and Conyer Marshes*

11.4.31 The key characteristics of these areas are as follows;

Elmley Marshes

- *Flat alluvial marshland with sinuous reed filled ditches.*
- *Atmospheric and tranquil landscape with large open and often dramatic skies.*
- *Rough grassland largely used for cattle and sheep grazing.*
- *Important wetland habitats.*
- *Important transport routes A249, railway and link bridges onto island.*
- *Large-scale landscape with little sense of enclosure.*
- *Boats in the swale.*
- *Strong sense of place, remote and isolated.*

11.4.32 The condition of the Elmley Marshes character area is defined as good and the intrinsic sensitivity is high.

Elmley Island

- *Outcrops of high land formed of London clay contrasting with the surrounding flat open alluvial marshland.*

- *Long views across open marsh intermittently interrupted by trees and scrub growing on the ridge.*

- *3,100 acres Elmley Estate farming practices managed for promotion of biodiversity.*

- *Historic buildings in various states of repair.*

- *Numerous man made features found in the landscape, provide strong evidence of the history of the area.*

11.4.33 The condition of the Elmley Island character area is defined as good and the intrinsic sensitivity is high.

South Sheppey Marshes and Mudflats

- *Vast, atmospheric and tranquil landscape with large, open and often dramatic skies, with extensive uninterrupted panoramic views.*

- *Alluvial soils on land, tidal mudflats and marine beaches in estuary.*

- *Sea walls form the only man made element within the landscape.*

- *Unique flora and fauna specially adapted to harsh environmental conditions.*

- *Vegetation limited to coarse, hummocky ground cover in rusty browns, green and pink.*

- *Unsettled with limited pedestrian access.*

11.4.34 The condition of the South Sheppey Marshes and Mudflats character area is defined as good and the intrinsic sensitivity is high.

Chetney and Greenborough Marshes

- *An area of traditional coastal marsh.*

- *Flat grazing marsh, saltmarsh and mud flats. Natural and man made features include ditches, fleets and counter walls.*

- *Scattered isolated patches of scrub.*

- *Major transport routes and power lines cut across the marsh.*

- *Large areas designated for the protection of its ecologically important habitats.*

- *Atmospheric and tranquil landscape with large open and often dramatic skies.*

- *Uncharacteristic undulations on the periphery of Sittingbourne reflect the former areas of landfill.*

- *Large industrial units including the Kemsley Paper Mill are highly visible within the largely flat and treeless marshland.*

- *Visually, certain areas are dominated by the large-scale industries present within adjacent areas, which sit inharmoniously beside this flat open landscape….at Kemsley north of Sittingbourne, the area is heavily influenced by industry, which has a direct impact on the wider landscape in terms of long-distance views.*

11.4.35 The condition of the Chetney and Greenborough Marshes character area is defined as good and the intrinsic sensitivity is high.

Lower Halstow Clay Farmlands

- *Mixed geology of London clay and outcrops of head brick earth and Woolwich beds, steeply rising to the south.*

- *Mixed agricultural land use with small-scale fields of pasture and localised orchards.*

- *Contrast between abutting marshland and farmland with hillside and ridge backdrop.*

- *Narrow lanes with impressive estuary views.*

- *Weak landscape structure with scattered mature standard trees and fragmented over-mature roadside hedges.*

- *Settlement limited to roadside cottages fixed mobile homes and isolated farms. Small scale industrial works.*

11.4.36 The condition of the Lower Halstow Clay Farmlands character area is defined as moderate and the intrinsic sensitivity is high.

Iwade Arable Farmlands

- *Mixed geology, clay and fertile drift soils.*

- *Cereal production has replaced traditional orchards.*

- *Medium to large scale fields. Fragmentation of hedgerows.*

- *Hawes and Wardwell Woods are larger woodlands on a prominent hillside near the coast.*

- *Valley and hill setting to village of Newington with landmark church.*

- *Isolated farmsteads and cottages.*

- *Isolated historic properties. Elsewhere mixed 20th century development.*

- *Intrusive overhead powerlines.*

- *Major trunk road, rail link and enclosed, winding country lanes.*

11.4.37 The condition of the Iwade Arable Farmlands character area is defined as poor and the intrinsic sensitivity is medium.

Teynham Fruit Belts

- *Undulating intimate landscape composed of small hills and valleys.*
- *Complex geology of fertile drift deposits, head gravel and London clay.*
- *Small scale well managed network of orchards and occasional hop fields. Elsewhere enlarged arable and grazing fields.*
- *Birth place of commercial fruit growing at Osiers Farm.*
- *Narrow winding lanes enclosed by mature hedgerows and shelter belts.*
- *Tracks, lanes and historic buildings raised above adjacent areas, which is indicative of the areas susceptibility to flooding.*
- *Mixed traditional historic houses and farms. 20th century residential and commercial development.*
- *Main transport routes include the railway and A2.*
- *Important local landmark at Tonge Mill and pond.*

11.4.38 The condition of the Teynham Fruit Belts character area is defined as moderate and its intrinsic sensitivity is medium.

Luddenham and Conyer Marshes

- *Flat alluvial marshland with sinuous reed filled ditches.*
- *Large open and often dramatic skies.*
- *Rough grassland largely used for cattle and sheep grazing.*
- *Important wetland habitats.*
- *Access routes limited to Harty Ferry approach and Conyer.*
- *Boats in the Swale and Creek.*
- *Large-scale landscape with little sense of enclosure.*
- *Strong sense of place, remote and isolated.*

11.4.39 The condition of the Luddenham and Conyer Marshes character area is defined as good and the intrinsic sensitivity is high.

Local Townscape Character Assessment

11.4.40 The Site lies wholly within the Sittingbourne urban area which lies outside any of the landscape character areas identified within the Swale Borough Councils assessment. Therefore, for the purposes of this assessment, the settlement which lies within the study area has been divided into two separate townscape character areas which display distinct characteristics, Sittingbourne Industrial/Commercial and Sittingbourne Residential. See Figure 11.11. The following key characteristics of the townscape areas can be defined as follows;

Sittingbourne Industrial Commercial

- Large scale industrial development in flat topography adjoining The Swale.
- Complex skyline of built forms contrasting with strong vertical elements of stacks, pylons and cranes.
- Active, at times visually chaotic, townscape due to operations and construction activities.
- Noisy environment with HGV traffic and strong odours.
- Smaller scale light industrial and commercial development adjoining Milton Creek.
- Rapidly changing and expanding character area with remnants of past industrial heritage.
- Extensive urban fringe having striking contrast with the adjoining natural landscape of The Swale.
- Linear tree belts and screens and blocks of scrub and woodland surrounding development.
- Extensively lit during night time.
- Stack emissions visible as plumes at times.

11.4.41 The condition of the Sittingbourne Industrial Commercial character area is considered to be poor and the intrinsic sensitivity is low.

Sittingbourne Residential

- Central area of mainly 19th century terrace houses surrounding the commercial core.
- Extensive 20th century residential estates extend out to the rural edge.
- The A2 road and railway line cross the town centre as major transport corridors from east to west.

- Church Marshes Country Park provides a large informal green space on the northern edge of housing.
- Hedgerow remnants, street trees, designed green space and gardens comprise the majority of vegetation within the town.

11.4.42 The condition of the Sittingbourne Residential character area is considered to be ordinary and the intrinsic sensitivity is medium.

Kent Landscape Character Assessment

11.4.43 The Kent Landscape Character Assessment was prepared by Kent County Council in 2004. The study describes the rural landscapes of the county and provides a broader overview of character than the *Swale Landscape Character and Biodiversity Appraisal Supplementary Planning Document.* A brief summary of key character areas is included for completeness and to avoid repetition of information. The Site lies within the Swale Marshes which are described as a remote, wild and isolated coastal marshland (See Figure 5.14). The assessment does not focus on urban areas, within which the proposed site lies, although recognises the intrusive buildings of Ridham Dock and the very high visual sensitivity of the rural area. The neighbouring Eastern Swale Marshes have a similar character although industrial development is less apparent.

11.4.44 Much of the landscape in the local area to the south, south west and south east lies within either the Fruit Belt or Eastern Fruit Belt. These are rural landscapes of undulating landform including orchards and hops and sub-divided by shelter belts. The condition of the landscapes is often poor and visual sensitivity moderate.

Kent Historic Landscape Characterisation

11.4.45 The description of the historic environment is detailed within Chapter 12 of the Environmental Statement. The Historic Landscape Study is the study of the 'time depth' aspect of the landscape. The *Kent Historic Landscape Characterisation* (Kent County Council, 2001) recognises that "landscape is dynamic and constantly changing in a manner that reflects the immediate preoccupations, future aspirations and past activities of societies and individuals". *Historic landscape* characterisation identifies *"characteristic patterns of change and important relics of past change"*.

11.4.46 The Site lies within Historic Landscape Character Area 17: Northern Horticultural Belt. Within this area the Site lies within the Historic Landscape Type 12.4: Large Scale Industry. The character area is primarily defined by its horticultural activities, in particular fruit orchards. However, the industrial nature of the Site is uncharacteristic of the overall character area. At paragraph 4.36 the report states *"Although primarily rural in nature, Kent has a considerable quantity of industrial areas, abandoned or otherwise, which account for 1.78% of the county's land surface. For the most part industrial activity tends to be confined to the areas adjacent to major urban centres, i.e. east of Maidstone, although significant groupings can also be found in the coastal areas"*. The Site is associated with the extensive strip of industrial land uses which form the northern edge of the settlement of Sittingbourne where it adjoins The Swale.

Landscape Value

11.4.47 From the desktop study and the field survey, the landscape value can be assessed. People give value to different landscapes which can be measured based on the following criteria:

- Landscape quality
- Scenic quality;
- Rarity;
- Representativeness;
- Conservation interests;
- Recreation value
- Perceptual aspects
- Associations

Landscape Quality

11.4.48 Landscape quality, or condition, measures the physical state of the landscape. It may include the extent to which typical character is represented in in individual areas, the intactness of the landscape and the condition of individual elements.

11.4.49 The condition of the landscape character areas defined in the *Swale Landscape Character and Biodiversity Appraisal Supplementary Planning Document* in September 2011, which are relevant to this assessment are included in the section above. The condition of the townscape areas of Sittingbourne are also described above. The Industrial/commercial character area has a poor quality and condition due to the extensive industrial buildings and infrastructure and the presence of disused and derelict land resulting in a low value. The wider estuarine and coastal landscapes have a high value.

Scenic Quality

11.4.50 This measures the degree to which the landscape appeals to the visual senses. The visual baseline is analysed in more detail above.

11.4.51 The combination of industrial uses within the Site and the adjacent industrial complex and nearby large-scale construction activities at the K3 Generating Station site results in a poor scenic quality and low value. However, the juxtaposition of the neighbouring industrial edge of Sittingbourne and open expanse of The Swale, Milton Creek and Isle of Sheppey create contrasting backdrops to the Site and provide a transition in the local context to landscapes with a high value.

Rarity

11.4.52 This is concerned with the presence of rare features and elements in the landscape or the presence of a rare character type.

11.4.53 The poor quality townscape of the majority of the Site is relatively typical of the urban fringe on the northern industrial edge of Sittingbourne and have a low value. However, when evaluated within the study area as a whole, this part of the Site is not typical. The landscapes of The Swale are more unusual and have relative value in the context of the settlement. The extensive salt marshes and mudflats are relatively uncommon and important to the character of the area.

Representativeness

11.4.54 This analyses the features or elements within the Site which are considered particularly important examples, which are worthy of retention.

11.4.55 There are no features within the Site that require retention and that would add positively to the townscape character. The mudflats and maritime vegetation of The Swale are important and typical features of the coastal landscape and are highly valued.

Conservation Interests

11.4.56 This considers the presence of features of wildlife, earth science or archaeological or historical and cultural interest can add value to a landscape.

11.4.57 There are no conservation features of importance within the Site or adjacent industrial areas. The estuarine habitat of The Swale is important for a wide range of flora and fauna and is designated in parts as a RAMSAR Site, National Nature Reserve, Special Protection Area, Site of Special Scientific Interest, rMCZ and Environmentally Sensitive Area and as a high value.

Perceptual Aspects

11.4.58 A landscape may be valued for its perceptual qualities, notably wildness and/or tranquillity.

11.4.59 The nature of the active industrial site is disturbed and its character is heavily influenced by its location within the urban fringes of Sittingbourne. Consequently, this site cannot be defined as wild and precludes any sense of tranquillity and has a low value. However, the open water, mud flats and salt marshes of The Swale have a wild character and provide a strong contrast. This is a locally typical and highly valued landscape of north Kent. Large industrial buildings, lighting, visible plumes, construction activities and loud noises associated with the industrial area of Sittingbourne have an adverse influence over the Swale and influence the tranquillity of the landscape.

Associations

11.4.60 There is no specific cultural association with the Site. The most significant historic and cultural influence within the local study area is The Swale as a transport corridor for Sittingbourne. The town, due to its location on this waterway, became an important port in the 19th century to transport goods to and from London. At the beginning of the 19th century the first sailing barges were designed and made in several locations along The Swale, the most significant being the Dolphin shipyard on Milton Creek. The brick and cement making industries and the fruit growers relied on the barges to transport produce to the markets of London. Following World War II there was a rapid decline in the barge building industry as road transport increased. Sailing barges are now an uncommon feature in the area, however commercial and leisure vessels continue to use The Swale.

11.4.61 During the 20th century the area became important as a producer of paper, particularly newsprint for Fleet Street. This industry continues to be important to the local community and the Kemsley site forms the location for the proposed K4 CHP.

Sensitive Receptors

11.4.62 The sensitive receptors listed in Table 11.6 below have the potential to be affected by effects arising from the Proposed Development. The assessment in this Chapter has considered the effects listed in the table upon the identified sensitive receptors.

Receptor	Importance/sensitivity/vulnerability to change
Landscape and Townscape Character	
Local landscape character areas (includes Special Landscape Area)	High to Medium
Local townscape character areas	Medium to Low
Visual Resources	
Walkers using the Saxon Shore Way long distance footpath beside The Swale and Milton Creek (includes public right of way ZU1)	High
Users of public open space at Church Marshes Country Park	High
Pedestrians using the pavements on Swale Way,	Medium
Walkers using public footpaths at Elmley National Nature Reserve on the Isle of Sheppey	High
Occupiers of residential properties at Tonge Corner,	High
Occupiers of vehicles travelling on Swale Way	Medium
Occupiers of vessels on The Swale	Medium to Low
Employees within commercial and industrial premises on the northern edge of Sittingbourne	Low

Table 11.1: Potentially affected sensitive receptors

<u>Sensitivity</u>

11.4.63 The majority of the Site is typical of the active industrial land within the urban fringes of the extensive industrial district of Sittingbourne. These areas of land, together with disused or derelict land and construction sites are often of poor visual quality. The Site has a low sensitivity to change through redevelopment of this scale and nature.

11.5 Future baseline

11.5.1 The future baseline conditions that would potentially exist in 2021, when the Proposed Development becomes operational, include cumulative schemes which have been granted a planning consent and are currently under construction or are under the control of DS Smith. These schemes are as follows;

- SW/10/444 Kemsley Paper Mill Sustainable Energy Plant (SEP) (K3) and power upgrade (under construction)
- 16/501228/FULL Kemsley Mill baling plant
- SW/11/1291 Land north of DS Smith Paper Mill anaerobic digester

11.5.2 The majority of these schemes are industrial or commercial in nature and would be located within the Sittingbourne Industrial/Commercial townscape character area, within which the Proposed Development would be located. The Kemsley Paper Mill Sustainable Energy Plant is under construction and already form part of the baseline situation. The immediate landscape and townscape context of the operational K4 CHP on the fringes of Sittingbourne would be slightly more intensively developed in 2021 than 2017, if these schemes are completed during that time period. Slightly less natural landscape, vacant land or previously used land would be present, replaced by energy infrastructure, industry or commercial development. Walkers using the Saxon Shore Way, which lies in close proximity to the future baseline developments, would experience a sequence of views that would be more heavily developed and less open within a journey between Milton Creek and Ridham Docks. People using rights of way within the Elmley Marshes on the Isle of Sheppey would notice a slightly more densely developed urban fringe at Sittingbourne, which forms a backdrop to many views west, south-west and north-west.

11.5.3 Due to the similarity in the existing conditions, with the cumulative schemes at the sustainable energy plant partly in place, and the future baseline situation where they are complete, the level of effects on landscape, townscape and visual receptors is likely to be the same when assessed against the 2017 baseline and 2021 future baseline. A brief summary assessment of future baseline effects is therefore included in the assessment of operational effects.

11.6 Predicted Effects

11.6.1 To enable effects to be predicted more accurately photomontages have been prepared to illustrate the likely change in landscape, townscape and visual resources based on the following three viewpoints;

- Viewpoint 3. Saxon Shore Way/Footpath ZU1, south of the Site, Figures 11.12 and 11.13;
- Viewpoint 4. Saxon Shore Way/Footpath ZU2, south-east of the Site, Figures 11.14 and 11.15; and
- Viewpoint 7. Swale Way overbridge, Figures 11.16 and 11.17.

11.6.2 Each of the buildings and elements of infrastructure within the K4 CHP have been modelled as maximum parameter, simple forms and coloured a neutral pale grey to indicate the scale, massing and location of the Proposed Development within the surrounding context. Separate photomontage images have been prepared to show each of the two stack location options a and b (see ES chapter 2 for details). The Kemsley K3 SEP generating station is currently under construction within the photographs. A representation of the outline of the completed development has been included within the photomontages to provide a greater level of understanding to the evolving, immediate context of the K4 CHP proposals. Photomontages are included at Figures 11.12 to 11.17.

Construction Effects

Predicted Character Effects

11.6.3 Direct effects on townscape character relate to the Sittingbourne Industrial/Commercial Area, which has a poor to ordinary condition and local or low value. The character area's sensitivity to change through the effects of demolition and construction activities within the Site would be low due to the similarity in the nature and scale of the proposed activities and the existing site conditions and neighbouring K1 CHP infrastructure. However, the construction activities would include cranes and high-level plant which would be slightly discordant in the industrial context. The direct effect of the large-scale construction works on the open area of the Site would create a small magnitude of change to the character, which would be adverse in nature, but only short term in duration. The overall significance of effect on the Sittingbourne Industrial/Commercial character area would be slight adverse in the day.

11.6.4 Temporary lighting proposals would result in an extension of the existing well-lit site conditions provided by high mast lighting at the Site and the urban conditions on adjacent land during the construction phase. This would be within the well-lit context of the existing building and tower mounted lights and lighting columns within industrial areas and high-level mast mounted lights at Ridham Docks. There would be a negligible magnitude of change on a low sensitivity receptor. The significance of night-time effects on the Sittingbourne Industrial/Commercial Area character area would be negligible adverse.

11.6.5 The adjoining character area of Chetney and Greenborough Marshes forms the immediate landscape context to the Site and is not directly affected by the construction activities. This character area is considered to be in good condition, has a high value and is of medium sensitivity to the indirect effects of the proposed construction activities. The nature and large scale of the construction works would be apparent as an intensification of baseline industrial site conditions and in the context of extensive industrial and post-industrial land uses. The negligible magnitude of change would result in indirect negligible effects on the natural and wild elements of this character area during the daytime and at night.

11.6.6 The wider landscape of the Elmley Marshes, Elmley Island, Lower Halston Clay Farmlands, Iwade Arable Farmland, Teynham Fruit Belt, Luddenham and Conyer Marshes and South Sheppey Marshes and Mudflats, which have a poor to good condition, medium to high value and a medium sensitivity due to the indirect nature of effects, provide context to the demolition and construction activities. The activities would be set on the edge of an existing industrial area and would have no direct effect on the valued aspects of these character areas. The existing extensive industrial development at Sittingbourne forms a backdrop to the character areas and is a characteristic element of the study area in North Kent. The magnitude of change would be negligible and adverse in the short term leading to a negligible significance of effect during the day and at night.

11.6.7 The neighbouring townscape of the Sittingbourne Residential character area has an ordinary condition, low value and a low sensitivity to change through the influence of high level construction activities of this nature within an industrial context. The magnitude of change would be negligible and adverse in the short term leading to a negligible significance of effect during the day and at night.

11.6.8 At a national scale, direct effects on the landscape apply to the Greater Thames Estuary character area. The proposed demolition and construction activities would directly affect the townscape of the industrial fringes of Sittingbourne which are of poor condition and would influence the natural landscapes of The Swale Marshes which are in good condition. Due to the large scale of the character areas within the study area and the relatively small scale of the Proposed Development it would not be appropriate to assess effects at this national scale and therefore local level assessments are relied upon to define landscape and townscape character effects.

Predicted Visual Effects

11.6.9 The zone of theoretical visibility (ZTV) for the existing site area would be relatively similar to the proposed construction phase due to the presence of existing tall stacks at the K1 CHP. The introduction of similar scale tall structures and buildings and cranes into a site partly contained by neighbouring industrial development would be slightly more visible although of similar character to the industrial surroundings. The activities associated with the construction of the stacks and tall buildings would be visible above the adjoining industrial development and landform, which screens the majority of the existing site and activities. The ZTV would extend over similar areas of Sittingbourne to the south and south-west and also over the wider landscape to the south and south-east of the Site. High level construction activities would appear as a slight intensification of existing elements in views gained by all visual receptors identified at the baseline stage. No additional visual receptors would be affected.

11.6.10 Occupiers of residential properties at Kemsley on the edge of Sittingbourne to the west and south-west of the Site and users of public open space at Church Marshes Country Park to the south would have glimpsed views through intervening industrial development of high level construction activities. To the south and north- east of the Site users of the Saxon Shore Way (public right of way ZU1) would continue to form the closest visual receptors. The significance of effect on these receptors and walkers using the rights of way network within the study area are dealt with in relation to specific viewpoint locations described below.

11.6.11 Views gained by occupants of vessels on The Swale to the east and north-east of the Site and Milton Creek to the south would be towards the construction site and activities. Near to mid-distance views would be gained of high level activities in the context of extensive industry on the urban fringe of Sittingbourne. A relatively small number of receptors would use the Swale for either leisure or commercial purposes and would range in sensitivity from medium to low. The magnitude of change would be negligible to small resulting in a negligible to slight adverse levels of effect, which is not significant.

