5 Air Quality

5.1 Introduction

5.1.1 This Chapter assesses the likely significant air quality effects resulting from the K3 and WKN Proposed Developments.

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 are summarised below.

Industrial Emissions Directive Limits

5.2.2 K3 and the WKN Proposed Development has been/will 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.

5.2.3 Emission limits in the IED are specified in the form of half-hourly mean concentrations; daily-mean concentrations; mean concentrations over a period of between 30 minutes and 8 hours; or, for dioxins and furans, mean concentrations evaluated over a period of between 6 and 8 hours.

5.2.4 For the purposes of this assessment for those pollutants having only one emission limit (for a single averaging period), the K3 and WKN Proposed Developments have been assumed to operate at that limit. Where more than one limit exists for a pollutant, the half-hourly mean emission concentration limit has been used to calculate short-term (less than 24-hour average) peak ground-level concentrations (Scenario 1). The daily mean emission concentration limit has been used for these pollutants to calculate long-term (greater than 24-hour average) mean ground-level concentrations (Scenario 2). The IED emission limit values are provided in Table 5.1.

Pollutant	Scenario 1 Short-Term Emission Limits ($mg.Nm^{-3}$)	Scenario 2 Daily-Mean Emission Limits ($mg.Nm^{-3}$)
Particles	30	10
Hydrogen chloride (HCl)	60	10
Hydrogen fluoride (HF)	4	1
Sulphur dioxide (SO_2)	200	50
Nitrogen oxides (NO_x)	400	200
Carbon monoxide (CO)	-	50
Group 1 metals [(a)]	-	0.05 [(d)]
Group 2 metals [(b)]	-	0.05 [(d)]
Group 3 metals [(c)]	-	0.5 [(d)]
Dioxins and furans	-	0.0000001 [(e)]

Table 5.1: Relevant Industrial Emission Directive Limit Values

5.2.5 The following notes accompany Table 5.1:

- All concentrations referenced to temperature 273 K, pressure 101.3 kPa, 11% oxygen, dry gas.
- (a) Cadmium (Cd) and thallium (Tl).
- (b) Mercury (Hg).
- (c) Antimony (Sb), arsenic (As), lead (Pb), chromium (Cr), cobalt (Co), copper (Cu), manganese (Mn), nickel (Ni), and vanadium (V).
- (d) All average values over a sample period of a minimum of 30 minutes and a maximum of 8 hours.
- (e) Average values over a sample period of a minimum of 6 hours and a maximum of 8 hours. The emission limit value refers to the total concentration of dioxins and furans calculated using the concept of toxic equivalence (TEQ).

5.2.6 Ammonia (NH_3), polychlorinated biphenyls (PCBs) and polycyclic aromatic hydrocarbons (PAHs) are not specifically regulated under the IED. For the purposes of this assessment, the emission concentrations in Table 5.2 have been used for these pollutants to calculate long-term (greater than 24-hour average) mean ground-level concentrations (Scenario 2).

Pollutant	Scenario 2 Emission Concentrations ($mg.Nm^{-3}$)
NH_3	5
PCBs	0.005
PAHs (as B[a]P equivalent)	0.001

Table 5.2 Modelled Emission Concentrations for non-IED Regulated Pollutants

5.2.7 The following notes accompany Table 5.2:

- All concentrations referenced to temperature 273 K, pressure 101.3 kPa, 11% oxygen, dry gas.
- Emission limits obtained from the IPPC Reference Document on the Best Available Techniques for Waste Incineration (August 2006)

Waste Framework Directive

5.2.8 Directive 2008/98/EC of the European Parliament and Council on Waste requires member states to ensure that waste is recovered or disposed of without harm to human health and the environment. It requires member states to impose certain obligations on all those dealing with waste at various stages. Operators of waste disposal and recovery facilities are required to obtain a permit or register a permit exemption. Retention of the permit requires periodic inspections and documented evidence of the activities in respect of waste.

5.2.9 The Waste Framework Directive (WFD) requires member states to take appropriate measures to establish an integrated and adequate network of disposal installations. The WFD also promotes environmental protection by optimising the use of resources, promoting the recovery of waste over its disposal (the "waste hierarchy").

5.2.10 Annex I and II of the WFD provide lists of the operations which are deemed to be "disposal" and "recovery", respectively. The terms are mutually exclusive, and an operation cannot be a disposal and recovery operation simultaneously. Where the operation is deemed to be a disposal operation, the permit will contain more extensive conditions than for a recovery operation.

5.2.11 The principal objective of a recovery operation is to ensure that the waste serves a useful purpose, replacing other substances which would have been used for that purpose. Where the combustion of waste is used to provide a source of energy, the operation is deemed to be a recovery operation.

5.2.12 The proposed development is deemed to be a recovery operation on the basis that the operation falls under the description of the first operation listed under Annex II:

"R 1 Use principally as a fuel or other means to generate energy"

5.2.13 The Environmental Permitting Regulations 2018 (EPR) [Ref 5.2] implement the WFD in the UK. As such, the EA is responsible for implementing the obligations set out in the WFD.

Ambient Air Quality Criteria

5.2.14 There are several EU Air Quality Directives and UK Air Quality Regulations [Ref 5.3] that will apply to the operation of the K3 and WKN Proposed Developments. These provide a series of statutory air quality limit values, target values and objectives for pollutants, emissions of which are regulated through the IED.

5.2.15 There are some pollutants whose emission levels are regulated by the IED but which do not have statutory ambient air quality standards prescribed under current legislation. For these pollutants, a number of non-statutory ambient air quality objectives and guidelines exist which have been applied within this assessment. The EA provides further assessment criteria in its online guidance.

Air Quality Directive and Air Quality Standards Regulations

5.2.16 The 2008 Ambient Air Quality Directive (2008/50/EC) [Ref 5.4] 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 (England) 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. The statutory ambient limit values are listed in Table 5.3.

Pollutant	Averaging Period	Limit Values	Not to be Exceeded More Than
Nitrogen Dioxide (NO_2)	1 hour	200 $\mu g.m^{-3}$	18 times pcy
	Annual	40 $\mu g.m^{-3}$	-
Particulate Matter (PM_{10})	24 hour	50 $\mu g.m^{-3}$	35 times pcy
	Annual	40 $\mu g.m^{-3}$	-
Particulate Matter ($PM_{2.5}$)	Annual	25 $\mu g.m^{-3}$	-
Carbon Monoxide	Maximum daily running 8 hour mean	10,000 $\mu g.m^{-3}$	-
Sulphur Dioxide (SO_2)	15 minute	266 $\mu g.m^{-3}$	> 35 times pcy
	1 hour	350 $\mu g.m^{-3}$	> 24 times pcy
	24 hour	125 $\mu g.m^{-3}$	> 3 times pcy
Lead	Annual	0.25 $\mu g.m^{-3}$	-
Arsenic (As)	Annual	0.006 $\mu g.m^{-3}$	-
Cadmium (Cd)	Annual	0.005 $\mu g.m^{-3}$	-
Nickel (Ni)	Annual	0.02 $\mu g.m^{-3}$	-

Table 5.3 Statutory Air Quality Limit Values

Non-Statutory Air Quality Objectives and Guidelines

5.2.17 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 has been

revised several times since, with the latest published in 2007 [Ref 5.5]. 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. There is no legal requirement to meet objectives set within the UK AQS except where equivalent limit values are set within the EU Directives.

5.2.18 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.

5.2.19 Non-statutory ambient air quality objectives and guidelines also exist within the World Health Organisation Guidelines [Ref 5.6] and the Expert Panel on Air Quality Standards Guidelines (EPAQS) [Ref 5.7]. The non-statutory ambient objectives and guidelines are presented in Table 5.4.

Pollutant	Averaging Period	Guideline
Particulate Matter ($PM_{2.5}$)	Annual	Target of 15% reduction in concentrations at urban background locations
	Annual	25 µg.m^{-3}
PAHs (as B[a]P equivalent)	Annual (a)	0.00025 µg.m^{-3}
Sulphur Dioxide (SO_2)	Annual (b)	50 µg.m^{-3}
Hydrogen Chloride	1 hour (c)	750 µg.m^{-3}
Hydrogen Fluoride	1 hour (c)	160 µg.m^{-3}

Table 5.4: Non-Statutory Air Quality Objectives and Guidelines

5.2.20 The following notes accompany Table 5.4:

- (a) Target date set in UK Air Quality Strategy 2007
- (b) World Health Organisation Guidelines
- (c) EPAQS recommended guideline values

Environmental Assessment Levels

5.2.21 The EA online guidance entitled *'Environmental management – guidance, Air emissions risk assessment for your environmental permit'* [Ref 5.8] provides further assessment criteria in the form of Environmental Assessment Levels (EALs).

5.2.22 Table 5.5 presents all available EALs for ambient concentrations of the pollutants relevant to this assessment.

Pollutant	Long-term EAL, µg.m^{-3}	Short-term EAL, µg.m^{-3}
Nitrogen dioxide (NO_2)	40 (a)	200
Carbon monoxide (CO)	-	10,000
Sulphur dioxide (SO_2)	50	267
Particulates (PM_{10})	40 (a)	50
Particulates ($PM_{2.5}$)	25	-
Hydrogen chloride (HCl)	-	750
Hydrogen fluoride (HF)	16 (monthly average)	160
Arsenic (As)	0.003	-
Antimony (Sb)	5	150
Cadmium (Cd)	0.005	-
Chromium (Cr)	5	150
Chromium VI (oxidation state in the PM_{10} fraction)	0.0002	-
Cobalt (Co)	0.2 (a)	6 (a)
Copper (Cu)	10	200
Lead (Pb)	0.25	-
Manganese (Mn)	0.15	1500
Mercury (Hg)	0.25	7.5
Nickel (Ni)	0.02	-
Thallium (Tl)	1 (a)	30 (a)
Vanadium (V)	5	1
PAHs (as B[a]P equivalent)	0.00025	-
Ammonia	5	-

Table 5.5: Environmental Assessment Levels (EALs)

5.2.23 In Table 5.5, (a) refers to EALs obtained from the EA's earlier Horizontal Guidance Note EPR H1 guidance note [Ref 5.9], as no levels are provided in the current guidance.

5.2.24 Within the assessment, the statutory ambient air quality limit and target values (as presented in Table 5.3) are assumed to take precedent over objectives, guidelines and the EALs. In addition, for those pollutants which do not have any statutory air quality standards, the assessment assumes the lower of either the EAL or the non-statutory air quality objective or guideline where they exist.

Environmental Protection Legislation

Environmental Permitting

5.2.25 Certain industrial installations are regulated under the Environmental Permitting Regulations (England and Wales) (Amendment) Regulations 2018, which implement the EU Directive 2008/1/EC concerning Integrated Pollution Prevention and Control ("the IPPC Directive"). The EPR define activities that require the operator to obtain an Environmental Permit from the EA.

5.2.26 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.

5.2.27 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.

5.2.28 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.

5.2.29 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 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."*

Planning Policies

National Policy Statements (NPS)

5.2.30 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 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."*

National Planning Policy Framework (NPPF)

5.2.31 The NPPF sets out three overarching objectives to achieve sustainable development. The relevant objective in the context of this air quality assessment is:

> ***"an environmental objective** – to contribute to protecting and enhancing our natural, built and historic environment; including making effective use of land, helping to improve biodiversity, using natural resources prudently, minimising waste and pollution and adapting to climate change, including moving to a low carbon economy*" (Paragraph 8c)

5.2.32 Under the heading 'Promoting sustainable transport', the NPPF states:

> *"The planning system should actively manage patterns of growth in support of these objectives. Significant development should be focused on locations which are or can be made sustainable, through limiting the need to travel and offering a genuine choice of transport modes. This can help to reduce congestion and emissions, and improve air quality and public health. However, opportunities to maximise sustainable transport solutions will vary between urban and rural areas, and this should be taken into account in both plan-making and decision-making."* (Paragraph 103)

5.2.33 Under the heading 'Conserving and enhancing the natural environment', the NPPF states:

> *Planning policies and decisions should contribute to and enhance the natural and local environment by:*
>
> *e) Preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans; …"* (Paragraph 170)
>
> *"Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas. Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement. So far as possible these opportunities should be considered at the plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications. Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan."* (Paragraph 181)

<u>National Planning Practice Guidance (NPPG)</u>

5.2.34 The 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.

5.2.35 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).

5.2.36 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."*

5.2.37 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 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

5.2.38 The Bearing Fruits 2031: The Swale Borough Local Plan was formally adopted by the council on 26 July 2017. In relation to air quality, 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.

5.2.39 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".

5.2.40 In the case, the key pollutants from the 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 Methodology

Scoping and Consultation

5.3.1 The formal scoping exercise is summarised in Chapter 3.

5.3.2 Neither the NPPF, the NPS 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."*

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

5.3.4 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 5.10], the IAQM Guidance on the assessment of dust from demolition and construction [Ref 5.11] and, where relevant, Defra's Local Air Quality Management Technical Guidance: LAQM.TG16 [Ref 5.12]. 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.*

5.3.5 Air quality guidance 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.

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 Where it has been necessary to consider background pollution levels, these 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 K3/WKN Sites.

Assessment of Effects

5.3.9 This assessment covers the WKN and K3 Proposed Developments including all works (No 1-7) set out in Chapter 2.

<u>Construction Phase</u>

5.3.10 Dust is the generic term used to describe particulate matter in the size range 1-75 µm in diameter [Ref 5.12]. 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.

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

5.3.12 PM10 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

5.3.13 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 [Ref 5.11] 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, there are no ecological receptors within the distances and ecological effects have been scoped out). 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: *"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:

5.3.19 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.

5.3.20 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.

5.3.21 The detail of the dust assessment methodology is provided in Appendix 5.1.

5.3.22 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 9: Ground Conditions.

Decommissioning Phase

5.3.23 The risk of dust impacts during the decommissioning phase, including demolition, will be the same or similar to the risk of impacts during the construction phase. A Demolition Construction Management Plan will be produced prior to decommissioning.

5.3.24 Decommissioning-related traffic is expected to be lower than the construction phase and the impacts of decommissioning-vehicle exhaust emissions have not been assessed specifically. The impact of construction-vehicle exhaust emissions is considered to be negligible and therefore the impacts of decommissioning-vehicle exhaust emissions is also considered to be negligible.

Operation of the K3 and WKN Proposed Developments

Summary of Key Pollutants Considered

5.3.25 The following effects have been assessed in this Chapter.

- Residual emissions from the flue gas treatment system and their effects on human health and ecological receptors
- Fugitive emissions of dust, odour and bio-aerosols during the operational phase
- Emissions from vehicle movements generated by the operation of the developments.

5.3.26 The assessment methodology for the stack emissions are described in the following sections. The assessment methodology for vehicle emissions is described in Appendix 5.5.

Dispersion Model Selection

5.3.27 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.

5.3.28 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.

Meteorological Data

5.3.29 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.

5.3.30 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.

5.3.31 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.

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

Surface Roughness

5.3.33 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.

5.3.34 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

5.3.35 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

5.3.36 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 modelling are provided in Table 5.6. The predictions presented in this report therefore include building wake effects.

5.3.37 The exact locations of the stack and building dimensions for WKN are not fixed; however, where possible, worse case assumptions have been made. For example, the dimensions presented in Table 5.6 include a +10% buffer. If the buildings are smaller than this then the predicted concentrations are likely to be lower. The assessment therefore presents the worst case in terms of building wake effects.

5.3.38 There is potential for the location of all buildings for WKN to vary by 5 m. Downwash effects caused by buildings near the stack can affect ground level

concentrations. Low pressure on the leeward side of buildings can bring the plume to the ground closer than would be the case for no building. The impact of a change in building locations will be a change in the location of the maximum impact over the short-term, rather than a significant change in the magnitude of the maximum prediction. Similarly, slight variations in the stack locations are more likely to affect the location of maximum impact rather than the magnitude. On that basis movement of the buildings by up to 5m is not expected to be significant.

	Building Name	Approx. location of centre (x,y)	Length (m)	Width (m)	Height (m)
K3 Proposed Development	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
WKN Proposed Development	FGT	592066, 166715	45	35	44
	Substation	592043, 166665	45	30	15
	ACC	592076, 166680	45	30	40
	Stores next to Pond	592234, 166775	40	35	15
	Admin	592172, 166715	30	15	30
	Turbine	592145, 166706	40	25	30
	Stores next to Turbine	592123, 166702	20	10	15
	Boiler	592118, 166727	50	36	58
	Bunker	592155, 166737	35	36	44
	Tipping Hall	592192, 166745	45	36	30

Table 5.6 Buildings Included Within the Model

Stack Parameters and Emissions Rates Used in Model

5.3.39 Stack and emissions characteristics modelled are provided in Table 5.7. 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.

Parameter	Unit	K3 as consented	K3 Proposed Development	WKN Proposed Development
Grid coordinates	x,y	592135, 166569	592135, 166569	592043, 166710
Stack height	m	90	90	90
Internal diameter	m	3.25	3.25	4.0
Efflux velocity	$m.s^{-1}$	19.06	22.81	15.3
Efflux temperature	^oC	140	140	130
Actual Volumetric flow	$m^3.s^{-1}$	158.42	189.2	192.3

Parameter	Unit	K3 as consented		K3 Proposed Development		WKN Proposed Development	
O_2	%	8.1		8.1		8	
Water	%	17.8		17.8		19	
Normalised Volumetric Flow (0^0C, dry, 11% O_2)	$Nm^3.s^{-1}$	110.98		132.9		137.5	
Pollutants		**Short**	**Long**	**Short**	**Long**	**Short**	**Long**
Particles	$g.s^{-1}$	3.33	1.11	3.99	1.33	4.12	1.37
HCl	$g.s^{-1}$	6.66	1.11	7.98	1.33	8.25	1.37
HF	$g.s^{-1}$	0.44	0.11	0.53	0.13	0.55	0.14
SO_2	$g.s^{-1}$	22.20	5.55	26.59	6.65	27.49	6.87
NO_x	$g.s^{-1}$	44.39	22.20	53.18	26.59	54.99	27.49
CO	$g.s^{-1}$	11.10	5.55	13.29	6.65	13.75	6.87
Group 1 Metals Total (b)	$g.s^{-1}$	-	5.55E-03	-	6.65E-03	-	6.87E-03
Group 2 Metals (c)	$g.s^{-1}$	-	5.55E-03	-	6.65E-03	-	6.87E-03
Group 3 Metals Total (d)	$g.s^{-1}$	-	5.55E-02	-	6.65E-02	-	6.87E-02
Dioxins and furans	$g.s^{-1}$	-	1.11E-08	-	1.33E-08	-	1.37E-08
PCBs	$g.s^{-1}$	-	5.55E-04	-	6.65E-04	-	6.87E-04
PAHs – B[a]P	$g.s^{-1}$	-	1.11E-04	-	1.33E-04	-	1.37E-04
NH_3	$g.s^{-1}$	-	5.55E-01	-	6.65E-01	-	6.87E-01

Table 5.7 Stack and Emissions Characteristics – Main Stacks

Modelled Scenarios

5.3.40 The K3 Proposed Development has been modelled and compared with the future baseline (i.e. K3 operating in accordance with its existing planning consent) to demonstrate the practical effect of the K3 Proposed Development.

5.3.41 For WKN, the model has been used to predict the PC for the following scenarios:

- WKN Proposed Development;
- WKN Proposed Development and K3 as consented; and
- WKN Proposed Development and K3 Proposed Development.

Stack Height Determination

5.3.42 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.

5.3.43 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 EA removed its detailed guidance, Horizontal Guidance Note EPR H1 [Ref 5.9], for undertaking risk assessments on 1 February 2016; however, in the absence of any other guidance, 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."

5.3.44 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 for the WKN Proposed Development are provided in Appendix 5.2. For K3 a stack height determination was undertaken in the 2010 ES (see Document 3.3 submitted in support of the application).

NOx to NO_2 Assumptions for Annual-Mean Calculations

5.3.45 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 NOx remains in the form of NO. Total conversion is, therefore, an unrealistic assumption, particularly in the near field [Ref 5.15]. While this approach is useful for screening assessments, it is not appropriate for detailed assessments.

5.3.46 Historically, the EA 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 EA requires a more detailed assessment to be carried out with operators asked to justify the use of percentages lower than 70%.

5.3.47 Following the withdrawal of the EA'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 EA's historic recommendations.

NO_x to NO_2 Assumptions for Hourly-Mean Calculations

5.3.48 An assumed conversion of 35% follows the EA's recommendations [Ref 5.16] for the calculation of 'worse case' scenario short-term NO_2 concentrations.

Modelling of Long-term and Short-term Emissions

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

5.3.50 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 and Decommissioning Phase

5.3.51 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".

Completed Development

5.3.52 The on-line EA guidance for risk assessments [Ref 5.8] provides details for screening out substances for detailed assessment. In particular, it states that:

"To screen out a PC for any substance so that you don't need to do any further assessment of it, the PC must meet both of the following criteria:

- *the short-term PC is less than 10% of the short-term environmental standard*
- *the long-term PC is less than 1% of the long-term environmental standard*

If you meet both of these criteria you don't need to do any further assessment of the substance.

If you don't meet them, you need to carry out a second stage of screening to determine the impact of the PEC."

5.3.53 The PEC refers to the Predicted Environmental Concentration calculated as the PC added to the ambient concentration. The on-line EA guidance continues by stating that:

"You must do detailed modelling for any PECs not screened out as insignificant."

5.3.54 It then states that further action may be required where:

"your PCs could cause a PEC to exceed an environmental standard (unless the PC is very small compared to other contributors – if you think this is the case contact the EA) the PEC is already exceeding an environmental standard"

5.3.55 On that basis:

- *The impacts are not considered significant if the short-term PC is less than 10 % of the short-term Environmental Assessment Level (EAL);*
- *The impacts are not considered significant if the long-term PC is less than 1 % of the long-term EAL; or*
- *The impacts are not considered significant if the PEC is below the EAL.*

5.3.56 For the purposes of this assessment, impacts that are not considered significant are described as negligible.

Limitations and Assumptions

5.3.57 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).

5.3.58 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.

5.3.59 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.

5.3.60 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 5.8.

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

Concentration	Source of Uncertainty	Approach to Dealing with Uncertainty	Comments
	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.	the model should lead to a forecast concentration that is towards the top of the uncertainty range, rather than a central estimate.
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.	

Table 5.8 Summary of Main Components of Uncertainty

5.3.61 The analysis of the component uncertainties indicates that, notwithstanding the limitations of the assessment, the predicted total concentration is likely to be conservative. 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 Existing Baseline Conditions

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 5.13]

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, existing background air quality has been characterised by drawing on information from the following public sources:

- Defra maps [Ref 5.14], 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 the key combustion related pollutants (NO_2 and PM_{10}) for the K3 and WKN Proposed Developments 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 likely to be 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 5.9. Values shown in bold 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 5.9 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 5.10. 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 5.10 Passively Monitored Urban Background Annual-Mean NO_2 Concentrations

5.4.9 The existing background concentrations of other pollutants are provided in Appendix 5.3.

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 5.11 and Table 5.12.

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	13.1
SW77 - Kemsley Fields, Swale Way	0.4	29.7 – 34.5	13.6
SW88 - Sonara Way	2.5	19.5 – 27.2	16.2
The Site	-	-	12.5

Table 5.11 Defra Mapped Annual-Mean NO_2 Concentration Estimates

Monitor Name	Approx. Distance to Site (km)	Concentration ($\mu g.m^{-3}$)	
		Range of Monitored	Estimated Defra Mapped
Maidstone	13.0	15.8 – 25.3	15.4
The Site	-	-	15.4

Table 5.12 Defra Mapped Annual-Mean PM_{10} Concentration Estimates

Appropriate Background Concentrations for the K3/WKN Sites

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 and Hernehill Village Hall but below the range at the other closest monitoring location sites, SW77 and SW88, where the Defra mapped concentration estimates are well below the bottom of the measured 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, 31.7 $\mu g.m^{-3}$, has been used to inform the existing background annual-mean NO_2.

5.4.12 For PM_{10}, the Defra mapped concentration estimate is are 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, 19.4 $\mu g.m^{-3}$, has been used to inform the existing background annual-mean PM_{10} concentration.

Sensitive Receptors

5.4.13 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 5.13] provides examples of exposure locations and these are summarised in Table 5.13.

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 expected to be short-term.

Averaging Period	Objectives should apply at:	Objectives should generally not apply at:
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 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.	Kerbside sites where the public would not be expected to have regular access.

Table 5.13: Examples of Where Air Quality Objectives Apply

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

5.4.15 In addition, the effects of the K3 and WKN Proposed Developments 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 5.14 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
R19	Grovehurst Road	1700	590335	166741
R20	Swale Way	800	591251	166473

Table 5.14: Modelled Sensitive Receptors

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

5.4.17 The receptor points selected for the assessment of sensitive ecological sites are described in Appendix 5.4.

5.5 Assessment baseline

5.5.1 For background traffic-related NO_2 concentrations, the view historically has been that in the UK it 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 K3/WKN Sites.

5.5.2 To ensure that the assessment presents conservative results, no reduction in the background has been applied for future years. Table 5.15 summarises the existing annual-mean Ambient Concentrations (AC) for NO_2 and PM_{10}. Where short-term background concentrations are required, the annual-mean concentrations have been doubled as is the convention.

Pollutant	Data Source	Ambient 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	-

Table 5.15 Summary of Background Annual-Mean Concentrations used in the Assessment

5.5.3 Where relevant, future baseline concentrations have been calculated at each modelled receptor location (grid points and selected sensitive receptors) as the total of the existing background concentration and the process contribution for the permitted K3. This is described as the Future Ambient Concentration (known hereafter as the Future AC) to distinguish it from the existing Ambient Concentration.

5.6 The K3 Proposed Development

Construction Effects

5.6.1 A construction dust assessment was undertaken as part of the original planning application for the now permitted K3 facility. Mitigation measures were recommended to ensure that the effect from construction would be not significant. (The original assessment is provided as Appendix 2.2. to Chapter 2.) Assuming that these mitigation measures are implemented during the construction phase for K3, the residual effect is expected to be not significant.

5.6.2 The air quality assessment for the permitted K3 did not quantitatively assess the effects of construction traffic on air quality as construction traffic flows were

expected to be lower than operational traffic flows. The operational traffic flows are considered later in this chapter.

Completed Development Effects

5.6.3 For each of the five years of meteorological data (2012 to 2016), the maximum predicted concentration across the identified selected sensitive receptors has been derived and are reported below. The predicted Process Contribution (PC) is for the K3 Proposed Development.

Scenario 1: Short-Term IED Emission Limit Values

5.6.4 Table 5.16 summarises the maximum predicted PC to ground-level concentrations for all relevant pollutants with short-term emission limit values set out in the IED.

Scenario 2: Long-Term IED Emission Limit Values

5.6.5 Table 5.17 summarises the PCs for all pollutants assuming that the K3 Proposed Development is operating at long-term emission limit values.

Pollutant	Averaging Period	EAL ($\mu g.m^{-3}$)	K3 PC ($\mu g.m^{-3}$)	K3 PC as % of EAL	Criteria (%)	Is K3 PC Potentially Significant?
HCl	1 hour (maximum)	750	15.0	2	10	No
HF	1 hour (maximum)	160	1.0	1	10	No
SO_2	15 minute (99.90th percentile)	266	45.3	17	10	Yes
	1 hour (99.73th percentile)	350	37.4	11	10	Yes
	24 hour (99.18th percentile)	125	16.0	13	10	Yes
NO_2	1 hour (99.79th percentile)	200	27.8	14	10	Yes
PM_{10}	24 hour (90.41st percentile)	50	1.0	2	10	No
CO	8 hour (maximum daily running)	10000	17.4	0	10	No

Table 5.16 Predicted Maximum Process Contributions at Short-Term Emission Limit Values – K3

Pollutant	Averaging Period	EAL ($\mu g.m^{-3}$)	K3 PC ($\mu g.m^{-3}$)	K3 PC as % of EAL	Criteria (%)	Is K3 PC Potentially Significant?
PM_{10}	24 hour (90.41st percentile)	50	0.3	1	10	No
	24 hour (annual mean)	40	0.1	0	1	No
$PM_{2.5}$	24 hour (annual mean)	25	0.1	0	1	No
HCl	1 hour (maximum)	750	2.5	0	10	No
HF	1 hour (maximum)	160	0.3	0	10	No
SO_2	15 minute (99.90th percentile)	266	11.3	4	10	No
	1 hour (99.73th percentile)	350	9.4	3	10	No
	24 hour (99.18th percentile)	125	4.0	3	10	No
	1 hour (annual mean)	50	0.5	1	1	No
NO_2	1 hour (99.79th percentile)	200	13.9	7	10	No
	1 hour (annual mean)	40	1.4	4	1	Yes
CO	8 hour (maximum daily running)	10,000	8.7	0	10	No

Pollutant	Averaging Period	EAL ($\mu g.m^{-3}$)	K3 PC ($\mu g.m^{-3}$)	K3 PC as % of EAL	Criteria (%)	Is K3 PC Potentially Significant?
Cd	1 hour (annual mean)	0.005	5.06E-04	10	10	No
Tl	1 hour (maximum)	30	1.25E-02	0	10	No
	1 hour (annual mean)	1	5.06E-04	0	1	No
Hg	1 hour (maximum)	7.5	1.25E-02	0	10	No
	1 hour (annual mean)	0.25	5.06E-04	0	1	No
Sb	1 hour (maximum)	150	1.25E-01	0	10	No
	1 hour (annual mean)	5	5.06E-03	0	1	No
As	1 hour (annual mean)	0.003	5.06E-03	169	1	Yes
Cr	1 hour (maximum)	150	1.25E-01	0	10	No
	1 hour (annual mean)	5	5.06E-03	0	1	No
Co	1 hour (maximum)	6	1.25E-01	2	10	No
	1 hour (annual mean)	0.2	5.06E-03	3	1	Yes
Cu	1 hour (maximum)	200	1.25E-01	0	10	No
	1 hour (annual mean)	10	5.06E-03	0	1	No
Pb	1 hour (annual mean)	0.25	5.06E-03	2	1	Yes
Mn	1 hour (maximum)	1500	1.25E-01	0	10	No
	1 hour (annual mean)	0.15	5.06E-03	3	1	Yes
Ni	1 hour (annual mean)	0.02	5.06E-03	25	1	Yes
V	1 hour (maximum)	5	1.25E-01	3	10	No
	1 hour (annual mean)	1	5.06E-03	1	1	No
Dioxins & Furans	1 hour (annual mean)	-	1.01E-09	-	-	-
PAHs	1 hour (annual mean)	0.00025	1.01E-05	4	1	Yes
PCB	1 hour (annual mean)	0.2	5.06E-05	0	1	No
NH_3	1 hour (annual mean)	5	5.06E-02	1	1	No

Table 5.17 Predicted Maximum Process Contributions at Long-Term Emission Limit Values – K3

5.6.6 The results presented in Table 5.16 show that the predicted PC is below 10% of the relevant EAL for all pollutants except SO_2 and NO_2.

5.6.7 When the 15-minute mean SO_2 PC of 45.3 $\mu g.m^{-3}$ is added to the AC of 22.1 $\mu g.m^{-3}$, the PEC is 67.4 $\mu g.m^{-3}$. As this is below the relevant EAL of 266 $\mu g.m^{-3}$ the effects are not considered to be significant.

5.6.8 When the 1-hour mean (99.73rd percentile) SO_2 PC of 37.4 $\mu g.m^{-3}$ is added to the AC of 15.7 $\mu g.m^{-3}$, the PEC is 53.1 $\mu g.m^{-3}$. As this is below the relevant EAL of 125 $\mu g.m^{-3}$ the effects are not considered to be significant.

5.6.9 When the 24-hour mean (99.18th percentile) SO_2 PC of 16.0 $\mu g.m^{-3}$ is added to the AC of 8.0 $\mu g.m^{-3}$, the PEC is 24.0 $\mu g.m^{-3}$. As this is below the relevant EAL of 125 $\mu g.m^{-3}$ the effects are not considered to be significant.

5.6.10 When the 1-hour mean (99.79th percentile) NO_2 PC of 27.89 $\mu g.m^{-3}$ is added to the AC of 63.5 $\mu g.m^{-3}$, the PEC is 91.3 $\mu g.m^{-3}$. As this is below the relevant EAL of 200 $\mu g.m^{-3}$ the effects are not considered to be significant.

5.6.11 The results presented in Table 5.17 show that the predicted PC is below 10% of the relevant short-term EAL and below 1% of the long-term EAL for all pollutants with the exception of nitrogen dioxide (NO_2), As (arsenic), Co (cobalt), Pb (lead), Mn (manganese) Ni (nickel), and PAHs.

5.6.12 Table 5.18 summarises the K3 Proposed Development PECs for all pollutants that were considered to be potentially significant in Table 5.17.

Pollutant	Averaging Period	EAL (µg.m^{-3})	AC (µg.m^{-3})	Max K3 PEC (µg.m^{-3})	Max K3 PEC as % of EAL	Is K3 PEC Potentially Significant?
NO_2	1 hour (annual mean)	40	31.7	33.2	83	No
As	1 hour (annual mean)	0.003	7.78E-04	5.84E-03	195	Yes
Co	1 hour (annual mean)	0.2	6.17E-05	5.12E-03	3	No
Pb	1 hour (annual mean)	0.25	6.13E-03	1.12E-02	4	No
Mn	1 hour (annual mean)	0.15	3.27E-03	8.32E-03	6	No
Ni	1 hour (annual mean)	0.02	6.75E-04	5.73E-03	29	No
PAHs	1 hour (annual mean)	0.00025	9.59E-05	1.06E-04	42	No

Table 5.18 Predicted Environmental Concentrations at Long-Term Emission Limit Values – K3

5.6.13 The results presented in Table 5.18 show that the predicted PEC is below 100% of the relevant EAL for all pollutants with the exception of As (arsenic).

5.6.14 The predictions are based on the assumption that arsenic comprises the total of the group 3 metals emissions. In reality, the IED emission limit applies to all nine of the group 3 metals. If the emissions limit is assumed to apply equally to each of the nine group 3 metals, then the PCs for As would be divided by 9 (or 11%) and the predicted PEC for As would be less than 100% of the EAL as shown in Table 5.19. The effects are therefore not considered significant.

Pollutant	Averaging Period	EAL (µg.m^{-3})	Max K3 PC (µg.m^{-3})	Max K3 PC as % of EAL	Max K3 PEC (µg.m^{-3})	Max K3 PEC as % of EAL	Is K3 PEC Potentially Significant?
As	1 hour (annual mean)	0.003	5.62E-04	19	1.34E-03	45	No

Table 5.19 Predicted Environmental Concentrations at Long-Term Emission Limit Values – K3

5.6.15 For hexavalent chromium (CrVI), the measured concentrations in the EA 'Releases from waste incinerators – Guidance on assessing group 3 metal stack emissions from incinerators' version 4 (undated), varies from 0.0005% to 0.03% of the IED emission concentration limit. Table 5.20 shows the predicted PC at these proportions.

Pollutant	Averaging Period	EAL (µg.m^{-3})	K3 PC (µg.m^{-3})	K3 PC as % of EAL	Percentage of the IED Emission Limit
CrVI	1 hour (annual mean)	0.0002	2.53E-08	0	0.0005% (min)
			1.52E-06	1	0.03% (max)

Table 5.20 Predicted Environmental Concentrations at Long-Term Emission Limit Values – K3

5.6.16 The combined PCs for K3 and WKN Proposed Developments are considered in Section 5.12.

Traffic-related Emissions

5.6.17 Modelling has been undertaken for the key traffic-related pollutants (NO_2, PM_{10} and $PM_{2.5}$) at sensitive receptor locations adjacent to roads affected.

5.6.18 Tables 5.21, 5.22 and 5.23 present the annual-mean NO_2, PM_{10} and $PM_{2.5}$ concentrations predicted at the facades of the receptors outlined in Table 5.14 for the K3 Proposed Development in the first fully operational year, 2021. The *With Development* scenarios is the *Without Development* scenario plus stack and traffic emissions from the K3 Proposed Development. The methodology and significance criteria for the traffic modelling are provided in Appendix 5.5.

5.6.19 It should be noted that the NO_2 future baseline concentration for the assessment of traffic emissions is based on the Defra mapped NO_2 background concentration of 12.5 $\mu g.m^{-3}$ (see Table 5.11) plus the K3 Proposed Development stack emissions rather than the baseline of 31.7 $\mu g.m^{-3}$ used for the stack emissions. The Defra mapped concentration is a background concentration (i.e. away from roads) whereas the 31.7 $\mu g.m^{-3}$ was measured at a roadside location and will include a large road contribution. Therefore, to avoid double counting of the road component, the Defra mapped background concentration has been used for all traffic modelling.

Receptor ID	Concentration ($\mu g.m^{-3}$)			With - Without Dev as % of the AQS Objective	Impact Descriptor
	Without Development	K3 Stack emissions	With Development		
R1	16.6	0.56	17.2	1	Negligible
R2	18.5	0.58	19.3	2	Negligible
R3	16.2	0.48	16.7	1	Negligible
R4	13.8	0.32	14.1	1	Negligible
R5	13.7	0.32	14.0	1	Negligible
R6	15.2	0.15	15.4	0	Negligible
R7	15.6	0.13	15.8	0	Negligible
R8	26.9	0.29	27.3	1	Negligible
R9	26.9	0.18	27.3	1	Negligible
R10	21.8	0.11	22.0	1	Negligible
R11	14.0	0.12	14.1	0	Negligible
R12	13.4	0.14	13.6	0	Negligible
R13	13.2	0.08	13.3	0	Negligible
R14	13.7	0.10	13.7	0	Negligible
R15	23.2	0.06	23.2	0	Negligible
R16	26.4	0.05	26.5	0	Negligible
R17	22.2	0.06	22.3	0	Negligible
R18	13.3	0.04	13.3	0	Negligible
R19	24.8	0.35	25.5	2	Negligible
R20	21.1	0.58	22.0	2	Negligible
Maximum	**26.9**	**0.58**	**27.3**	-	-
Minimum	**13.2**	**0.04**	**13.3**	-	-

Table 5.21 Predicted Annual-Mean NO_2 Impacts at Receptors – K3 Proposed Development

Receptor ID	Concentration ($\mu g.m^{-3}$)			With - Without Dev as % of the AQS Objective	Impact Descriptor
	Without Development	K3 Stack emissions	With Development		
R1	16.3	0.08	16.3	0	Negligible
R2	16.8	0.10	17.0	0	Negligible
R3	16.1	0.08	16.2	0	Negligible
R4	15.6	0.05	15.7	0	Negligible
R5	15.6	0.04	15.6	0	Negligible

Receptor ID	Concentration (µg.m^{-3})			With - Without Dev as % of the AQS Objective	Impact Descriptor
	Without Development	K3 Stack emissions	With Development		
R6	15.9	0.02	15.9	0	Negligible
R7	16.0	0.02	16.0	0	Negligible
R8	18.4	0.04	18.5	0	Negligible
R9	18.4	0.03	18.5	0	Negligible
R10	17.3	0.02	17.3	0	Negligible
R11	15.6	0.02	15.7	0	Negligible
R12	15.5	0.02	15.5	0	Negligible
R13	15.5	0.01	15.5	0	Negligible
R14	15.5	0.01	15.6	0	Negligible
R15	16.5	0.01	16.5	0	Negligible
R16	16.8	0.01	16.8	0	Negligible
R17	16.5	0.01	16.5	0	Negligible
R18	15.5	0.01	15.5	0	Negligible
R19	18.2	0.06	18.4	0	Negligible
R20	17.5	0.09	17.7	0	Negligible
Maximum	**18.4**	**0.10**	**18.5**	-	-
Minimum	**15.5**	**0.01**	**15.5**	-	-

Table 5.22 Predicted Annual-Mean PM_{10} Impacts at Receptors – K3 Proposed Development

Receptor ID	Concentration (µg.m^{-3})			With - Without Dev as % of the AQS Objective	Impact Descriptor
	Without Development	K3 Stack emissions	With Development		
R1	11.1	0.08	11.2	0	Negligible
R2	11.5	0.10	11.6	1	Negligible
R3	11.1	0.08	11.2	0	Negligible
R4	10.8	0.05	10.8	0	Negligible
R5	10.8	0.04	10.8	0	Negligible
R6	10.9	0.02	10.9	0	Negligible
R7	11.0	0.02	11.0	0	Negligible
R8	12.4	0.04	12.4	0	Negligible
R9	12.4	0.03	12.4	0	Negligible
R10	11.7	0.02	11.8	0	Negligible
R11	10.8	0.02	10.8	0	Negligible
R12	10.7	0.02	10.7	0	Negligible
R13	10.7	0.01	10.7	0	Negligible
R14	10.7	0.01	10.8	0	Negligible
R15	11.4	0.01	11.4	0	Negligible
R16	11.6	0.01	11.6	0	Negligible
R17	11.3	0.01	11.4	0	Negligible
R18	10.7	0.01	10.7	0	Negligible
R19	12.2	0.06	12.4	1	Negligible
R20	11.8	0.09	12.0	1	Negligible
Maximum	**12.4**	**0.10**	**12.4**	-	-
Minimum	**10.7**	**0.01**	**10.7**	-	-

Table 5.23 Predicted Annual-Mean $PM_{2.5}$ Impacts at Receptors – K3 Proposed Development

5.6.20 Predicted annual-mean NO_2, PM_{10} and $PM_{2.5}$ concentrations of the K3 Proposed Development once operational at the façades of the existing receptors are below the relevant AQS objectives. When the magnitude of change is considered in the

context of the absolute concentrations, the impact descriptors are 'negligible' at all receptors.

5.6.21 As all predicted annual-mean NO_2 concentrations are below 60 µg.m^{-3}, the hourly-mean objective for NO_2 is likely to be met at all receptors. The short-term NO_2 impact can be considered 'negligible' and is not considered further within this assessment.

5.6.22 As all predicted annual mean PM_{10} concentrations are below 31.5 µg.m^{-3}, the daily-mean PM_{10} objective is expected to be met at all receptors and the short-term PM_{10} impact is not considered further within this assessment.

5.6.23 Overall, the impact on the surrounding area from NO_2, PM_{10} and $PM_{2.5}$ is considered to be 'negligible', using the criteria adopted for this assessment and based on professional judgement.

Dust Emissions

5.6.24 The operation of the K3 Proposed Development could potentially be associated with dust. Some of the key activities likely to generate dust during the operation of the K3 Proposed Development are:

- Delivery of waste; and
- Sorting and handling of waste.

5.6.25 Post recycled waste will be brought to the K3 Site in HGVs or RCVs. At arrival at the site the vehicles will be weighed on weighbridges at the site entrance before vehicles proceed to the tipping hall. Once at the tipping hall vehicles will be directed to one of the unloading bays from which waste will then be deposited into the fuel (waste) bunker. The bunker principally takes the form of a recessed rectangular pit below the floor level of the plant. The waste material can vary widely in moisture content and thermal value, so it is continually managed in the bunker to ensure consistency prior to the combustion process.

5.6.26 The process would produce residues in the form of bottom ash and boiler ash, together with air pollution control residue which would be collected and removed from the site for further treatment off-site.

5.6.27 There are dedicated areas for the reception and storage of imported material, which together with the processing and materials separation are all contained within a controlled environment.

5.6.28 The accepted best practice approach for the primary control of dust releases is containment within the building, which is the technique employed to be employed for the K3 Proposed Development. Air from within the waste reception hall and waste processing hall would be drawn for use as combustion air and the dust levels inside would be managed so as to comply with health and safety obligations for personal exposure. Based on the above, the magnitude of the source of emissions is considered to be small.

5.6.29 The wind roses illustrated in Figure 5.1 show that the prevailing wind direction is south westerly. The nearest high sensitivity receptors are residential properties on

Swale Way (to the south west of the site). These properties are upwind of the site and, at 770 metres, remote from potential sources of emissions. On that basis, the risk of dust impacts from the process is considered to be very low. No significant effects are anticipated.

Odour Emissions

Source Odour Potential

5.6.30 The first step in the qualitative assessment of odour impact is to estimate the odour source potential which has been determined based on the guidance set out in Appendix 5.6.

5.6.31 Waste delivered to the K3 Site would be unloaded within the tipping hall. Therefore, the potential for odours to be released to the outside air during the delivery stage and storage stages would be minimal.

5.6.32 Defra published a "Review of Environmental and Health Effects of Waste Management" (Defra, 2004). This publication included a literature review, which noted that odour is potentially significant from the waste storage and processing phases of incineration, but that odours are normally controlled via the combustion air. Combustion air for the plant would be drawn from within the buildings creating a slight negative pressure ensuring that airflow and, therefore, odours are likely to be directed into rather than out of the building. The height of the stack and the destruction of odours during the incineration process are sufficient to ensure that it is unlikely that odours from the stack would be detectable at ground level. On that basis, the Source Odour Potential has been categorised as 'small'.

Pathway Effectiveness

5.6.33 The odour flux from the odour sources is dependent on the effectiveness of odour transport to the receptors, versus the mitigating effect of dilution/dispersion in the atmosphere.

5.6.34 The wind roses illustrated in Figure 5.1 show that the prevailing wind direction is south westerly.

Risk of Odour Exposure (Impact)

5.6.35 When the small Source Odour Potential (ignoring mitigation) is considered in the context of the pathway effectiveness (Appendix 5.6, Table 5.6.3), the risk of odour exposure (impact) is negligible at all receptors.

Likely Magnitude of Odour Effect

5.6.36 When the above risk of odour exposure impact is considered in the context of the sensitivity of the receptors using the matrix in Appendix 5.6, Table 5.6.4, the likely resulting odour effect is summarised in Table 5.24.

Receptor	Source Odour Potential	Pathway Effectiveness	Risk Odour Exposure	Receptor Sensitivity	Likely Odour Effect
Station Road (770m to the	Small	Ineffective	Negligible Risk	High	Negligible Effect

south west-upwind)					

Table 5.24 Likely Odour Effects at the Proposed Development Site

5.6.37 The likely resulting odour effect would be "negligible". Overall, the effect is considered to be "negligible" and would not be significant.

Bioaerosol Emissions

5.6.38 Bioaerosols are microscopic airborne particles or droplets of biological origin. These biological aerosols are complex in nature, and may include: viruses, bacteria, actinomycetes, fungal spores, enzymes, endotoxins, mycotoxins and glucans, dust mites, protozoa, fragments of plant material, and human and animal debris (skin cells, hair, etc) that have been shed.