11.6.12 Employees at industrial premises along the edge of Sittingbourne would be visual receptors of low sensitivity and form the largest group of receptors in close proximity to the Proposed Development. Many views of the construction activities would be gained through intervening development of a similar character. The works would be seen as an intensification or extension of existing industry. The proximity of the development would create a negligible to medium magnitude of change in view, leading to a negligible to slight adverse significance of effect, which is not significant.

Viewpoint 1. Saxon Shore Way/Footpath ZU1, south of the Site

11.6.13 Near, partly obscured views through the palisade fence would include cranes and the top of the stack under construction. The activities would appear within a well-lit industrial edge location and wider context of Milton Creek. The sensitivity of the receptor is high and the magnitude of change in view would be negligible and temporary in nature, leading to a negligible adverse effect on views, during the day and at night.

Viewpoint 2. Saxon Shore Way/Footpath ZU1, east of the Site

11.6.14 Near views of high level construction activities above the intervening palisade fence. Ground level activities would be largely obscured by the fence and landfill landform. The activities would appear within the context of existing stacks and lighting at the K1 CHP. The sensitivity of the receptor is high and the magnitude of change in view would be negligible and temporary in nature, leading to a negligible adverse effect on views, during the day and at night.

Viewpoint 3. Saxon Shore Way/Footpath ZU1, south of the Site

11.6.15 Near views of some low-level construction activities, visible above the effluent treatment works, would be gained in this relatively open location. The tops of buildings under construction would be visible and the stack and cranes, forming high level elements against the sky and stacks beyond at the K1 CHP. The sensitivity of the receptor is high and the magnitude of change in view would be small and temporary in nature, leading to a slight adverse effect on views, during the day and at night (See Figures 11.12 and 11.13).

Viewpoint 4. Saxon Shore Way/Footpath ZU2, south-east of the Site

11.6.16 Near views of some low-level construction activities, visible above a strip of coastal vegetation and the effluent treatment works, would be gained across the open water and marshes of Milton Creek. The tops of buildings under construction would be visible and the stack and cranes, forming high level elements against the sky and stacks beyond at the K1 CHP. Lighting required for night time works would be seen in the context of an existing well-lit industrial context. Walkers are of high sensitivity to the small magnitude of temporary change in view, resulting in a slight adverse effect on views, during the day and at night (See Figures 11.14 and 11.15).

Viewpoint 5: Saxon Shore Way/Footpath ZR200 north of the Site

11.6.17 Near open views gained by footpath users would include high level construction activities only. The activities would form an intensification of the existing infrastructure at the K1 CHP and would appear within an urban fringe context comprising a combination of industry and natural habitats set beside the estuarine landscape of The Swale. Temporary lighting for night time working during the construction period would be seen in the context of existing light sources either on the Site or within the adjoining industrial district. The sensitivity of the receptor is high in this urban fringe context and the magnitude of change in view would be negligible and temporary in nature, leading to a slight adverse effect on views during the day and at night.

Viewpoint 6. Swale Way

11.6.18 Occupiers of vehicles and pedestrians using the roadside pavement would gain mid-distance partly obscured views of the K4 CHP during construction from this transport corridor as it crosses the marshes. Low level activities would be concealed by intervening landform, vegetation and industrial development. High level construction activities would be visible next to the Kemsley Paper Mill buildings. Only high-level lighting for night time working during the construction period would be seen in the context of existing light sources at the construction site and within the adjoining industrial district. The sensitivity of occupiers of vehicles is low and the magnitude of change in view would be small, temporarily leading to a negligible adverse effect on views, during the day and at night. Pedestrians are of medium sensitivity and would experience a small magnitude of change, leading to a slight adverse level of effect in the short term, during the day and at night.

Viewpoint 7. Swale Way overbridge

11.6.19 Occupiers of vehicles and pedestrians using the roadside pavement would gain mid-distance relatively open views of the construction activities from this elevated bridge over the Milton Creek. Low level activities would be partly concealed by vegetation and the effluent treatment works. High level construction activities would be visible in front of the K1 CHP. Lighting for night time working during the construction period would be seen in the context of existing light sources at the construction site and within the adjoining industrial district. The sensitivity of occupiers of vehicles is low and the magnitude of change in view would be negligible, temporarily leading to a negligible adverse effect on views, during the day and at night. Pedestrians are of medium sensitivity and would experience a negligible magnitude of change, leading to a slight adverse level of effect in the short term, during the day and at night (See Figures 11.16 and 11.17).

Viewpoint 8. Church Marshes Country Park

11.6.20 Walkers and people engaged in leisure activities are receptors of high sensitivity within this open space which has a context of urban fringe and industrial townscapes and natural landscapes. These receptors would gain mid-distance filtered views over open space of high level construction activities at the Proposed Development site, rising up beyond existing development at Kemsley Paper Mill. High level lighting operated during the construction period would be seen in the context of existing light sources within the adjoining industrial district at night. The construction phase would result in an intensification of existing development on the skyline. The magnitude of change in view would be negligible resulting, temporarily, in a negligible adverse level of effect, during the day and at night.

Viewpoint 9. Saxon Shore Way/Footpath ZU2, east of the Site

11.6.21 Walkers on the Saxon Shore Way would gain mid-distance open views of the Proposed Development under construction as an intensification of the existing large-scale buildings at the Kemsley Paper Mill and stacks at the K1 CHP. The mound of the restored landfill site would screen some of the low level site activities, however, the high level construction of the buildings and stack would form a more visible element in the view. New light sources would be seen in the context of existing lighting within the adjoining industrial townscape and at the Site. The receptors are of high sensitivity and the magnitude of change they would experience is negligible, leading to a slight adverse level of effect, in the short term.

Viewpoint 10: Church Road at Tonge Corner (representative of views from residential properties)

11.6.22 Residents within properties at the hamlet of Tongue are receptors of high sensitivity and would have mid-distance views over arable farmland and solar farm of some low-level construction activities, visible above a strip of coastal vegetation and the effluent treatment works. The tops of buildings under construction would be visible and the stack and cranes, forming high level elements against the sky and stacks beyond at the K1 CHP. Lighting required for night time works would be seen in the context of an existing well-lit industrial context. Receptors are of high sensitivity to the negligible magnitude of temporary change in view, resulting in a negligible adverse effect on views, during the day and at night.

Viewpoint 11: Elmley Marshes Nature Reserve, public right of way

11.6.23 Visitors to the Nature Reserve would gain mid-distance open views from the footpath on the Isle of Sheppey. The proposed construction activities and traffic at the existing industrial site would be seen as part of the urban fringe of Sittingbourne beyond the foreground of open grassland. Some low level activities would be obscured by the landfill landform. High level construction works would be visible to the left of the cluster of stacks at the K1 CHP and would break the horizon of the North Downs beyond. The high sensitivity of the receptor in this rural location and the negligible magnitude of the temporary change would lead to a negligible adverse level of effect during the day and at night.

Viewpoint 12. Barge Way near site access

11.6.24 Near, partly obscured views would include cranes and the top of the stack under construction above the foreground palisade fence, signage and industrial development. Construction activities associated with the access road would be visible in the foreground and some filtered views of the construction laydown area may be visible through vegetation to the right of the view. All activities would appear within a well-lit industrial location. The sensitivity of the receptor is low and the magnitude of change in view would be negligible and temporary in nature, leading to a negligible adverse effect on views, during the day and at night.

Operational Effects

Predicted Character Effects

11.6.25 Direct effects on townscape character relate to the Sittingbourne Industrial/Commercial Area, which has a poor to ordinary condition and local or low value. Although the scale of the Proposed Development is large, within the context of this extensive industrial area of Sittingbourne it is relatively modest. The new CHP and associated infrastructure could be accommodated within this character area without significant effects on key features or elements. The character area's sensitivity to change through the effects of the redevelopment of the Site would be low due to the similarity in the nature and scale of the proposals and the existing site conditions, neighbouring K1 CHP infrastructure and construction activities at the Kemsley Paper Mill SEP . The direct effect of the large-scale development on the open area of the Site would create a small magnitude of change to the character, which would be adverse in nature in the long term. The overall significance of effect on the Sittingbourne Industrial/Commercial character area would be slight adverse in the day.

11.6.26 The future baseline would include the completed Kemsley Paper Mill SEP and the baling plant and anaerobic digester. Although this would represent a slightly more developed industrial context the level of effect would also be slight adverse.

11.6.27 Lighting proposals would extend the existing well-lit site conditions provided by high mast lighting at the Site and the urban conditions on adjacent land. This would be within the context of the existing building and tower mounted lights and lighting columns within industrial areas and high-level mast mounted lights at Ridham Docks. The lighting at this site would not change the existing character of the area, particularly given the measures adopted to ensure lighting is directional and that spillage is therefore controlled as far as practicable. There would be a negligible magnitude of change on a low sensitivity receptor. The significance of night-time effects on the existing and future baseline situation of the Sittingbourne Industrial/Commercial Area character area would be negligible adverse in the long term.

11.6.28 The adjoining character area of Chetney and Greenborough Marshes forms the immediate landscape context to the Proposed Development site and is not directly affected by the new CHP facility. This character area is considered to be in good condition, has a high value and is of medium sensitivity to the indirect effects of the proposals. The large scale of the K4 CHP would be apparent as an intensification of baseline conditions in the context of similar infrastructure at the K1 CHP, the wider industrial townscape at Kemsley and the existing and future baseline conditions at the Kemsley Paper Mill SEP sites. The negligible magnitude of change would result in indirect slight effects on the natural and wild elements of this character area during the daytime and at night.

11.6.29 The future baseline would include the completed Kemsley Paper Mill SEP and the baling plant and anaerobic digester. Although this would represent a slightly more developed industrial context the level of indirect effect on the rural character area would also be slight adverse.

11.6.30 The wider landscape of the Elmley Marshes, Elmley Island, Lower Halston Clay Farmlands, Iwade Arable Farmland, Teynham Fruit Belt, Luddenham and Conyer

Marshes and South Sheppey Marshes and Mudflats, which have a poor to good condition, medium to high value and a medium sensitivity to the indirect effects, provide context to the Proposed Development. The development would be set on the edge of an existing industrial area and would have no direct effect on the valued aspects of these character areas. The existing extensive industrial development at Sittingbourne forms a backdrop to the character areas and is a characteristic element of the study area in North Kent. The magnitude of change would be negligible and adverse in the long term leading to a slight significance of effect during the day and at night.

11.6.31 The future baseline would include the completed Kemsley Paper Mill SEP and the baling plant and anaerobic digester. Although this would represent a slightly more developed industrial context the level of indirect effect on the rural character areas would also be slight adverse.

11.6.32 The neighbouring townscape of the Sittingbourne Residential character area has an ordinary condition, low value and a low sensitivity to change through the influence of a stack within an industrial context which contains many stacks. The magnitude of change would be negligible and adverse in the long term leading to a negligible significance of effect during the day and at night.

11.6.33 The effect on the urban townscapes future baseline situation would also be negligible.

Predicted Visual Effects

11.6.34 The operational phase ZTV's for the CHP facility would extend over the same area as the construction phase ZTV's (See Figure 11.1 and 11.4).

11.6.35 Users of the Saxon Shore Way (ZU1) immediately to the south and south-east of the Site would continue to form the closest visual receptors within public locations to the Proposed Development, with the ability to gain views of some aspects of the CHP. Occupiers of residential properties at Kemsley to the west and south-west of the Proposed Development and users of public open space at Church Marshes Country Park to the south-west would have glimpsed views through intervening industry of the tops of buildings and stack at the CHP. The significance of effect on these receptors is dealt with in relation to specific viewpoint locations described below.

11.6.36 Views gained by occupants of vessels within the relatively wild coastal locations of The Swale to the east and north-east of the Site and Milton Creek to the south would include the new CHP located beside the existing K1 CHP. Near to mid-distance views would be gained of mainly the stack and to a lesser extent the tops of tall buildings within the Site, in the wider context of extensive industry on the urban fringe of Sittingbourne. The landfill landform would obscure many views from the east. A relatively small number of receptors would use the Swale for either leisure or commercial purposes and would range in sensitivity from medium to low. The magnitude of change would be negligible to small resulting in a negligible to slight adverse levels of effect in the long term, which is not significant.

11.6.37 The future baseline view would include the completed Kemsley Paper Mill SEP and the anaerobic digester. Although this would represent a slightly more developed industrial visual context than the existing situation the level of effect on occupiers of vessels on the Swale would also be negligible to slight adverse.

11.6.38 Employees at industrial premises along the edge of Sittingbourne, including primarily Kemsley and premises north of Swale Way, would be visual receptors of low sensitivity and form the largest group of receptors in close proximity to the Proposed Development. Most views of the new CHP facility from Kemsley would be gained through intervening development of a similar character with a backdrop including the Kemsley Paper Mill SEP under construction. Views from north of Swale Way extend across a more open landscape of the Milton Creek. The new CHP would be seen as an intensification or extension of existing industry, including light sources at night. The proximity of the development would create a negligible to medium magnitude of change in view, leading to a negligible to slight adverse significance of effect, which is not significant.

11.6.39 The future baseline view would include the completed Kemsley Paper Mill SEP , baling plant and anaerobic digester. Although this would represent a slightly more developed industrial visual context than the existing situation the level of effect on employees would also be negligible to slight adverse.

<u>Viewpoints</u>

<u>Viewpoint 1. Saxon Shore Way/Footpath ZU1, south of the Site</u>

11.6.40 Near views from the closest public viewpoint to the Site are likely to include only the top of the stack through the palisade fence. All other buildings and infrastructure are likely to be obscured by the intervening effluent treatment works. The small amount of additional development would be easily missed from this location and would be barely perceptible. Proposed lighting at the Site would appear within a well-lit industrial edge location. The sensitivity of the receptor is high and the magnitude of change in view would be negligible, leading to a negligible adverse effect on views, during the day and at night.

11.6.41 There would be very little perceptible change in the future baseline situation. The level of visual effect would be negligible adverse.

<u>Viewpoint 2. Saxon Shore Way/Footpath ZU1, east of the Site</u>

11.6.42 Near views of the top of the stack and potentially the top of the tallest building within the K4 CHP would be visible above the intervening palisade fence. Lower level buildings and infrastructure at the Site would be largely obscured by the fence and landfill landform. The stack would appear within the context of existing stacks and lighting at the K1 CHP. The sensitivity of the receptor is high and the magnitude of change in view would be negligible and long term in nature, leading to a slight adverse effect on views, during the day and at night.

11.6.43 There would be no perceptible change in the future baseline situation. The level of visual effect would be slight adverse.

<u>Viewpoint 3. Saxon Shore Way/Footpath ZU1, south of the Site</u>

11.6.44 Near views of some lower level elements of the K4 CHP, including buildings and infrastructure would be visible above the effluent treatment works, where coastal vegetation is low enough to allow relatively open views. The tops of tall buildings and the whole of the stack would form high level additions to the view, increasing the intensity of the cluster of existing stacks at the K1 CHP and the Kemsley Paper Mill SEP under construction. The sensitivity of the receptor is high and the magnitude of change in view would be small, leading to a moderate adverse effect on views, during the day and at night, which is not significant.

11.6.45 There would be slightly more industrialised visual context in the future baseline situation however, the level of visual effect would also be moderate adverse.

Viewpoint 4. Saxon Shore Way/Footpath ZU2, south-east of the Site

11.6.46 Open views across the natural landscape of the Milton Creek estuary focus on the industrial development at Kemsley Paper Mill. New buildings and relatively low-level infrastructure within the K4 CHP would be visible above coastal vegetation and the effluent treatment works. The tops of taller buildings and the stack would be more clearly visible, replicating the scale and form of existing infrastructure at the K1 CHP and the Kemsley Paper Mill SEP under construction, slightly increasing the intensity of industrial development in the view, whilst maintaining the character of the view. Any new light sources would be seen in the context of an existing well-lit industrial context. Walkers would have a high sensitivity to the small magnitude of change in view, resulting in a moderate adverse effect in the long term, during the day and at night.

11.6.47 There would be more industrialised visual context in the future baseline situation however, the level of visual effect would also be moderate adverse.

Viewpoint 5: Saxon Shore Way/Footpath ZR200 north of the Site

11.6.48 Receptors walking south on the long-distance path would gain near fragmented views of the top of the new stack and potentially the top of the tallest buildings on site, immediately beyond building and infrastructure of a similar scale at the K1 CHP and the Kemsley Paper Mill SEP under construction. The activities would form an intensification of the existing industrial conditions within an urban fringe context and a foreground of the Swale channel. New lighting would be seen in the context of existing light sources either on the Site or within the adjoining industrial district. The sensitivity of the receptor is high in this urban fringe context and the magnitude of change in view would be negligible, resulting in a slight adverse effect on views during the day and at night, in the long term.

11.6.49 There would be a more industrialised visual context in the future baseline situation and the top of the new stack is likely to be the only visible element of the K4 CHP however. The level of visual effect would be no more than slight adverse.

Viewpoint 6. Swale Way

11.6.50 Occupiers of vehicles and pedestrians using the roadside pavement would gain mid-distance partly obscured views of the K4 CHP from this transport corridor within the Church Marshes Country Park. Some buildings and low-level infrastructure would be visible rising above intervening buildings as DS Smith and infrastructure at the effluent treatment works and the backdrop of the Kemsley Paper Mill SEP under construction. The whole of the new stack would be visible to the right of the four existing stacks at the K1 CHP. There would be a slight intensification of industrial development within the view, whilst the character of the view would remain the same. New light sources would be seen in the context of existing light sources at the Site and within the adjoining industrial district. The sensitivity of occupiers of vehicles is low and the magnitude of change in view would be small, resulting in a negligible adverse effect on views, during the day and at night. Pedestrians are of medium sensitivity and would experience a small magnitude of change, leading to a slight adverse level of effect, during the day and at night.

11.6.51 There would be slightly more industrialised visual context in the future baseline situation however, the level of visual effect would also be negligible adverse for occupiers of vehicles and slight adverse for pedestrians.

Viewpoint 7. Swale Way overbridge

11.6.52 The elevated section of the road which crosses Milton Creek enables receptors to gain mid-distance relatively open views of the new CHP along the estuary landscape. Low buildings and infrastructure would be partly concealed by scrubby trees and the effluent treatment works. Taller buildings and the stack would be visible in front of the K1 CHP. The proposals would slightly increase the density of the existing cluster of energy infrastructure within the view, without changing the nature of the view. Any new lighting which is visible would be barely discernible from the existing night time context of well-lit industrial buildings. The sensitivity of occupiers of vehicles is low and the magnitude of change in view would be negligible, leading to a negligible adverse effect on views, during the day and at night. Pedestrians are of medium sensitivity and would experience a negligible magnitude of change, leading to a slight adverse level of effect in the long term, during the day and at night.

11.6.53 There would be slightly more industrialised visual context in the future baseline situation however, the level of visual effect would also be slight adverse.

Viewpoint 8. Church Marshes Country Park

11.6.54 The top of the new stack at the CHP is likely to be the only visible element of the proposals in views gained by walkers and people engaged in leisure activities within the country park. Whilst the density of the cluster of stacks would be slightly increased the character of the view would remain the same comprising urban fringe and industrial townscapes and natural landscapes. High-level lighting would be seen in the context of existing light sources within the adjoining industrial district at night. High sensitivity receptors would experience a negligible magnitude of change in view, resulting in a negligible adverse level of effect, during the day and at night.

11.6.55 There would be slightly more industrialised visual context in the future baseline situation however, the level of visual effect would also be negligible adverse.

Viewpoint 9. Saxon Shore Way/Footpath ZU2, east of the Site

11.6.56 Receptors walking west on this long-distance path would gain mid-distance open views of the Proposed Development as an intensification of the existing large scale buildings at the Kemsley Paper Mill and stacks at the K1 CHP. The mound of the restored landfill site would screen some of the buildings and low-level infrastructure. The tops of tall buildings and the whole of the stack would be more recognisable against the skyline.

The balance of industrial townscape and wild coastal landscape would remain the same. New light sources would be seen in the context of existing lighting within the adjoining industrial townscape and at the Site. The receptors are of high sensitivity and the magnitude of change they would experience is negligible, leading to a slight adverse level of effect, in the long term.

11.6.57 There would be slightly more industrialised visual context in the future baseline situation however, the level of visual effect would also be slight adverse.

<u>Viewpoint 10: Church Road at Tonge Corner (representative of views from residential properties)</u>

11.6.58 Occupiers of residential properties at Tongue are receptors of high sensitivity and would gain mid-distance views over a largely rural landscape of some buildings and low-level infrastructure beyond coastal vegetation and the effluent treatment works. The tops of taller buildings and the stack, would be slightly more visible although not immediately discernible from the development at the K1 CHP. Lighting at the Site would be seen in the context of an existing well-lit industrial context at Kemsley and Ridham Docks to the right of the view. Receptors are of high sensitivity to the negligible magnitude of change in view, resulting in a slight adverse effect on views, during the day and at night.

11.6.59 There would be slightly more industrialised visual context in the future baseline situation however, the level of visual effect would also be slight adverse.

<u>Viewpoint 11: Elmley Marshes Nature Reserve, public right of way</u>

11.6.60 Mid-distance views from this elevated location within the nature reserve on the Isle of Sheppey would gain open views across stark grassland and marshes of the industrial edge of Sittingbourne. The buildings and low-level infrastructure would be indiscernible from the existing Kemsley paper Works. The additional stack would be easily missed in this view when seen together with the four existing stacks. The landfill landform would obscure some low-level infrastructure. The character of the view would remain the same. The high sensitivity of walkers in this location and the negligible magnitude of the change would lead to a slight adverse level of effect during the day and at night.

11.6.61 There would be slightly more industrialised visual context in the future baseline situation however, the level of visual effect would also be slight adverse.

<u>Viewpoint 12. Barge Way near site access</u>

11.6.62 The top of the new stack would form the only visible element of the K4 CHP. This would be seen in the context of existing stacks at the K1 CHP and the numerous vertical forms of the high mast lighting. The industrial character of this view would remain unchanged. Any new lighting would be barely discernible in the well-lit context of the Kemsley Paper Mill. The sensitivity of occupiers of vehicles is low and the magnitude of change in view would be negligible, leading to a negligible adverse effect on views, during the day and at night.