5.6.39 The individual particles vary in size from fractions of a micron to up to 30 µm or more, but many have a tendency to form larger clumps or agglomerations, or to attach to inert dust particles. Once airborne, bioaerosols may be transported by the wind away from the source and towards sensitive receptors.

5.6.40 The main effects of significant exposure of people to aerosols are on respiratory health. The main pathway is by inhalation of particles which reach the respiratory system (being of small size, most bioaerosols are inhalable and some are respirable). Other potential health effects can include irritation of the eyes and nose, nausea, headache and fatigue.

5.6.41 The 2009 EA Review of Methods to Measure Bioaerosols at Composting Sites [Ref 5.17] notes that the absence of definitive health-based data on dose-response relationships between bioaerosols and respiratory allergy or infection prevents the identification of an exposure level that poses no risk.

5.6.42 The EA takes a precautionary approach to permitting sites that emit bioaerosols, as described by its Position Statement [Ref 5.18] on permit applications for composting operations. It requires new composting operations within 250 metres of workplaces or dwellings to carry out a Site Specific Bioaerosol Risk Assessment (SSBRA) in support of their application to demonstrate that the level of bioaerosols emission attributable to the composting facility (i.e. the PC) can, and will, be maintained no higher than acceptable levels at nearby sensitive receptors. Whilst the Position Statement relates to composting facilities, it provides a useful starting point from which to assess the risks associated with bioaerosol emissions from other waste facilities. The Position Statement notes that "Generally, the complexity of a risk assessment is related to the size and complexity of the proposed facility and the uncertainty of the risk posed, varying from a qualitative, largely generic approach at one extreme to a site specific quantitative risk assessment at the other."

5.6.43 The 2008 EA Science Report Development of Amenity Risk Assessments at Organic Waste Treatment Facilities [Ref 5.19] was produced to provide scientific evidence to support the development of impact assessments and included a detailed review of bioaerosol monitoring and modelling. The project drew attention to the many challenges to modelling bioaerosols and concluded that although progress had been made in dispersion modelling of bioaerosols, it could

not recommend the use of models as tools in regulatory risk assessment at that time.

5.6.44 The difficulties of producing quantitative assessments are reflected in the Position Statement, which notes, "Standard methods of determining bioaerosol levels are available. However, based on our present scientific understanding of bioaerosols, the way they behave and their health impacts we now consider that there is currently no suitable methodology for carrying out adequate quantitative SSBRAs for new composting facilities. Accordingly, we believe that we need to take a precautionary approach and not normally permit those facilities where we would have expected a quantitative SSBRA until such time as a suitable methodology becomes available." It clarifies that "The types of new facilities affected by this are those that would have handled more than 500 tonnes of waste at any one time and would have carried out any "composting operations in the open that are likely to result in the uncontrolled release of high levels of bioaerosols", as defined above. In practice, this would not include situations where the entire composting operation is carried out inside a building, or where composting takes place outside, but using negative aeration and without turning. However, it would include compost maturation in conventional outdoor turned windrows, carried out following other treatment operations such as in-vessel composting, treatment in a dry AD (anaerobic digestion) plant and treatment in an MBT (mechanical biological treatment) plant."

5.6.45 It follows that a qualitative approach may be used to assess bioaerosol impacts for facilities likely to pose a lower risk than large composting operations performed outdoors. This is consistent with the 2008 Defra-commissioned report [Ref 5.20] into the exposure-response relationships for bioaerosol emissions from waste treatment processes, which stated, "There have been relatively few studies of bioaerosol exposure at waste transfer stations, materials recovery facilities (MRFs), landfills or other waste processes" and acknowledged the difficulties in modelling and measuring bioaerosol emissions, stating that it is "… extremely difficult to define, model and measure emissions in a quantitative fashion for most waste management processes … Even where a waste process does incorporate discrete point sources that would be amenable to measurement, these sources may be small in comparison to fugitive sources elsewhere on site and be of limited relevance to overall emissions of bioaerosols from the site."

5.6.46 Paragraphs 5.6.18 to 5.6.21 set out the measures to control dust. These measures will also reduce emissions of bioaerosols and, on that basis, the magnitude of the source of emissions is considered to be small.

5.6.47 The wind roses illustrated in Figure 5.1 show that the prevailing wind direction is south westerly. The nearest sensitive receptors are workers at Kemsley Paper Mill which is upwind of the K3 Site and, at 200 metres, remote from potential sources of bioaerosol emissions. On that basis, the risk of bioaerosol impacts from the process is considered to be low and no significant effects are anticipated.

Decommissioning Effects

5.6.48 The construction dust assessment undertaken as part of the original planning application for the now permitted K3 facility provided a list of recommended mitigation measures to ensure that the effect from construction would be not

significant. Assuming that these mitigation measures are implemented during the decommissioning phase, the effect is expected to be not significant.

5.6.49 The air quality assessment for the permitted K3 did not quantitatively assess the effects of construction traffic on air quality as construction traffic flows were expected to be lower than operational traffic flows. During the decommissioning phase the traffic generated is likely to be the same or lower than during the construction phase and on that basis the effect is expected to be not significant.

Effect Identified	Receptor Sensitivity	Impact Magnitude	Nature	Duration	Degree of Effect
Construction Effects					
Increase in deposited and suspended dust	High, medium and low	Low	Adverse	Short-term	Negligible
Completed Development Effects					
Increase in air quality pollutants (stack and traffic-related emissions)	High	Low	Adverse	Long-term	Negligible
Decommissioning Effects					
Increase in deposited and suspended dust	High, medium and low	Low	Adverse	Short-term	Negligible

Table 5.25 – Summary of Effects Prior to Mitigation

5.7 The Practical Effect of the K3 Proposed Development

5.7.1 Planning permission for K3, an energy-from-waste facility with a generating capacity of 49.9MW and an annual tonnage throughput of 550,000 tonnes of waste, was granted by Kent County Council on the 6th March 2012. A number of material and non-material amendments have been made to that original consent since then.

5.7.2 Construction of K3 began in 2016, with the facility expected to be fully operational to its consented generating capacity (49.9MW) and tonnage throughput (550,000 tonnes) by late 2019. The practical effect of the K3 Proposed Development allow K3 as consented and currently being built to operate to an upgraded power generation level of 75MW (an additional 25.1MW) and to process 657,000 tonnes of waste per annum (an additional 107,000 tonnes) above and beyond that permitted under its existing planning permission. For further details refer to Chapter 2.

Construction Effects

5.7.3 The practical effect of the consent sought would not result in any additional external physical changes to K3 as permitted and the layout and appearance of the facility will remain as per its consented design. There would be no additional construction work.

Completed Development Effects

5.7.4 The increase in power output and tonnage throughput increase to K3 as consented will increase the concentration of emissions from the facility. For each of the five years of meteorological data (2012 to 2016), the maximum predicted concentration across the identified selected sensitive receptors has been derived and are reported below. The predicted Process Contribution (PC) is the K3 Proposed Development PC – the K3 Permitted Development PC. i.e. it is contribution associated with the increased waste throughput.

Scenario 1: Short-Term IED Emission Limit Values

5.7.5 Table 5.26 summarises the maximum predicted PC to ground-level concentrations for all relevant pollutants with short-term emission limit values set out in the IED.

Scenario 2: Long-Term IED Emission Limit Values

5.7.6 Table 5.27 summarises the PCs for all pollutants assuming that the K3 Proposed Development is operating at long-term emission limit values.

Pollutant	Averaging Period	EAL ($\mu g.m^{-3}$)	Max Increase in K3 PC ($\mu g.m^{-3}$)	Max Increase in K3 PC as % of EAL	Criteria (%)	Is Increase in K3 PC Potentially Significant?
HCl	1 hour (maximum)	750	1.5	0	10	No
HF	1 hour (maximum)	160	0.1	0	10	No
SO_2	15 minute (99.90th percentile)	266	4.7	2	10	No
	1 hour (99.73th percentile)	350	3.3	1	10	No
	24 hour (99.18th percentile)	125	1.6	1	10	No
NO_2	1 hour (99.79th percentile)	200	2.6	1	10	No
PM_{10}	24 hour (90.41st percentile)	50	0.1	0	10	No
CO	8 hour (maximum daily running)	10000	1.4	0	10	No

Table 5.26 Predicted Maximum Process Contributions at Short-Term Emission Limit Values – Increase in K3

Pollutant	Averaging Period	EAL ($\mu g.m^{-3}$)	Max Increase in K3 PC ($\mu g.m^{-3}$)	Max Increase in K3 PC as % of EAL	Criteria (%)	Is Increase in K3 PC Potentially Significant?
PM_{10}	24 hour (90.41st percentile)	50	0.03	0	10	No
	24 hour (annual mean)	40	0.01	0	1	No
$PM_{2.5}$	24 hour (annual mean)	25	0.01	0	1	No
HCl	1 hour (maximum)	750	0.25	0	10	No

Pollutant	Averaging Period	EAL ($\mu g.m^{-3}$)	Max Increase in K3 PC ($\mu g.m^{-3}$)	Max Increase in K3 PC as % of EAL	Criteria (%)	Is Increase in K3 PC Potentially Significant?
HF	1 hour (maximum)	160	0.03	0	10	No
SO_2	15 minute (99.90th percentile)	266	1.18	0	10	No
	1 hour (99.73th percentile)	350	0.83	0	10	No
	24 hour (99.18th percentile)	125	0.41	0	10	No
	1 hour (annual mean)	50	0.03	0	1	No
NO_2	1 hour (99.79th percentile)	200	1.32	1	10	No
	1 hour (annual mean)	40	0.09	0	1	No
CO	8 hour (maximum daily running)	10,000	0.72	0	10	No
Cd	1 hour (annual mean)	0.005	3.66E-05	1	10	No
Tl	1 hour (maximum)	30	1.36E-03	0	10	No
	1 hour (annual mean)	1	3.66E-05	0	1	No
Hg	1 hour (maximum)	7.5	1.36E-03	0	10	No
	1 hour (annual mean)	0.25	3.66E-05	0	1	No
Sb	1 hour (maximum)	150	1.36E-02	0	10	No
	1 hour (annual mean)	5	3.66E-04	0	1	No
As	1 hour (annual mean)	0.003	3.66E-04	12	1	Yes
Cr	1 hour (maximum)	150	1.36E-02	0	10	No
	1 hour (annual mean)	5	3.66E-04	0	1	No
Co	1 hour (maximum)	6	1.36E-02	0	10	No
	1 hour (annual mean)	0.2	3.66E-04	0	1	No
Cu	1 hour (maximum)	200	1.36E-02	0	10	No
	1 hour (annual mean)	10	3.66E-04	0	1	No
Pb	1 hour (annual mean)	0.25	3.66E-04	0	1	No
Mn	1 hour (maximum)	1500	1.36E-02	0	10	No
	1 hour (annual mean)	0.15	3.66E-04	0	1	No
Ni	1 hour (annual mean)	0.02	3.66E-04	2	1	Yes
V	1 hour (maximum)	5	1.36E-02	0	10	No
	1 hour (annual mean)	1	3.66E-04	0	1	No
Dioxins & Furans	1 hour (annual mean)	-	6.66E-11	-	-	-
PAHs	1 hour (annual mean)	0.00025	6.66E-07	0	1	No
PCB	1 hour (annual mean)	0.2	3.34E-06	0	1	No
NH_3	1 hour (annual mean)	5	3.34E-03	0	1	No

Table 5.27 Predicted Maximum Process Contributions at Long-Term Emission Limit Values – Increase in K3

5.7.7 The results presented in Table 5.26 show that the predicted PC is below 10% of the relevant EAL for all pollutants and the impacts at short-term emission limits are therefore not considered significant.

5.7.8 The results presented in Table 5.27 show that the predicted PC is below 10% of the relevant short-term EAL and below 1% of the long-term EAL for all pollutants with the exception of As (arsenic) and Ni (nickel).

5.7.9 The predictions are based on the assumption that arsenic and nickel each comprise the total of the group 3 metals IED emission limit. In reality, the IED emission limit applies to all nine of the group 3 metals. If the emission limit is therefore assumed

to apply equally for each of the nine group 3 metals, then the PC for As and Ni would be divided by 9 (and therefore makes up 11% of the IED emission limit value) and the predicted PC for As would be marginally above than 1% of the EAL. This is likely to be a conservative assumption: The EA 'Releases from waste incinerators – Guidance on assessing group 3 metal stack emissions from incinerators' version 4 (undated), outlines monitoring data from 18 Municipal Waste Incinerators and Waste Wood Co-Incinerators between 2007 and 2015. For arsenic measured concentrations were between 0.04 to 5.0% of the group 3 metals IED emission limit value. If As was assumed to be 5.0% of the group 3 limit, the predicted PC for As would be below 1% of the EAL. For nickel the measured concentrations ranged from 0.5 to 44.0 % of the group 3 metals IED emission limit value. The guidance notes "*that the two highest nickel concentrations are outliers being 44%, as above, and 27% of the ELV. The third highest concentration is 0.53 mg/Nm3 or 11% of the ELV*". If nickel was assumed to make up 44% of the emission limit value, the PC would be well below 1% of the EAL. On that basis, the impacts of As and Ni are not considered significant.

5.7.10 For hexavalent chromium (CrVI), the measured concentrations in the EA 'Releases from waste incinerators – Guidance on assessing group 3 metal stack emissions from incinerators' version 4 (undated), varies from 0.0005% to 0.03% of the IED emission concentration limit. Table 5.28 shows the predicted PC at these proportions.

Pollutant	Averaging Period	EAL ($\mu g.m^{-3}$)	Max Increase in K3 PC ($\mu g.m^{-3}$)	Max Increase in K3 PC as % of EAL	Percentage of the IED Emission Limit
CrVI	1 hour (annual mean)	0.0002	1.83E-09	0	0.0005% (min)
			1.10E-07	0	0.03% (max)

Table 5.28 Predicted Environmental Concentrations at Long-Term Emission Limit Values – increase in K3

5.7.11 The combined PCs for K3 and WKN Proposed Developments are considered in Section 5.12.

Traffic-related Emissions

5.7.12 The results of an assessment of the impacts associated with vehicles generated by the K3 Proposed Development is provided in Section 5.6.

5.7.13 The practical effect of the K3 Proposed Development would be an additional 68 HGV movements per day on the A259, Barge Way and part of the Swale Way above that associated with K3 as consented. The indicative criterion of 100 vehicles outside an AQMA is therefore not exceeded.

5.7.14 The traffic flows are expected to be significantly lower on other routes as the traffic redistributes. Therefore, the aforementioned EPUK & IAQM traffic-flow thresholds are not expected to be exceeded for any individual road and the impacts of exhaust emissions associated with the K3 Proposed Development, compared with the permitted K3, have not been assessed specifically and can be considered to be negligible.

5.7.15 The practical effect of the K3 Proposed Development will not increase staff numbers beyond those associated with K3 as consented.

Decommissioning Effects

5.7.16 The construction dust assessment undertaken as part of the original planning application for the now permitted K3 facility provided a list of recommended mitigation measures to ensure that the effect from construction would be not significant. A Decommissioning Environmental Management Plan will be produced and assuming that these mitigation measures are implemented during the decommissioning phase, the effect is expected to be not significant.

5.7.17 The air quality assessment for the permitted K3 did not quantitatively assess the effects of construction traffic on air quality as construction traffic flows were expected to be lower than operational traffic flows. During the decommissioning phase the traffic generated is likely to be the same or lower than during the construction phase and on that basis the effect is expected to be not significant.

Effect Identified	Receptor Sensitivity	Impact Magnitude	Nature	Duration	Degree of Effect
Construction Effects					
N/A	-	-	-	-	-
Completed Development Effects					
Increase in air quality pollutants (stack and traffic-related emissions)	High	Low	Adverse	Long-term	Negligible
Decommissioning Effects					
Increase in deposited and suspended dust	High, medium and low	Low	Adverse	Short-term	Negligible

Table 5.29 – Summary of Effects Prior to Mitigation

5.8 Mitigation for the K3 Proposed Development

Mitigation from Completed Development Effects

5.8.1 Predicted concentrations of pollutants from the completed development have been demonstrated by the assessment to meet all relevant air quality standards and objectives. The air quality effect is considered to be "not significant". On that basis, no further mitigation measures are considered necessary.

Mitigation from Decommissioning Effects

5.8.2 A detailed Decommissioning Environmental Management Plan (DEMP) is to form a requirement of the DCO, which will require the DEMP to be submitted for written approval prior to any decommissioning works. This will detail the IAQM dust guidance mitigation measures to be employed to minimise dust effects.

5.9 Residual Effects

5.9.1 Residual effects are those that are predicted to remain after implementation of mitigation measures. The residual air quality effects are summarised in Table 5.30.

Residual Effect Identified	Receptor Sensitivity	Impact Magnitude	Nature	Duration	Degree of Effect
Increase in air quality pollutants	**High**	**Low**	**Adverse**	**Long-term**	**Negligible**

Table 5.30: Residual air quality effects

5.10 WKN Proposed Development Predicted Effects

Construction Effects

Traffic-related Emissions

5.10.1 Modelling has been undertaken for the key traffic-related pollutants (NO_2, PM_{10} and $PM_{2.5}$) at sensitive receptor locations adjacent to roads affected.

5.10.2 Tables 5.31, 5.32 and 5.33 present the annual-mean NO_2, PM_{10} and $PM_{2.5}$ concentrations predicted at the facades of the receptors outlined in Table 5.14 for the WKN Proposed Development during the construction year, 2021. The 'Without Development' scenario assumes that K3 as consented is operational. The methodology and significance criteria for the traffic modelling are provided in Appendix 5.5.

Receptor ID	Concentration ($\mu g.m^{-3}$)		With - Without Dev as % of the AQS Objective	Impact Descriptor
	Without Development	With Development		
R1	17.1	17.2	0	Negligible
R2	19.2	19.4	0	Negligible
R3	16.7	16.8	0	Negligible
R4	14.1	14.1	0	Negligible
R5	14.0	14.0	0	Negligible
R6	15.3	15.3	0	Negligible
R7	15.8	15.8	0	Negligible
R8	27.2	27.5	1	Negligible
R9	27.2	27.5	1	Negligible
R10	21.9	22.1	0	Negligible
R11	14.1	14.2	0	Negligible
R12	13.5	13.5	0	Negligible
R13	13.3	13.3	0	Negligible
R14	13.7	13.7	0	Negligible
R15	23.2	23.2	0	Negligible
R16	26.5	26.5	0	Negligible
R17	22.3	22.3	0	Negligible
R18	13.3	13.3	0	Negligible
R19	25.4	25.7	1	Negligible

Receptor ID	Concentration (µg.m^{-3})		With - Without Dev as % of the AQS Objective	Impact Descriptor
	Without Development	With Development		
R20	21.9	22.2	1	Negligible
Maximum	**27.2**	**27.5**	-	-
Minimum	**13.3**	**13.3**	-	-

Table 5.31 Predicted Annual-Mean NO_2 Impacts at Receptors – WKN Proposed Development, Construction Traffic

Receptor ID	Concentration (µg.m^{-3})		With - Without Dev as % of the AQS Objective	Impact Descriptor
	Without Development	With Development		
R1	16.4	16.4	0	Negligible
R2	17.0	17.1	0	Negligible
R3	16.3	16.3	0	Negligible
R4	15.7	15.7	0	Negligible
R5	15.6	15.6	0	Negligible
R6	15.9	15.9	0	Negligible
R7	16.0	16.0	0	Negligible
R8	18.5	18.6	0	Negligible
R9	18.5	18.6	0	Negligible
R10	17.4	17.4	0	Negligible
R11	15.7	15.7	0	Negligible
R12	15.5	15.5	0	Negligible
R13	15.5	15.5	0	Negligible
R14	15.6	15.6	0	Negligible
R15	16.5	16.5	0	Negligible
R16	16.8	16.8	0	Negligible
R17	16.5	16.5	0	Negligible
R18	15.5	15.5	0	Negligible
R19	18.4	18.4	0	Negligible
R20	17.7	17.8	0	Negligible
Maximum	**18.5**	**18.6**	-	-
Minimum	**15.5**	**15.5**	-	-

Table 5.32 Predicted Annual-Mean PM_{10} Impacts at Receptors – WKN Proposed Development, Construction Traffic

Receptor ID	Concentration (µg.m^{-3})		With - Without Dev as % of the AQS Objective	Impact Descriptor
	Without Development	With Development		
R1	11.3	11.3	0	Negligible
R2	11.6	11.7	0	Negligible
R3	11.2	11.2	0	Negligible
R4	10.8	10.8	0	Negligible
R5	10.8	10.8	0	Negligible
R6	11.0	11.0	0	Negligible
R7	11.0	11.0	0	Negligible
R8	12.5	12.5	0	Negligible
R9	12.4	12.5	0	Negligible
R10	11.8	11.8	0	Negligible
R11	10.8	10.8	0	Negligible

Receptor ID	Concentration (µg.m^{-3})		With - Without Dev as % of the AQS Objective	Impact Descriptor
	Without Development	With Development		
R12	10.8	10.8	0	Negligible
R13	10.7	10.7	0	Negligible
R14	10.8	10.8	0	Negligible
R15	11.4	11.4	0	Negligible
R16	11.6	11.6	0	Negligible
R17	11.4	11.4	0	Negligible
R18	10.7	10.7	0	Negligible
R19	12.4	12.4	0	Negligible
R20	12.0	12.1	0	Negligible
Maximum	**12.5**	**12.5**	-	-
Minimum	**10.7**	**10.7**	-	-

Table 5.33 Predicted Annual-Mean $PM_{2.5}$ Impacts at Receptors – WKN Proposed Development, Construction Traffic

5.10.3 Predicted annual-mean NO_2, PM_{10} and $PM_{2.5}$ concentrations of the WKN Proposed Development during the construction phase at the façades of the existing receptors are below the relevant AQS objectives. When the magnitude of change is considered in the context of the absolute concentrations, the impact descriptors are 'negligible' at all receptors.

5.10.4 As all predicted annual-mean NO_2 concentrations are below 60 µg.m^{-3}, the hourly-mean objective for NO_2 is likely to be met at all receptors. The short-term NO_2 impact can be considered 'negligible' and is not considered further within this assessment.

5.10.5 As all predicted annual mean PM_{10} concentrations are below 31.5 µg.m^{-3}, the daily-mean PM_{10} objective is expected to be met at all receptors and the short-term PM_{10} impact is not considered further within this assessment.

5.10.6 Overall, the impact on the surrounding area from NO_2, PM_{10} and $PM_{2.5}$ is considered to be 'negligible', using the criteria adopted for this assessment and based on professional judgement.

Construction Dust

5.10.7 The level and distribution of demolition and 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.

5.10.8 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

Source

5.10.9 The WKN Site is currently being used by the Applicant as a laydown and parking area for the construction of the adjacent K3 and so no demolition will occur.

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

5.10.11 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.

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

5.10.13 The source magnitudes in each of the three phases are summarised in Table 5.34.

Earthworks	Construction	Trackout
Large	Medium	Large

Table 5.34: Dust Emission Magnitude for Earthworks, Construction and Trackout

Pathway and Receptor

5.10.14 All earthworks and construction activities are assumed to occur within the DCO 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 5.35 below.

Potential Impact	Sensitivity of the Surrounding Area	Reason for Sensitivity Classification
Dust Soiling	Low	There are few highly sensitive receptors in the area. The closest residential properties are more than 350 m from the Site (Appendix 5.1, Table A4)
Human Health	Low	Background PM_{10} concentrations for the assessment is below 24 $\mu g.m^{-3}$ (Appendix 5.1, Table A5)

Table 5.35: Sensitivity of the Surrounding Area for Demolition, Earthworks and Construction

5.10.15 The Dust Emission Magnitude for trackout is classified as medium 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 5.36 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 5.1, Table A4)
Human Health	Low	Background PM_{10} concentrations for the assessment is below 24 $\mu g.m^{-3}$ (Appendix 5.1, Table A5)

Table 5.36: Sensitivity of the Surrounding Area for Trackout

Overall Dust Risk

5.10.16 The Dust Emission Magnitude has been considered in the context of the Sensitivity of the Area (Appendix 5.1, Tables A6 to A9) to give the Dust Impact Risk. Table 5.37 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
Risk	Low	Low	Low

Table 5.37 Dust Impact Risk for Earthworks, Construction and Trackout – Without Mitigation

5.10.17 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 three phases of activity.

5.10.18 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, to be secured via a requirement in the DCO.

Completed Development Effects

Stack Emissions

5.10.19 For each of the five years of meteorological data (2012 to 2016), the maximum predicted concentration across the identified selected sensitive receptors has been derived and are reported below.

Scenario 1: Short-Term IED Emission Limit Values

5.10.20 Table 5.38 summarises the maximum predicted WKN Proposed Development PC to ground-level concentrations for all relevant pollutants with short-term emission limit values set out in the IED.

Scenario 2: Long-Term IED Emission Limit Values

5.10.21 Table 5.39 summarises the WKN Proposed Development PCs for all pollutants assuming that the proposed development is operating at long-term emission limit values.

Pollutant	Averaging Period	EAL ($\mu g.m^{-3}$)	Max WKN PC ($\mu g.m^{-3}$)	Max WKN PC as % of EAL	Criteria (%)	Is WKN PC Potentially Significant?
HCl	1 hour (maximum)	750	12.4	2	10	No
HF	1 hour (maximum)	160	0.8	1	10	No
SO_2	15 minute (99.90th percentile)	266	36.1	14	10	Yes
	1 hour (99.73th percentile)	350	30.9	9	10	No
	24 hour (99.18th percentile)	125	16.3	13	10	Yes
NO_2	1 hour (99.79th percentile)	200	22.1	11	10	Yes
PM_{10}	24 hour (90.41st percentile)	50	1.0	2	10	No
CO	8 hour (maximum daily running)	10000	15.9	0	10	No

Table 5.38 Predicted Maximum Process Contributions at Short-Term Emission Limit Values - WKN

Pollutant	Averaging Period	EAL ($\mu g.m^{-3}$)	Max WKN PC ($\mu g.m^{-3}$)	Max WKN PC as % of EAL	Criteria (%)	Is WKN PC Potentially Significant?
PM_{10}	24 hour (90.41st percentile)	50	0.32	1	10	No
	24 hour (annual mean)	40	0.10	0	1	No
$PM_{2.5}$	24 hour (annual mean)	25	0.10	0	1	No
HCl	1 hour (maximum)	750	2.07	0	10	No
HF	1 hour (maximum)	160	0.21	0	10	No
SO_2	15 minute (99.90th percentile)	266	9.02	3	10	No
	1 hour (99.73th percentile)	350	7.73	2	10	No
	24 hour (99.18th percentile)	125	4.06	3	10	No
	1 hour (annual mean)	50	0.50	1	1	No
NO_2	1 hour (99.79th percentile)	200	11.06	6	10	No
	1 hour (annual mean)	40	1.41	4	1	Yes
CO	8 hour (maximum daily running)	10,000	7.93	0	10	No
Cd	1 hour (annual mean)	0.005	5.04E-04	10	10	No
Tl	1 hour (maximum)	30	1.04E-02	0	10	No
	1 hour (annual mean)	1	5.04E-04	0	1	No
Hg	1 hour (maximum)	7.5	1.04E-02	0	10	No
	1 hour (annual mean)	0.25	5.04E-04	0	1	No
Sb	1 hour (maximum)	150	1.04E-01	0	10	No
	1 hour (annual mean)	5	5.04E-03	0	1	No
As	1 hour (annual mean)	0.003	5.04E-03	168	1	Yes
Cr	1 hour (maximum)	150	1.04E-01	0	10	No
	1 hour (annual mean)	5	5.04E-03	0	1	No
Co	1 hour (maximum)	6	1.04E-01	2	10	No
	1 hour (annual mean)	0.2	5.04E-03	3	1	Yes
Cu	1 hour (maximum)	200	1.04E-01	0	10	No
	1 hour (annual mean)	10	5.04E-03	0	1	No
Pb	1 hour (annual mean)	0.25	5.04E-03	2	1	Yes

Pollutant	Averaging Period	EAL ($\mu g.m^{-3}$)	Max WKN PC ($\mu g.m^{-3}$)	Max WKN PC as % of EAL	Criteria (%)	Is WKN PC Potentially Significant?
Mn	1 hour (maximum)	1500	1.04E-01	0	10	No
	1 hour (annual mean)	0.15	5.04E-03	3	1	Yes
Ni	1 hour (annual mean)	0.02	5.04E-03	25	1	Yes
V	1 hour (maximum)	5	1.04E-01	2	10	No
	1 hour (annual mean)	1	5.04E-03	1	1	No
Dioxins & Furans	1 hour (annual mean)	-	1.00E-09	-	-	-
PAHs	1 hour (annual mean)	0.00025	1.00E-05	4	1	Yes
PCB	1 hour (annual mean)	0.2	5.04E-05	0	1	No
NH_3	1 hour (annual mean)	5	5.04E-02	1	1	No

Table 5.39 Predicted Maximum Process Contributions at Long-Term Emission Limit Values - WKN

5.10.22 The results presented in Table 5.38 show that the predicted PC is below 10% of the relevant EAL for all pollutants except SO_2 and NO_2.

5.10.23 When the 15-minute mean SO_2 is added to the future AC of 64.5 $\mu g.m^{-3}$, the PEC is 100.6$\mu g.m^{-3}$. As this is below the relevant EAL of 266 $\mu g.m^{-3}$ the effects are not considered to be significant.

5.10.24 When the 24-hour mean SO_2 is added to the future AC of 24.8 $\mu g.m^{-3}$, the PEC is 41.1 $\mu g.m^{-3}$. As this is below the relevant EAL of 125 $\mu g.m^{-3}$ the effects are not considered to be significant.

5.10.25 When the 1-hour mean NO_2 is added to the future AC of 90.3 $\mu g.m^{-3}$, the PEC is 112.4 $\mu g.m^{-3}$. As this is below the relevant EAL of 200 $\mu g.m^{-3}$ the effects are not considered to be significant.

5.10.26 The results presented in Table 5.39 show that the predicted PC is below 10% of the relevant short-term EAL and below 1% of the long-term EAL for all pollutants with the exception of annual-mean NO_2, As, Co, Mn, Ni and PAHs.

5.10.27 Table 5.40 summarises the WKN Proposed Development PECs for all pollutants that were considered to be potentially significant in Table 5.39.

Pollutant	Averaging Period	EAL ($\mu g.m^{-3}$)	Future AC ($\mu g.m^{-3}$)	Max WKN PEC ($\mu g.m^{-3}$)	Max WKN PEC as % of EAL	Is WKN PEC Potentially Significant?
NO_2	1 hour (annual mean)	40	33.1	34.5	86	No
As	1 hour (annual mean)	0.003	5.63E-03	1.07E-02	356	Yes
Co	1 hour (annual mean)	0.2	4.92E-03	9.96E-03	5	No
Mn	1 hour (annual mean)	0.15	8.12E-03	1.32E-02	9	No
Ni	1 hour (annual mean)	0.02	5.53E-03	1.06E-02	53	No
PAHs	1 hour (annual mean)	0.00025	1.06E-04	1.16E-04	46	No

Table 5.40 Predicted Environmental Concentrations at Long-Term Emission Limit Values - WKN

5.10.28 The results presented in Table 5.40 show that the predicted PEC is below 100% of the relevant EAL for all pollutants with the exception of As (arsenic).

5.10.29 The predictions are based on the assumption that arsenic comprises the total of the group 3 metals emissions. In reality, the IED emission limit applies to all nine of the group 3 metals. If the emissions limit is assumed to apply equally to each of the nine group 3 metals, then the PCs (and the WKN Proposed Development) for As for the would be divided by 9 (or 11%) and the predicted PEC for As would be less than 100% of the EAL as shown in Table 5.41 and the effects are therefore not considered significant. As discussed in paragraph 5.7.9, measured concentrations of arsenic ranged from 0.04 to 5.0% of the group 3 emission limit value so this is a conservative assumption.

Pollutant	Averaging Period	EAL ($\mu g.m^{-3}$)	Max WKN PC ($\mu g.m^{-3}$)	Max WKN PC as % of EAL	Future AC ($\mu g.m^{-3}$)	Max WKN PEC ($\mu g.m^{-3}$)	Max WKN PEC as % of EAL	Is WKN PEC Potentially Significant?
As	1 hour (annual mean)	0.003	5.6E-04	19	1.32E-03	1.88E-03	63	No

Table 5.41 Predicted Environmental Concentrations at Long-Term Emission Limit Values - WKN

5.10.30 For hexavalent chromium (CrVI), the measured concentrations in the EA 'Releases from waste incinerators – Guidance on assessing group 3 metal stack emissions from incinerators' version 4 (undated), varies from 0.0005% to 0.03% of the IED emission concentration limit. Table 5.42 shows the predicted PC at these proportions.

Pollutant	Averaging Period	EAL ($\mu g.m^{-3}$)	Max WKN PC ($\mu g.m^{-3}$)	Max WKN PC as % of EAL	Percentage of the IED Emission Limit
CrVI	1 hour (annual mean)	0.0002	2.52E-08	0	0.0005% (min)
			1.51E-07	1	0.03% (max)

Table 5.42 Predicted Environmental Concentrations at Long-Term Emission Limit Values – WKN

5.10.31 The PC at each end of the range is below 1% of the EAL and the impacts are not considered significant.

5.10.32 The combined PCs for the K3 and WKN Proposed Developments are considered in Section 5.12.

Traffic-related Emissions

5.10.33 Modelling has been undertaken for the key traffic-related pollutants (NO_2, PM_{10} and $PM_{2.5}$) at sensitive receptor locations adjacent to roads affected.

5.10.34 Tables 5.43, 5.44 and 5.45 present the annual-mean NO_2, PM_{10} and $PM_{2.5}$ concentrations predicted at the facades of the receptors outlined in Table 5.14 for the WKN Proposed Development in the opening year, 2024. The 'Without development' scenario assumes that the permitted K3 is operational. The PCs from stack emissions of the WKN Proposed Development at each of these receptors have been added to the *With Development* scenario and an Impact Descriptor has been derived based on EPUK&IAQM guidance. The methodology and significance criteria for the traffic modelling are provided in Appendix 5.5.

5.10.35 It should be noted that the NO_2 future baseline concentration is based on the Defra mapped NO_2 background concentration of 12.5 µg.m^{-3} (see Table 5.11) plus the PC from K3. For the stack emissions, a baseline of 31.7 µg.m^{-3} representing the maximum AC across the grid was used. The Defra mapped concentration is a background concentration whereas the 31.7 µg.m^{-3} was measured at a roadside location. Therefore, to avoid double counting of the road component, the Defra mapped background concentration has been used for all traffic modelling.

Receptor ID	Concentration (µg.m^{-3})			With - Without Dev as % of the AQS Objective	Impact Descriptor
	Without Development	WKN Stack Emissions	With Development		
R1	16.0	0.52	16.5	1	Negligible
R2	17.4	0.83	18.3	2	Negligible
R3	15.6	0.61	16.3	2	Negligible
R4	13.8	0.32	14.1	1	Negligible
R5	13.6	0.29	13.9	1	Negligible
R6	14.6	0.17	14.8	0	Negligible
R7	14.9	0.19	15.1	0	Negligible
R8	23.4	0.29	23.7	1	Negligible
R9	23.3	0.19	23.6	1	Negligible
R10	19.4	0.11	19.5	0	Negligible
R11	13.7	0.12	13.9	0	Negligible
R12	13.3	0.12	13.4	0	Negligible
R13	13.1	0.09	13.2	0	Negligible
R14	13.4	0.11	13.5	0	Negligible
R15	20.6	0.06	20.7	0	Negligible
R16	23.2	0.05	23.2	0	Negligible
R17	19.9	0.06	20.0	0	Negligible
R18	13.1	0.04	13.2	0	Negligible
R19	21.9	0.57	22.5	2	Negligible
R20	19.3	0.76	20.2	2	Negligible
Maximum	**23.4**	**0.83**	**23.7**	-	-
Minimum	**13.1**	**0.04**	**13.2**	-	-

Table 5.43 Predicted Annual-Mean NO_2 Impacts at Receptors – WKN Proposed Development

Receptor ID	Concentration (µg.m^{-3})			With - Without Dev as % of the AQS Objective	Impact Descriptor
	Without Development	WKN Stack Emissions	With Development		
R1	16.4	0.04	16.4	0	Negligible
R2	17.0	0.06	17.1	0	Negligible
R3	16.2	0.04	16.3	0	Negligible
R4	15.7	0.02	15.7	0	Negligible
R5	15.6	0.02	15.7	0	Negligible
R6	15.9	0.01	15.9	0	Negligible
R7	16.0	0.01	16.0	0	Negligible
R8	18.4	0.02	18.5	0	Negligible
R9	18.4	0.01	18.5	0	Negligible
R10	17.3	0.01	17.3	0	Negligible
R11	15.6	0.01	15.7	0	Negligible
R12	15.5	0.01	15.5	0	Negligible
R13	15.5	0.01	15.5	0	Negligible
R14	15.6	0.01	15.6	0	Negligible
R15	16.4	<0.005	16.4	0	Negligible

Receptor ID	Concentration (µg.m^{-3})			With - Without Dev as % of the AQS Objective	Impact Descriptor
	Without Development	WKN Stack Emissions	With Development		
R16	16.7	<0.005	16.7	0	Negligible
R17	16.4	<0.005	16.4	0	Negligible
R18	15.5	<0.005	15.5	0	Negligible
R19	18.3	0.04	18.4	0	Negligible
R20	17.7	0.05	17.8	0	Negligible
Maximum	**18.4**	**0.06**	**18.5**	**0**	-
Minimum	**15.5**	**<0.005**	**15.5**	**0**	-

Table 5.44 Predicted Annual-Mean PM_{10} Impacts at Receptors – WKN Proposed Development

Receptor ID	Concentration (µg.m^{-3})			With - Without Dev as % of the AQS Objective	Impact Descriptor
	Without Development	WKN Stack Emissions	With Development		
R1	11.2	0.04	11.3	0	Negligible
R2	11.6	0.06	11.7	0	Negligible
R3	11.2	0.04	11.2	0	Negligible
R4	10.8	0.02	10.9	0	Negligible
R5	10.8	0.02	10.8	0	Negligible
R6	10.9	0.01	10.9	0	Negligible
R7	11.0	0.01	11.0	0	Negligible
R8	12.4	0.02	12.4	0	Negligible
R9	12.3	0.01	12.4	0	Negligible
R10	11.7	0.01	11.7	0	Negligible
R11	10.8	0.01	10.8	0	Negligible
R12	10.7	0.01	10.8	0	Negligible
R13	10.7	0.01	10.7	0	Negligible
R14	10.8	0.01	10.8	0	Negligible
R15	11.3	<0.005	11.3	0	Negligible
R16	11.5	<0.005	11.5	0	Negligible
R17	11.3	<0.005	11.3	0	Negligible
R18	10.7	<0.005	10.7	0	Negligible
R19	12.3	0.04	12.3	0	Negligible
R20	12.0	0.05	12.0	0	Negligible
Maximum	**12.4**	**0.06**	**12.4**	-	-
Minimum	**10.7**	**<0.005**	**10.7**	-	-

Table 5.45 Predicted Annual-Mean $PM_{2.5}$ Impacts at Receptors – WKN Proposed Development

5.10.36 Predicted annual-mean NO_2, PM_{10} and $PM_{2.5}$ concentrations in the opening year of the WKN Proposed Development at the façades of the existing receptors are below the relevant AQS objectives. When the magnitude of change is considered in the context of the absolute concentrations, the impact descriptors are 'negligible' at all receptors.

5.10.37 As all predicted annual-mean NO_2 concentrations are below 60 µg.m^{-3}, the hourly-mean objective for NO_2 is likely to be met at all receptors. The short-term NO_2 impact can be considered 'negligible' and is not considered further within this assessment.

5.10.38 As all predicted annual mean PM_{10} concentrations are below 31.5 µg.m^{-3}, the daily-mean PM_{10} objective is expected to be met at all receptors and the short-term PM_{10} impact is not considered further within this assessment.

5.10.39 Overall, the impact on the surrounding area from NO_2, PM_{10} and $PM_{2.5}$ is considered to be 'negligible', using the criteria adopted for this assessment and based on professional judgement.

Dust Emissions

5.10.40 The operation of the WKN Proposed Development could potentially be associated with dust emissions. Sources of dust would be the same as for K3. The magnitude of the source of emissions is considered to be small.

5.10.41 The wind roses illustrated in Figure 5.1 show that the prevailing wind direction is south westerly. The nearest high sensitivity receptors are residential properties on Swale Way (to the south west of the site). These properties are upwind of the site and, at 770 metres, remote from potential sources of emissions. On that basis, the risk of dust impacts from the process is considered to be very low. No significant effects are anticipated.

Odour Emissions

5.10.42 The operation of the WKN Proposed Development could potentially be associated with odour emissions. Sources of odour would be the same as K3. The magnitude of the source of emissions is considered to be small.

5.10.43 Taking into account the pathway effectiveness and the sensitivity of receptors, as for K3, the likely resulting odour effect would be "negligible". Overall, the effect is considered to be "negligible" and would not be significant.

Bioaerosol Emissions

5.10.44 The approach to the assessment of bio-aerosol impacts is described in paragraph 5.6.37 to 5.6.46.

5.10.45 With the implementation of measures to control dust, as for K3, the magnitude of the source of emissions is considered to be small.

5.10.46 The wind roses illustrated in Figure 5.1 show that the prevailing wind direction is south westerly. The nearest sensitive receptors are workers at Kemsley Paper Mill which is upwind of the WKN Site and, at 200 metres, remote from potential sources of bioaerosol emissions. On that basis, the risk of bioaerosol impacts from the process is considered to be low and no significant effects are anticipated.

Decommissioning Phase

5.10.47 The risk of impacts during decommissioning and demolition phase 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. A detailed Decommissioning Environmental Management Plan (DEMP) is to form a

requirement of the DCO, which will require the DEMP to be submitted for written approval prior to any decommissioning works. This will detail the IAQM dust guidance mitigation measures to be employed to minimise dust effects.

5.10.48 During the decommissioning phase the traffic generated is likely to be the same or lower than during the construction phase and on that basis the effect is expected to

Effect Identified	Receptor Sensitivity	Impact Magnitude	Nature	Duration	Degree of Effect
Construction Effects					
Increase in deposited and suspended dust	High, medium and low	Low	Adverse	Short-term	Negligible
Completed Development Effects					
Increase in air pollutants including stack, vehicular emissions, dust, odour and bioaerosols	High	Low	Adverse	Long-term	Negligible
Decommissioning Effects					
Increase in deposited and suspended dust	High, medium and low	Low	Adverse	Short-term	Negligible

Table 5.46 Summary of Effects Prior to Mitigation

5.11 Mitigation

Mitigation for Construction Effects

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

5.11.2 As summarised in Table 5.27, 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, a draft of which is included as Appendix 2.1.

<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.

Operating vehicle/machinery and sustainable travel

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

Operations

- Use enclosed chutes and conveyors and covered skips.

Waste management

- Avoid bonfires and burning of waste materials.

Communications

- 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.

Site Management

- 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.
- Develop and implement a Dust Management Plan.

Monitoring

- 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 for Completed Development Effects

5.11.3 Predicted concentrations of pollutants from the completed development have been demonstrated by the assessment to meet all relevant air quality standards and objectives. The air quality effect is considered to be "not significant". On that basis, no mitigation measures are considered necessary.

Mitigation for Decommissioning Effects

5.11.4 The nature of the decommissioning phase would remain similar to the construction phase and subject to the same or similar mitigation measures as set

out in CEMP. A Decommissioning Environmental Management Plan (DEMP) is to be produced and subject to the approval of the planning authority prior to the future decommissioning of the WKN Proposed Development As such, it can be concluded that the potential effects on air quality would remain the same as assessed for construction and would not be significant.

5.12 Residual Effects

5.12.1 Residual effects are those that are predicted to remain after implementation of mitigation measures described above. The residual air quality effects are summarised in Table 5.47.

Residual Effect Identified	Receptor Sensitivity	Impact Magnitude	Nature	Duration	Degree of Effect
Increase in air quality pollutants (stack emissions, traffic-related emissions, dust, odour and bioaerosol emissions)	High	Low	Adverse	Long-term	Negligible

Table 5.47 Summary of Residual Effects

5.13 Cumulative Effects

Stack Emissions

5.13.1 Table 5.48 and Table 5.49 summarises the cumulative PCs for the K3 and WKN Proposed Developments for five scenarios:

- The K3 Proposed Development + other cumulative developments
- The practical effect of the K3 Proposed Development + other cumulative developments
- WKN Proposed Development + other cumulative developments
- WKN Proposed Development + K3 Proposed Development + other cumulative developments.
- WKN Proposed Development + the practical effect of the K3 Proposed Development + other cumulative developments.

5.13.2 Table 5.48 and Table 5.49 also summarise the cumulative PECs.

5.13.3 Figures 5.3 and 5.4 illustrate the long and short-term NO_2 contours for the combined PC associated with the WKN Proposed Development and the practical

effect of the K3 Proposed Development. The point of maximum impact is not at a location where the public are regularly present.

5.13.4 The sections below outline the 'other cumulative developments' considered.

5.13.5 During the construction and decommissioning 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.

5.13.6 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. This section considers the cumulative effects of the proposed developments with other schemes that are operational /constructed, consented or for which planning permissions are currently being sought. The cumulative traffic effects are considered later in this chapter.

Other Cumulative Sites Considered

5.13.7 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 main area of impact from the WKN Proposed Development and K3 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.

5.13.8 EN010090 (18/501923/ADJ) Application for an Order Granting Development Consent to decommission the existing K1 CHP on the site and build, commission and operate a new CHP plant, known as K4. K4 has been included within the model and the maximum PCs have been added to give a cumulative PEC in Table 5.48 and 5.49.

5.13.9 16/507687/COUNTY – 150 m northeast - Construction and operation of an Incinerator Bottom Ash recycling facility. Wheelabrator Technologies have confirmed that they plan to withdraw this application.

5.13.10 SW/11/1291 – 700 m north - Construction of an anaerobic digestion (AD) plant at the Kemsley Paper 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 5.21] have been added to give a cumulative PEC in Table 5.48 and 5.49.

5.13.11 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 5.22] have been added to the cumulative PEC in Table 5.48 and 5.49. For CO, no maximum PC across the grid is included so the maximum PC at the modelled discrete receptors has been used instead. Construction traffic from this development has been considered in the cumulative traffic modelling.

5.13.12 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 5.23] has been added to the cumulative PEC in Table 5.48 and 5.49. Traffic generated by the development has been included in the traffic data modelled.