11.6.63 There would be slightly more industrialised wider visual context in the future baseline situation however, the level of visual effect would also be negligible adverse.

Sequential Visual Effects

11.6.64 Walkers using the Saxon Shore Way would experience a sequence of views that would include a more heavily developed cluster of energy infrastructure at Kemsley Paper Mill within a journey between Milton Creek and Ridham Docks. Whilst the assessment of individual viewpoints above concludes that there would be no more than a moderate effect on receptors at each individual location, which is not significant, when the series of views are combined into a single journey, walkers would experience a significant sequential effect on visual amenity, in the long term, as defined in the methodology at paragraph 11.3.18.

Decommissioning Effects

11.6.65 It is noted that there is an intention to decommission the K4 development at the end of its operational life. Demolition/ dismantling would be comparable to the construction phase in reverse. The nature and level of effects on landscape, townscape and visual receptors would be the same as those identified for the construction phase, described at paragraphs 11.6.3 to 11.6.24 above. Furthermore, the scoping opinion states that effects on landscape character and visual resources during the decommissioning phase should be scoped out of the ES.

11.7 Mitigation

11.7.1 The mitigation of effects on landscape, townscape and visual resources is generally achieved through the following two methods;

- The provision of hard and soft landscape proposals to enhance the scheme and to screen it in views from neighbouring areas and the wider landscape; and
- The design of the built environment and infrastructure to minimise the scale and massing of development and the appropriate use of form, surface materials and colours.

11.7.2 However, due to the industrial nature of the Site and immediate context, no specific landscape mitigation measures have been proposed as they would not achieve a meaningful reduction in landscape, townscape and visual effects. The K4 CHP design incorporates buildings, infrastructure, hardstanding and access roads which extend over the whole K4 site and would be contiguous with existing industry at Kemsley to the north, south and west. The incorporation of landscape planting, earth shaping or screen fences within the proposals would not, due to the scale of the new CHP, achieve a screening function.

11.7.3 The form of the K4 CHP is largely dictated by its function. The stack height and diameter, the buildings scale and mass and the arrangement of infrastructure to achieve the energy generation process are determined through an iterative engineer lead design process. The scheme design is further constrained by the shape and size of the available site and the need to connect to existing paper mill infrastructure. Maximum parameters have been identified for all elements of infrastructure.. Detailed design of the K4 CHP will take place following the DCO process however, it is likely that the new infrastructure will be clad in non-reflective materials and generally pale grey in colour to minimise the apparent scale and bulk of the CHP when viewed against the skyline and backdrop of Kemsley Paper Mill, the majority of which is pale grey.

11.8 Residual Effects

11.8.1 Residual effects are those that are predicted to remain after implementation of any secondary mitigation measures. No specific landscape mitigation measures have been identified, therefore residual effects will be the same as those effects previously identified within this chapter. The significant residual effects are summarised in Table 11.7.

Significant residual effect	Receptor sensitivity	Impact magnitude	Nature	Duration	Degree of effect	Level of certainty
Operational effects: Day and night time, sequential views from the Saxon Shore Way/public right of way ZU1/2	High	Small	Adverse	Long term	Moderate	Reasonable

Table 11.7: Significant residual visual and landscape effects

11.9 Cumulative Effects

11.9.1 The significance of cumulative effects on the existing landscape and townscape character and visual resources of the proposed K4 CHP development with other schemes that are being constructed, consented or for which planning permissions are currently being sought have been assessed and are illustrated in Figure 3.2 of Chapter 3 of this ES.

Cumulative Developments	Landscape/Townscape Character Area
SW/10/444 Kemsley Paper Mill Sustainable Energy Plant (SEP) and power upgrade	Sittingbourne Industrial/Commercial
16/507687 Kemsley Paper Mill Incinerator Bottom Ash (IBA) Recycling Facility	Sittingbourne Industrial/Commercial
16/501228/FULL Kemsley Mill baling plant	Sittingbourne Industrial/Commercial
Forthcoming application by DS Smith for Kemsley Paper Mill southern boundary road	Sittingbourne Industrial/Commercial
SW/11/1291 Land north of DS Smith Paper Mill anaerobic digester and associated ground profiling and landscaping	Sittingbourne Industrial/Commercial
16/501484/COUNTY Countryside Recycling gypsum recycling plant	Sittingbourne Industrial/Commercial
SW/14/0224 Solar Farm north west of Tonge Corner Farm	Teynham Fruit Belt
SW/12/0816 Relocation of Nicholls Transport depot north of Swale Way	Iwade Arable Farmland

Cumulative Developments	Landscape/Townscape Character Area
from Lydbrook Close	
17/503713/ENVSCR Land east of Iwade Residential Development	Iwade Arable Farmland
16/506193/ENVSCR Land west of Iwade Residential Development up to 275 dwellings	Iwade Arable Farmland
15/500348/COUNTY Advance thermal conversion energy project	Iwade Arable Farmland
16/506014 Sustainable urban extension north-west of Sittingbourne up to 1,100 dwellings	Iwade Arable Farmland
18/500257 North-west of Sittingbourne 153 dwellings	Iwade Arable Farmland
14/500327/OUT Land south of Kemsley Mill up to 8,000m2 of class B1 and B2 and country park	Chetney and Greenborough Marshes/Teynham Fruit Belt
15/510/589/OUT Land east of Sittingbourne Business Park	Teynham Fruit Belt
SW/12/1211 Ridham Dock Materials Recycling Facility (MRF) and waste transfer station	Sittingbourne Industrial/Commercial
14/502737/EIA Ridham Dock combined heat and energy plant	Sittingbourne Industrial/Commercial
16/506935/COUNTY Ridham Dock Kemsley Mill steam pipeline	Sittingbourne Industrial/Commercial
17/505073/FULL Tile factory service yard, storage yard and parking	Luddenham and Conyer Marshes
18/500393/FULL Sittingbourne natural gas reserve power plant	Luddenham and Conyer Marshes

Table 11.2: Cumulative Developments and Landscape and Townscape Character Areas

Cumulative Effects on Landscape and Townscape Character

11.9.2 The proposed K4 CHP and the cumulative developments generally lie within the same urban character type comprising the Sittingbourne Industrial/Commercial townscape character area. The existing Kemsley Paper Mill complex, MVV Biomass Power Plant, Knauf building and Ridham Dock developments together with nine of the cumulative schemes would form a more developed context into which the proposed CHP would be placed. The industrial and commercial characteristics of the northern part of Sittingbourne adjoining the Swale would be intensified within this townscape character area as a result of the addition of the nine schemes and the proposed K4 CHP however, the intrinsic character and qualities of the area would remain the same. Redevelopment of industrial land within the Kemsely Paper Mill to accommodate the new southern access road immediately south of the Site would not result in any adverse changes to the urban townscape. This would result in a reduction in built development at the paper mill. The condition of the character area would remain poor or ordinary and the sensitivity would be low. The cumulative schemes, together with the proposed K4 CHP would result in a medium magnitude of change, leading to a slight adverse level of cumulative townscape effect in the day, which is not significant. The K4 CHP would make a negligible contribution to this cumulative effect.

11.9.3 At night the additional light sources at the nine cumulative developments together with the proposed K4 CHP, within the Sittingbourne Industrial/Commercial townscape character area would create a more intensely urban townscape. The cumulative night time effects that would occur would have a negligible magnitude of impact on a low sensitivity receptor, resulting in a negligible adverse level of effect in the long term.

11.9.4 The large cumulative business developments south of Kemsley Mill and east of Murston would lie wholly or partly within the Chetney and Greenborough Marshes character area. The developments would occupy open land which extends up to Milton Creek and up to the marshes to the east of Milton Creek. These cumulative schemes would considerably change this landscape character area to that of Sittingbourne Industrial/Commercial townscape, effectively extending the urban influence south and creating a more developed immediate and wider context. The direct cumulative effects of the cumulative schemes and indirect effects of the proposed K4 CHP development on the Chetney and Greenborough Marshes character area would be of medium magnitude on a character area of high sensitivity. The resulting level of cumulative effect would be substantial adverse during the day, which is significant. However, the proposed K4 CHP would make a negligible contribution to this cumulative effect.

11.9.5 The cumulative commercial development south of Kemsley Paper Mill would change largely rural unlit landscape into well-lit townscape, extending the separation between the Site and the Chetney and Greenborough Marshes. The business park east of Murston would also considerably change the night time character of a rural fringe landscape. limiting any influence the change in number of light sources as a result of the addition of the K4 CHP would have over the landscape. The direct cumulative effects of the cumulative schemes and the indirect effect of the proposals over the marshes character area would be medium in magnitude, resulting in a substantial adverse level of cumulative effect at night, which is significant. However, the proposed K4 CHP would make a negligible contribution to this cumulative effect.

- The cumulative development of the tile factory and the natural gas reserve power plant would be located within the Luddenham and Conyer marshes character area. The developments would be located on previously used land or cleared land on the edge of the commercial district of Sittingbourne, approximately 0.6km to 0.8km to the south of the Site. The effects on this rural and wild character area would be limited due to the reduced sensitivity to change of the site areas. The cumulative schemes would change these fringe areas of the landscape character area to that of Sittingbourne Industrial/Commercial, effectively extending the urban influence north and creating a more developed immediate context for the proposed CHP development. The direct cumulative effects of the tile factory and power plant and indirect cumulative effects of the proposed K4 CHP development on the Luddenham and Conyer marshes character area would be of small magnitude on a character area of medium sensitivity. The resulting level of cumulative effect would be slight adverse during the day, which is not significant. The K4 CHP would make a negligible contribution to this cumulative effect.

11.9.6 A large solar farm site east of Sittingbourne would be located in the Teynham Fruit Belt character area. This is located approximately 1.3km from the Site and would change the rural character of the landscape and have an influence over the landscape character context of the proposed scheme. The direct cumulative effects of the solar park and the indirect cumulative effects of the K4 CHP would result in a medium magnitude of impact on a medium sensitivity receptor. The level of cumulative effect on the Teynham Fruit Belt would be moderate adverse in the long term, during the day and at night, which is not significant. The K4 CHP would make a negligible contribution to this cumulative effect.

11.9.7 The South Sheppey Marshes and Mudflats, Elmley Marshes and Elmley Island character areas lie north-east of the Site beyond The Swale. The industrial development at

Sittingbourne forms a backdrop to these open, rural landscapes which have a high intrinsic sensitivity. The cumulative schemes and the proposed K4 CHP within the Sittingbourne Industrial/Commercial townscape character area and the cumulative schemes in the Chetney and Greenborough Marshes, Luddenham and Conyer Marshes and Teynham Fruit Belt landscape character areas would add to this concentration of developments and light sources at night, increasing the influence of urban townscape over the rural landscapes of the Isle of Sheppey. The cumulative magnitude of impact would be small resulting in a moderate adverse level of indirect cumulative effect in the day and a negligible adverse level of cumulative change at night, where the presence of more light sources would be difficult to discern from the urban fringe. The K4 CHP would make a negligible contribution to this cumulative effect.

11.9.8 Large residential developments east and south of Iwade, a large residential development north-west of Sittingbourne and a smaller residential scheme adjacent to this at Quinton Road, the thermal conversion energy project and the relocated Nicholls Transport depot would be located in the Iwade Arable Farmlands character area. These are located in an area approximately 0.5km to 1.3km to the west and north-west of the Site and would collectively have a significantly urbanising effect on the character area and an influence over the wider rural character context of the scheme through the extension of the Sittingbourne Residential townscape character area. The direct effects of the cumulative schemes and the indirect effect of the K4 CHP on the Iwade Arable Farmland character area would result in a large magnitude of impact on a medium sensitivity receptor. The level of cumulative effect would be substantial adverse in the long term, during the day and at night, which is significant. However, the proposed K4 CHP would make a negligible contribution to this cumulative effect.

<u>Cumulative Effects on Visual Resources</u>

11.9.9 Cumulative visual effects have been assessed based on the 12 viewpoint locations previously identified. Static cumulative effects would occur where receptors look directly towards the proposed scheme and would also see cumulative schemes in the same angle of view. Additional successive cumulative effects would occur where the receptor can turn through 360 degrees to gain views of cumulative schemes in different angles of view.

11.9.10 Walkers using the Saxon Shore Way/Footpath ZU1 south of the Site, at Viewpoints 1 and 3, east of the Site at Viewpoint 2, footpath ZU2, south-east of the Site at Viewpoint 4 and footpath ZU2, east of the Site at Viewpoint 9 would all gain views of the completed Kemsley Paper Mill SEP , and the B1 and B2 office development on land south of Kemsley Mill within the same angle of view as the new K4 CHP development. The scale and nature of the three cumulative schemes and the K4 CHP would considerably change the nature and character of views from these locations. The tile factory and the gas reserve power plant to the south would add to the intensity of industrial development in successive cumulative views.

11.9.11 There would be a cumulative effect on views gained by walkers using the Saxon Shore Way in these locations. The sensitivity of the receptor is high and the magnitude of change in view would be medium and long term in nature, leading to a substantial adverse level of cumulative effect, which is significant. However, the proposed K4 CHP would make a slight adverse contribution to this cumulative effect.

11.9.12 Walkers using the Saxon Shore Way/Footpath ZR200 north of the Site, at Viewpoint 5, would gain near views of the large scale cumulative scheme at Kemsley Paper Mill SEP , when complete, and the anaerobic digester in the foreground of views towards the Site. The SEP would become the dominant element in the view, significantly changing the character of the view, although obscuring views beyond to the Site. The Proposed Development would make no additional contribution to cumulative effects on views. The gypsum recycling building and CHP at Ridham Docks to the north would add to the intensity of industrial development in successive cumulative views if the viewer turns through 180 degrees.

11.9.13 Pedestrians using the roadside pavement of Swale Way at the overbridge at Viewpoint 7 and at Viewpoint 6 and users of the Church Marshes Country Park at Viewpoint 8, south of the Site, would gain near views of the large scale cumulative scheme of the B1 and B2 office development on land south of Kemsley Paper Mill in the foreground of views towards the Site, whilst the tile factory and gas reserve power plant on the northern edge of the commercial district may also be partly visible. The office development would become the dominant element in the view, significantly changing the character of the view. The K4 CHP is likely to be obscured and would make no additional contribution to cumulative effects on views.

11.9.14 Occupiers of residential properties at Church Road Tonge Corner at Viewpoint 10 would gain views of the cumulative solar farm scheme in addition to the existing solar farm, the tile factory and the gas reserve power plant on the urban edge and more distant, fragmented views of the completed Kemsley Paper Mill SEP and the B1 and B2 office development on land south of Kemsley Mill within the same angle of view as the new K4 CHP development. The cumulative schemes would be prominent in the view, although the overall character of the view would remain the same. High sensitivity receptors would experience a small magnitude of change in view, resulting in a moderate adverse cumulative effect during the day and slight effect at night, which is not significant.. The K4 CHP would make a slight adverse contribution to this cumulative effect.

11.9.15 Open, elevated views from Viewpoint 11 at Elmley Marshes Nature Reserve would enable walkers to see a series of distant cumulative developments including the completed Kemsley SEP , gypsum recycling building, the anaerobic digester north of the paper mill and the Ridham Dock CHP, the tile factory and gas reserve power plant by Milton Creek and part of the B1 and B2 office development on land south of Kemsley Paper Mill and east of Murston. The Kemsley Paper Mill southern access road may also be partly visible from this location, although would be barely perceptible within this urban context.

11.9.16 The cumulative schemes and K4 CHP would further extend the band of commercial and industrial development which forms a backdrop to the rural landscape. These schemes would combine to form a more developed context although would not change the intrinsic nature and character of the view. Walkers at the nature reserve are of high sensitivity to a small magnitude of change in view, leading to a moderate adverse cumulative effect, during the day and slight effect at night, which is not significant. The proposed K4 CHP would be barely perceptible and would make no more than a negligible contribution to this cumulative effect.

Significant residual effect	Receptor sensitivity	Impact magnitude	Nature	Duration	Degree of effect	Level of certainty
Operational Effects: Day and night time effects on rural character of Chetney and Greenborough Marshes	High	Medium	Adverse	Long term	Substantial (However, the proposed K4 CHP would make a negligible adverse contribution to this cumulative effect).	Absolute
Operational Effects: Day and night time effects on rural character of Iwade Arable Farmland	Medium	Large	Adverse	Long term	Substantial (However, the proposed K4 CHP would make a negligible adverse contribution to this cumulative effect).	Absolute
Operational effects: Day and night time, sequential views from the Saxon Shore Way/public right of way ZU1/2 at Viewpoints 1, 2, 3, 4 and 9	High	Medium	Adverse	Long term	Substantial (However, the proposed K4 CHP would make a slight adverse contribution to this cumulative effect).	Absolute
Operational effects: Day and night time, sequential views from the Saxon Shore Way/public right of way ZU1/2	High	Medium	Adverse	Long term	Substantial (However, the proposed K4 CHP would make a slight adverse contribution to this cumulative effect).	Absolute

Table 11.3: Significant residual cumulative visual and landscape effects

11.10 Summary

11.10.1 The proposed site currently comprises concrete hardstanding and forms part of the operational land within the Kemsley Paper Mill site. Large scale industrial buildings, energy infrastructure and chimneys form the northern and western site boundaries, separating the location from the residential districts of Sittingbourne to the west. This urban area is defined as the Sittingbourne Industrial/Commercial townscape character area. The urban character area has a poor quality and condition due to the extensive industrial buildings and infrastructure and the presence of disused and derelict land resulting in a low value.

11.10.2 There are no designated landscapes which lie within the Site area. The North Kent Marshes Special Landscape Area (SLA) extends over the Swale and neighbouring coastal landscape. This area includes the Chetney and Greenborough Marshes which lie next to the Site and extend along Milton Creek. This area is valued for the open character of its landscape. Other designated landscapes within the borough include an Area of High Landscape Value approximately 1 km to the south-east of the Site. This area of landscape lies inland of the marshes and includes the Teynham Fruit Belt.

11.10.3 The Site is currently not visible in views from the majority of the settlement of Sittingbourne due to industrial development on the edge of the town and the restored landfill mound to the east on the banks of the Swale. To the south-east of the Site the channel of the Swale and low-lying landscape of the Isle of Sheppy allow more open, longer distance views. Key visual receptors of high sensitivity and susceptibility to change in view as a result of the Proposed Development include walkers using the Saxon Shore Way long distance footpath (ZU1/2) beside the Swale and Milton Creek. People using this path form the closest high sensitivity receptors. The greatest number of visual receptors with views towards the Site would be occupiers of vehicles travelling on Swale Way.

Effects on Landscape and Townscape Character

11.10.4 The new buildings and infrastructure which form the proposed K4 CHP, although large in scale, would form an extension of the existing character of neighbouring development at Kemsley Paper Mill. The townscape character of the Site would be of low sensitivity to change through redevelopment. There would be no significant adverse effects on townscape character during construction or operation during the day or at night.

11.10.5 The surrounding rural landscape character areas of the Swale and Isle of Sheppey are generally in good condition and have an intrinsically high value. There would be no direct effects on these rural and wild landscapes and their sensitivity to change through the indirect influence of the new CHP would be medium or low. There would be no significant adverse effects on landscape character during construction or operation during the day or at night.

Effects on Visual Receptors

11.10.6 Walkers using the Saxon Shore Way would experience a sequence of views that would include a more heavily developed cluster of energy infrastructure at Kemsley Paper Mill within a journey between Milton Creek and Ridham Docks. Whilst the assessment of individual viewpoints concludes that there would be no significant effects on receptors at each individual location, when the series of views are combined into a single journey, walkers would experience a significant sequential effect on visual amenity, in the long term. Plans to establish the England Coast Path by 2020 on the alignment of the Saxon Shore Way in the vicinity of the Site, whilst not leading to an increase in the level of effect, could lead to an increase in numbers of walkers experiencing these effects in the future. There would be no significant adverse effects on other visual receptors within the study area during construction or operation during the day or at night.

Cumulative Effects on Landscape and Townscape Character

11.10.7 The proposed K4 CHP and many of the relevant cumulative developments lie within the same urban character type comprising the Sittingbourne Industrial/Commercial townscape character area. The existing Kemsley Paper Mill site and neighbouring and nearby industrial developments together with nine cumulative schemes would form a more developed context into which the proposed CHP would be placed. The industrial and commercial characteristics of the northern part of Sittingbourne adjoining the Swale would be intensified within this townscape character area as a result of the addition of the nine cumulative schemes and the K4 CHP however, the intrinsic character and qualities of the area would remain the same. There would be a medium magnitude of change, leading to a slight adverse level of cumulative townscape effect in the day and at night. The K4 CHP would make a negligible contribution to this cumulative effect.

11.10.8 The large cumulative business development south of Kemsley Mill would lie predominantly within the neighbouring Chetney and Greenborough Marshes character area, considerably changing this landscape character area to that of urban Sittingbourne Industrial/Commercial. The direct cumulative effects of the business park and the indirect effects of the proposed K4 CHP development would result in substantial adverse and significant cumulative effects during the day. The large residential schemes east and south of Iwade and west of Sittingbourne would change the rural character of the Iwade Arable Farmlands to an urban townscape of Sittingbourne Residential. The direct cumulative effects of the residential schemes and the indirect effects of the proposed K4 CHP development would result in substantial adverse and significant cumulative effects during the day. The proposed K4 CHP would make a negligible contribution to these significant cumulative effects, which would occur even in the absence of the K4 CHP.

Cumulative Effects on Visual Receptors

11.10.9 Visual receptors within the study area would generally gain views of a more intensively developed industrial/commercial townscape within the same angle of view as the new K4 CHP development. The scale and nature of the cumulative schemes in particular, and to a lesser extent the K4 CHP, would change the nature and character of many views, resulting in a considerably more developed context at Kemsley for walkers using the Saxon Shore Way near Sittingbourne. Walkers using the Saxon Shore Way at Viewpoints 1, 2, 3 and 9, in relatively close proximity to the Site are receptors of high sensitivity. The magnitude of change in view would be medium and long term in nature, leading to a substantial adverse level of cumulative effect, which is significant. However, the proposed K4 CHP would make a slight adverse contribution to this cumulative effect.