5.13.13 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.

5.13.14 16/506935/COUNTY – 200 m north - Planning Application for a Steam Pipeline connecting the existing Ridham Dock Biomass Facility to the Kemsley Paper 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.

5.13.15 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.

5.13.16 15/502197/FULL – Extension to existing yard and HGV parking area including installation of 5 no. lighting columns, landscaping, drainage and amendments to existing balancing pond. There are no significant sources to air so no significant cumulative air quality effects are expected.

5.13.17 18/502489/FULL Construction of a 7.2m wide internal access road and pedestrian footpath, together with the associated removal of existing water holding lagoon, chemical building and works yard. Erection of a new chemical store, works yard and engine store, breaking out and crushing of existing concrete hardstanding, lighting and landscape planting. There are no significant sources to air so no significant cumulative air quality effects are expected.

5.13.18 15/504458/FULL Formation or new rear access road and extension to trailer park to serve Kemsley Paper Mill and ancillary development including attenuation pond, security kiosk and weightbringers. There are no significant sources to air so no significant cumulative air quality effects are expected.

5.13.19 SW/14/0191 Extension to existing HGV Fitters shed plus small additional storage building. There are no significant sources to air so no significant cumulative air quality effects are expected.

5.13.20 17/505919/COUNTY County Matter: For extension of the existing IBA Recycling Facility by the use of an adjoining building and land; and associated amendments to the layout of the site. There are no significant sources to air so no significant cumulative air quality effects are expected.

5.13.21 17/502834/FULL Installation of new underground water pipeline via open cut trenching and directional auger boring, including working area and site compounds. There are no significant sources to air so no significant cumulative air quality effects are expected.

5.13.22 16/507943/FULL Construction of an agricultural anaerobic digestion plant and associated infrastructure, for the purposes of generating renewable energy. A full air quality assessment has not been undertaken. On the basis that a full assessment was not required and that the site is over 5 km from the Proposed Development, no significant cumulative air quality effects are expected.

5.13.23 17/503032/FULL Installation of an electricity battery storage facility within a new steel framed portal building and ancillary infrastructure. There are no significant sources to air so no significant cumulative air quality effects are expected.

5.13.24 18/503075/NSIP Consultation - Construction and Operation of Photovoltaic (PV) Electricity Generating and Storage. There are no significant sources to air so no significant cumulative air quality effects are expected.

5.13.25 15/506005/COUNTY EIA Screening opinion (County) to determine whether an environmental impact assessment is required for the proposed establishment of a secondary aggregate recycling facility and the reworking of existing aggregate deposits at Rushenden Marshes Disposal Site. No further detail about the site is available, but as it is over 4.5km from the Proposed Development no significant cumulative air quality effects are expected.

5.13.26 15/506166/ENVSCR EIA Screening Opinion - Redevelopment of site, comprising demolition of selected buildings, extension, refurbishment and remodelling of selected buildings and the erection of new buildings to provide up to 88,000sqm, comprising laboratories, offices incubation/innovation hubs; 400sqm of retail and up to 300-400 dwellings. No further detail about the site is available, but as it is nearly 6 km from the Proposed Development no significant cumulative air quality effects are expected.

5.13.27 17/504034/COUNTY County Matter - Provision of a new car park, drainage layout and SUDs pond to accommodate and support the existing waste management facility. The additional staff movements have already been included in extant permission so not included in the cumulative traffic.

5.13.28 17/502678/COUNTY Section 73 application to vary conditions 15 and 16 of planning permission SW/12/1184 to permit the facility to operate during a wider range of hours and to also change the number of vehicle movements associated with the operations. The additional traffic movements are minimal so have not been included in cumulative traffic data.

5.13.29 18/503873/ENVSCR EIA Screening Opinion Application for housing and country park. At this stage only a scoping report has been submitted. As there is a lack of information available this development is not considered further.

5.13.30 SW/13/1571 The erection of four wind turbines with a maximum blade tip height of up to 126.5 metres, together with a substation and control building, associated hardstandings, an improved access junction, connecting internal access tracks, and other related infrastructure. Traffic generated by this development would be temporary and has therefore not been included in the cumulative traffic data.

5.13.31 SW/13/1495 Variation of condition 9 of planning permission SW/11/548 (use of building 15B to install and operate materials recycling facility (MRF) and a refuse derived fuel (RDF) facility and to use existing weighbridge, weighbridge office, site office and washroom/toilets to the south of building 15a) to allow an increase of HGV movements from 58 to 98 (49 in and 49 out) for a temporary period of 12 months Traffic generated by this development would be temporary and has therefore not been included in the cumulative traffic data.

5.13.32 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. At this stage only a scoping report has been submitted. As there is a lack of information available this development is not considered further.

5.13.33 MC/18/2229 request for a screening opinion as to whether an Environmental Impact Assessment is necessary for the development of a new cement plant.

			Max PC ($\mu g.m^{-3}$)				Max PC + total of other developments ($\mu g.m^{-3}$)					Max PEC ($\mu g.m^{-3}$)	Max PEC + as % of EAL
Pollutant	**Averaging Period**	**EAL ($\mu g.m^{-3}$)**	**Kemsley K4 CHP PC (EN010090 (18/501923/ADJ))**	**Kemsley AD (SW/11/1291)**	**Reserve Power Plant PC (18/500393/FULL)**	**Garden of England Energy Facility (15/500348/COUNTY)**	**K3 Proposed Development**	**Practical effect of the K3 Proposed Development**	**WKN**	**WKN + K3 Proposed Development**	**WKN + the practical effect of the K3 Proposed Development**	**K3 Proposed Development + WKN + AC + other developments**	
HCl	1 hour (maximum)	750	-	-	-	13.6	28.6	15.1	26.0	41.0	27.5	42.2	6
HF	1 hour (maximum)	160	-	-	-	0.9	1.9	1.0	1.8	2.8	1.9	5.2	3
SO_2	15 minute (99.90th percentile)	266	-	-	-	33.4	78.6	38.1	69.5	114.7	74.2	136.9	51
	1 hour (99.73th percentile)	350	-	-	-	29.9	67.3	33.2	60.8	98.2	64.1	113.9	33
	24 hour (99.18th percentile)	125	-	-	-	13.5	29.5	15.1	29.7	45.7	31.4	53.7	43
NO_2	1 hour (99.79th percentile)	200	12.79	18.10	19.57	21.40	99.7	74.5	94.0	121.8	96.6	185.3	93
PM_{10}	24 hour (90.41st percentile)	50	-	-	-	1.1	2.1	1.2	2.1	3.1	2.2	22.5	45
CO	8 hour (maximum daily running)	10000	20	131	116	13.9	299.1	283.1	297.5	314.9	299.0	856.9	9

Table 5.48 Cumulative Predicted Environmental Concentrations at Short-Term Emission Limit Values

			Max PC ($\mu g.m^{-3}$)				Max PC + total of other developments ($\mu g.m^{-3}$)					Max PEC ($\mu g.m^{-3}$)	Max PEC + as % of EAL
Pollutant	Averaging Period	EAL ($\mu g.m^{-3}$)	Kemsley K4 CHP PC (EN010090 (18/501923/ADJ))	Kemsley AD (SW/11/1291)	Reserve Power Plant PC (18/500393/FULL)	Garden of England Energy Facility (15/500348/COUNTY)	K3 Proposed Development	Practical effect of the K3 Proposed Development	WKN	WKN + K3 Proposed Development	WKN + the practical effect of the K3 Proposed Development	K3 Proposed Development + WKN + AC + other developments	
PM_{10}	24 hour (90.41st percentile)	50	-	-	-	0.38	0.7	0.4	0.7	1.0	0.7	20.4	41
	24 hour (annual mean)	40	-	-	-	0.12	0.2	0.1	0.2	0.3	0.2	19.7	49
$PM_{2.5}$	24 hour (annual mean)	25	-	-	-	0.12	0.2	0.1	0.2	0.3	0.2	10.8	43
HCl	1 hour (maximum)	750	-	-	-	2.26	4.8	2.5	4.3	6.8	4.6	8.0	1
HF	1 hour (maximum)	160	-	-	-	0.23	0.5	0.3	0.4	0.7	0.5	3.1	2
SO_2	15 minute (99.90th percentile)	266	-	-	-	8.34	19.7	9.5	17.4	28.7	18.5	50.8	19
	1 hour (99.73th percentile)	350	-	-	-	7.48	16.8	8.3	15.2	24.6	16.0	40.2	11
	24 hour (99.18th percentile)	125	-	-	-	3.37	7.4	3.8	7.4	11.4	7.8	19.4	16
	1 hour (annual mean)	50	-	-	-	-	0.5	0.0	0.5	1.0	0.5	3.1	6

			Max PC ($\mu g.m^{-3}$)				Max PC + total of other developments ($\mu g.m^{-3}$)					Max PEC ($\mu g.m^{-3}$)	Max PEC + as % of EAL
Pollutant	Averaging Period	EAL ($\mu g.m^{-3}$)	Kemsley K4 CHP PC (EN010090 (18/501923/ADJ))	Kemsley AD (SW/11/1291)	Reserve Power Plant PC (18/500393/FULL)	Garden of England Energy Facility (15/500348/COUNTY)	K3 Proposed Development	Practical effect of the K3 Proposed Development	WKN	WKN + K3 Proposed Development	WKN + the practical effect of the K3 Proposed Development	K3 Proposed Development + WKN + AC + other developments	
NO_2	1 hour (99.79th percentile)	200	12.79	18.10	19.57	10.70	75.1	62.5	72.2	86.1	73.5	149.6	75
	1 hour (annual mean)	40	0.7	1.3	0.9	1.62	6.0	4.6	6.0	7.4	6.1	39.1	98
CO	8 hour (maximum daily running)	10,000	20	-	-	6.97	35.7	27.7	34.9	43.6	35.6	577.7	6
Cd	1 hour (annual mean)	0.005	-	-	-	5.800E-04	1.09E-03	6.17E-04	1.08E-03	1.59E-03	1.12E-03	1.21E-03	34
Tl	1 hour (maximum)	30	-	-	-	1.100E-02	2.35E-02	1.24E-02	2.14E-02	3.39E-02	2.27E-02	2.35E-02	0
	1 hour (annual mean)	1	-	-	-	5.800E-04	1.09E-03	6.17E-04	1.08E-03	1.59E-03	1.12E-03	1.09E-03	0
Hg	1 hour (maximum)	7.5	-	-	-	1.100E-02	2.35E-02	1.24E-02	2.14E-02	3.39E-02	2.27E-02	2.43E-02	0
	1 hour (annual mean)	0.25	-	-	-	5.800E-04	1.09E-03	6.17E-04	1.08E-03	1.59E-03	1.12E-03	1.87E-03	1
Sb	1 hour (maximum)	150	-	-	-	1.130E-01	2.38E-01	1.27E-01	2.17E-01	3.42E-01	2.30E-01	2.38E-01	0

			Max PC ($\mu g.m^{-3}$)				Max PC + total of other developments ($\mu g.m^{-3}$)					Max PEC ($\mu g.m^{-3}$)	Max PEC + as % of EAL
Pollutant	Averaging Period	EAL ($\mu g.m^{-3}$)	Kemsley K4 CHP PC (EN010090 (18/501923/ADJ))	Kemsley AD (SW/11/1291)	Reserve Power Plant PC (18/500393/FULL)	Garden of England Energy Facility (15/500348/COUNTY)	K3 Proposed Development	Practical effect of the K3 Proposed Development	WKN	WKN + K3 Proposed Development	WKN + the practical effect of the K3 Proposed Development	K3 Proposed Development + WKN + AC + other developments	
	1 hour (annual mean)	5	-	-	-	5.800E-03	1.09E-02	6.17E-03	1.08E-02	1.59E-02	1.12E-02	1.09E-02	0
As	1 hour (annual mean)	0.003	-	-	-	0.000638	5.70E-03	1.00E-03	5.68E-03	1.07E-02	6.04E-03	6.47E-03	384
Cr	1 hour (maximum)	150	-	-	-	1.130E-01	2.38E-01	1.27E-01	2.17E-01	3.42E-01	2.30E-01	2.38E-01	0
	1 hour (annual mean)	5	-	-	-	5.800E-03	1.09E-02	6.17E-03	1.08E-02	1.59E-02	1.12E-02	1.22E-02	0
Co	1 hour (maximum)	6	-	-	-	1.130E-01	2.38E-01	1.27E-01	2.17E-01	3.42E-01	2.30E-01	2.38E-01	6
	1 hour (annual mean)	0.2	-	-	-	5.800E-03	1.09E-02	6.17E-03	1.08E-02	1.59E-02	1.12E-02	1.09E-02	8
Cu	1 hour (maximum)	200	-	-	-	1.130E-01	2.38E-01	1.27E-01	2.17E-01	3.42E-01	2.30E-01	2.43E-01	0
	1 hour (annual mean)	10	-	-	-	5.800E-03	1.09E-02	6.17E-03	1.08E-02	1.59E-02	1.12E-02	1.54E-02	0
Pb	1 hour (annual mean)	0.25	-	-	-	5.800E-03	1.09E-02	6.17E-03	1.08E-02	1.59E-02	1.12E-02	1.70E-02	9
Mn	1 hour (maximum)	1500	-	-	-	1.130E-01	2.38E-01	1.27E-01	2.17E-01	3.42E-01	2.30E-01	2.42E-01	0

			Max PC ($\mu g.m^{-3}$)				Max PC + total of other developments ($\mu g.m^{-3}$)					Max PEC ($\mu g.m^{-3}$)	Max PEC + as % of EAL
Pollutant	Averaging Period	EAL ($\mu g.m^{-3}$)	Kemsley K4 CHP PC (EN010090 (18/501923/ADJ))	Kemsley AD (SW/11/1291)	Reserve Power Plant PC (18/500393/FULL)	Garden of England Energy Facility (15/500348/COUNTY)	K3 Proposed Development	Practical effect of the K3 Proposed Development	WKN	WKN + K3 Proposed Development	WKN + the practical effect of the K3 Proposed Development	K3 Proposed Development + WKN + AC + other developments	
	1 hour (annual mean)	0.15	-	-	-	5.800E-03	1.09E-02	6.17E-03	1.08E-02	1.59E-02	1.12E-02	1.41E-02	13
Ni	1 hour (annual mean)	0.02	-	-	-	5.800E-03	1.09E-02	6.17E-03	1.08E-02	1.59E-02	1.12E-02	1.15E-02	83
V	1 hour (maximum)	5	-	-	-	6.000E-03	1.31E-01	1.96E-02	1.10E-01	2.35E-01	1.23E-01	1.32E-01	5
	1 hour (annual mean)	1	-	-	-	5.800E-03	1.09E-02	6.17E-03	1.08E-02	1.59E-02	1.12E-02	1.15E-02	2
Dioxins & Furans	1 hour (annual mean)	-	-	-	-	1.200E-09	2.21E-09	1.27E-09	2.20E-09	3.22E-09	2.27E-09	1.25E-08	
PAHs	1 hour (annual mean)	0.00025	-	-	-	1.200E-06	1.13E-05	1.87E-06	1.12E-05	2.14E-05	1.19E-05	1.07E-04	47
PCB	1 hour (annual mean)	0.2	-	-	-	1.200E-07	5.07E-05	3.46E-06	5.05E-05	1.01E-04	5.38E-05	1.51E-04	0
NH_3	1 hour (annual mean)	5	-	-	-	1.160E-01	1.67E-01	1.19E-01	1.66E-01	2.17E-01	1.70E-01	1.16E+00	24

Table 5.49 Cumulative Predicted Environmental Concentrations at Long-Term Emission Limit Values

5.13.34 The values presented in Table 5.48 and 5.49 are the predictions at the location of maximum impact. In reality, the maximum impacts for each stack are unlikely to occur at the same location. Therefore, the results in these tables can be considered highly conservative.

5.13.35 The results presented in Table 5.48 show that the cumulative PECs are below the EAL for all pollutants and the effects are therefore not considered significant.

5.13.36 The results presented in Table 5.49 show that the cumulative PECs are below the relevant EALs for all pollutants except As (arsenic).

5.13.37 For As (arsenic) the predictions are based on the assumption that arsenic comprises the total of the group 3 metals emissions. In reality, the IED emission limit applies to all nine of the group 3 metals. If the predicted PC is assumed to apply equally to each of the nine group 3 metals, i.e. the PC for As is divided by 9, the predicted cumulative PEC for As would be less than 100% of the EAL as shown in Table 5.50 and the effects are therefore not considered significant.

Pollutant	Averaging Period	EAL ($\mu g.m^{-3}$)	K3 Proposed Development + WKN + other developments ($\mu g.m^{-3}$)		K3 Proposed Development + WKN + other developments + AC ($\mu g.m^{-3}$)	
			Max PC ($\mu g.m^{-3}$)	Max PC as % of EAL	Max PEC ($\mu g.m^{-3}$)	Max PEC as % of EAL
As	1 hour (annual mean)	0.003	1.19E-03	39.8	1.97E-03	66

Table 5.50 Cumulative Predicted Environmental Concentrations at Long-Term Emission Limit Values

Traffic-related Emissions

5.13.38 An assessment of cumulative traffic-related emissions has been undertaken for the following scenarios:

- With and Without the WKN Proposed Development construction traffic and K3 Proposed Development in the opening year of the K3 Proposed Development, 2021.
- With and Without the WKN and K3 Proposed Development traffic in the opening year of WKN, 2024.

5.13.39 Both of these scenarios are based on traffic data that considers a number of other cumulative developments.

5.13.40 The practical effect of the K3 Proposed Development would be an additional 68 HGV movements per day on the A259, Barge Way and part of the Swale Way above that associated with K3 as consented. The indicative EPUK/IAQM criterion of 100 vehicles outside an AQMA is therefore not exceeded and the impacts are not considered to be significant.

5.13.41 Chapter 4: Traffic and Transport discusses in detail the cumulative traffic data and the cumulative developments included in each scenario are summarised below.

5.13.42 The traffic data includes the following committed developments:

- SW/18/503317 Amendment K3 to allow for additional Refuse Collection Vehicles
- Removal of vehicles associated with the IBA facility adjacent to the Wheelabrator Kemsley Generating Station (KCC/SW/0265/2016).
- 16/501484/COUNTY – 1 km north - Construction of a gypsum recycling building on land at Ridham Dock.
- 14/500327/OUT – 250 m south - Development of Fulcrum Business Park and extension to Milton Creek Country Park.
- 15/510589/OUT – 2.2 km south- Development of a business park (Eurolink V) on land north of Northern Relief Road.
- 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).
- 17/505073/FULL- 800 m south - Erection of a tile factory including service yard, storage yard and car parking area.
- 14/501588/OUT Outline application for the development of 550-600 houses and all necessary supporting infrastructure including roads, open space, play areas, neighbourhood shopping/community facilities (up to 650 sq m gross) and landscaping. All detailed matters are reserved for subsequent approval except (i) vehicular access to A2 Fox Hill; (ii) emergency access to Peel Drive; (iii) landscape buffer between housing and countryside gap and (iv) layout, planting, biodiversity enhancement and management of countryside gap, as amended by drawings 5257/OPA/SK001 Rev J (new red line plan), D119/52 (Swanstree Avenue Plan) and D119/53 (junction layout plan). At this stage only the scoping report has been submitted and so the lack of information means it is not possible to include this development.
- 16/507877/FULL Erection of a residential development comprising 383 dwellings including associated access, parking, public open spaces and landscaping. New vehicular/pedestrian access from Eurolink Way and further secondary vehicular/pedestrian access off Crown Quay Lane. Associated drainage and earthworks.
- 16/507594/COUNTY County Matter - phased extraction of brickearth, advance planting, access improvements, restoration and replanting back to agricultural use.

- 16/501228/FULL Construction of a new baling plant building within an existing waste paper storage yard.

- SW/95/0099 G-Park Industrial and business park.

5.13.43 The 2021 cumulative traffic data includes two additional developments:

- EN010090 (18/501923/ADJ)) Kemsley K4 CHP - Construction traffic

- 18/500393/FULL Natural gas fuelled reserve power plant - Construction traffic

5.13.44 The 2024 cumulative traffic data includes four additional developments included in the Swale Borough Council Bearing Fruit 2031 Local Plan 2017 Allocations:

- A17 Iwade Expansion – Construction traffic

- MU1 North West Sittingbourne - minimum of 1,500 dwellings, community facilities and structural landscaping and open space adjacent the A249. – part operational/part construction traffic

- MU2 mixed use development comprising 43,000 sq m of 'B' use class employment uses, approximately 106 dwellings, together with 31.1 ha of open space, flooding, biodiversity and landscape enhancements – Construction traffic

- MU3 Planning permission will be granted for a minimum of 564 dwellings, commercial floorspace (including potential neighbourhood facilities), landscaping and open space on land at south-west Sittingbourne (Borden) – Construction traffic

5.13.45 The following Swale Borough Council Bearing Fruit 2031 Local Plan 2017 Allocations were not included in the 2021 or 2024 cumulative traffic data either because of the geographical location or the likely timing of the development. More detail is provided in Chapter 4: Traffic and Transport:

- A1 Land allocated for 'B' class employment uses

- A10 Housing allocations for a mix of at least 240 dwellings

- A3 Planning permission will be granted for employment uses (use classes B1, B2 or B8)

- A4 Planning permission will be granted for employment uses on sites north and south of the A249 at Cowstead Corner, as shown on the Proposals Map. The northern site is allocated for a hotel (use class C1), whilst the southern site for use classes B1, B2 or B8.

- MU4 Planning permission will be granted for mixed uses comprising approximately 260 dwellings, 26,840 sqm of 'B' use class employment, open space and landscaping

- MU5 Planning permission will be granted for mixed-uses, comprising 1,500 sqm of commercial floorspace, together with some 330 homes and proposals for the conservation, enhancement, and long term management of the site's ecological and heritage assets

5.13.46 The effects of these additional cumulative developments have not been specifically assessed as the traffic generated would increase the future baseline concentration only; the difference between the 'with development' and 'without development' scenarios would remain the same. If the change is small (i.e. less than 1% of the AQS Objective) the impact descriptors would be 'negligible' at all receptors regardless of the absolute concentration.

Results of Cumulative Traffic Modelling - WKN Proposed Development construction traffic and K3 Proposed Development in the opening year of the K3 Proposed Development, 2021.

5.13.47 Earlier traffic modelling in this chapter (Tables 5.43 to 5.46), provides the predicted impacts with WKN operating with the K3 Permitted Development.

5.13.48 Tables 5.51, 5.52 and 5.53 present the annual-mean NO_2, PM_{10} and $PM_{2.5}$ concentrations predicted at the facades of the receptors outlined in Table 5.14 for the WKN Proposed Development Construction traffic and K3 Proposed Development in the opening year of the K3 Proposed Development, 2021. The difference between the *Without development* and *With development* scenarios in this case is the following:

- WKN Proposed Development construction traffic emissions
- K3 Proposed Development operational traffic emission
- K3 Proposed Development stack emissions
- Other cumulative developments traffic emissions

5.13.49 The Impact Descriptor has been derived based on EPUK&IAQM guidance. The methodology and significance criteria for the traffic modelling are provided in Appendix 5.5.

Receptor ID	Concentration (µg.m^{-3})			With - Without Dev as % of the AQS Objective	Impact Descriptor
	Without Development	K3 Stack Emissions	With Development		
R1	16.6	0.56	17.3	2	Negligible
R2	18.5	0.58	19.6	3	Negligible
R3	16.2	0.48	16.8	2	Negligible
R4	13.8	0.32	14.2	1	Negligible
R5	13.7	0.32	14.0	1	Negligible
R6	15.2	0.15	15.4	0	Negligible
R7	15.6	0.13	15.8	1	Negligible
R8	26.9	0.29	27.7	2	Negligible
R9	26.9	0.18	27.7	2	Negligible
R10	21.8	0.11	22.2	1	Negligible

Receptor ID	Concentration (µg.m^{-3})			With - Without Dev as % of the AQS Objective	Impact Descriptor
	Without Development	K3 Stack Emissions	With Development		
R11	14.0	0.12	14.2	0	Negligible
R12	13.4	0.14	13.6	0	Negligible
R13	13.2	0.08	13.3	0	Negligible
R14	13.7	0.10	13.8	0	Negligible
R15	23.2	0.06	23.3	0	Negligible
R16	26.4	0.05	26.5	0	Negligible
R17	22.2	0.06	22.4	0	Negligible
R18	13.3	0.04	13.3	0	Negligible
R19	24.8	0.35	26.0	3	Negligible
R20	21.1	0.58	22.4	3	Negligible
Maximum	**26.9**	**0.58**	**27.7**	-	-
Minimum	**13.2**	**0.04**	**13.3**	-	-

Table 5.51 Predicted Annual-Mean NO_2 Impacts at Receptors – WKN Proposed Development Construction Traffic and K3 Proposed Development

Receptor ID	Concentration (µg.m^{-3})			With - Without Dev as % of the AQS Objective	Impact Descriptor
	Without Development	K3 Stack Emissions	With Development		
R1	16.3	0.08	16.4	0	Negligible
R2	16.8	0.10	17.1	1	Negligible
R3	16.1	0.08	16.3	0	Negligible
R4	15.6	0.05	15.7	0	Negligible
R5	15.6	0.04	15.6	0	Negligible
R6	15.9	0.02	15.9	0	Negligible
R7	16.0	0.02	16.0	0	Negligible
R8	18.4	0.04	18.6	1	Negligible
R9	18.4	0.03	18.6	1	Negligible
R10	17.3	0.02	17.4	0	Negligible
R11	15.6	0.02	15.7	0	Negligible
R12	15.5	0.02	15.5	0	Negligible
R13	15.5	0.01	15.5	0	Negligible
R14	15.5	0.01	15.6	0	Negligible
R15	16.5	0.01	16.5	0	Negligible
R16	16.8	0.01	16.8	0	Negligible
R17	16.5	0.01	16.5	0	Negligible
R18	15.5	0.01	15.5	0	Negligible
R19	18.2	0.06	18.5	1	Negligible
R20	17.5	0.09	17.8	1	Negligible
Maximum	**18.4**	**0.10**	**18.6**	-	-
Minimum	**15.5**	**0.01**	**15.5**	-	-

Table 5.52 Predicted Annual-Mean PM_{10} Impacts at Receptors – WKN Proposed Development Construction Traffic and K3 Proposed Development

Receptor ID	Concentration (µg.m^{-3})			With - Without Dev as % of the AQS Objective	Impact Descriptor
	Without Development	K3 Stack Emissions	With Development		
R1	11.1	0.08	11.2	0	Negligible
R2	11.5	0.10	11.7	0	Negligible

Receptor ID	Concentration (µg.m^{-3})			With - Without Dev as % of the AQS Objective	Impact Descriptor
	Without Development	K3 Stack Emissions	With Development		
R3	11.1	0.08	11.2	0	Negligible
R4	10.8	0.05	10.8	0	Negligible
R5	10.8	0.04	10.8	0	Negligible
R6	10.9	0.02	10.9	0	Negligible
R7	11.0	0.02	11.0	0	Negligible
R8	12.4	0.04	12.5	0	Negligible
R9	12.4	0.03	12.5	0	Negligible
R10	11.7	0.02	11.8	0	Negligible
R11	10.8	0.02	10.8	0	Negligible
R12	10.7	0.02	10.7	0	Negligible
R13	10.7	0.01	10.7	0	Negligible
R14	10.7	0.01	10.8	0	Negligible
R15	11.4	0.01	11.4	0	Negligible
R16	11.6	0.01	11.6	0	Negligible
R17	11.3	0.01	11.4	0	Negligible
R18	10.7	0.01	10.7	0	Negligible
R19	12.2	0.06	12.4	0	Negligible
R20	11.8	0.09	12.1	1	Negligible
Maximum	**12.4**	**0.10**	**12.5**	-	-
Minimum	**10.7**	**0.01**	**10.7**	-	-

Table 5.53 Predicted Annual-Mean $PM_{2.5}$ Impacts at Receptors – WKN Proposed Development Construction Traffic and K3 Proposed Development

5.13.50 Predicted annual-mean NO_2, PM_{10} and $PM_{2.5}$ concentrations in the opening year of the K3 Proposed Development at the façades of the existing receptors are below the relevant AQS objectives. When the magnitude of change is considered in the context of the absolute concentrations, the impact descriptors are 'negligible' at all receptors.

5.13.51 As all predicted annual-mean NO_2 concentrations are below 60 µg.m^{-3}, the hourly-mean objective for NO_2 is likely to be met at all receptors. The short-term NO_2 impact can be considered 'negligible' and is not considered further within this assessment.

5.13.52 As all predicted annual mean PM_{10} concentrations are below 31.5 µg.m^{-3}, the daily-mean PM_{10} objective is expected to be met at all receptors and the short-term PM_{10} impact is not considered further within this assessment.

5.13.53 Overall, the impact on the surrounding area from NO_2, PM_{10} and $PM_{2.5}$ is considered to be 'negligible', using the criteria adopted for this assessment and based on professional judgement.

Results of Cumulative Traffic Modelling - WKN and K3 Proposed Development traffic in the opening year of WKN, 2024.

5.13.54 Tables 5.54, 5.55 and 5.56 present the annual-mean NO_2, PM_{10} and $PM_{2.5}$ concentrations predicted at the facades of the receptors outlined in Table 5.14 for the WKN and K3 Proposed Development in the opening year of WKN, 2024. The

difference between the *Without development* and *With development* scenarios are the following:

- WKN Proposed Development operational traffic emissions
- WKN stack emissions
- K3 Proposed Development operational traffic emissions
- K3 Proposed Development stack emissions
- Other cumulative developments traffic emissions

5.13.55 An Impact Descriptor has been derived based on EPUK&IAQM guidance. The methodology and significance criteria for the traffic modelling are provided in Appendix 5.5.

Receptor ID	Concentration (µg.m^{-3})				With - Without Dev as % of the AQS Objective	Impact Descriptor
	Without Development	K3 Stack Emissions	WKN Stack Emissions	With Development		
R1	15.5	0.56	0.52	16.6	3	Negligible
R2	16.7	0.58	0.83	18.4	4	Negligible
R3	15.2	0.48	0.61	16.4	3	Negligible
R4	13.5	0.32	0.32	14.1	2	Negligible
R5	13.4	0.32	0.29	14.0	2	Negligible
R6	14.5	0.15	0.17	14.9	1	Negligible
R7	14.8	0.13	0.19	15.2	1	Negligible
R8	23.1	0.29	0.29	24.2	3	Negligible
R9	23.1	0.18	0.19	24.0	2	Negligible
R10	19.3	0.11	0.11	19.8	1	Negligible
R11	13.6	0.12	0.12	13.9	1	Negligible
R12	13.2	0.14	0.12	13.4	1	Negligible
R13	13.0	0.08	0.09	13.2	0	Negligible
R14	13.4	0.10	0.11	13.6	1	Negligible
R15	20.6	0.06	0.06	20.7	0	Negligible
R16	23.1	0.05	0.05	23.3	0	Negligible
R17	19.8	0.06	0.06	20.1	1	Negligible
R18	13.1	0.04	0.04	13.2	0	Negligible
R19	21.4	0.35	0.57	22.8	3	Negligible
R20	18.6	0.58	0.76	20.3	4	Negligible
Maximum	**23.1**	**0.58**	**0.83**	**24.2**	-	-
Minimum	**13.0**	**0.04**	**0.04**	**13.2**	-	-

Table 5.54 Predicted Annual-Mean NO_2 Impacts at Receptors – WKN and K3 Proposed Development

Receptor ID	Concentration (µg.m^{-3})				With - Without Dev as % of the AQS Objective	Impact Descriptor
	Without Development	K3 Stack Emissions	WKN Stack Emissions	With Development		
R1	16.2	0.08	0.04	16.4	0	Negligible
R2	16.8	0.10	0.06	17.1	1	Negligible
R3	16.1	0.08	0.04	16.3	0	Negligible
R4	15.6	0.05	0.02	15.7	0	Negligible

Receptor ID	Concentration (µg.m^{-3})				With - Without Dev as % of the AQS Objective	Impact Descriptor
	Without Development	K3 Stack Emissions	WKN Stack Emissions	With Development		
R5	15.6	0.04	0.02	15.6	0	Negligible
R6	15.8	0.02	0.01	15.9	0	Negligible
R7	16.0	0.02	0.01	16.0	0	Negligible
R8	18.3	0.04	0.02	18.6	1	Negligible
R9	18.3	0.03	0.01	18.5	1	Negligible
R10	17.2	0.02	0.01	17.4	0	Negligible
R11	15.6	0.02	0.01	15.7	0	Negligible
R12	15.5	0.02	0.01	15.5	0	Negligible
R13	15.5	0.01	0.01	15.5	0	Negligible
R14	15.5	0.01	0.01	15.6	0	Negligible
R15	16.4	0.01	<0.005	16.5	0	Negligible
R16	16.7	0.01	<0.005	16.7	0	Negligible
R17	16.4	0.01	<0.005	16.4	0	Negligible
R18	15.5	0.01	<0.005	15.5	0	Negligible
R19	18.1	0.06	0.04	18.4	1	Negligible
R20	17.4	0.09	0.05	17.7	1	Negligible
Maximum	**18.3**	**0.10**	**0.06**	**18.6**		-
Minimum	**15.5**	**0.01**	**<0.005**	**15.5**	-	-

Table 5.55 Predicted Annual-Mean PM_{10} Impacts at Receptors – WKN and K3 Proposed Development

Receptor ID	Concentration (µg.m^{-3})				With - Without Dev as % of the AQS Objective	Impact Descriptor
	Without Development	K3 Stack Emissions	WKN Stack Emissions	With Development		
R1	11.1	0.08	0.04	11.2	0	Negligible
R2	11.4	0.10	0.06	11.7	1	Negligible
R3	11.0	0.08	0.04	11.2	0	Negligible
R4	10.8	0.05	0.02	10.8	0	Negligible
R5	10.7	0.04	0.02	10.8	0	Negligible
R6	10.9	0.02	0.01	10.9	0	Negligible
R7	11.0	0.02	0.01	11.0	0	Negligible
R8	12.2	0.04	0.02	12.4	0	Negligible
R9	12.2	0.03	0.01	12.4	0	Negligible
R10	11.7	0.02	0.01	11.8	0	Negligible
R11	10.8	0.02	0.01	10.8	0	Negligible
R12	10.7	0.02	0.01	10.7	0	Negligible
R13	10.7	0.01	0.01	10.7	0	Negligible
R14	10.7	0.01	0.01	10.8	0	Negligible
R15	11.3	0.01	<0.005	11.3	0	Negligible
R16	11.5	0.01	<0.005	11.5	0	Negligible
R17	11.3	0.01	<0.005	11.3	0	Negligible
R18	10.7	0.01	<0.005	10.7	0	Negligible
R19	12.1	0.06	0.04	12.4	1	Negligible
R20	11.8	0.09	0.05	12.0	1	Negligible
Maximum	**12.2**	**0.10**	**0.06**	**12.4**	-	-
Minimum	**10.7**	**0.01**	**<0.005**	**10.7**	-	-

Table 5.56 Predicted Annual-Mean $PM_{2.5}$ Impacts at Receptors – WKN and K3 Proposed Development

5.13.56 Predicted annual-mean NO_2, PM_{10} and $PM_{2.5}$ concentrations in the opening year of the WKN Proposed Development at the façades of the existing receptors are below the relevant AQS objectives. When the magnitude of change is considered in the context of the absolute concentrations, the impact descriptors are 'negligible' at all receptors.

5.13.57 As all predicted annual-mean NO_2 concentrations are below 60 $\mu g.m^{-3}$, the hourly-mean objective for NO_2 is likely to be met at all receptors. The short-term NO_2 impact can be considered 'negligible' and is not considered further within this assessment.

5.13.58 As all predicted annual mean PM_{10} concentrations are below 31.5 $\mu g.m^{-3}$, the daily-mean PM_{10} objective is expected to be met at all receptors and the short-term PM_{10} impact is not considered further within this assessment.

5.13.59 Overall, the impact on the surrounding area from NO_2, PM_{10} and $PM_{2.5}$ is considered to be 'negligible', using the criteria adopted for this assessment and based on professional judgement.

Summary of Cumulative Effects

K3 Proposed Development + other cumulative developments

5.13.60 As shown in Table 5.48 – 5.50 and discussed in paragraphs 5.13.34 to 5.13.37, the cumulative effects across the grid for the K3 Proposed Development + other cumulative developments are considered to be not significant.

Practical effect of the K3 Proposed Development + other cumulative developments

5.13.61 As shown in Table 5.48 – 5.50 and discussed in paragraphs 5.13.34 to 5.13.37, the cumulative effects across the grid for the increase in K3 + other cumulative developments are considered to be not significant.

WKN Proposed Development + other cumulative developments

5.13.62 As shown in Table 5.48 – 5.50 and discussed in paragraphs 5.13.34 to 5.13.37, the cumulative effects across the grid for the WKN Proposed Development + other cumulative developments are considered to be not significant.

WKN Proposed Development + K3 Proposed Development + other cumulative developments.

5.13.63 As shown in Table 5.48 – 5.50 and discussed in paragraphs 5.13.34 to 5.13.37, the cumulative effects across the grid for the WKN Proposed Development + K3 Proposed Development + other cumulative developments are considered to be not significant.

WKN Proposed Development + practical effect of the K3 Proposed Development + other cumulative developments.

5.13.64 As shown in Table 5.48 – 5.50 and discussed in paragraphs 5.13.34 to 5.13.37, the cumulative effects across the grid for the WKN Proposed Development + increase in K3 + other cumulative developments are considered to be not significant.

5.13.65 When considering the cumulative effects of traffic-related and stack emissions at sensitive receptors, the cumulative effects are considered to be not significant.

5.14 Summary

5.14.1 A detailed air quality assessment predicting the potential effects of emissions generated during the construction and operation of the WKN and K3 Proposed Development has been undertaken.

5.14.2 Impacts during the construction, 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, indicate that before the implementation of mitigation and controls, the risk of dust impacts will be medium. Implementation of the 'highly recommended' mitigation measures described in the IAQM construction dust guidance is likely to reduce the residual dust effects to a level categorised as "not significant".

5.14.3 Stack emissions from the K3 and WKN 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 would be of 'negligible' significance.

5.14.4 The operational impact of the K3 and WKN Proposed Developments on existing receptors in the local area are predicted to be 'negligible' taking into account the changes in pollutant concentrations and absolute levels.

5.14.5 The main dust mitigation measure is containment. Taking into account the fact that the processes would be largely contained, and the relative distance to sensitive receptors, the risk of dust impacts during operation is predicted to be not significant based on professional judgement.

5.14.6 The risk of odour and bioaerosol impacts has been assessed qualitatively using a source-pathway-receptor conceptual model. The likely odour and bioaerosol effect is negligible.

5.14.7 Overall the air quality effects of the K3 and WKN Proposed Developments, both separately and cumulatively, are not considered to be significant.

References

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

5.2 OPSI, 2018, The Environmental Permitting (England and Wales) (Amendment) Regulations 2018.

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

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

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

5.6 WHO (2005) Air Quality Guidelines: Global Update 2005.

5.7 EPAQS (2005) Expert Panel on Air Quality Standards(www.defra.gov.uk/environment/airquality/panels/aqs/index.htm)

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

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

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

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

5.12 British Standard Institute (1994) BS 6069:Part 2:1994, ISO 4225-1980 Characterization of air quality. Glossary

5.13 Defra (2018) Local Air Quality Management Technical Guidance (TG16)

5.14 Drawn from Defra Maps at http://uk-air.defra.gov.uk/data/laqm-background-maps?year=2017

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

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

5.17 Environment Agency, Review of Methods to Measure Bioaerosols at Composting Sites, Science Report SC040021/SR3, ISBN 978-1-84911-041-9 (2009)

5.18 Environment Agency (2010) Composting and Potential Health Effects from Bioaerosols: our Interim Guidance for Permit Applications, Position Statement 031, Version 1.0, 1st November 2010.

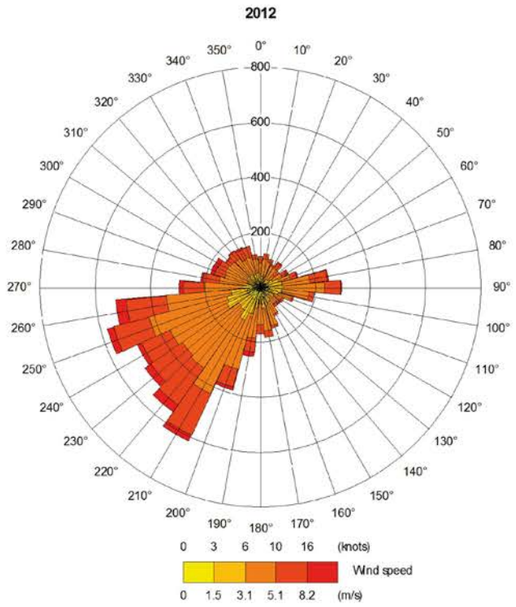
5.19 Environment Agency, Development of Amenity Risk Assessments at Organic Waste Treatment Facilities, Science Report SC040021/SR1, ISBN 978-1-84432-778-2 (2008)

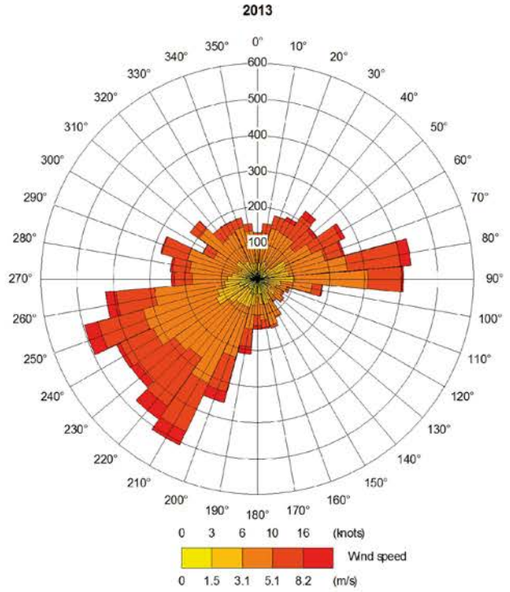
5.20 IOM Consulting Ltd (2008) Exposure-response relationships for bioaerosol emissions from waste treatment processes

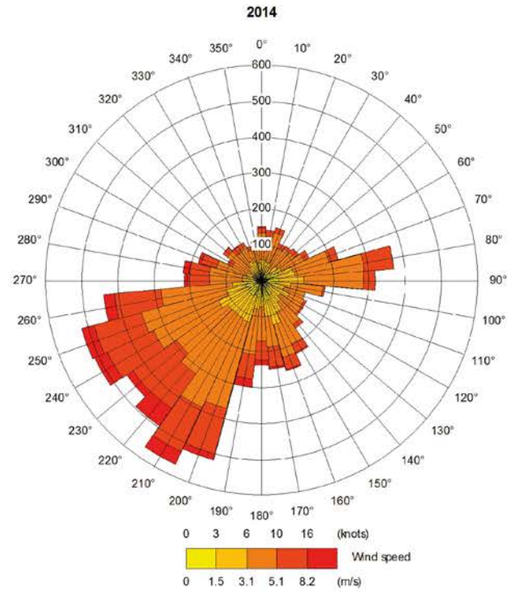
5.21 DHA Environment (2011) Proposed Anaerobic Digestor Kemsley DCH/7471

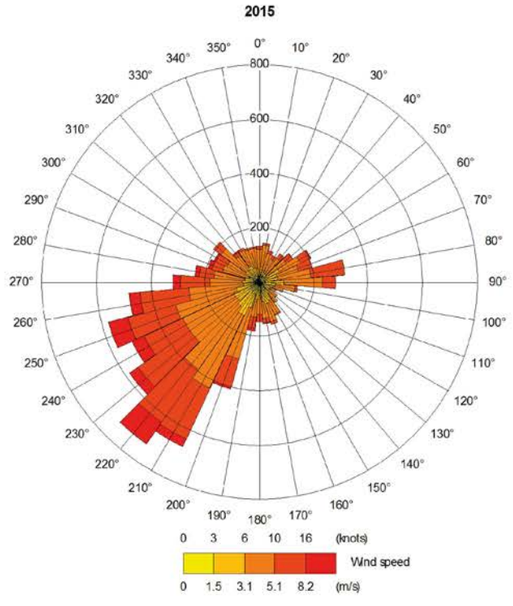
5.22 wyg (2018) Proposed Standing Reserve Power Plant at Eurolink Industrial Estate, Castle Road, Sittingbourne, Kent

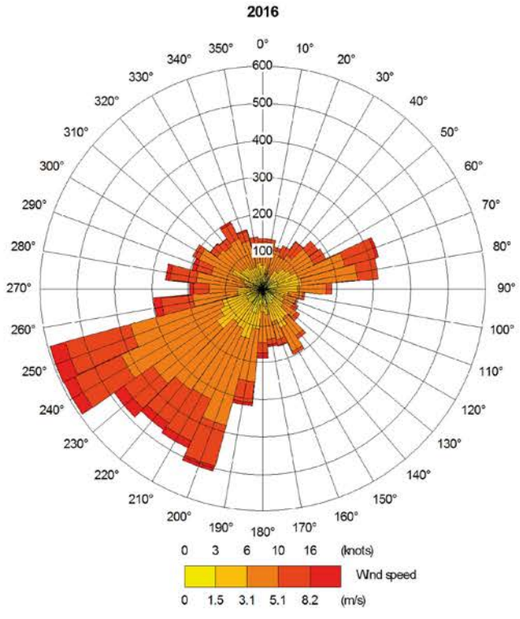
5.23 Environmental Compliance Limited (2014) Air Quality Assessment of Emissions from the Proposed Garden of England Energy Facility