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11.7 Landscape Institute and Institute of Environmental Management and Assessment (2013) *Guidelines for Landscape and Visual Impact Assessment* 3rd Edition

11.8 The Countryside Agency and Scottish Natural Heritage (2002) *Landscape Character Assessment – Guidance for England and Scotland*

11.9 Natural England (formerly the Countryside Agency and English Nature) *National Character Area Profiles*

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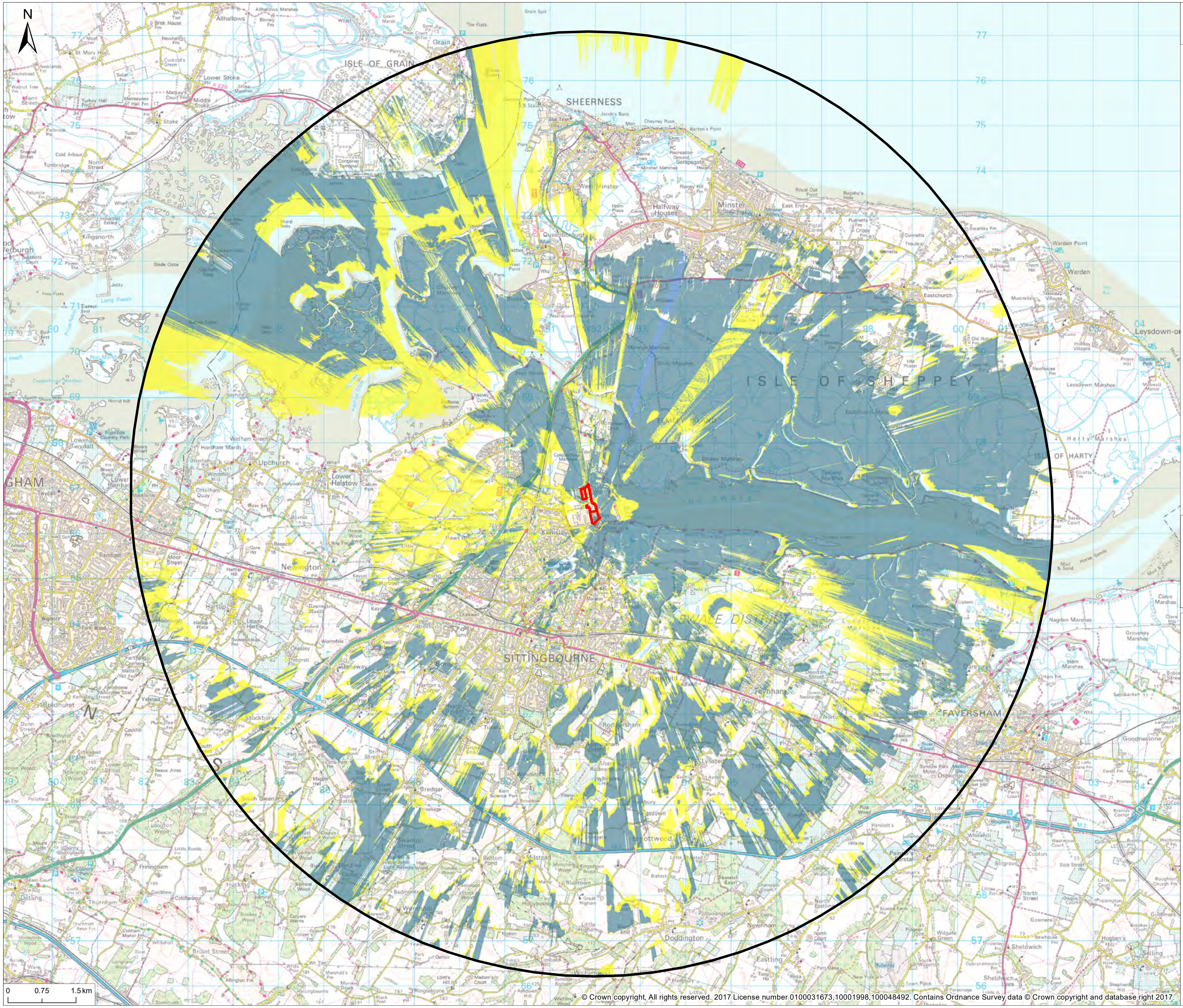
11.13 Kent County Council (2001) *Kent Historic Landscape Characterisation*



Preliminary Environmental Information Report

Legend

- Application boundary
- 10km search area
- Building's Zone of Theoretical Visibility
- Stack Zone of Theoretical Visibility

Note:
EA 1 m LiDAR and OS Terrtain 5 data has been used to generate the model.

ZTV compiled assuming observer height of 2m at eye level, and takes into account screen effects of existing vegetation and buildings. For OS Terrain 5 data a building height of 9m and vegetation height of 12m was added using OS Open Map layers .

The height of the proposed budiling is 32 m with a stack height of 70 m.

DS Smith

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Client	DS Smith Paper Limited
Project	K4 DCO Project, Kemsley Mill, Sittingbourne
Title	Zone of Theoretical Visibility (ZTV) 10 km radius study area

Status	Drawn By:	PM/Checked By
FINAL	CR	PE
Job Ref	**Scale @ A3**	**Date Created**
OXF10392	1:80,000	MAR 2018

Figure Number
11.1

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Legend

Application boundary

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Client DS Smith Paper Limited

Project K4 DCO Project, Kemsley Mill, Sittingbourne

Title Site Context Aerial Photography

Status	Drawn By:	PM/Checked By
FINAL	BM	PE
Job Ref	Scale @ A3	Date Created
OXF10392	1:25,000	MAR 2018

Figure Number
11.2

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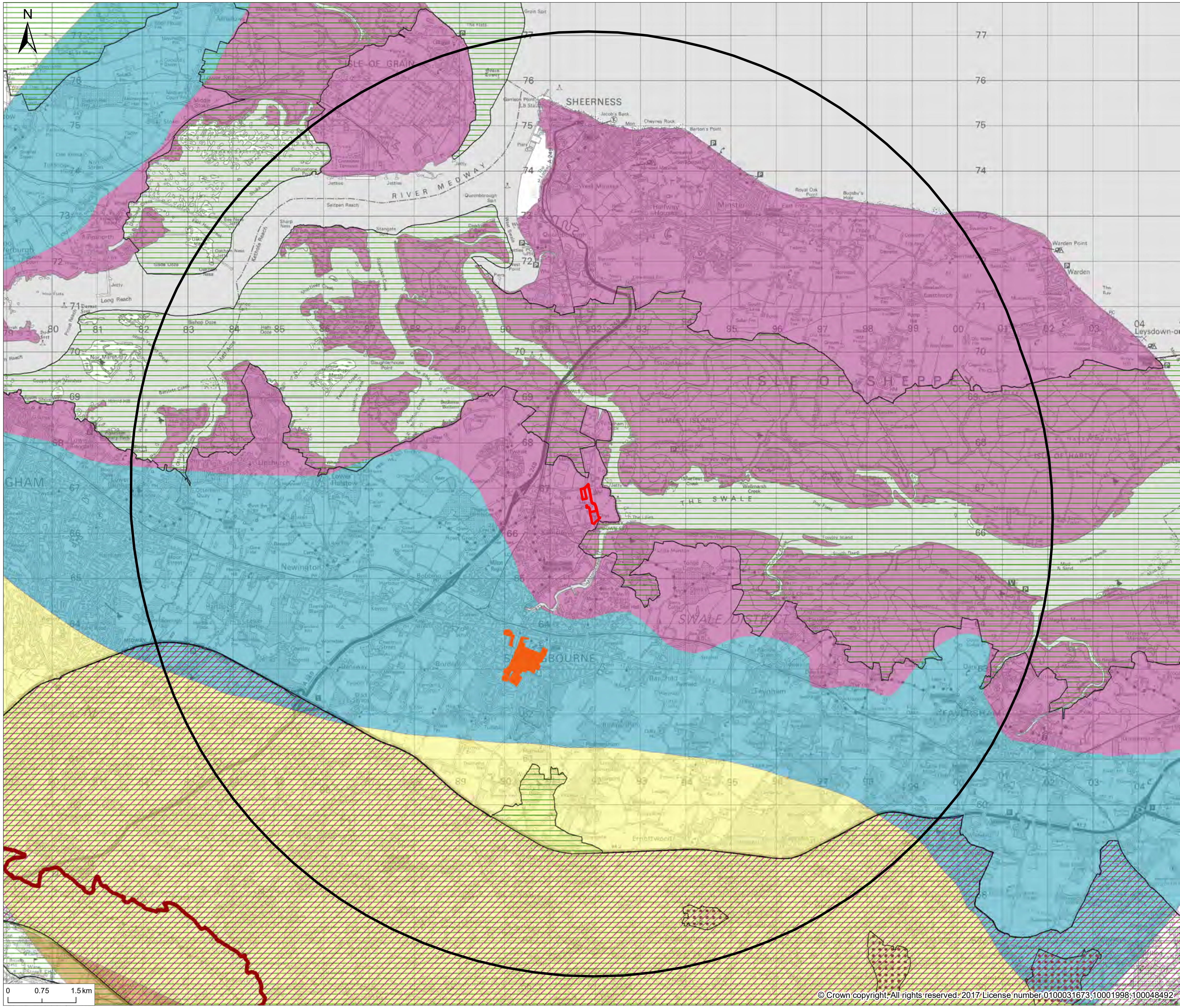

Preliminary Environmental Information Report

Legend

- Application boundary
- 10km search area
- National Trail
- Registered Park and Garden
- Area of Outstanding Natural Beauty
- Special Landscape Area
- Area of High Townscape Value

National Character Area

- Greater Thames Estuary
- North Downs
- North Kent Plain
- Wealden Greensand

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Title	Landscape & Relevant Designations & National Landscape Character

Status	Drawn By:	PM/Checked By
FINAL	CR	PE
Job Ref	**Scale @ A3**	**Date Created**
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Figure Number
11.3

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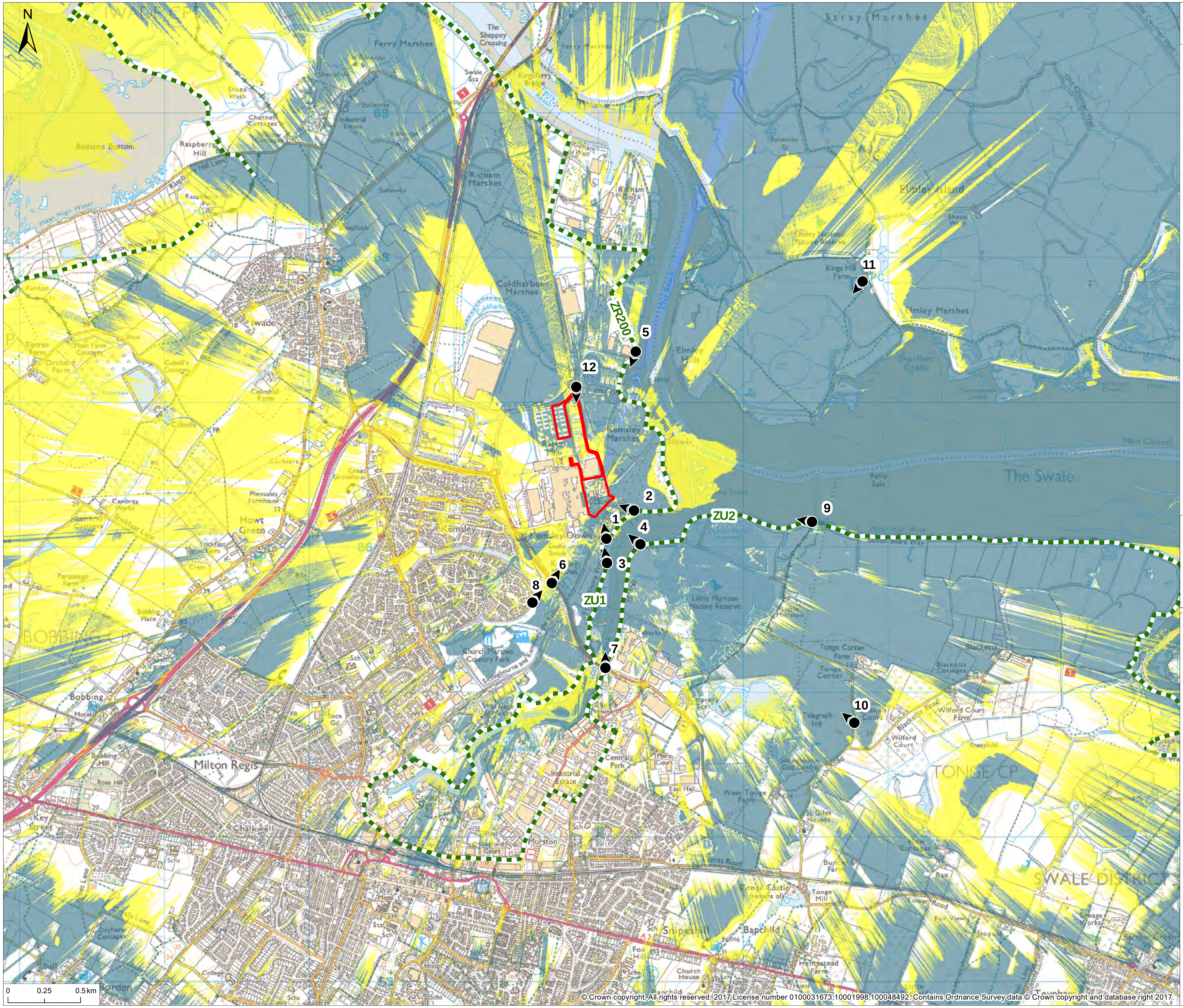

Preliminary Environmental Information Report

Legend

- Application boundary
- Building's Zone of Theoretical Visibility
- Stack Zone of Theoretical Visibility
- Viewpoint location
- Saxon Shore Way

Note:
EA 1 m LiDAR and OS Terrain 5 data has been used to generate the model.

ZTV compiled assuming observer height of 2m at eye level, and takes into account screen effects of existing vegetation and buildings. For OS Terrain 5 data a building height of 9m and vegetation height of 12m was added using OS Open Map layers .

The height of the proposed budiling is 32 m with a stack height of 70 m.

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Title	Zone of Theoretical Visibility (ZTV) and photographic viewpoint locations

Status	Drawn By:	PM/Checked By
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Job Ref	**Scale @ A3**	**Date Created**
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Figure Number
11.4

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Viewpoint 1


Viewpoint 2

RPS	**Kemsley K4**	Lens: 50mm Viewing distance: 300mm @ A3		**Figure 11.5: Viewpoints 1 and 2** **Existing views**

Viewpoint 3

Viewpoint 4

Ref: 10392-0011-002

RPS	Kemsley K4	Lens: 50mm Viewing distance: 300mm @ A3		Figure 11.6: Viewpoints 3 and 4 Existing views

Viewpoint 5

Viewpoint 6

Ref: 10392-0011-002

RPS	**Kemsley K4**	Lens: 50mm Viewing distance: 300mm @ A3		**Figure 11.7: Viewpoints 5 and 6** **Existing views**


Viewpoint 7


Viewpoint 8

Ref: 10392-0011-002

RPS	Kemsley K4	Lens: 50mm Viewing distance: 300mm @ A3			Figure 11.8: Viewpoints 7 and 8 Existing views

Viewpoint 9

Viewpoint 10

Ref: 10392-0011-002

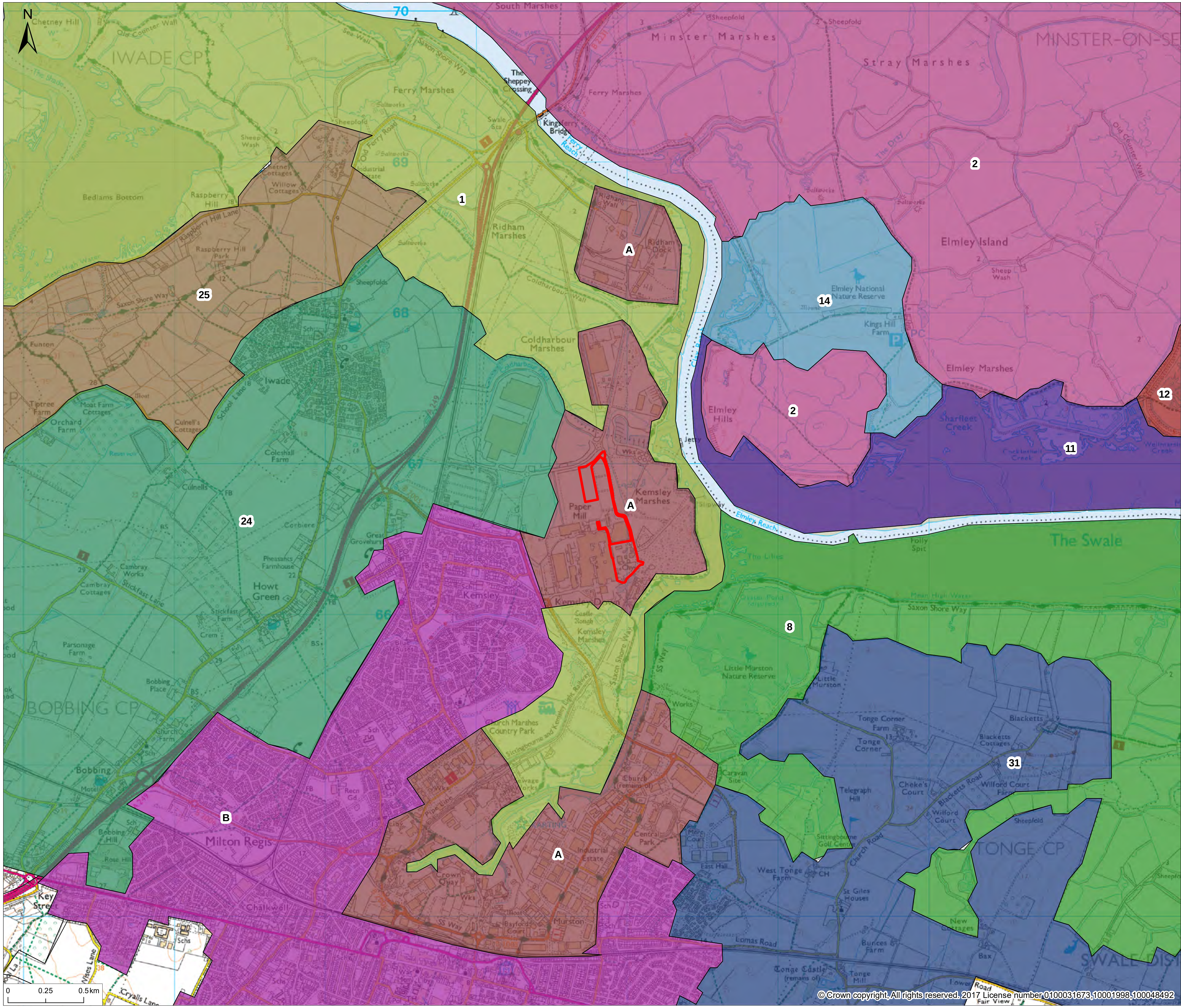
RPS Kemsley K4	Lens: 50mm Viewing distance: 300mm @ A3			Figure 11.9: Viewpoints 9 and 10 Existing views

Viewpoint 11

Viewpoint 12

RPS	Kemsley K4	Lens: 50mm Viewing distance: 300mm @ A3		**Figure 11.10: Viewpoints 11 and 12** **Existing views**

Ref: 10392-0011-002



Legend

Application boundary

Local Landscape Character Areas

- 1, Chetney and Greenborough Marshes
- 2, Elmley Marshes
- 8, Luddenham And Conyer Marshes
- 11, South Sheppey Marshes And Mudflats
- 12, Spitend Marshes
- 14, Elmley Island
- 24, Iwade Arable Farmlands
- 25, Lower Halstow Clay Farmlands
- 31, Teynham Fruit Belt

Townscape Character Areas

- A, Sittingbourne industrial commercial
- B, Sittingbourne residential

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Project	K4 DCO Project, Kemsley Mill, Sittingbourne
Title	Landscape Character Swale District

Status	Drawn By:	PM/Checked By
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Job Ref	Scale @ A3	Date Created
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Figure Number
11.11

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RPS K4 DCO Project, Kemsley Mill, Sittingbourne	Date of photography: 25/10/2017 Lens: 50mm (35mm format)	Distance to site: 330m OS reference: 592059, 165893	Direction to site: northwest Viewpoint height: 6m AOD	Horizontal field of view: Approx. 75° Viewing distance: 300mm @ A3	**Photomontage Viewpoint 3. Saxon Shore Way/Footpath ZU1, south of the site** **Figure: 11.12**

Ref: 10392-0012-007

Ref: 10392-0012-007

RPS K4 DCO Project, Kemsley Mill, Sittingbourne	Date of photography: 25/10/2017 Lens: 50mm (35mm format)	Distance to site: 330m OS reference: 592059, 165893	Direction to site: northwest Viewpoint height: 6m AOD	Horizontal field of view: Approx. 75° Viewing distance: 300mm @ A3	**Photomontage Viewpoint 3. Saxon Shore Way/Footpath ZU1, south of the site** **Figure: 11.13**

Ref: 10392-0012-007

RPS K4 DCO Project, Kemsley Mill, Sittingbourne	Date of photography: 25/10/2017 Lens: 50mm (35mm format)	Distance to site: 360m OS reference: 592288, 166021	Direction to site: north Viewpoint height: 6m AOD	Horizontal field of view: Approx. 75^{0} Viewing distance: 300mm @ A3	Photomontage Viewpoint 4. Saxon Shore Way/Footpath ZU2, south-east of the site Figure: 11.14

Ref: 10392-0012-007

RPS K4 DCO Project, Kemsley Mill, Sittingbourne	Date of photography: 25/10/2017 Lens: 50mm (35mm format)	Distance to site: 360m OS reference: 592288, 166021	Direction to site: north Viewpoint height: 6m AOD	Horizontal field of view: Approx. 75° Viewing distance: 300mm @ A3	**Photomontage Viewpoint 4. Saxon Shore Way/Footpath ZU2, south-east of the site** **Figure: 11.15**

RPS K4 DCO Project, Kemsley Mill, Sittingbourne	Date of photography: 25/10/2017 Lens: 50mm (35mm format)	Distance to site: 1.4km OS reference: 592047, 165169	Direction to site: north Viewpoint height: 11m AOD	Horizontal field of view: Approx. 75° Viewing distance: 300mm @ A3	Photomontage Viewpoint 7. Swale Way overbridge Figure: 11.16

Ref: 10392-0012-007

RPS K4 DCO Project, Kemsley Mill, Sittingbourne	Date of photography: 25/10/2017 Lens: 50mm (35mm format)	Distance to site: 1.4km OS reference: 592047, 165169	Direction to site: north Viewpoint height: 11m AOD	Horizontal field of view: Approx. 75⁰ Viewing distance: 300mm @ A3	**Photomontage Viewpoint 7. Swale Way overbridge** **Figure: 11.17**

Ref: 10392-0012-007

12 Archaeology & Cultural Heritage

12.1 Introduction

12.1.1 This chapter assesses the likely significant archaeological and cultural heritage effects resulting from the Proposed Development. The direct and indirect effects of the Proposed Development on the historic environment of the area, including buried archaeological sites, historic buildings and historic landscapes are considered. It aims to identify all effects on these heritage assets - in terms of the potential for direct physical disturbance and indirect visual effects on setting - and to assess the overall effect and significance of these predicted effects. The chapter reports on studies, including a combination of field surveys and desktop research, to describe, classify and evaluate the existing resource. The likely impacts are assessed during the construction, operational and decommissioning phases of the Proposed Development. Full details of the Proposed Development proposed are presented in Chapter 2 and accompanying figures, which set the basis against which this assessment has been conducted.