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Project: K3 and WKN DCO

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Figure Number
5.1

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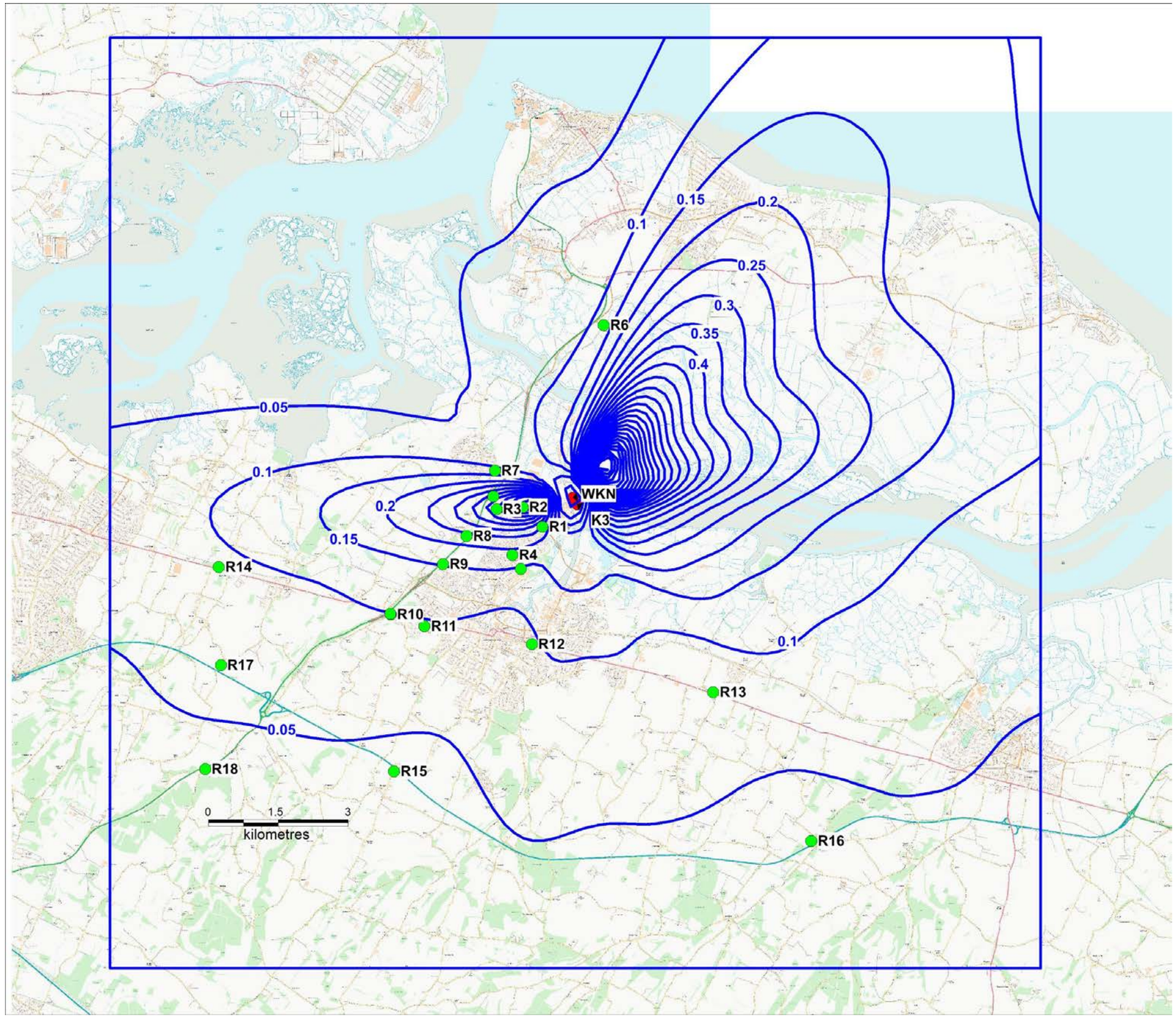

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Project: K3 and WKN DCO

Title: Contour of Annual-mean NO2 PCs (Increase in K3 and WKN)

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Job Ref	**Scale @ A3**	**Date Created**
OXF9812	NTS	MARCH 2020

Figure Number
5.3

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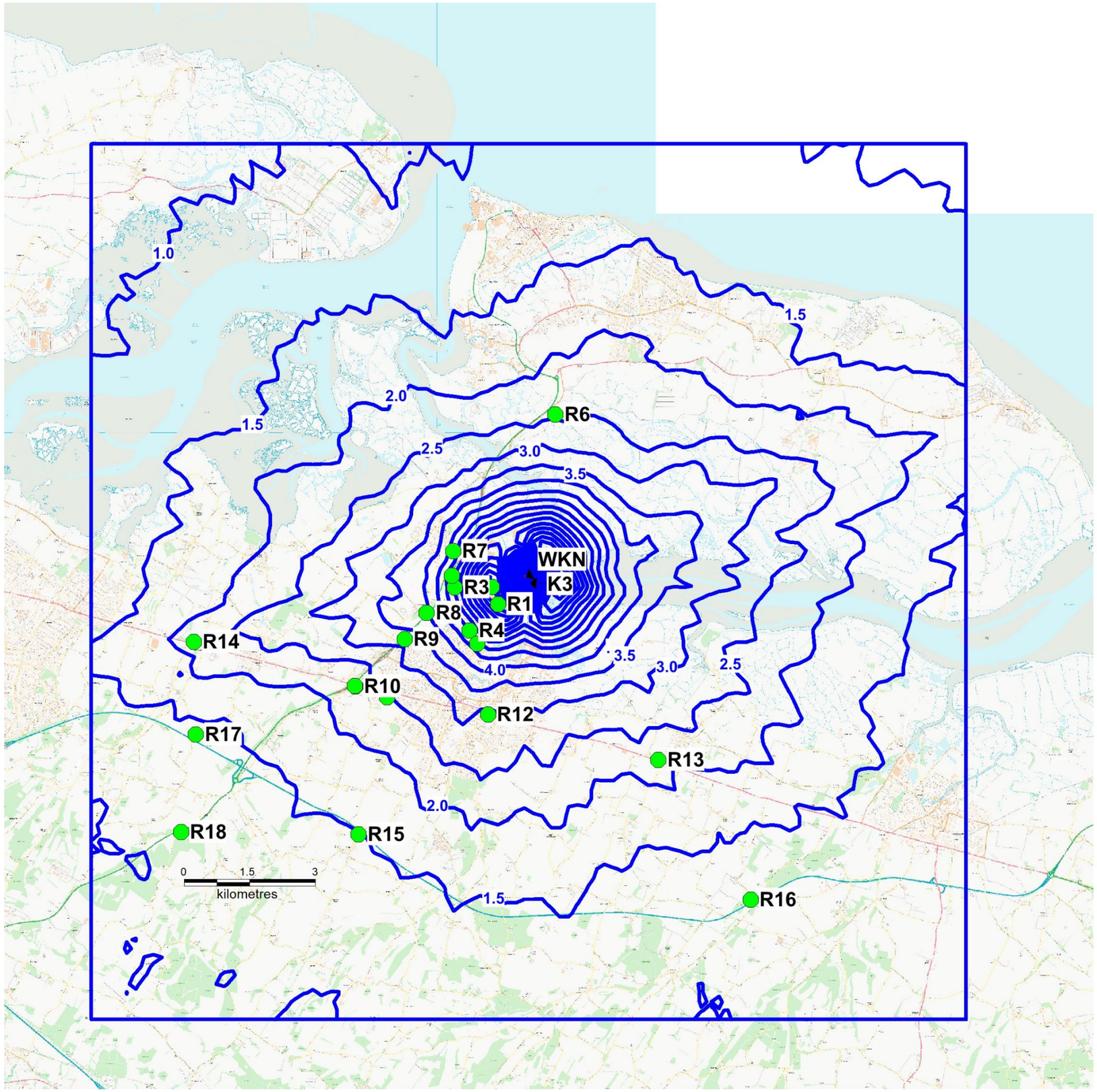

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Project: K3 and WKN DCO

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Figure Number
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Appendix 5.1: Construction Dust Assessment Methodology

Source

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 Table A1.

Table A1 Risk Allocation – Source (Dust Emission Magnitude)

Features of the Source of Dust Emissions	Dust Emission Magnitude
Demolition - building over 50,000 m^3, potentially dusty construction material (e.g. concrete), on-site crushing and screening, demolition activities > 20 m above ground level. **Earthworks** – total site area over 10,000 m^2, potentially dusty soil type (e.g. clay), >10 heavy earth moving vehicles active at any one time, formation of bunds > 8 m in height, total material moved > 100,000 tonnes. **Construction** - total building volume over 100,000 m^3, activities include piling, on-site concrete batching, sand blasting. Period of activities more than two years. **Trackout** – 50 HDV outwards movements in any one day, potentially dusty surface material (e.g. High clay content), unpaved road length > 100 m.	Large
Demolition - building between 20,000 to 50,000 m^3, potentially dusty construction material and demolition activities 10 - 20 m above ground level. **Earthworks** – total site area between 2,500 to 10,000 m^2, moderately dusty soil type (e.g. silt), 5 – 10 heavy earth moving vehicles active at any one time, formation of bunds 4 - 8 m in height, total material moved 20,000 to 100,000 tonnes. **Construction** - total building volume between 25,000 and 100,000 m^3, use of construction materials with high potential for dust release (e.g. concrete), activities include piling, on-site concrete batching. Period of construction activities between one and two years. **Trackout** – 10 - 50 HDV outwards movements in any one day, moderately dusty surface material (e.g. High clay content), unpaved road length 50 – 100 m.	Medium
Demolition - building less than 20,000 m^3, construction material with low potential for dust release (e.g. metal cladding or timber), demolition activities < 10 m above ground, demolition during winter months. **Earthworks** – total site area less than 2,500 m^2. Soil type with large grain size (e.g. sand), < 5 heavy earth moving vehicles active at any one time, formation of bunds < 4 m in height, total material moved < 10,000 tonnes earthworks during winter months. **Construction** - total building volume below 25,000 m^3, use of construction materials with low potential for dust release (e.g. metal cladding or timber). Period of construction activities less than one year. **Trackout** – < 10 HDV outwards movements in any one day, surface material with low potential for dust release, unpaved road length < 50 m.	Small

Pathway and Receptor - Sensitivity of the Area

Pathway means the route by which dust and particulate matter may be carried from the source to a receptor. The main factor affecting the pathway effectiveness is the distance from the receptor to the source. The orientation of the receptors to the source compared to the prevailing wind direction is a relevant risk factor for

long-duration construction projects; however, short-term construction projects may be limited to a few months when the most frequent wind direction might be quite different, so adverse effects can potentially occur in any direction from the site.

As set out in the IAQM dust guidance, a number of attempts have been made to categorise receptors into high, medium and low sensitivity categories; however there is no unified sensitivity classification scheme that covers the quite different potential effects on property, human health and ecological receptors.

Table A2 and Table A3 sets out the IAQM basis for categorising the sensitivity of people and property to dust and PM_{10} respectively.

Table A2 Sensitivities of People and Property Receptors to Dust

Receptor	Sensitivity
Principles:- ▪ Users can reasonably expect enjoyment of a high level of amenity; or ▪ the appearance, aesthetics or value of their property would be diminished by soiling; and the people or property would reasonably be expected to be present continuously, or at least regularly for extended periods as part of the normal pattern of use of the land. Indicative Examples:- ▪ Dwellings. ▪ Museums and other culturally important collections. ▪ Medium and long-term car parks and car showrooms.	High
Principles:- ▪ Users would expect to enjoy a reasonable level of amenity, but would not reasonably expect to enjoy the same level of amenity as in their home; or ▪ the appearance, aesthetics or value of their property could be diminished by soiling; or ▪ the people or property wouldn't reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land. Indicative Examples:- ▪ Parks. ▪ Places of work.	Medium
Principles:- ▪ the enjoyment of amenity would not reasonably be expected; or ▪ there is property that would not reasonably be expected to be diminished in appearance, aesthetics or value by soiling; or ▪ there is transient exposure, where the people or property would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land. Indicative Examples:- ▪ Playing fields, farmland (unless commercially-sensitive horticultural). ▪ Footpaths and roads. ▪ Short-term car parks.	Low

Table A3 Sensitivities of People and Property Receptors to PM_{10}

Receptor	Sensitivity
Principles:- ▪ Locations where members of the public are exposed over a time period relevant to the air quality objective (in the case of the 24-hour objective for PM_{10}, a relevant location would be one where individuals may be exposed for eight hours or more in a day). Indicative Examples:- ▪ Residential properties. ▪ Schools, hospitals and residential care homes.	High
Principles:- ▪ Locations where the people exposed are workers and exposure is over a time period relevant to the air quality objective (in the case of the 24-hour objective for PM_{10}, a relevant location would be one where individuals may be exposed for eight hours or more in a day). Indicative Examples:- ▪ Office and shop workers (but generally excludes workers occupationally exposed to PM_{10} as protection is covered by Health and Safety at Work legislation).	Medium
Principles:- ▪ Locations where human exposure is transient exposure. Indicative Examples:- ▪ Public footpaths. ▪ Playing fields, parks. ▪ Shopping streets.	Low

The IAQM methodology combines consideration of the pathway and receptor to derive the 'sensitivity of the area'. Table A4 and Table A5 show how the sensitivity of the area has been derived for this assessment.

Table A4 Sensitivity of the Area to Dust Soiling Effects on People and Property

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

The sensitivity of the area has been derived for demolition, construction, earthworks and trackout.

a The total number of receptors within the stated distance has been estimated. Only the highest level of area sensitivity from the table has been recorded.

b For trackout, the distances have been measured from the side of the roads used by construction traffic. Without site-specific mitigation, trackout may occur from roads up to 500 m from large sites, 200 m from medium sites and 50 m from small sites, as measured from the site exit. The impact declines with distance from the site, and trackout impacts have only been considered up to 50 m from the edge of the road.

Table A5 Sensitivity of the Area to Human Health Impacts

Receptor Sensitivity	Annual Mean PM_{10} Concentration [a]	Number of Receptors [b, c]	Distance from the Source (m) [d]				
			<20	<50	<100	<200	<350
High	> 32 µg.m^{-3}	>100	High	High	High	Medium	Low
		10-100	High	High	Medium	Low	Low
		1-10	High	Medium	Low	Low	Low
	28 - 32 µg.m^{-3}	>100	High	High	Medium	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	High	Medium	Low	Low	Low
	24 - 28 µg.m^{-3}	>100	High	Medium	Low	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	< 24 µg.m^{-3}	>100	Medium	Low	Low	Low	Low
		10-100	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Medium	> 32 µg.m^{-3}	>10	High	Medium	Low	Low	Low
		1 – 10	Medium	Low	Low	Low	Low
	28 – 32 µg.m^{-3}	> 10	Medium	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	< 28 µg.m^{-3}	>1	Low	Low	Low	Low	Low
Low	-	>1	Low	Low	Low	Low	Low

The sensitivity of the area has been derived for demolition, construction, earthworks and trackout.

a This refers to the background concentration derived from the assessment of baseline conditions later in this report. The concentration categories listed in this column apply to England, Wales and Northern Ireland but not to Scotland.

b The total number of receptors within the stated distance has been estimated. Only the highest level of area sensitivity from the table has been recorded.

c For high sensitivity receptors with high occupancy (such as schools or hospitals), the approximate number of occupants has been used to derive an equivalent number of receptors.

d For trackout, the distances have been measured from the side of the roads used by construction traffic. Without site-specific mitigation, trackout may occur from roads up to 500 m from large sites, 200 m from medium sites and 50 m from small sites, as measured from the site exit. The impact declines with distance from the site, and trackout impacts have only been considered up to 50 m from the edge of the road.

The IAQM dust guidance lists the following additional factors that can potentially affect the sensitivity of the area and, where necessary, professional judgement has been used to adjust the sensitivity allocated to a particular area:

- any history of dust generating activities in the area;
- the likelihood of concurrent dust generating activity on nearby sites;

- any pre-existing screening between the source and the receptors;
- any conclusions drawn from analysing local meteorological data which accurately represent the area; and if relevant the season during which the works will take place;
- any conclusions drawn from local topography;
- duration of the potential impact, as a receptor may become more sensitive over time; and
- any known specific receptor sensitivities which are considered go beyond the classifications given in the table above.

The matrices in Table A6, Table A7, Table A8 and Table A9 have been used to assign the risk for each activity to determine the level of mitigation that should be applied. For those cases where the risk category is 'negligible', no mitigation measures are required beyond those mandated by legislation.

Table A6 Risk of Dust Impacts – Demolition

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

Table A7 Risk of Dust Impacts – Earthworks

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

Table A8 Risk of Dust Impacts – Construction

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

Table A9 Risk of Dust Impacts – Trackout

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

Appendix 5.2: Stack Height Determination for WKN

A stack height determination has been undertaken for WKN to establish the height at which there is minimal additional environmental benefit associated with the cost of further raising the stack. A stack height determination was undertaken for K3 in the 2010 ES.

The Environment Agency removed their detailed guidance, Horizontal Guidance Note EPR H1 [1], 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."*

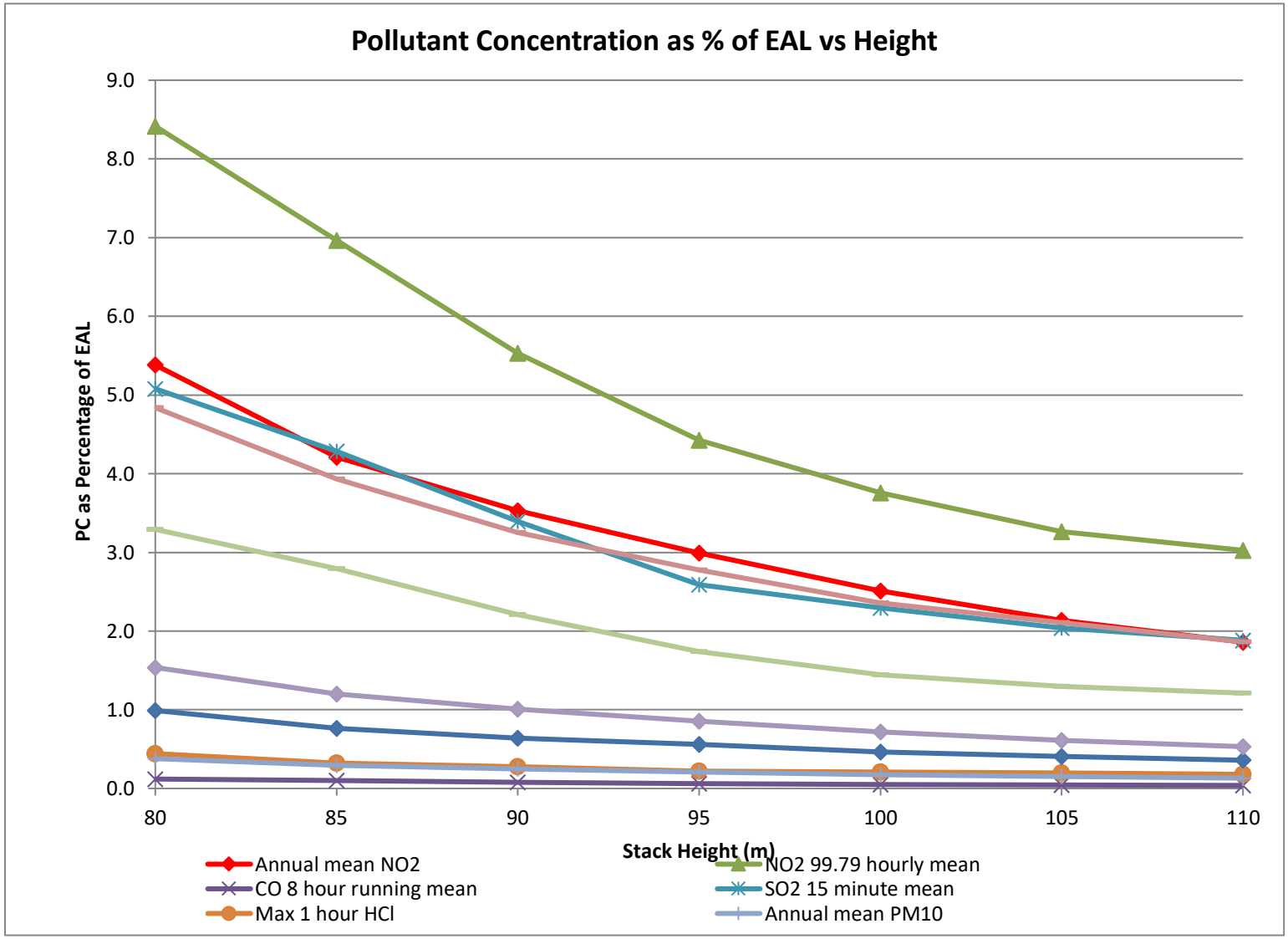
The emissions data used in the stack height determination are summarised in Chapter 5: Air Quality, Section 5.3. Simulations have been run using ADMS 5 to determine what stack height is required to provide adequate dispersion/dilution and to overcome local building wake effects.

The stack height determination considers ground level concentrations over the averaging periods relevant to the air quality assessment, together with the full range of all likely meteorological conditions through the use of five years of hourly sequential meteorological data from Gravesend. The model was run for a range of stack heights between 80 m to 110 m, at 5 m increments.

The dispersion modelling for the purposes of stack height determination assumed a domain of 20 km by 20 km centred on the proposed development and with a grid spacing of 200 m. Results have been reported for the location where the highest concentration is predicted. This is considered a robust and conservative approach.

The predicted Process Contributions (PCs) as a percentage of the relevant Environmental Assessment Level (EAL) have been plotted against height in Graph 5.2.1 (at long-term emission limits) and Graph 5.2.2 (at short-term emission limits) to indicate if there is a height beyond which the benefit from further increases in stack height are diminished. The PCs as a percentage of the relevant EALs are provided in Table 5.2.1 and Table 5.2.2 respectively.