12.1.2 An appendix baseline desk assessment (Appendix 12.1) contains a detailed baseline with accompanying figures. In addition, this chapter contains two figures. Figure 12.1 shows the existing and proposed views from Landscape Viewpoint 7, the bridge over Milton Creek to the south of the Site. Due to the interrelated nature of the assessments there is some cross over between this chapter and Chapter 11, Landscape. On this basis some of the landscape figures remain relevant for this assessment and the location plan for Figure 12.1 is contained within Chapter 11-Landscape, as are further relevant visualisations referred to in this chapter. Figure 12.2 shows the designated assets in the area surrounding the Proposed Development.

12.2 Regulatory and Policy Framework

Legislation and Planning Policies

12.2.1 Listed buildings are protected under the designation regime set out in the Planning (Listed Buildings and Conservation Areas) Act (1990) which empowers the Secretary of State for the Department of Digital, Culture, Media and Sport (DCMS) to maintain a list of built structures of historic or architectural significance.

12.2.2 Scheduled monuments are protected through the Ancient Monuments and Archaeological Areas Act (1979), which had been updated in the National Heritage Act (1983). Scheduled monuments are maintained on a list held by the Secretary of State for DCMS. Any alterations or works to a scheduled monument (including archaeological investigation) requires scheduled monument consent (SMC).

<u>National Policy Statements for Energy</u>

12.2.3 In July 2011 the Secretary of State for Energy and Climate Change designated the six National Policy Statements for Energy (NPSs) under the Planning Act 2008. These NPSs set out national policy against which proposals for major energy schemes will be assessed and determined.

12.2.4 The NPSs which are relevant to the application for the Proposed Development is the Overarching Energy National Policy Statement (NPS EN-1); Department of Energy and Climate Change (DECC 2011a).

12.2.5 NPS EN-1 responds to the guidance provided in the NPPF in that it requires applicants to describe the significance of heritage assets affected by a Proposed Development and the contribution of their setting to that significance (NPS EN-1: 5.8.8). The applicant also has to ensure that the extent of the impact of the Proposed Development on the significance of any heritage assets affected can be adequately understood from the application documents

12.2.6 NPS EN-1 advises that harmful impacts on the significance of heritage assets should be weighed against the public benefit of the Proposed Development, also that where a development may affect the setting of a heritage asset the IPC and its successor bodies should treat more favourably applications that preserve those elements of the setting that make a positive contribution to the significance of the asset.

12.2.7 NPS EN-1 at paragraph 5.5.8 notes that applicants should provide a description of the significance of the heritage assets affected by the Proposed Development and the contribution of their setting to that significance. The level of detail should be proportionate to the importance of the heritage assets and no more than is sufficient to understand the potential impact of the proposal on the significance of the heritage asset

12.2.8 NPS EN-1 at paragraph 5.5.8 goes on to note that as a minimum the applicant should have consulted the relevant Historic Environment Record (or, where the development is in English or Welsh waters, EH or Cadw) and assessed the heritage assets themselves using expertise where necessary according to the Proposed Development's impact

12.2.9 NPS EN-1 at paragraph 5.8.9 notes that where a development site includes, or the available evidence suggests it has the potential to include, heritage assets with an archaeological interest, the applicant should carry out an appropriate DBA and, where such desk-based research is insufficient to properly assess the interest, a field evaluation

12.2.10 NPS EN-1 at paragraph 5.8.9 goes on to note that where Proposed Development will affect the setting of a heritage asset, representative visualisations may be necessary to explain the impact

<u>National Planning Policy Framework (NPPF)</u>

12.2.11 The National Planning Policy Framework (NPPF) (Department of Communities and Local Government, March 2012) provides guidance to planning authorities regarding the protection of heritage assets within the planning process. The NPPF deals with all types of heritage in a single document. It takes an integrated approach to the historic environment and heritage assets, moving beyond a distinction between buildings, landscapes and archaeological remains.

12.2.12 A heritage asset is defined in the NPPF at page 52 as a building, monument, site, place, area or landscape identified as having a degree of significance meriting consideration in planning decisions, because of its heritage interest. Heritage assets include designated heritage assets and assets identified by the local planning authority (including local listing).

12.2.13 'Setting of a heritage asset' is defined in the NPPF at page 56 as the surroundings in which a heritage asset is experienced. Its extent is not fixed and may change as the asset and its surroundings evolve. Elements of a setting may make a positive or negative contribution to the significance of an asset, may affect the ability to appreciate that significance or may be neutral.

Swale Borough Council's Development Plan

12.2.14 The Swale Borough council development plan comprises the Swale Borough local Plan, Neighbourhood Plans where they exist within Swale; and The Minerals and Waste Local Plan, prepared by Kent County Council, the latter not being directly relevant to the proposed development.

12.2.15 The Swale Borough local Plan was published in July 2017. Policy CP8, Conserving and enhancing the historic environment, states the following:

12.2.16 To support the Borough's heritage assets, the Council will prepare a Heritage Strategy. Development will sustain and enhance the significance of designated and non-designated heritage assets to sustain the historic environment whilst creating for all areas a sense of place and special identity. Development proposals will, as appropriate:

1. Accord with national planning policy in respect of heritage matters, together with any heritage strategy adopted by the Council;

2. Sustain and enhance the significance of Swale's designated and non-designated heritage assets and their settings in a manner appropriate to their significance and, where appropriate, in accordance with Policies DM30-DM34;

3. Respond to the integrity, form and character of settlements and historic landscapes;

4. Bring heritage assets into sensitive and sustainable use within allocations, neighbourhood plans, regeneration areas and town centres, especially for assets identified as being at risk on national or local registers;

5. Respond positively to the conservation area appraisals and management strategies prepared by the Council;

6. Respect the integrity of heritage assets, whilst meeting the challenges of a low carbon future; and

7. Promote the enjoyment of heritage assets through education, accessibility, interpretation and improved access.

12.3 Methodology

Scoping and Consultation

12.3.1 The formal scoping exercise is set out in Chapter 3 of the Environmental Statement with a summary of consultation responses set out in Appendix 3.1. In addition, consultation with the Kent County Archaeology Advisory Service and their Historic Environment Record (HER) was undertaken.

Establishing Baseline Conditions

Study Area

12.3.2 The study area is based upon recent experience of similar developments, the Site visit and consideration of the landscape study, including the zone of theoretical visibility (ZTV) that has been defined for the LVIA (see Chapter 11). This assessment, for the purpose of buried archaeology, focuses on a study area of 1km around the project site. For the purpose of the settings of heritage assets, the assessment focuses on a study area of 3km around the project site while taking into consideration evidence from a wider area if appropriate, for example assets outside the study area characterise the baseline or if it appeared likely that there would be a significant effect on a heritage asset outside the study area.

12.3.3 With respect to the settings of heritage assets, only those assets which lie within the ZTV are assessed, using the guidance prepared by Historic England in their document "The Setting of Heritage Assets"(Historic England 2015) along with "Conservation Principles".(Historic England 2008).

Baseline Methodology

12.3.4 A baseline desk assessment and site walkover survey has been undertaken.

12.3.5 The desk assessment comprised, in the first instance, consultation with the Kent County Archaeology Advisory Service and their Historic Environment Record (HER). Data on scheduled monuments, registered parks and gardens and registered battlefields was obtained from Historic England. A review of relevant documentary and archival material held in libraries and archives was undertaken. An iterative approach was adopted during this process to determine the scope of the above consultations/searches.

12.3.6 A site visit was undertaken in October 2017 to establish the presence of above ground archaeology, whether or not previously recorded and to verify the settings of the heritage assets surrounding the project site. The assessment has conformed to the relevant legislation and guidance, including:

- National Planning Policy Framework (NPPF) Department of Communities and Local Government (DCLG) (March 2012);
- Overarching Energy National Policy Statement (NPS EN-1); Department of Energy and Climate Change (DECC) (2011a);
- Renewable Energy Infrastructure National Policy Statement (NPS EN-3); Department of Energy and Climate Change (DECC) (2011b);
- Code of Conduct Chartered Institute for Archaeologists (2014);
- Standard and Guidance for Historic Environment Desk Based Assessment Chartered Institute for Archaeologists (2014); and
- Historic Environment Good Practice in Planning Note 3: The Setting of Heritage Assets Historic England (2015)

Significance Criteria

Assessment Criteria and Impact Assessment Methodology

12.3.7 The significance of predicted impacts likely to occur during construction, operation and decommissioning of the Proposed Development has been determined by consideration of the importance of assets that may be affected and the magnitude of the predicted impact.

Asset Significance and Importance

12.3.8 In order to reach an understanding of the likely effect that a project may have on a heritage asset, it is necessary to understand the significance and importance of that asset.

12.3.9 Establishing the importance of a heritage asset is principally a means of identifying the extent to which the asset should be valued. For example, is it important at a national level or at a local level?

12.3.10 Significance can primarily be understood through examination of why a structure, site or area should be considered as a heritage asset. In the NPPF the significance of an asset is defined as:

12.3.11 'The value of a heritage asset to this and future generations because of its heritage interest. That interest may be archaeological, architectural, artistic or historic. Significance derives not only from a heritage asset's physical presence, but also from its setting.' (DCLG 2012, Annex 2 and cross-referenced in National Policy Statement EN-1).

12.3.12 These levels of interest broadly tie in with previous guidance from EH expressed in the document Conservation Principles, Policies and Guidance for the Sustainable Management of the Historic Environment (English Heritage, 2008). This provides guidance on understanding heritage values and also included a section (Section 6) advising on how to assess heritage significance.

12.3.13 According to the guidance published by EH (2008), heritage values fall into four inter-related groups:

- Evidential value – the potential of a place to yield evidence about past human activity;
- Historical value - this derives from the ways in which past people, events and aspects of life can be connected through a place to the present. This value tends to be illustrative (providing insights into past communities and their activities) or associative (association with a notable family, person, event or movement);
- Aesthetic value – this derives from the ways in which people draw sensory and intellectual stimulation from a place; and
- Communal value – this derives from the meanings of a place for the people who relate to it, or for whom it figures in their collective experience or memory.

Assessment of Asset Importance - Archaeological Assets

12.3.14 There are no national government guidelines for evaluating the importance of heritage assets. For archaeological assets, the Department of Culture, Media and Sport (DCMS) has adopted a series of recommended (i.e. non-statutory) criteria for use in the determination of national importance when scheduling ancient monuments. These are expressed in the document Scheduled Monuments - Identifying, Protecting, Conserving and Investigating Nationally Important Archaeological Sites under the Ancient Monuments and Archaeological Areas Act 1979 (DCMS 2010). The criteria include period, rarity, documentation, group value, survival/condition, fragility/vulnerability, diversity and potential, and can be used as a basis for the assessment of the importance of historic remains and archaeological sites. However, the document also states that these criteria 'should not be regarded as definitive; but as indicators which contribute to a wider judgement based on the individual circumstances of a case.'

12.3.15 The criteria described above may also be used as a basis for the assessment of the importance of archaeological assets of less than national importance. However, the categories of regional and district/local importance are less clearly established than that of national and implicitly relate to local, district and regional priorities, which themselves vary within and between regions. Where available, local, district and regional research agenda, and local or structure plans may assist in this process.

12.3.16 It is noted that a high degree of professional judgement is required in the identification of importance for archaeological assets and this approach has been applied to this assessment, guided by acknowledged standards, designations and priorities. It is also important to recognise that buried archaeological remains may not always be well-understood at the time of assessment and can therefore be of uncertain importance.

12.3.17 The most recent guidance from any national agency regarding cultural heritage and EIA is from the Highways Agency and is expressed in Guidance Note 208/07 (August 2007) that now forms part of the Design Manual for Roads and Bridges, Volume 11, Section 3, Part 2 (HA 208/7) (Highways Agency et al., 2007).

12.3.18 The following table (Table 12.2) is primarily based on HA 208/07 and has been used to inform the assessment.

Sensitivity	Typical Descriptors
Assets of the highest significance	World Heritage Sites. Assets of acknowledged international importance. Assets that can contribute significantly to acknowledged international research objectives. Scheduled Monuments. Undesignated assets of schedulable quality and importance.
High	Assets that can contribute significantly to acknowledged national research objectives.
Medium	Designated or undesignated heritage assets that contribute to regional research objectives.
Low	Undesignated heritage assets of local importance. Assets compromised by poor preservation and/or poor survival of contextual associations. Assets of limited value, but with potential to contribute to local research objectives.
Negligible	Assets with very little or no surviving archaeological interest.

Unknown	The importance of the resource cannot be ascertained.

Table 12.1: Example Definitions of Sensitivity or Value (Archaeological Assets)

Assessment of Asset Importance - Historic Buildings

12.3.19 For historic buildings, assessment of importance is usually based on the designations used in the Listed Building process. Where historic buildings are not listed, or where the listing grade may be in need of updating, professional judgement has been used.

12.3.20 The criteria used in establishing the importance of historic buildings within the Listed Building process include architectural interest, historic interest, close historic association (with nationally important people or events) and group value. Age and rarity are also taken into account. In general (where surviving in original or near-original condition), all buildings of pre-1700 date are listed, most of 1700 to 1840 date are listed, those of 1840 to 1914 date are more selectively listed, and thereafter even more selectively. Specific criteria have been developed for buildings of 20th century date. At a local level, buildings may be valued for their association with local events and people or for their role in the community.

12.3.21 HA 208/07 provides a basis for the following table (Table 12.3), as a guide for establishing the importance of historic buildings. This has been used to inform the current assessment.

Sensitivity	Typical Descriptors
Assets of the highest significance	Standing buildings inscribed as of universal importance as World Heritage Sites. Other buildings of recognised international importance. Scheduled Monuments with standing remains. Grade I and II* listed buildings. Other listed buildings that can be shown to have exceptional qualities in their fabric or historical association not adequately reflected in the listing grade. Conservation Areas containing very important buildings. Undesignated structures of clear national importance.
High	Grade II listed buildings. Historic (unlisted) buildings that can be shown to have exceptional qualities in their fabric or historical association. Conservation Areas containing important buildings.
Medium	Historic Townscape or built-up areas with historic integrity in their buildings, or built settings (e.g. including street furniture and other structures).
Low	'Locally listed' buildings. Historic (unlisted) buildings of modest quality in their fabric or historical association. Historic Townscape or built-up areas of limited historic integrity in their buildings, or built settings (e.g. including street furniture and other structures).
Negligible	Buildings of no architectural or historic note; buildings of an intrusive character.

Table 12.2: Example Definitions of Sensitivity or Value (Historic Buildings)

Assessment of Asset Importance - Historic Landscapes

12.3.22 The sub-topic of Historic Landscape is recognised as having significant overlaps with other topics, such as landscape and townscape and therefore a multi-disciplinary approach to assessment has been adopted. This is to avoid double counting and duplication of effort. There are also significant overlaps with the other cultural heritage sub-topics of archaeological remains and historic buildings. The elements that are considered within those two sub-topics can make significant contributions to the historic landscape. This latter sub-topic has therefore concentrated on the overall Historic Landscape Character (HLC) and its value, rather than the individual elements within it.

12.3.23 All landscapes have some level of historic significance, as all of the present appearance of the urban and rural parts of England is the result of human or human-influenced activities overlain on the physical parameters of climate, geography and geology

12.3.24 A number of designations can apply to historic landscapes, including World Heritage Sites (inscribed for their historic landscape value), Registered Parks and Gardens, Registered Battlefields and Conservation Areas. Some local plans include locally designated Historic Landscape Areas and Historic Parks and Gardens (or similar).

12.3.25 A model has been produced by the Council for British Archaeology (Rippon, 2004), whereby the historic landscape can be divided up into units that are scaled from smallest to largest, as follows:

- Elements - individual features such as earthworks, structures, hedges, woods etc.;
- Parcels - elements combined to produce, for example farmsteads or fields;
- Components - larger agglomerations of parcels, such as dispersed settlements or straight-sided field systems;
- Types - distinctive and repeated combinations of components defining generic historic landscapes such as ancient woodlands or parliamentary enclosure;
- Zones - characteristic combinations of types, such as Anciently Enclosed Land or Moorland and Rough Grazing;
- Sub-regions - distinguished on the basis of their unique combination of interrelated components, types and zones; and
- Regions - areas sharing an overall consistency over large geographical tracts.

12.3.26 The model described above can be used as the principal part of the overall assessment usually known as Historic Landscape Characterisation (HLC). However, although HLC has been undertaken for much of England, there is no specific guidance or advice regarding the attribution of importance or significance to identified HLC types.

12.3.27 The following Table (Table 12.4) is based on the guidance provided in HA 208/07 with regard to evaluating the importance of historic landscape character units and has been used to inform the current assessment.

Sensitivity	Typical Descriptors
Assets of the highest significance	World Heritage Sites inscribed for their historic landscape qualities. Historic landscape of international sensitivity, whether designated or not. Extremely well-preserved historic landscapes with exceptional coherence, time-depth, or other critical factor(s).
High	Designated historic landscapes of outstanding interest. Undesignated landscapes of outstanding interest. Undesignated landscapes of high quality and importance, and of demonstrable national sensitivity. Well-preserved historic landscapes exhibiting exceptional coherence, time-depth, or other critical factor(s).
Medium	Designated special historic landscapes. Undesignated historic landscapes that would justify special historic landscape designation, landscapes of regional sensitivity. Averagely well preserved historic landscapes with reasonable coherence, time-depth, or other critical factor(s).
Low	Robust undesignated historic landscapes. Historic landscapes with specific and substantial importance to local interest groups, but with limited sensitivity. Historic landscapes whose sensitivity is limited by poor preservation and/or poor survival of contextual associations.
Negligible	Landscapes with little or no significant historical interest.

Table 12.3: Example Definitions of Sensitivity or Value (Historic Landscape Character)

Assessment of Impact Magnitude – Archaeological Assets

12.3.28 The magnitude of an impact is assessed without regard to the value of the heritage asset. In considering the magnitude of impact, the principle established in section 12 of the NPPF that preservation of the asset is preferred, and that total physical loss of the asset is least preferred, has been taken into account.

12.3.29 It is not always possible to assess the physical impact in terms of percentage loss and therefore it can be important in such cases to try to assess the capacity of the heritage asset to retain its character and significance following any impact. Similarly, impacts resulting from changes within the settings of buried archaeological assets may also be more difficult to assess as they do not involve physical loss of the resource and may be reversible.

12.3.30 The magnitude of the predicted impact is assessed using the criteria expressed in Table 12.5 below. These are primarily based on the guidance provided in HA 208/07.

Magnitude	Typical Descriptors
High	Change to most or all key archaeological elements, such that the asset is totally altered and much of its significance is lost. Substantial change within the setting leading to considerable loss of significance of the asset.
Medium	Changes to many key archaeological elements, such that the asset is clearly modified and there is some loss of significance. Change within the setting leading to some loss of significance of the asset.
Low	Changes to key archaeological elements, such that the asset is slightly altered and there is a slight loss of significance. Slight change within the setting leading to a slight loss of significance of the asset.
Negligible	Very minor changes to key archaeological elements or within the setting that hardly affect the significance of the asset.
None	No substantive change to key archaeological elements or within the setting.

Table 12.4: Example Definitions of Impact Magnitude (Archaeological Assets)

Assessment of Impact Magnitude – Historic Buildings

12.3.31 As for archaeological assets, the magnitude of impact in relation to historic buildings is assessed without regard to the importance of the asset, so the total destruction of an insignificant historic building has the same degree of magnitude of impact as the total loss of a high value historic building. Determination of the magnitude of impact is based on the principle that preservation of the asset and its setting is preferred and that total physical loss of the asset and/or its setting is the least preferred.

12.3.32 Changes within the settings of historic buildings may result from vibration, noise and lighting issues as well as visual impacts, and may be reversible. Additional methodology regarding the assessment of effects resulting from changes within settings is provided below.

12.3.33 The magnitude of the predicted impact is assessed using the criteria expressed in Table 12.6 below. These are primarily based on the guidance provided in HA 208/07.

Magnitude	Typical Descriptors
High	Change to key historic building elements, such that the asset is totally altered and much of its significance is lost. Substantial change within the setting of an historic building leading to considerable loss of significance of the asset.
Medium	Change to many key historic building elements, such that the asset is clearly modified and there is some loss of significance. Change within the setting of an historic building leading to some loss of significance of the asset.
Low	Changes to key historic building elements, such that the asset is slightly altered and there is some loss of significance. Change within the setting of an historic building leading to a slight loss of significance of the asset.
Negligible	Slight changes to historic building elements or within its setting that hardly affect the significance of the asset.
None	No substantive change to fabric or within the setting.

Table 12.5: Example Definitions of Impact Magnitude (Historic Buildings)

Assessment of Impact Magnitude – Historic Landscapes

12.3.34 Historic landscapes cannot be destroyed or damaged but impacts on them can change their character. Impacts are assessed using evaluated HLC units, not the elements/parcels/components that contribute towards the character. There may be impacts resulting from changes within the settings of identified units, especially with regard to designated historic landscapes. Additional methodology regarding the assessment of effects resulting from changes within settings is provided at paragraph 12.3.45 et seq below.

12.3.35 The magnitude of the predicted impact is assessed using the criteria expressed in Table Table 12.7 below. These are primarily based on the guidance provided in HA 208/07.

Magnitude	Typical Descriptors
High	Change to most or all key historic landscape elements, parcels or components; extreme visual effects; gross change of noise or change to sound quality; fundamental changes to use or access; resulting in total change to HLC unit and complete loss of significance.
Medium	Changes to many key historic landscape elements, parcels or components; visual change to many key aspects of the historic landscape; noticeable differences in noise or sound quality; considerable changes to use or access; resulting in moderate changes to HLC and some loss of significance.
Low	Changes to few key historic landscape elements, parcels or components; slight visual changes to few key aspects of historic landscape; limited changes to noise levels or sound quality; slight changes to use or access; resulting in limited changes to HLC and slight loss of significance.
Negligible	Very minor changes to key historic landscape elements, parcels or components; virtually unchanged visual effects; very slight changes in noise levels or sound quality; very slight changes to use or access; resulting in a very small change to HLC and very little loss of significance.
None	No change to elements, parcels or components; no visual or audible changes; no changes arising from in amenity or community factors.

Table 12.6: Example Definitions of Impact Magnitude (Historic Landscape Character)

Significance of Effects

12.3.36 The significance of an effect is a combination of the importance of the heritage asset and the magnitude of impact on that asset.

12.3.37 Effects can be adverse or beneficial. Beneficial effects are those that mitigate existing impacts and help to restore or enhance heritage assets, therefore allowing for greater understanding and appreciation. Based on the approach in HA 208/07, the following matrix in Table 12.8 below has been used for the assessment of archaeological remains, historic buildings and historic landscapes.

Sensitivity	Magnitude of impact				
	No Change	Negligible	Low	Medium	High
Negligible	No change	Negligible	Negligible or Minor	Negligible or Minor	Minor
Low	No change	Negligible or Minor	Negligible or Minor	Minor	Minor or Moderate
Medium	No change	Negligible or Minor	Minor	Moderate	Moderate or Major
High	No change	Minor	Minor or Moderate	Moderate or Major	Major or Substantial
Very high	No change	Minor	Moderate or Major	Major or Substantial	Substantial

Table 12.7: Assessment Matrix

12.3.38 Impacts can be either favourable or adverse; however, to avoid confusion; the default position of any effect recorded in this chapter is understood to be adverse unless stated otherwise.

12.3.39 Where the matrix provides a split in the level of effects, e.g. moderate/minor, the assessor has exercised professional judgement in determining which of the levels is more appropriate.

12.3.40 For the purposes of this assessment, any effect that is moderate, major or substantial is considered to be significant. Any effect that is minor or below is not significant.

12.3.41 The duration of the effect is indicated where known using the following terminology.

i. Short term: a period of months, up to one year to cover the anticipated initial infrastructure delivery period and initial working;

ii. Medium term: a period of between one and 20 years to cover the whole of the anticipated construction period and anticipated restoration of the site; and

iii. Long term: a period of 20 years or more which accounts for the post-completion effects.

12.3.42 The significance of any effect on a heritage asset is clearly different from the significance of the asset itself.

Settings

12.3.43 In 2015, HE published a document entitled 'Historic Environment Good Practice Advice' in 'Planning Note 3: The Settings of Heritage Assets' (Historic England, 2015). This guidance provides further advice on the definition of setting and the general principles of setting in the context of strategic planning and development control.

12.3.44 Paragraph 2 of the HE advice document in particular deals with the issue of setting and development control. It advises applicants that the information required in support of applications for planning permission and listed building consents should be no more than is necessary to reach an informed decision, and those activities to conserve or invest need to be proportionate to the significance of the heritage assets affected and the impact on the significance of those heritage assets.

12.3.45 Paragraph 12 of the HE advice document provides the following broad approach to assessment, undertaken as a series of steps that apply proportionately to complex or more straightforward cases.

- Step 1: identify which heritage assets and their settings are affected.
- Step 2: assess whether, how and to what degree these settings make a contribution to the significance of the heritage asset(s).
- Step 3: assess the effects of the Proposed Development, whether beneficial or harmful, on that significance.
- Step 4: explore the way to maximise enhancement and avoid or minimise harm.
- Step 5: make and document the decision and monitor outcomes.

12.3.46 Although assessments of changes within the settings of heritage assets can involve non-visual issues such as noise, it is more often the visual aspects of a development that form the major part of the assessment. To this end the ZTV (see Chapter 11, Landscape) is a useful tool in assessing in general terms the assets which are likely to be impacted by the Proposed Development likely level (HE 2015: paragraph 14).

12.3.47 An assessment of visual impacts on the heritage assets and their settings needs to take into account a wide variety of factors. These include the location of the asset within the physical landscape, its relationship with contemporary and non-contemporary features within that landscape and the location, size and character of the project in relation to these factors. The assessment then needs to balance the impact of these various considerations on the basis of informed professional judgment.

12.3.48 Assessment of the visual effects of the project has been undertaken in accordance with the procedures expressed in the Guidelines for Landscape and Visual Impact Assessment (The Landscape Institute and the Institute of Environmental Management and Assessment 2013). The findings of the landscape and visual assessment are presented in Chapter11: Landscape and Visual Impact. These findings have been taken into account in considering the impact on settings in this chapter. Where there is the potential for changes within the setting of heritage assets due to noise or other impacts, these have been considered within this chapter using appropriate procedures.

12.3.49 There should also be consideration of the sensitivity to change of the setting of a heritage asset. This requires examination of the current setting with regard to identifying elements that contribute to the significance of the asset, elements that make a neutral contribution to the significance of the asset and elements that make a negative contribution (i.e. detract from) the significance of the asset.

12.3.50 Once the impact on the heritage asset has been examined, this has been related to the impact scales defined above for each type of heritage asset. The level of impact has been considered against the importance of the heritage asset in the matrix provided in Table 12.8, above to reach a conclusion regarding the overall significance of effect. The effects on heritage assets resulting from change within their settings may be adverse or beneficial.

Limitations and Assumptions

12.3.51 A comprehensive desk assessment has been undertaken using all available relevant sources. On this basis there are no major data limitations that would compromise the robustness of the assessment.

12.4 Baseline Conditions

12.4.1 The baseline desk based assessment (Appendix 12.1) describes the baseline conditions. These conditions are summarised below.

Prehistoric and Roman

12.4.2 The Site is located at the junction of the higher ground of the Kemsley Ridge, which lies on London Clay, underlying the built part of the Site and the alluvial floodplain to the north and east, which in general has the potential to contain deposits of palaeo-environmental significance.

12.4.3 The wider area saw extensive activity from early times, with remains of ritual, settlement and agricultural origin being recorded on the mainland and on Sheppey. At least part of the higher ground of the Kemsley Ridge is known to have been used for occupation activity during the prehistoric and Roman periods, while the alluvial floodplain would have been marshland and would have been exploited for a number of purposes, including salt making and pottery manufacture as well as hunting and fishing. Part of the area now covered by the Swale may have been drier in prehistory than it is today and may therefore have potential for prehistoric terrestrial as well as maritime remains (Parham and Firth: 47).

12.4.4 A small collection of Mesolithic or Neolithic flints was recovered during fieldwork in connection with the construction of Swale Way (HER number TQ96NM122), with Mesolithic flints also being recovered at Castle Rough, to the south of the Site (HER number TQ96NM10).

12.4.5 A middle Bronze Age barrow was found at Kemsley Down, during fieldwork in connection with the construction of Swale Way, some 480m southwest of the Site (HER number TQ96NM125).

12.4.6 The wider area was heavily Romanised with the line of Roman Watling Street leading from London to the coast running rather less than 3 kilometres to the south of the Site.

12.4.7 Three ditches of Roman date were recorded during an archaeological evaluation to the north of Ridham Avenue, some 700 metres from the Site (HER number TQ96NW98). Closer to the Site, a late Roman Age to early Roman enclosure was discovered during fieldwork in connection with the construction of Swale Way, some 460m southwest of the Site (HER number TQ96NM127).

Medieval

12.4.8 A possible Anglo Saxon site of unknown type is recorded as being located some 75 metres southeast of the Site. The source is antiquarian and the site type and location uncertain, although it may be based on place name evidence (HER number TQ96NW13).

12.4.9 A moated site, Castle Rough, is located some 230 metres southwest of the Site. The site is located below the 5 metre contour, overlooks Milton Creek and comprises a rectangular earthwork island surrounded on four sides by a moat. Excavations during the early 1970s indicated that the site was constructed during the 13th or 14th century. Numerous earlier artefacts were recovered dating from the Mesolithic and Roman periods. These were interpreted by the excavators as having been brought in with material from elsewhere. It is not entirely clear from the available material whether material was imported from some distance away or whether the dumped material represents upcast from the moat. The site is a scheduled monument (HER number TQ96NW10, list entry number 1013368).

12.4.10 The parish church of the Holy Trinity at Milton, located some 1.3 kilometres southwest of the proposed Site, is flint-faced with Stone Quoins. The roof is of the 14th century, while the south porch is of the 15th century. The church was subject to restoration during the 1880s. The building is listed at grade I (list entry number 1061036).

Post-medieval and modern

12.4.11 There are numerous remains of timber structures and vessels recorded along the foreshore. The vast majority of these are probably post medieval in origin and when recognisable this seems to be the case, although some remains may be earlier.

12.4.12 The Site itself appears to have been used for agricultural purposes until the 19th century, although nearby fields were used for brick making and other industries.

12.4.13 Little Murston Farmhouse, located some 1.4 kilometres southeast of the Site is a farmhouse of the 18th century or earlier. It is of two storeys in brown brick, now partly pebble- dashed. The building has a hipped tiled roof with one chimney stack. The building is listed at Grade II (list entry number 1061035).

12.4.14 The earliest detailed map of the area is probably William Barlow's Map of the hundreds of Milton and Teynham of 1800. This shows the wider area as being divided in to three zones, which seem to represent water, marshland and dry land. Milton, with its parish church and the Site are located within the latter, while Castle Rough is located in the marsh.

12.4.15 Mudge's Map of Kent of 1801 shows Milton as being a rather larger settlement than Sittingbourne. Castle Rough (perhaps shown located slightly south of its true position), is shown with a drain into Milton Creek. The Site is shown being located in enclosed fields to the south of the Coldharbour Fleet, which is shown but not named.

12.4.16 The Milton Next Sittingbourne Tithe Map of 1838 shows the Site and much of the surrounding area being used for pasture, with parcels occasionally being recorded as 'pasture and water'. Castle Rough is shown and is recorded as being recorded as 'wood' at that time.

12.4.17 The first edition six inch to the mile Ordnance Survey map of 1869 shows the Site as being in fields with New Milton at its southwestern boundary. The built part of the Site is indicated as being located within Kemsley Down, with the access and laydown area to the north lying partly within Kemsley Marshes. The built part of the Site is divided into two by a field boundary and the access is crossed by a northeast-southwest running tramway.

12.4.18 The OS six inch edition of 1898 shows a number of brick works established in the area. Along the shore line, saltings and a disused oyster pond are marked. At the northern part of the Site, where the access road exits it, a tramway had been constructed from a wharf on Milton Creek in the east, west past Decoy House to the west of the Site to a brickworks.

12.4.19 A narrow gauge mineral railway, the Sittingbourne and Kemsley Light Railway was laid by the Bowater Paper Company in 1908 to connect their mills at Sittingbourne and Kemsley with their dock at Grovehurst on the Swale (HER number TQ 96NW22).

12.4.20 The post First World War shortage of wood pulp and an increased demand for paper led Frank Lloyd, the owner of the Sittingbourne paper mill to expand the operation and build a new paper mill at Kemsley. Construction began in 1923 and the mill was in operation in 1924.

12.4.21 The mill was supplied from Ridham Dock by an extension of the earlier light railway. The railway expanded after the opening of Lloyd's Kemsley Mill in 1924 and from Sittingbourne to the south acted as a passenger railway, bringing workers to and from the mill.

12.4.22 An air raid shelter, dating from the Second World War was located some 150m west of the Site. The shelter has been demolished (HER number TQ96MN131). In addition a gun platform or possible derrick base has been recorded at the foreshore some 170m south of the Site (HER number TQNW961146). An aircraft, a Spitfire, crashed outside the Site some 100m southwest of Castle Rough in 1940. The pilot survived (HER number TQ 96 NW 133).

12.4.23 The railway line was taken over by Bowater's in 1948 and operated until 1968. The maintenance depot is situated at the original end of the line, Kemsley Down.

12.4.24 In 1969 the railway was handed over to the Locomotive Club of Great Britain's Light Railway Section which became the Sittingbourne & Kemsley Light Railway. The southern half of the railway, south of the Site, continues in use as a preserved railway, while the section of the northern part which lies within the boundary of the Site has been replaced by the perimeter road around the paper mill and the northern access road to the Site.

12.4.25 The Site lies within the Industrial Complexes and Factories three historic landscape character (HLC) area (HLC number 2702).

12.4.26 The site visit undertaken in October 2017 indicated that the Site is located within the perimeter fence of the and inside the perimeter road around the main paper mill buildings. The northern access road and associated development, including the pond to its east, have been constructed recently and are in operation. The Site is entirely covered in hardstanding. No archaeological features were observed or finds made during the site visit.

Designated Assets

12.4.27 There are no World Heritage Sites, Protected Wrecks, registered battlefields or registered parks and gardens located within 3km of the Site.

12.4.28 There are no listed buildings or conservation areas located within 1km of the Site.

12.4.29 There is one SM located within 1km of the Site. This is `Castle Rough' Medieval moated site (list entry number 1013368).

12.4.30 There is one SM (Murston Old Church, Sittingbourne, list entry number 1011768) and 11 listed buildings located between 1km and 2km of the Site. Of these, 9 are listed at Grade II and two, the Church of the Holy Trinity (list entry number 1061036) and the Church of all Saints (list entry number 1069380), are listed at Grade I. The listed buildings are shown in Table 1 of the desk assessment (Appendix 12.1).

12.4.31 There is one SM (World War II Heavy Anti-aircraft gunsite (TS2), 300m east of Chetney Cottages, list entry number 1020389) and 91 listed buildings located between 2km and 3km of the Site. Of these, 87 are listed at Grade II, three, The Church of St Michael (list entry number 1061030), The Court House (list entry number 1344240) and 49 and 51 High Street (list entry number 1352683), are listed at Grade II* and one, the Church of St Giles (list entry number 1322821) is listed at Grade I. Of the total, two Grade II listed buildings are located within the Tonge conservation area, one Grade II* and 37 Grade II listed buildings are located within the Milton Regis High Street conservation area and two Grade II* and 26 Grade II listed buildings are located within the High Street Sittingbourne conservation area. The listed buildings are shown in Table 2 of the desk assessment (Appendix 12.1).

Sensitive Receptors

12.4.32 The sensitive receptors listed in Table 12.9 below have the potential to be affected by effects arising from the Proposed Development. The assessment in this Chapter has considered the effects listed in the table upon the identified sensitive receptors.

Receptor	Importance/sensitivity/vulnerability to change
Scheduled Monument	High
Listed Building	High
Conservation Area	High
Undesignated assets (below ground archaeology)	Low

Table 12.8: Potentially affected sensitive receptors

12.5 Future baseline

12.5.1 The likely future baseline conditions of the application site in the absence of the Proposed Development have been considered. Within and immediately surrounding the Proposed Development site, there may be the following future changes in baseline conditions when the project is likely to become operational in 2021.

- SW/10/444 Kemsley Paper Mill Sustainable Energy Plant (SEP) (K3) and power upgrade (under construction)

- 16/501228/FULL Kemsley Mill baling plant
- SW/11/1291 Land north of DS Smith Paper Mill anaerobic digester

12.5.2 These schemes are industrial or commercial in nature and would be located within the Sittingbourne Industrial/Commercial townscape character area, within which the Proposed Development would be located. The Kemsley Paper Mill Sustainable Energy Plant is under construction and already form part of the baseline situation. The immediate landscape and townscape context of the operational K4 CHP on the fringes of Sittingbourne would be slightly more intensively developed in 2021 than 2017, if these schemes are completed during that time period. Due to the similarity in the existing conditions, with the schemes at the sustainable energy plant, and the future baseline situation where they are complete, the level of effects on heritage assets is likely to be the same when assessed against the 2017 baseline and 2021 future baseline.

12.5.3 In the absence of the proposed development, K1 would undergo modification to meet future emission limits and thereby would remain in situ in the future baseline scenario.

12.6 Predicted Effects

Construction Effects

Buried Archaeological Remains

12.6.1 The Site lies within a wider landscape which generally has high potential to contain remains of all dates from the prehistoric onwards.

12.6.2 Recent archaeological work on the Sittingbourne Northern Relief Road has indicated that the higher ground of the Kemsley Ridge has the potential to contain remains from the prehistoric through to the medieval periods, with further activity taking place in the lower lying marshlands now represented by areas of alluvium.

12.6.3 Site visits, however, have indicated that the Site contains buildings and hardstanding. Both the nature of the 20th century land-use at the site and the associated ground disturbance suggests that the potential for the survival of previously unidentified sub-surface archaeological remains of national importance, or of sufficient importance to warrant preservation in situ, is unlikely. In addition it is likely that any archaeological deposits have been damaged or removed and that the potential for the survival of significant, coherent archaeological remains is low.

12.6.4 The heritage values of any buried assets within the Site are as follows:

- Evidential and Historical – The value derives from any buried remains. The historical value is illustrative.
- Aesthetic - The value is unlikely to apply to these remains.
- Communal – The value of any remains would derive from their symbolic value as part of the local community.

12.6.5 Any buried remains are likely to be of at most low significance. There may be a physical impact on these remains. The impact magnitude on any surviving remains is assessed as being high. The effect of the Proposed Development on buried remains would be minor adverse and not significant.

Designated Assets located within 1 km of the Site

12.6.6 The nearest designated asset is Castle Rough, a scheduled monument (list entry number 1013368). The scheduled monument is located some 230 m southwest of the Site.

12.6.7 The heritage values of the scheduled monument are as follows:

- Evidential and Historical – The value derives primarily from the earthworks and buried remains of the scheduled monument. The historical value is largely illustrative.

- Aesthetic - The value derives from the earthwork remains of the scheduled monument.

- Communal – The value of the scheduled monument derives from its symbolic value as part of the local community.

12.6.8 The scheduled monument is of highest significance. There would be no physical impact upon the scheduled monument from the Proposed Development and any impact would be on the setting of the designated asset.

12.6.9 Setting makes a contribution to the significance of the scheduled monument mainly in the sense that it has not entirely lost its rural location, although the setting of the scheduled monument is now against the background of an industrial landscape.

12.6.10 The scheduled monument itself is low lying and not visible from any distance away. Its position in the landscape is indicated by trees. An aerial photograph taken in 1999 shows the position then, which remains largely unchanged (see Appendix 6 of the desk assessment, Appendix 12.1). Perhaps the clearest view of the scheduled monument and the Proposed Development site is obtained from the southwest. From here, the scheduled monument itself is not visible but the trees growing on it are visible against a background of the existing paper mill buildings. The buildings of the Site would be difficult to see from this viewpoint. A view from the western side of Milton Creek, some 330m to the south of the Site (Landscape viewpoint 3, see Figures 11.12 and 11.13 of Chapter 11: Landscape) shows the existing and proposed views with the Site with the scheduled monument at the extreme left of the view. A view from the western side of Milton Creek, some 1.4km to the south of the Site (Landscape viewpoint 7, the visualisation included in this chapter as Figure 1) shows the existing and proposed views with the Site with the scheduled monument at the centre of the view. From both these viewpoints, the Proposed Development would be visible but the scheduled monument would be screened. A further view from the eastern side of Milton Creek, some 360m to the east of the Site (Landscape viewpoint 4, see Figures 11.14 and 11.15 of Chapter 11: Landscape) shows the existing and proposed views with the Site with the scheduled monument just outside the extreme left of the view. From here, the Proposed Development would be visible and would form part of the complex of industrial buildings at Kemsley Mill, but the scheduled monument would be screened.

12.6.11 Consultation with the client's acoustics specialists has indicated that perception of the operational noise from K4 is unlikely to significantly change the existing ambient noise levels from Kemsley Mill when standing at the scheduled monument.

12.6.12 Consultation with the client's highways team and Chapter 4 Traffic & Transport indicate that there will be up to 80HGVs and 250 cars visiting the Mill during the peak construction of K4. The construction period will last up to 24 months beginning in 2019. Construction traffic will access the site from the north via Barge Way or from the East via Ridham Avenue. The eastern access leads into an existing car park and will utilise the internal road network to access the K4 site. This would comprise a temporary impact of at most minor adverse magnitude. Once constructed there will be virtually no vehicle movements except in the event of maintenance.

12.6.13 Lighting will be minimal and implemented using BS EN 12464-2:2007 Lighting of work places. Outdoor work places. Part 1 &2. The existing buildings will also act to screen it to some extent from the SM and it will be seen in the context of an existing industrial site with external lighting.

12.6.14 Given the location and scale of the existing paper mill buildings, the impact magnitude on the scheduled monument is assessed as being negligible. The effect of the Proposed Development on the scheduled monument would be minor adverse, and this would be an indirect effect and not significant. The effect would be long term.

Designated Assets located between 1 km and 2 km of the Site

<u>Scheduled Monuments</u>

12.6.15 Murston Old Church, Sittingbourne is a scheduled monument (list entry number 1011768). The scheduled area includes both the above ground and buried remains of the church building and encompasses the churchyard.

12.6.16 The scheduled monument is located some 1.4km south of the Site. The heritage values of the scheduled monument are as follows:

- Evidential and Historical – The value derives primarily from the fabric of the church and the buried remains of the scheduled monument. The historical value is largely illustrative, although there are associations with known individuals.
- Aesthetic - The value derives from the ruins of the church building and the churchyard.
- Communal – The value of the scheduled monument derives from its symbolic value as part of the local community.

12.6.17 The scheduled monument is of highest significance. Setting makes a relatively minor contribution to the significance of the scheduled monument because it is bounded on all sides by roads and/ or modern development. On its north side the scheduled monument is bounded by modern business/ industrial units which provide an effective northern boundary to the setting of the scheduled monument.

12.6.18 There would be no physical impact upon the scheduled monument from the Proposed Development and any impact would be on the setting of the scheduled monument. The

Proposed Development is at a scale with the existing structures located at Kemsley Mill. The impact magnitude on the site is assessed as being 'no change'. The effect of the Proposed Development on the scheduled monument would be 'no change'.

Listed Buildings

12.6.19 Little Murston Farmhouse, listed at Grade II is located some 1.4km southeast of the Site.

12.6.20 The heritage values of the listed building are as follows:

- Evidential and Historical – The evidential value derives primarily from the fabric of the listed building and the potential for associated buried archaeological remains. The historical value is largely illustrative.

- Aesthetic - The value derives from the design value of the listed building in terms of its expression of the local vernacular.

- Communal – The value of the listed building derives from its symbolic value as part of the local community.

12.6.21 The listed building is of high significance. There would be no physical impact upon the listed building from the Proposed Development and any impact would be on its setting.

12.6.22 The setting of the listed building comprises the surrounding fields, those to the west having been subject to gravel extraction. The setting of the listed building is now rather degraded and setting makes a relatively minor contribution to the setting of the listed building.

12.6.23 There is currently little intervisibility with the Site. The Proposed Development would lie on a line of sight between the listed building and the existing paper mill and would be located adjacent to the latter.

12.6.24 The Proposed Development is similar in scale to the adjacent structures and would be seen as part of the industrial development of Kemsley Mill when viewed from the listed building or its surroundings.

12.6.25 The impact magnitude on the site is assessed as being negligible adverse. The effect of the Proposed Development on the site would be minor adverse, at the lower end of this scale and this would be an indirect effect.

12.6.26 The medieval parish church of the Holy Trinity, Milton, located some 1.3 km southwest of the Site. The church is listed at grade I (list entry number 1061036).

12.6.27 The heritage values of the listed building are as follows:

- Evidential and Historical – The value derives primarily from the fabric of the church and the associated buried remains. The historical value is largely illustrative, although there are associations with known individuals.

- Aesthetic - The value derives from the design value of the listed building in terms of its expression of medieval and later religious architecture.

- Communal – The value of the listed building derives from its symbolic value as part of the local community.

12.6.28 The listed building is of highest significance. Development, including existing paper mill buildings and stacks, is located between the listed building and the Proposed Development site and the housing development on the west, north and east side of the listed building effectively limits its setting. Setting, other than its location within its churchyard, makes a relatively minor contribution to the significance of the listed building

12.6.29 There would be little intervisibility between the Proposed Development and the listed building. There would be no physical impact upon the listed building from the Proposed Development. Any effect would be on its setting. The Proposed Development is similar in scale to the adjacent structures and would be seen as part of the industrial development of Kemsley Mill when viewed from the listed building or its surroundings. The magnitude of impact is assessed as being negligible. The significance of effect of the Proposed Development on the listed building would be minor adverse and not significant.

12.6.30 The church of All Saints, Iwade is located approximately 1.8 km north west of the nearest part of the Proposed Development site and some 2.3 km from its built development. The building is listed at Grade I (list entry number 1069380)

12.6.31 The heritage values of the listed building are as follows:

- Evidential and Historical – The value derives primarily from the fabric of the church and the associated buried remains. The historical value is largely illustrative, although there are associations with known individuals.

- Aesthetic - The value derives from the design value of the listed building in terms of its expression of medieval and later religious architecture.

- Communal – The value of the listed building derives from its symbolic value as part of the local community.

12.6.32 The listed building is of highest significance. The church is located within a surrounding churchyard which forms its primary setting. The eastern side of the churchyard is bordered by agricultural fields which form a secondary setting. Setting, other than its location within its churchyard, makes a relatively minor contribution to the significance of the listed building.

12.6.33 There has been considerable large scale development on the Kemsley Ridge to the northwest of the Proposed Development site. This development provides a substantial visual barrier. The Proposed Development would fit into this area and would add little , if any visible mass to the view in this direction from the listed building.

12.6.34 There would be no physical impact upon the listed building from the Proposed Development and any impact would be on the setting of the site.

12.6.35 The impact magnitude on the site is assessed as being no change. The effect of the Proposed Development on the site would be no change.

12.6.36 There are further Grade II listed buildings at 66 North Street, Kemsley, located some 1.6 km southwest of the Proposed Development site and to the west of Kemsley, Pheasant Farmhouse and Bramblefield Farmhouse, 2 km and 1.6 km west of the Proposed Development site respectively. These buildings are of high value. In each case their settings have been rather degraded. Any view of the Proposed Development from the listed buildings would be through Kemsley and the existing KemsleyMill buildings. The magnitude of impact would be 'no change' and the effect of the Proposed Development on these listed buildings would be 'no change'.

12.6.37 Mere Court and East Hall, both listed at Grade II are located some 1.6 km and 2 km south of the Proposed Development site respectively. Development, including recent industrial development, as well as the existing paper mill buildings and stacks, is located between the listed building and the Proposed Development site. There would be little intervisibility between the Proposed Development and the listed buildings. There would be no physical impact upon the listed buildings from the Proposed Development. Any effect would be on their setting. The magnitude of impact on setting would be negligible and the significance of effect of the Proposed Development on the listed buildings would be minor adverse and not significant.

Designated Assets located between 2 km and 3 km of the Site

12.6.38 A World War II Heavy anti-aircraft gunsite (known as Thames South 2), is located 300 m west of Chetney Cottages, some 2.5 km northwest of the Proposed Development site and is a Scheduled Monument (list entry number 1020389). The heritage values of the SM are as follows:

- Evidential and Historical – The value derives primarily from the buried and upstanding remains of the scheduled monument. The historical value is largely illustrative, although there are associations with known organisations and individuals.

- Aesthetic - The value derives from the earthwork remains of the scheduled monument.

- Communal – The value of the scheduled monument derives from its symbolic value as part of the local community.

12.6.39 The scheduled monument is of highest significance. The scheduling description indicates that the site was chosen to defend the industrial and military targets in the Lower Thames and Medway areas from high flying strategic bombers approaching from the south and east. The site overlooks the River Medway and the Chetney Marshes. On this basis, setting makes a contribution to the significance of the scheduled monument.

12.6.40 The setting of the scheduled monument is dependent on its defensive purpose and is wide ranging. The paper mill at Kemsley would have been in existence during the period of use of the scheduled monument and would presumably have been an area for the guns to avoid, assuming they could be depressed that far. There has been considerable large scale development on the Kemsley Ridge to the northwest of the Proposed Development site. This new development provides a partial visual barrier and means that the original paper mill is not the landscape feature that it would have been during the period of use of the scheduled monument. In addition, there has been significant new development at the paper mill. The Proposed Development would fit into this area and would add little, if any visible mass.

12.6.41 There would be no physical impact upon the scheduled monument from the Proposed Development and any impact would be on the setting of the scheduled monument. The impact magnitude on the site is assessed as being no change. The effect of the Proposed Development on the SM would be neutral.

12.6.42 Tonge Corner Farmhouse is located some 2.1 km south east of the Site and is listed at Grade II (list entry number 1069270).

12.6.43 The heritage values of the listed building is as follows:

- Evidential and Historical – The evidential value derives primarily from the fabric of the listed building and the potential for associated buried archaeological remains. The historical value is largely illustrative.
- Aesthetic - The value derives from the design value of the listed building in terms of its expression of the local vernacular.
- Communal – The value of the listed building derives from its symbolic value as part of the local community.

12.6.44 The listed building is of high significance. There would be no physical impact upon the listed building from the Proposed Development and any impact would be on its setting.

12.6.45 The setting of the listed building comprises the surrounding fields and setting makes a contribution to the significance of the listed buildings in that they retain their rural location. There is currently little or no intervisibility with the Site, although the stacks of the existing paper mill are likely to be visible from the listed building. The Proposed Development is likely to be only partly visible from the listed building, being screened by the high ground of the adjacent land fill site and existing farm buildings.

12.6.46 There would be no physical impact upon the listed building from the Proposed Development. Any effect would be on its setting. The Proposed Development is similar in scale to the adjacent structures and would be seen as part of the industrial development of Kemsley Mill when viewed from the listed building or its surroundings.

12.6.47 The magnitude of impact on setting would be negligible adverse and the effect of the Proposed Development on the listed building would be minor adverse and not significant.

12.6.48 Kingshill Farmhouse and the barn adjoining the cattleshed immediately north of Kingshill Farmhouse are located some 2.3 km northeast of the built part of the Site on the Island of Sheppey and are listed at Grade II (list entry numbers 1258073 and 1243080).

12.6.49 The heritage values of the listed buildings are as follows:

- Evidential and Historical – The evidential value derives primarily from the fabric of the listed buildings and the potential for associated buried archaeological remains. The historical value is largely illustrative.

- Aesthetic - The value derives from the design value of the listed buildings in terms of their expression of the local vernacular.

- Communal – The value of the listed buildings derives from their symbolic value as part of the local farming community.

12.6.50 The listed buildings are of high significance. There would be no physical impact upon the listed buildings from the Proposed Development and any impact would be on their setting.

12.6.51 Each listed building and the space between them forms the primary setting of the other. The setting of the listed buildings also comprises the surrounding fields and setting makes a contribution to the significance of the listed buildings in that they retain their rural location. The Site is just visible from the listed buildings but K3, currently under construction, will provide a high degree of screening. In addition, the Proposed Development would be seen through the prism and against a background of the existing paper mill buildings.

12.6.52 The impact magnitude on the listed buildings is assessed as being no change. The effect of the Proposed Development on the listed buildings would be no change.

12.6.53 The church of St Giles is located some 2.6 km southeast of the Site and is listed at Grade I (list entry number 1322821).

12.6.54 The heritage values of the listed building are as follows:

- Evidential and Historical – The value derives primarily from the fabric of the church and the associated buried remains. The historical value is largely illustrative, although there are associations with known individuals.

- Aesthetic - The value derives from the design value of the listed building in terms of its expression of medieval and later religious architecture.

- Communal – The value of the listed building derives from its symbolic value as part of the local community.

12.6.55 The listed building is of highest significance. There would be no physical impact upon the listed building from the Proposed Development.

12.6.56 The setting of the listed building comprises its churchyard, the road to its west and the surrounding fields. Although nominally within the ZTV, the Proposed Development would not be visible from the listed building. The magnitude of impact on setting would be 'no change' and the effect of the Proposed Development on the listed building would be 'no change'.

12.6.57 The nearest Conservation Area is Milton Regis High Street, located some 2.1 km south west of the Site. The Conservation Area contains a number of listed buildings which are assessed as part of the Conservation Area. The heritage values of the conservation area are as follows:

- Evidential and Historical – The evidential value derives primarily from the fabric of the buildings, listed and otherwise, structures and streetscape within the conservation area and the potential for below ground remains. The historical value is largely illustrative.

- Aesthetic - The value derives from the design value of the conservation area in terms of its expression of settlement architecture.

- Communal – The value of the conservation area derives from its symbolic value as part of the local community.

12.6.58 The conservation area is of high significance. There would be no physical impact upon the Conservation Area from the Proposed Development.

12.6.59 The conservation area is inward looking and on its eastern side, much of it is bounded by trees in back gardens of houses and its setting to the east is thus limited. To the north east, extensive areas of built development further restrict the setting of the Conservation Area. Views of the Proposed Development site were not obtained from any part of the Conservation Area within the public realm and it is unlikely that the Proposed Development would be visible from the Conservation Area. Setting makes a minor contribution to the significance of the conservation area.

12.6.60 At most, only the stack of the Proposed Development would be visible from the Conservation Area. Any impact would be on the setting of the Conservation Area. The impact magnitude on the Conservation Area is assessed as being negligible. The effect of the Proposed Development on the site would be minor adverse, and this would be an indirect effect that is not significant.

12.6.61 Sittingbourne High Street Conservation Area is located some 2.7 km south of the Site. The Conservation Area contains a number of listed buildings which are assessed as part of the Conservation Area. The heritage values of the conservation area are as follows:

- Evidential and Historical – The evidential value derives primarily from the fabric of the buildings, listed and otherwise, structures and streetscape within the conservation area and the potential for below ground remains. The historical value is largely illustrative.

- Aesthetic - The value derives from the design value of the conservation area in terms of its expression of settlement architecture.

- Communal – The value of the conservation area derives from its symbolic value as part of the local community.

12.6.62 The conservation area is of high significance. There would be no physical impact upon the Conservation Area from the Proposed Development.

12.6.63 The conservation area is inward looking and its setting is therefore very limited and comprised the surrounding built development in Sittingbourne. Setting makes a minor contribution to the significance of the conservation area. Views of the Site, or of the proposed location of the stack were not obtained from any part of the Conservation Area within the public realm. Views to or from the Proposed Development would be difficult to obtain in relation to most if not all of the conservation area.

12.6.64 At most only the stack of the Proposed Development would be visible from the Conservation Area. Any impact would be on the setting of the Conservation Area. There would be slight changes to the setting of the conservation area that hardly affect it and the magnitude of impact is assessed as being negligible. The effect of the Proposed Development on the conservation area is assessed as being minor adverse, and this would be an indirect effect that is not significant.

12.6.65 The Tonge Conservation Area is located some 2.8 km southeast of the Site at its nearest point. The heritage values of the conservation area are as follows:

- Evidential and Historical – The evidential value derives primarily from the fabric of the buildings, listed and otherwise, structures and streetscape within the conservation area and the potential for below ground remains. The historical value is largely illustrative.

- Aesthetic - The value derives from the design value of the conservation area in terms of its expression of settlement architecture.

- Communal – The value of the conservation area derives from its symbolic value as part of the local community.

12.6.66 The conservation area is of high significance. Setting makes a significant contribution to the significance of the conservation area.

12.6.67 The Conservation Area Character Appraisal (paragraph 18) notes that the railway embankment, aligned east-west along the northern edge of Tonge, is an important feature in the local landscape, especially where the banks are covered with tree growth. This embankment has, in effect, severed Tonge visually from the wide sweep of low lying land to the north including the marshes so that it now forms a well-defined northern edge to the settlement. The trees now comprise an important background to Tonge when viewed from the south.

12.6.68 This defined edge limits the setting of the Conservation Area to the north. It is likely that part of the stack of the Proposed Development would be visible from the Conservation Area. There would be no physical impact upon the Conservation Area from the Proposed Development. Any impact would be on the setting of the Conservation Area. The impact magnitude on the Conservation Area is assessed as being negligible. The effect of the Proposed Development on the Conservation Area would be minor adverse, and this would be an indirect effect that is not significant.

Historic Parks and Gardens and Historic Battlefields

12.6.69 The nearest Registered Park and Garden is Doddington Place, some 9 km to the south of the Site. There would be no physical impact upon the Registered Park and Garden from the Proposed Development and no effect on its setting.

12.6.70 There are no registered battlefields within 15 km of the Proposed Development site and there would be no effect on any registered battlefield or its setting arising from the Proposed Development.

Historic Landscapes

12.6.71 The HER indicates that the Proposed Development site is located within the Industrial complexes and factories HLC type. This HLC type has a high ability to withstand change. The Proposed Development would introduce further large built development of an industrial nature and would be consistent with the existing historic landscape character.

12.6.72 The heritage values of the HLC Area are as follows:

- Evidential and Historical – The evidential value derives primarily from the fabric of the road, buildings and land divisions within the HLC area and the potential for below ground remains. The historical value is largely illustrative.
- Aesthetic - The value derives from the design value of the HLC area in terms of its expression of industrial architecture.
- Communal – The value of the HLC area derives from its symbolic value as part of the local community.

12.6.73 The HLC area is of low significance. Given the existing development in the area, the impact magnitude on the HLC area is assessed as being no change. Overall, the effect on the historic landscape is considered to be 'no change'.

12.6.74 The nature of the Proposed Development and its location within an area already containing an industrial complexes means that there would be no impact on any other HLC.

Operational Effects and Decommissioning

12.6.75 The effects of the completed development will be as those for the construction phase. It is noted that K4 will likely be decommissioned at the end of its operational life. Demolition/ dismantling would have no further effect on below ground archaeology and any effect on the settings of heritage assets through the construction of the propose development would be reversed. No further effects are likely or assessed.

12.7 Mitigation

Mitigation of Construction Effects

12.7.1 The location (on previously developed land), nature and design (i.e. an industrial development of appropriate scale and massing) of the Proposed Development is intended to help mitigate any effects on the setting of designated assets through demolition and construction and no specific mitigation measures are required.

12.7.2 Whilst the archaeological resource of the Site is likely to be low and the unmitigated effect of the development on the buried archaeology therefore not significant, in light of the fact the archaeological resource of the Site is technically unknown a programme of archaeological fieldwork in the form of trial trenching (in the first instance) to investigate and record any surviving archaeological remains will be undertaken at a suitable time following consent. It is anticipated that this will form a requirement of any forthcoming DCO permission.

Mitigation of Operational Effects

12.7.3 The location (on previously developed land), nature and design (i.e. an industrial development of appropriate scale and massing) of the Proposed Development is intended to help mitigate any effects on the setting of designated assets. The remaining boundary alignments around the Proposed Development site would be preserved in situ and the landscape pattern in terms of the industrial character of the area would remain unchanged.

12.7.4 The remaining boundary alignments around the Proposed Development site would be preserved in situ and the landscape pattern in terms of the industrial character of the area would remain unchanged following the completion of the development.

12.7.5 No specific mitigation measures are therefore required.

12.8 Residual Effects

12.8.1 There are no significant adverse effects envisaged to result from the Proposed Development following implementation of the mitigation measures identified above.

12.9 Cumulative Effects

12.9.1 An assessment of the effects of the Proposed Development with other schemes that are operational/ constructed consented or for which planning permissions are currently being sought has been undertaken. Those schemes are as follows as outlined in Chapter 3:

- 14/502737/EIASCO Request for Scoping Opinion to determine the extent of an application for a combined heat and power plant at Ridham Docks.
- 16/501484/COUNTY County matter - The construction and operation of a gypsum recycling building with plant and machinery to recycle plasterboard and the reconfiguration of the existing lorry park to include office/welfare facilities and ancillary supporting activities.
- SW/11/1291 Anaerobic digester and associated ground profiling and landscaping.
- SW/12/0816 Relocation of Nicholls Transport depot from Lydbrook Close, Sittingbourne to land north of Swale Way.
- SW/12/1211 Construction and operation of a Materials Recycling Facility (MRF) and Waste Transfer Station (WTS) for Commercial and Industrial and Municipal Solid Waste and ancillary staff and fleet vehicle parking, vehicle workshop, 2 x weighbridges, fuel tank, sprinkler tank, pump house, substation, fencing and improved access and office and welfare facility.
- 15/510589/OUT Outline application for access matters reserved for construction of Business Park (Use Classes B1(B), B1(C), B2 and B8) (research and development, light industrial, general industrial and storage or distribution) (up to a maximum of 46,600sqm)

- SW/14/0224 Solar farm, comprising the erection of solar arrays of photovoltaic panels, inverter and transformer sheds, fencing, site storage cabin, combined DNO and EPC switchgear housing, internal gravel access road, and associated equipment.
- 16/506935/COUNTY County Matters application for steam pipeline connecting the Ridham Dock Biomass Facility to the DS Smith Paper Mill
- 14/501181/COUNTY KCC Regulation 13 - Scoping opinion as to the scope of an environmental impact assessment for a proposed combined heat and power plant at Ridham B.
- END10085 - DCD scoping opinon for power upgrade project
- 14. 15/500348/COUNTY - Install advance thermal conversion and energy facility at Kemsley Fields Business Park
- 17/503713/ENVSCR - EIA Screening Opinion for large residential development
- 16/506193/ENVSCR - EIA Screening Opinion – Outline application for proposed residential development of 275 dwellings
- 16/506014 - EIA Scoping Opinion - A sustainable urban extension comprising up to 1,100 new dwellings
- 17/505073/FULL - Erection of a tile factory including service yard, storage yard and parking area
- 18/500393/FULL - Erection of a natural gas fuelled reserve power plant with a maximum export capacity of up to 12MW
- Forthcoming application by D S. Smith for a new southern boundary road for Kemsley Paper Mill
- 18/500257 - Proposed Development of 153 Dwellings

12.9.2 The majority of these schemes are industrial or commercial in nature and would be located within the industrial and commercial part of Sittingbourne, within which the Site is also located. The immediate context of the Proposed Development on the fringes of Sittingbourne would be more intensively developed if the cumulative schemes are constructed. Less natural landscape, vacant land or previously used land would be present, this being replaced by energy infrastructure development.

12.9.3 There would be no significant effect on heritage assets from the cumulative developments. Neither are there any assets significantly affected by the proposed development. On this basis any cumulative effects would not be significant.

12.10 Summary

12.10.1 This chapter assesses the likely significant archaeological and cultural heritage effects resulting from the Proposed Development. The direct and indirect effects of the Proposed Development on the historic environment of the area, including buried archaeological sites, historic buildings and historic landscapes are considered. It aims to identify all effects on these heritage assets - in terms of the potential for direct physical disturbance and indirect visual effects on setting - and to assess the overall effect and significance of these predicted effects. The likely impacts are assessed during the construction, operational and decommissioning phases of the Proposed Development.

12.10.2 The Site lies within a wider landscape which generally has high potential to contain remains of all dates from the prehistoric onwards. Site visits, however, have indicated that the Site contains buildings and hardstanding. Both the nature of the 20th century land-use at the site and the associated ground disturbance suggests that the potential for the survival of previously unidentified sub-surface archaeological remains of national importance, or of sufficient importance to warrant preservation in situ, is unlikely. In addition it is likely that any archaeological deposits have been damaged or removed and that the potential for the survival of significant, coherent archaeological remains is low. Any buried remains are likely to be of at most low significance. There may be a physical impact on these remains. The impact magnitude on any surviving remains is assessed as being high. The effect of the Proposed Development on buried remains would be minor adverse. There is no evidence for the proposal site to contain below ground remains of the highest significance, or of sufficient significance to warrant preservation in situ.

12.10.3 This study has revealed that there are no designated assets (e.g. scheduled monuments, listed buildings) within the Site. The nearest designated asset is Castle Rough, a scheduled monument (list entry number 1013368). The scheduled monument is located some 230 m southwest of the Site. The scheduled monument is of highest significance. There would be no physical impact upon the scheduled monument from the Proposed Development and any impact would be on the setting of the designated asset. Given the location and scale of the existing paper mill buildings, the impact magnitude on the setting of the scheduled monument is assessed as being negligible. The effect of the Proposed Development on the scheduled monument would be minor adverse, and this would be an indirect effect. The effect would be long term. There would be no significant effects on either this or any other designated assets.

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Ref: 10392-0020-003

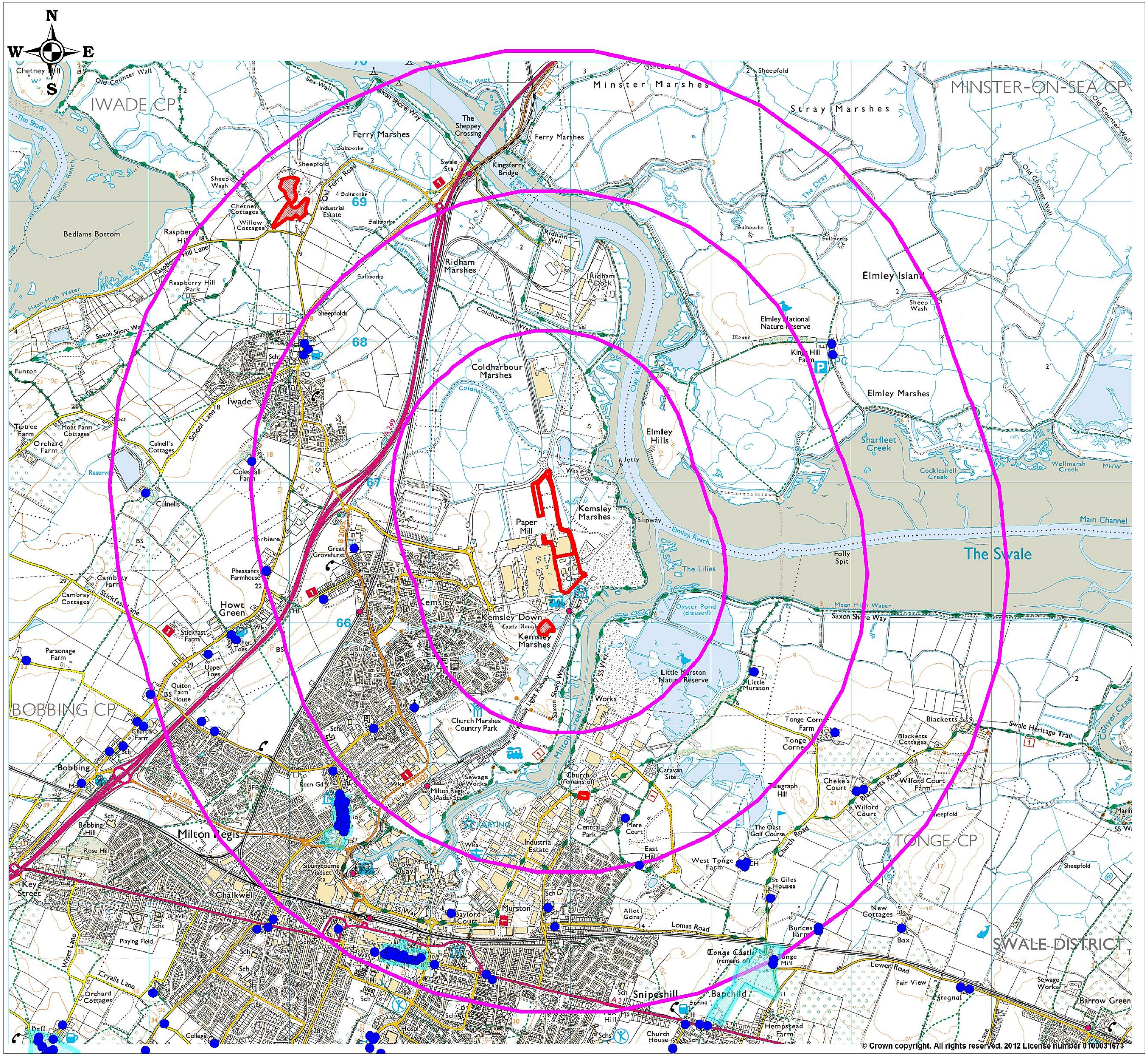
RPS K4 DCO Project, Kemsley Mill, Sittingbourne	Date of photography: 25/10/2017 Lens: 50mm (35mm format)	Distance to site: 1.4km OS reference: 592047, 165169	Direction to site: north Viewpoint height: 11m AOD	Horizontal field of view: Approx. 75° Viewing distance: 300mm @ A3	**Photomontage Viewpoint 7. Swale Way overbridge** **Figure: 12.1a**

Existing view

Proposed view: Stack location B intside boiler house

Ref: 10392-0020-003

RPS K4 DCO Project, Kemsley Mill, Sittingbourne	Date of photography: 25/10/2017 Lens: 50mm (35mm format)	Distance to site: 1.4km OS reference: 592047, 165169	Direction to site: north Viewpoint height: 11m AOD	Horizontal field of view: Approx. 75° Viewing distance: 300mm @ A3	**Photomontage Viewpoint 7. Swale Way overbridge** **Figure: 12.1b**



Scheduled Monument

Listed Building

Conservation Area

1, 2 and 3km buffers around Proposal Site

Notes

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Client	DS Smith Ltd
Project	Kemsley K4
Title	Figure 12.2 - Designated Assets

Status	Drawn By	Checked By
Issue	JM	DS
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JAC23564	NTS	Nov 17

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13 Summary

13.1 Introduction

13.1.1 A comprehensive assessment of the potential significant environmental effects arising from the Proposed Development has been undertaken. Where possible, measures have been incorporated into the design of the proposals to avoid / reduce the potential for significant environmental effects to arise known as 'primary mitigation' (see Chapter 2 of this ES).

13.1.2 Measures that have been proposed to help mitigate effects identified during the assessment process have also been proposed for some of the environmental topics ('secondary mitigation'). These largely, but not exclusively, cover potential effects arising during construction activity and are summarised in Table 13.1 below.

13.1.3 The residual effects, i.e. those significant effects remaining after mitigation, represent the likely significant effects of the Proposed Development and these are summarised in Table 13.2.

13.1.4 Table 13.3 provides a summary of the likely significant cumulative effects predicted to result from the Proposed Development in combination with other committed/proposed developments as set out in Chapter 3 of this ES.

Table 13.1 Proposed measures to mitigate potentially significant adverse effects	
Potential significant adverse effects	**Mitigation measure proposed**
Traffic and Transport	
Effects on the local road network (including traffic flows, disruption and driver delay) from construction vehicles including HGV's during the two year construction period	A Construction Traffic Management Plan (CTMP) will be prepared and agreed with Highway Officers prior to construction commencing and the works will be undertaken in accordance with this. The CTMP will be a management tool that contractors will follow to minimise the impact of construction vehicles. It will be regularly monitored and reviewed on an ongoing basis to seek to further reduce impacts where possible. The CTMP will include amongst other provisions: • A programme and total timescale for the project, each major phase of the construction and the anticipated start date; • Days and hours of site construction works; • Vehicular access routes to and from the site; • Details on the number, type, size and weight of vehicles accessing the site; • Details of how contractors, delivery companies and visitors will be made aware of the access route; • Measures to ensure route compliance; • Contingency details on where delivery vehicles will wait to load/unload in the event they are unable to access the site; • Details on the arrangements for supervising, controlling and monitoring vehicle movements to/from the site; • Details on the arrangements to ensure that the loading/collection areas are clear of vehicles and materials before the next HGV arrives; • Details on any specific arrangements for contractor car sharing / minibus / collection / drop-off arrangements to and from the site; • Details on the arrangements for contractor parking on site; • Details on monitoring and review; • Details on how complaints from local residents and businesses, etc. will be dealt with,

	reported and acted upon; • Details on the transport requirements for abnormal indivisible loads; • A detailed swept path analysis of abnormal indivisible loads; • Details of any measures to accommodate abnormal indivisible loads along the access route along with the management measures to be adopted; and • Details of any road condition surveys.
Air Quality	
Generation of dust during construction	A Construction Environmental Management Plan (CEMP) will be prepared and agreed with the local planning authority prior to construction commencing and the works will be undertaken in accordance with this. The CEMP will include but not limited to the following measures: • Planning the site layout so that machinery and dust causing activities are located away from receptors, as far as is possible. • Ensuring all vehicles switch off engines when stationary – no idling vehicles. • Use enclosed chutes and conveyors and covered skips. • Avoid bonfires and burning of waste materials. • Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken. • Production of a site specific Dust Management Plan • Carry out regular site inspections to monitor compliance with a Dust Management Plan, record inspection results, and make an inspection log available to the local authority when asked.

Climate Change	
Generation of GHG emissions during construction	Construction-stage effects are not considered likely to be material to the total life-cycle effect of the Proposed Development. Nevertheless, in consideration of IEMA guidance that all GHG emissions are potentially significant, and government policy seeking GHG emissions reductions across all economic sectors including construction, the following additional mitigation measures should be considered during detailed design: • Seek a reduction in total materials required and hence embodied carbon through lean/efficient design; • Maximise re-use of materials and components from K1, insofar as feasible; • Specify materials with low embodied carbon (e.g. based on data in the BRE Green Guide to Specification or product EPDs; • Source materials locally where possible to reduce transport GHG emissions; • Consider use of an established methodology, such as BREEAM New Infrastructure PAS2080 and/or life-cycle analysis to guide low-carbon design and construction, set a feasible reduction target and quantify its achievement.

Noise and vibration	
Construction noise levels on sensitive receptors	No specific mitigation is identified as being required to reduce construction noise or vibration adverse effects. Notwithstanding this, best practicable means will be adopted to minimise noise emissions as far as is reasonably practicable. This will include minimising noisy night-time and weekend working, and adherence to a Construction Environmental Management Plan (CEMP) which will demonstrate how the construction works will meet best practicable means. Examples of appropriate construction mitigation are provided in BS 5228-1:2009+A1:2014. The CEMP will be agreed in writing with the local planning authority prior to commencement of development. The Project will be constructed during standard working hours except by prior written agreement of SBC.
Ground Conditions	
Effects on human health and ground water during construction	Although the assessment did not identified any significant effects to human health and the environment as a consequence of the construction phase of the Proposed Development, there are a number of measures that should be implemented during construction to minimise potential impacts associated with the Proposed Development. These measures are standard in construction projects and are in line with current industry good practice for construction on brownfield sites (see Chapter 8 for details). A Construction Environmental Management Plan (CEMP) will be prepared and agreed with the local planning authority prior to construction commencing setting out these measures, who will implement and the relevant legislative requirements. A piling risk assessment is required to be undertaken prior to commencement of development to determine the most suitable piling technique to be implemented, to minimise the potential for the downward migration of contamination within the Made Ground into the Secondary A

	aquifers (Lambeth Group and Thanet Formation). The proposed development will be required to be implemented in accordance with the recommendations of the piling risk assessment.
Effects on human health from the presence of potential ground gas post construction	To mitigate completed development effects to human health from the presence of ground gas, ground gas protection measures will be implemented within new structures to minimise the potential for the migration into and accumulation of ground gas within these structures. The design of ground gas protection measures will be undertaken in accordance with CIRIA C665 and BS8485 (see Chapter 8).
Water Environment	
Water quality and flood risk impacts during construction and decommissioning	**Surface Water Management Strategy** The Proposed Developments would result in the construction of low permeability surfacing, increasing the rate of surface water run-off from the Site. A surface water management plan produced which will ensure that any increase in surface water run-off would be handled on-site and a run-off rate to the surrounding water environment (Swale Estuary) is maintained at the agreed upon rate with the appropriate authority. This would highlight potential contaminants and suspended sediment originating from the Site, which may affect the receiving watercourse. **Flood Management Plan** A flood management plan will be produced and adhered to throughout the construction phase, and will include flood-warning measures for safe site evacuation.
Water quality and flood risk impacts during operation of K4	**Drainage maintenance plan** A drainage maintenance plan will be produced and adhered to for the lifetime of the development for the drainage of the Site and any connections to the surface water, or foul sewer. **Flood management plan** A flood management plan will be produced and adhered to throughout the operational life of K4, and will include flood-warning measures for safe site evacuation.

	Emergency spillage management plan An emergency spillage management plan will be produced and adhered to throughout the lifetime of the development, and will include emergency measures. **Water quality monitoring strategy** A water quality monitoring strategy will be produced for the Proposed Development and adhered to throughout the lifetime of the development. This will apply to the drainage ditches within and surrounding the Site.
Biodiversity	
Dust impacts on designated sites	Subject to the implementation of the dust mitigation measures set out above under 'Air quality' no further mitigation measures are required.
Landscape and Visual Impact	
No mitigation proposed and/or feasible.	

Cultural Heritage	
Impact on the archaeological resource of the site	Whilst the archaeological resource of the Site is likely to be low and the unmitigated effect of the development on the buried archaeology therefore not significant, in light of the fact the archaeological resource of the Site is technically unknown a programme of archaeological fieldwork in the form of trial trenching (in the first instance) will be undertaken at a suitable time following consent.

Table 13.2 Identified significant residual effects		
Impact Type	Stage of Development	Significant Residual Effects (beneficial or adverse)
Traffic and Transport	Demolition and Construction	There are no predicted significant traffic and transport effects envisaged as a result of the Proposed Development subsequent to the mitigation measures set out in Table 13.1 above.
	Completed Development	
	Decommissioning	
Air Quality	Demolition and Construction and	There are no predicted significant effects on air quality envisaged as a result of the Proposed Development post mitigation.
	Completed Development	
	Decommissioning	
Climate Change	Demolition and Construction and	There are no predicted significant effects on Green House Gas emissions and subsequently climate change envisaged as a result of the Proposed Development.
	Completed Development	
	Decommissioning	
Noise and Vibration	Demolition and Construction	There are no predicted significant effects on the noise environment envisaged as a result of the Proposed Development post mitigation.
	Completed Development	
	Decommissioning	
Ground Conditions	Demolition and Construction	There are no predicted significant ground condition related effects envisaged as a result of the Proposed Development post implementation of the mitigation measures set out in Table 13.1 above.
	Completed Development	
	Decommissioning	

Water Environment	Demolition and Construction	There are no predicted significant effects on the water environment envisaged as a result of the Proposed Development post mitigation.
	Completed Development	
	Decommissioning	
Biodiversity	Demolition and Construction	There are no predicted significant effects on biodiversity envisaged as a result of the Proposed Development.
	Completed Development	
Landscape & Visual Impact	Demolition and Construction	There are no predicted significant landscape and visual effects envisaged as a result of the Proposed Development during construction
	Completed Development	The Proposed Development will result in a significant adverse effect on sequential views from the Saxon Shore Way/public right of way ZU1/2.
	Decommissioning	There are no predicted significant landscape and visual effects envisaged as a result of the Proposed Development during decommissioning.
Archaeology & Cultural Heritage	Demolition and Construction	There are no predicted significant archaeological or cultural heritage related effects envisaged as a result of the Proposed Development.
	Completed Development	
	Decommissioning	

Table 13. 3 Identified significant residual cumulative effects

Impact Type	Stage of Development	Significant Residual Effects (beneficial or adverse)
Traffic and Transport	Demolition and Construction	There are no predicted significant cumulative effects on traffic or transport envisaged as a result of the Proposed Development post mitigation.
	Completed Development	
	Decommissioning	
Air Quality	Demolition and Construction and	There are no predicted significant cumulative effects on air quality envisaged as a result of the Proposed Development post mitigation.
	Completed Development stages	
	Decommissioning	
Climate Change	Demolition and Construction and	There are no predicted significant cumulative effects on Green House Gas emissions and climate change envisaged as a result of the Proposed Development.
	Completed Development stages	
	Decommissioning	
Noise and Vibration	Demolition and Construction	There are no predicted significant cumulative effects on the existing noise environment envisaged as a result of the Proposed Development.
	Completed Development	
	Decommissioning	
Ground Conditions	Demolition and Construction	There are no predicted significant cumulative ground condition related effects envisaged as a result of the Proposed Development post implementation of the mitigation measures set out in Table 13.1 above.
	Completed Development	

	Decommissioning	
Water Environment	Demolition and Construction	There are no predicted significant cumulative effects on the water environment envisaged as a result of the Proposed Development.
	Completed Development	
	Decommissioning	
Biodiversity	Demolition and Construction	There are no predicted significant cumulative effects on biodiversity envisaged as a result of the Proposed Development.
	Completed Development	
	Decommissioning	
Landscape & Visual Impact	Demolition and Construction	The Proposed Development in combination with the other cumulative developments identified would result in a significant adverse effect on the landscape character of the area and sequential views along the Saxon Shore Way public right of way. This is an inevitable effect of the quantum of development permitted or proposed in this locality reflective of its industrial context. However, K4 on its own is considered to make a negligible contribution to the cumulative effect on landscape character which would occur even in the absence of K4.
	Completed Development	
	Decommissioning	There are no predicted significant cumulative effects on landscape character and visual impact envisaged as a result of decommissioning the Proposed Development.
Archaeology & Cultural Heritage	Demolition and Construction	There are no predicted significant cumulative archaeological or heritage effects envisaged as a result of the Proposed Development.
	Completed Development	
	Decommissioning	

14 Glossary of Terms and Abbreviations

AOD: Above Ordnance Datum
Above mean sea level

Applicant:
DS Smith Paper Ltd

AQAP: Air Quality Action Plan

AQMA: Air Quality Management Area

Aquifer
A deposit or rock, such as sandstone, containing water that can be used to supply wells

AQMA:

Air Quality Management Area

CEMP: Construction Environment Management Plan

CHP: Combined heat and power

Controlled Waters
Inland freshwater (any lake, pond or watercourse above the freshwater limit), water contained in underground strata and any coastal water between the limit of highest tide or the freshwater line to the three mile limit of territorial waters.

Critical Levels

A quantitative estimate for exposure to one or more airborne pollutants in gaseous form, below which significant harmful effects on sensitive habitats do not occur, according to present knowledge.

Critical Loads

A quantitative estimate of exposure to deposition of one or more pollutants, below which significant harmful effects on sensitive habitats do not occur, according to present knowledge.

DBA: Desk-based Assessment

Decibel (dB)
A unit of level derived from the logarithm of the ratio between the value of a quantity and a reference value. It is used to describe the level of many different quantities. The threshold of normal hearing is in the region of 0 dB and 140 dB is the threshold of pain. A change of 1 dB is only perceptible under controlled conditions. dB(A); normal conversation about 60 dB(A) at 1 metre; heavy road traffic about 80 dB(A) at 10 metres; the level near a pneumatic drill about 100 dB(A).

DCLG: Department for Communities and Local Government
The UK Government department with responsibility for planning, housing and the implementation of EIA

Diffusion Tube
A passive sampler used for collecting NO2 in the air

DEFRA: Department for Environment, Food and Rural Affairs

EA: Environment Agency

EIA: Environmental Impact Assessment

EIA Regulations
The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017

ES: Environmental Statement
This report, which provides a written account of the findings of the EIA process

EU: European Union

Fluvial
Of or found in Rivers

GHG: Greenhouse gases

GLVIA: Guidelines for Landscape and Visual Impact Assessment

Groundwater
Is the water found underground in the cracks and spaces in soil, sand and rock.

HDV
Heavy Duty Vehicle; a vehicle with a gross vehicle weight greater than 3.5 tonnes. Includes HGVs and buses

HGV: Heavy Goods Vehicle

IAQM: Institute of Air Quality Management

IED: Industrial Emissions Directive

IEMA: Institute of Environmental Management and Assessment
The independent professional body for environmental management professionals

K1

An existing CHP plant to be decommissioned as part of the Proposed Development.

K2
A steam generating planting located within the mill site

K3

An energy from waste plant currently under construction by Wheelabrator Technologies which will supply steam to the Mill

K4: The Proposed Development

LAmax (Maximum noise level):

The maximum of the sound pressure levels recorded of a measurement period.

LAeq, T

Equivalent continuous sound pressure level with 'A' frequency weighting - The value of the sound pressure level of a continuous steady noise that, a measurement interval of time (t), has the same mean square sound pressure as the sound under consideration whose level varies with time.

***LCA:* Landscape Character Area**

LVIA: Landscape and Visual Impact Assessment

MW

Mega Watts

NO_2

Nitrogen dioxide

NO_x

Nitrogen oxides, generally considered to be nitric oxide and NO2. Its main source is from combustion of fossil fuels, including petrol and diesel used in road vehicles

NPPF: National Planning Policy Framework

NPPG: National Planning Practice Guidance

NPS: National Planning Statements

NTS: Non-Technical Summary

OS: Ordnance Survey

Peak Particle Velocity (PPV)

Is defined as the instantaneous maximum velocity reached by a vibrating element as it oscillates about its rest position.

***PINS:* Planning Inspectorate**

PM_{10}

Small airborne particles less than 10μm in diameter

Primary Mitigation

Measures incorporated into the design of the proposals to avoid / reduce the potential for significant environmental effects.

PC: Process contribution

Proposed Development

The development described in Chapter 2, subject to assessment in this ES

Residual Effects

Those significant effects remaining after mitigation.

SRN: Strategic Road Network

Motorways and trunk roads, in this instance the M2

Secondary Mitigation

Measures required to help mitigate effects identified during the assessment process that have been mitigated by primary mitigation measures.

SM: Scheduled Monument

A scheduled monument is an historic building or site that is included in the Schedule of Monuments kept by the Secretary of State for Digital, Culture, Media and Sport.

the Site

The area to which the planning application and this ES relates, as described in Chapter 2 of this ES.

WFD: Water Framework Directive

ZTV: Zone of Theoretical Visibility