Graph 5.2.1: Maximum Predicted Process Contribution as Percentage of EAL vs Stack Height at Long-term IED Limits



Graph 5.2.2: Maximum Predicted Process Contribution as Percentage of EAL vs Stack Height at Short-term IED Limits

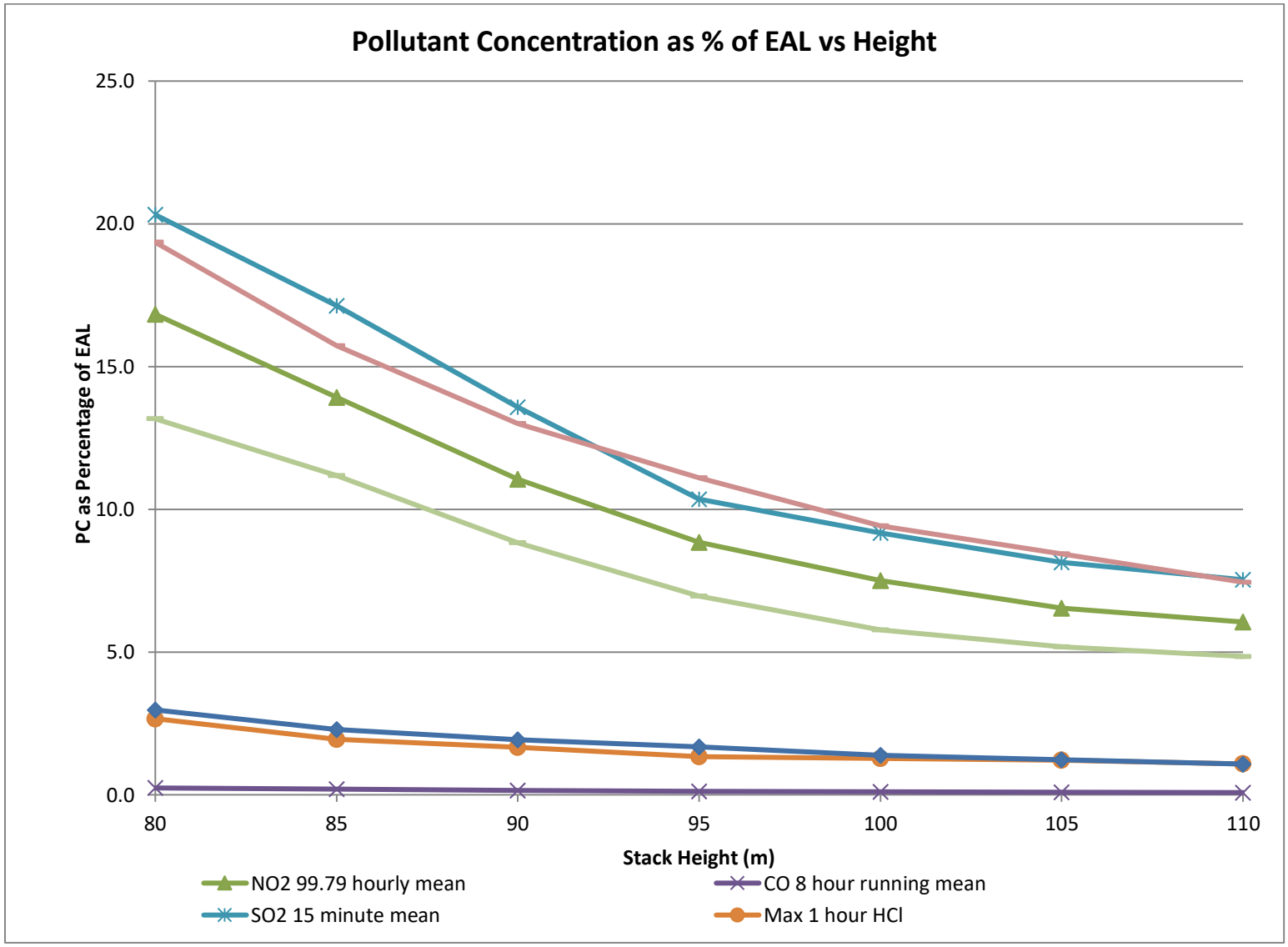


Table 5.2.1 Maximum Predicted Process Contributions as a Percentage of the Relevant EAL at each Stack Height Modelled – Long-term IED Concentration Limits

	Percentage of Environmental Assessment Level (%)									
Environmental Assessment Level ($\mu g.m^{-3}$)	**40**	**50**	**750**	**50**	**350**	**10000**	**40**	**200**	**125**	**266**
Height (m)	**Annual-mean PM_{10}**	**90.41st percentile daily mean PM_{10}**	**Maximum hourly HCl**	**Annual mean SO_2**	**99.73rd percentile hourly mean SO_2**	**Maximum 8-hour running CO**	**Annual mean NO_2**	**99.79th percentile NO_2**	**99.18th percentile daily mean SO_2**	**99.9th percentile 15-minute mean SO_2**
80	0.4	1.0	0.4	1.5	3.3	0.12	5.4	8.4	4.8	5.1
85	0.3	0.8	0.3	1.2	2.8	0.10	4.2	7.0	3.9	4.3
90	0.2	0.6	0.3	1.0	2.2	0.08	3.5	5.5	3.3	3.4
95	0.2	0.6	0.2	0.9	1.7	0.06	3.0	4.4	2.8	2.6
100	0.2	0.5	0.2	0.7	1.4	0.05	2.5	3.8	2.4	2.3
105	0.2	0.4	0.2	0.6	1.3	0.04	2.1	3.3	2.1	2.0
110	0.1	0.4	0.2	0.5	1.2	0.04	1.9	3.0	1.9	1.9

Cells are shaded grey where the predicted process contribution is above 1% of EAL for long-term average periods and 10% for short-term average periods.

Table 5.2.2 Maximum Predicted Process Contributions as a Percentage of the Relevant EAL at each Stack Height Modelled – Short-term IED Concentration Limits

	Percentage of Environmental Assessment Level (%)						
Environmental Assessment Level ($\mu g.m^{-3}$)	**50**	**750**	**200**	**10000**	**350**	**125**	**266**
Height (m)	**90.41st percentile daily mean PM_{10}**	**Maximum hourly HCl**	**99.79th percentile NO_2**	**Maximum 8-hour running CO**	**99.73rd percentile hourly mean SO_2**	**99.18th percentile daily mean SO_2**	**99.9th percentile 15-minute mean SO_2**
80	3.0	2.7	16.8	0.2	13.2	19.4	20.3
85	2.3	1.9	13.9	0.2	11.2	15.7	17.1
90	1.9	1.7	11.1	0.2	8.8	13.0	13.6
95	1.7	1.3	8.8	0.1	7.0	11.1	10.3
100	1.4	1.3	7.5	0.1	5.8	9.4	9.2
105	1.2	1.2	6.5	0.1	5.2	8.4	8.1
110	1.1	1.1	6.1	0.1	4.8	7.4	7.5

Cells are shaded grey where the predicted process contribution is above 10% for short-term average periods.

Discussion

The results in Table 5.2.1 indicate that there are no heights below 110 m at which the impacts can be screened-out as insignificant based on the PC alone when the plant is operating at long-term IED concentration limits as the maximum predicted PC for annual-mean NO_2 is above 1% at all heights.

The ambient annual-mean NO_2 concentration adopted for the assessment is 31.7 $\mu g.m^{-3}$. When the maximum predicted PC at 90 m for the annual-mean NO_2 is added to the ambient NO_2 concentration, the total Predicted Environmental Concentration (PEC) is 31.7 + 1.4 = 33.1 $\mu g.m^{-3}$ at 90 m. This is below the EAL of 40 $\mu g.m^{-3}$ for NO_2. On that basis, and according to the EA guidance, the impacts would not be considered significant at 90 m or above.

The results in Table 5.2.2 indicate that the PC is above 10% of the EAL for SO_2 at 90 and 95 m.

The 99.18th daily-mean SO_2 baseline concentration shown in Appendix 5.3 is 8.0 $\mu g.m^{-3}$. When the maximum predicted PC at 90 m is added to the baseline concentration, the total Predicted Environmental Concentration (PEC) is 8.0 + 16.3 = 24.3 $\mu g.m^{-3}$ at 90 m. This is below the EAL of 125 $\mu g.m^{-3}$.

The 99.9th 15-minute mean SO_2 baseline concentration shown in Appendix 5.3 is 22.1 $\mu g.m^{-3}$. When the maximum predicted PC at 90m is added to the baseline concentration, the total Predicted Environmental Concentration (PEC) is 36.1 + 22.1 = 58.2 $\mu g.m^{-3}$ at 90 m. This is below the EAL of 266 $\mu g.m^{-3}$.

On that basis, and according to the EA guidance, the impacts would not be considered significant at 90 m or above

Based on the results of the detailed stack height modelling and using professional judgement, an acceptable stack height for the assessment of the WKN Proposed Development is considered to 90 m and the detailed modelling undertaken in this report assumes a 90 m high stack.

It should be noted that this is based on the information available to date. The stack height may be subject to change and may increase as the detailed design for the WKN Proposed Development continues to evolve. The stack height will be confirmed as part of the formal submission to PINS in spring 2020.

References

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

Appendix 5.3: Additional Baseline Assessment

Chapter 5 sets out the background concentrations for the key combustion-related pollutants, NO_2 and PM_{10}. This Appendix sets out the background concentrations for other pollutants emitted from the stack.

Carbon Monoxide

In the absence of any local carbon monoxide (CO) monitoring, the background annual-mean concentration has been extracted from the Defra mapped background concentration estimate for the grid square of the site. A maximum daily running 8-hour mean of 542 $\mu g.m^{-3}$ has been estimated as twice the annual-mean CO concentration in line with Environment Agency guidance [1].

Particulate Matter with a Mean Aerodynamic Diameter less than 2.5 µm ($PM_{2.5}$)

In the absence of any local monitoring of particulate matter with a mean aerodynamic diameter less than 2.5 µm ($PM_{2.5}$), the background annual-mean concentration has been extracted from the Defra mapped background concentration estimate for the grid square of the site of 10.5 $\mu g.m^{-3}$.

Sulphur Dioxide

The nearest monitoring sulphur dioxide (SO_2) monitor is located at Rochester and operated by Defra as part of the Automatic Urban Rural Network (AURN). The measured concentrations in the two most recent years are provided in Table 5.3.1. For each averaging period, the maximum measure concentration has been used in the assessment.

Table 5.3.1: Measured SO_2 Concentrations ($\mu g.m^{-3}$)

	SO_2 Concentration ($\mu g.m^{-3}$)		
Averaging Period	**2016**	**2017**	**Maximum**
15 minute (99.90th percentile)	22.14	8.22	22.14
1 hour (99.73th percentile)	15.67	6.30	15.67
24 hour (99.18th percentile)	8.00	2.96	8.00
Annual mean (1 hour)	2.10	1.17	2.10

For each averaging period, the maximum measured concentration has been used in the assessment.

Heavy Metals

The Heavy Metals Network monitors the concentrations in air, and the deposition rates of a range of metallic elements. The nearest monitor is located at Detling, approximately 15 km south west of the DCO site boundary. With the exception of mercury (Hg), the measured concentrations in the last full calendar year (2017) are provided in Table 5.3.2. Hg monitoring has ceased at Detling and the measurement from the most recent year of monitoring (2012) is provided instead.

Table 5.3.2: Measured Metals Concentrations (ng.m^{-3})

Group	Metal	Concentration (ng.m^{-3})
1	Cd	0.123
	Tl	-
2	Hg	0.784 (2012)
3	As	0.778
	Co	0.062
	Cr	1.321
	Cu	4.543
	Mn	3.266
	Ni	0.675
	Pb	6.128
	Sb	-
	V	0.663

Polycyclic Aromatic Hydrocarbons (PAHs)

The polycyclic aromatic hydrocarbon (PAH) network monitors ambient concentrations of PAHs at 31 sites in the UK. Gaseous and solid PAHs are monitored at Harwell. The most recent available measurements from Harwell are provided in Table 5.3.3.

Table 5.3.3: Annual-mean PAHs Concentrations (ng.m^{-3})

Site Name	2011	2012	2013	2014	Maximum
Harwell (solid and gas)	0.062	0.084	0.096	0.043	0.096

The maximum measured concentration monitored of 0.096 µg.m^{-3} has been used within the assessment.

Hydrogen Chloride (HCl)

Hydrogen chloride (HCl) is monitored as part of the Acid Gas and Aerosol Network, part of the UK Eutrophying and Acidifying Pollutants (UKEAP) Network. The nearest monitoring location is Detling. The maximum hourly-mean concentrations in the most recent years of measurements from Detling are provided in Table 5.3.4. (Note that monitoring ceased at Detling in 2016).

Table 5.3.4: Measured HCl Concentrations (µg.m^{-3}) at Detling

Site Name	2012	2013	2014	2015	Maximum
Detling	0.81	0.78	1.16	0.62	1.16

The maximum measured concentration of 1.16 µg.m^{-3} has been used within the assessment.

Hydrogen Fluoride

The Expert Panel on Air Quality Standards (EPAQS) was set up in 1991 to provide independent advice on air quality issues. In 2005 it published a draft report entitled 'Guidelines for halogen and hydrogen halides in ambient air for protecting human health against acute irritancy effects' [2]. The report noted that only a small number of measurements of ambient concentrations of hydrogen fluoride have been made in the UK. All of these have been made in the vicinity of three industrial plants. Many samples were below the limit of detection; however, measurable values were in the range 0.05 to 3.5 $\mu g.m^{-3}$ as approximate monthly averages. The report concluded that it would be reasonable to expect maximum 1 hour mean hydrogen fluoride concentrations to reach about 2.46 $\mu g.m^{-3}$ at rural sites exposed to coal-fired power station plumes.

Polychlorinated Biphenyls (PCBs)

PCB concentration data are currently available from five sites in the UK that form the Toxic Organic Micropollutants (TOMPS) network. The closest site urban background site is Nobel House in London. Table 5.3.5 present the most recent available years of monitoring data at London for PCBs [3].

Table 5.3.5: Annual-Mean Concentrations ($pg.m^{-3}$) of Polychlorinated Biphenyls

Site Name	2012	2013	2014	2015	2016	Average
Nobel House	83.2	83.2	107.0	111.3	118.9	100.7

The average annual-mean concentration of PCBs of 100.7 $pg.m^{-3}$ has been used within the assessment.

Dioxins and Furans

Dioxins and Furans concentration data from the TOMPS network Nobel House site are provided in Table 5.3.6.

Table 5.3.6: Annual-Mean Concentrations ($fg.m^{-3}$) of Dioxins and Furans

Site Name	2012	2013	2014	2015	2016	Average
Nobel House	15.5	3.5	2.9	5.5	24.3	10.3

The average annual-mean concentration of dioxins and furans of 10.3 $fg.m^{-3}$ has been used within the assessment.

Ammonia (NH_3)

NH_3 is monitored as part of the Ammonia Network, part of the UKEAP Network. The nearest monitoring location is Detling. The maximum hourly-mean concentrations in the most recent years of measurements from Detling are provided in Table 5.3.7.

Table 5.3.7: Measured NH_3 Concentrations ($\mu g.m^{-3}$) at Detling

Site Name	2014	2015	2016	2017	Maximum
Detling	0.98	0.96	1.11	0.90	0.99

The maximum measured concentration of 0.99 $\mu g.m^{-3}$ has been used within the assessment.

References

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

2 Expert Panel on Air Quality Standards: guidelines for halogen and hydrogen halides in ambient air for protecting human health against acute irritancy effects. Draft consultation document. Defra 2005 Available at http://www.defra.gov.uk/corporate/consult/airqual-halogen/index.htm

3 http://www.defra.gov.uk/evidence/statistics/environment/airqual/download/xls/aqtb29.xls

Appendix 5.4: Assessment of Ecological Impacts

The following European designated nature conservation sites, within 10 km of the Application Site, have been identified:

- The Swale Special Protection Area (SPA);
- The Swale Ramsar;
- Medway Estuary and Marshes SPA;
- Medway Estuary and Marshes Ramsar;
- Thames Estuary and Marshes SPA;
- Thames Estuary and Marshes Ramsar;
- Queensdown Warren Special Area of Conservation (SAC); and
- Outer Thames Estuary SPA.

The following nationally designated sites, within 2 km of the Application Site, have also been identified:

- The Swale Site of Special Scientific Interest (SSSI);
- Milton Creek Local Wildlife Site (LWS); and.
- Elmley National Nature Reserve (NNR).

For information, the Medway Estuary and Marshes SSSI is 2.9 km from the Application Site (i.e. more than 2 km away) and has been excluded from the assessment. The Swale Marine Conservation Zone (MCZ) has also been excluded as there is no requirement to assess air quality impacts at waterbodies/MCZs.

Approach

This approach to this assessment considers the IAQM '*A guide to the assessment of air quality impacts on designated nature conservation sites'.* Concentrations of NOx, SO_2 and ammonia have been predicted using the same model as used in the assessment of impacts at human-health receptors. Modelling has been undertaken for a grid of receptor points, with a grid spacing of 200 m, across each identified nature conservation site. The receptor grid points have been modelled at ground level. To ensure that the assessment is conservative, the maximum PC for WKN and K3 (0 – 75MW) the K3 Proposed Development at each site and for all the meteorological datasets has been identified and is presented in this Appendix.

Critical Levels

Critical level are the concentrations of an air pollutant above which adverse effects on ecosystems may occur based on present knowledge. They are specified within relevant European air quality directives and corresponding UK air quality regulations. PCs and, where appropriate, PECs of NOx, SO_2 and NH_3 have been calculated for comparison with the relevant critical level. Background concentrations at each designated site have been derived from the UK Air Pollution Information System (APIS) database [1].

Critical Loads

Critical loads 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. Nutrient nitrogen deposition and acid deposition are considered in this Appendix.

Critical Loads – Nutrient N Deposition

Percentage contributions to nutrient nitrogen deposition have been derived from the modelled NOx concentrations. Deposition rates have been calculated using empirical methods recommended by the Environment Agency, as follows:

1. The dry deposition flux ($\mu g.m^{-2}.s^{-1}$) has been calculated by multiplying the ground level NO_2 concentrations ($\mu g.m^{-3}$) by the deposition velocity of 0.003 $m.s^{-1}$ for forests/tall habitats and 0.0015 $m.s^{-1}$ for grassland/short habitats.

2. Units of $\mu g.m^{-2}.s^{-1}$ have been converted to units of $kg.ha^{-1}.year^{-1}$ by multiplying the dry deposition flux by the standard conversion factor of 96 for NOx.

3. Predicted contributions to nitrogen deposition have been calculated and compared with the relevant critical load range for the habitat types associated with the designated site. These have been derived from the APIS database.

Critical Loads – Acidification

The acid deposition rate, in equivalents $keq.ha^{-1}.year^{-1}$, has been calculated by multiplying the dry deposition flux ($kg.ha^{-1}.year^{-1}$) by a conversion factor of 0.071428 for N. This takes into account the degree to which a chemical species is acidifying, calculated as the proportion of N within the molecule.

Wet deposition in the near field is not significant compared with dry deposition for N [2] and therefore for the purposes of this assessment, wet deposition has not been considered.

Predicted contributions to acid deposition have been calculated and compared with the minimum critical load function for the habitat types associated with the designated site as derived from the APIS database.

Significance Criteria

Maximum PCs and PECs of NO_x, SO_2, NH_3 and N/acid deposition have been compared against the relevant critical levels/loads for the relevant habitat type/interest feature. The Environment Agency on-line risk guidance [3] provides a step-wise approach to assessing the significance of effects at nature conservation sites. It states that:

"If emissions that affect SPAs, SACs, Ramsar sites or SSSIs meet both of the following criteria, they're insignificant - you don't need to assess them any further:

- *the short-term PC is less than 10% of the short-term environmental standard for protected conservation areas*
- *the long-term PC is less than 1% of the long-term environmental standard for protected conservation areas*

If you don't meet these requirements you need to calculate the PEC and check the PEC against the standard for protected conservation areas.

You don't need to calculate PEC for short-term targets.

If your short-term PC exceeds the screening criteria, you need to do detailed modelling.

If your long-term PC is greater than 1% and your PEC is less than 70% of the long-term environmental standard, the emissions are insignificant – you don't need to assess them any further.

If your PEC is greater than 70% of the long-term environmental standard, you need to do detailed modelling."

The IAQM's '*A guide to the assessment of air quality impacts on designated nature conservation sites'* states that *"The Environment Agency risk assessment guidance states that if the PEC is less than 70% of the long-term criterion it can be deemed to be insignificant, regardless of the PC. For some pollutants (nitrogen deposition, in particular) background values are high over much of the UK and it is unlikely there will be many occasions where the PEC is less than 70%. Also, this was intended to be a trigger for detailed dispersion modelling. It is not intended to be a damage threshold."*

The Environment Agency on-line risk guidance continues by stating that:

"At the detailed modelling stage there are no criteria to determine whether:

- *PCs are significant*
- *PECs are insignificant or significant*

You must explain how you judged significance and base this on the site specific circumstances"

This Appendix presents the results of detailed modelling at each of the sites. In this case, the emission is considered not significant if the PC does not exceed 1% of relevant critical level/load (or 100% at local designations). With reference to the definition of critical levels and critical loads above, the emission is considered not significant if the PEC does not exceed 100% of the relevant critical level/load. Otherwise, the impact is considered *potentially* significant. Where *potentially* significant impacts have been identified, the impacts have been passed to the project's ecologist to allow the significance of the likely effect to be determined.

Results

The ambient NO_x, SO_2 and NH_3 concentrations and existing deposition rates have been obtained from APIS. The highest deposition rates have been obtained taking into account the various habitats across the sites. The lowest critical loads for nitrogen deposition and acid deposition have been also obtained from APIS [4].

The maximum predicted annual-mean NO_x, SO_2 and NH_3 concentrations are compared with the critical level in Tables 5.4.1, 5.4.2 and 5.4.3. The maximum predicted nutrient N deposition rates are compared with the critical load in Table 5.4.4. The maximum predicted acid deposition rates are compared with the critical load

function in Table 5.4.5. Only Queendown Warren is sensitive to acid deposition and the other designated sites have not been presented in this table.

For the Outer Thames Estuary SPA, APIS describes the habitat as *inshore sublittoral sediment*, which provides wintering for the red-throated diver. APIS states that this habitat is not sensitive to increases in NOx, SO_2 or NH_3 concentrations, nitrogen deposition or acid deposition. As such, this site has not been considered further in the assessment.

Table 5.4.1 Predicted Annual-Mean NOx Concentrations at Designated Sites

Designated Site	CL ($\mu g.m^{-3}$)	AC ($\mu g.m^{-3}$)	WKN + K3 PC ($\mu g.m^{-3}$)	WKN + K3 PC/CL (%)	WKN + K3 PEC ($\mu g.m^{-3}$)	WKN + K3 PEC as % of CL ($\mu g.m^{-3}$)
The Swale SPA/Ramsar/SSSI	30	12.3	4.0	13	16.3	54
Medway Estuary and Marshes SPA/Ramsar		24.4	0.4	1	24.8	83
Thames Estuary and Marshes SPA/Ramsar		18.3	0.1	0	18.4	61
Queendown Warren SAC		18.7	0.2	1	18.9	63
Elmley NNR		12.3	4.0	13	16.3	54
Milton Creek LWS		12.3	1.6	5	13.9	46

Table 5.4.2 Predicted Annual-Mean SO_2 Concentrations at Designated Sites

Designated Site	CL ($\mu g.m^{-3}$)	AC ($\mu g.m^{-3}$)	WKN + K3 PC ($\mu g.m^{-3}$)	WKN + K3 PC/CL (%)	WKN + K3 PEC ($\mu g.m^{-3}$)	WKN + K3 PEC as % of CL ($\mu g.m^{-3}$)
The Swale SPA/Ramsar/SSSI	20	0.29	1.00	5	1.29	6
Medway Estuary and Marshes SPA/Ramsar		0.36	0.10	0	0.46	2
Thames Estuary and Marshes SPA/Ramsar		0.32	0.03	0	0.35	2
Queendown Warren SAC		0.34	0.04	0	0.38	2
Elmley NNR		0.29	1.00	5	1.29	6
Milton Creek LWS		0.29	0.40	2	0.69	3

Table 5.4.3 Predicted Annual-Mean NH_3 Concentrations at Designated Sites

Designated Site	CL ($\mu g.m^{-3}$)	AC	WKN + K3 PC ($\mu g.m^{-3}$)	WKN + K3 PC/CL (%)	WKN + K3 PEC ($\mu g.m^{-3}$)	WKN + K3 PEC/CL (%)
The Swale SPA/Ramsar/SSSI	3	0.88	0.100	3	0.98	33
Medway Estuary and Marshes SPA/Ramsar		0.77	0.010	0	0.78	26

Thames Estuary and Marshes SPA/Ramsar		0.76	0.003	0	0.76	25
Queendown Warren SAC		1.01	0.004	0	1.01	34
Elmley NNR		0.88	0.100	3	0.98	33
Milton Creek LWS		0.88	0.040	1	0.92	31

Notes:
The Swale SPA, Medway Estuary and Marshes SPA and Thames Estuary and Marshes SPA all cover the same geographical areas as the corresponding Ramsar and SSSI designations. Therefore, the values set out in Tables 5.4.1 to 5.4.3 represent the pollutant concentrations at all of these sites. Elmley NNR is within The Swale SPA/Ramsar/SSSI. APIS does not provide data for NNRs so the ambient concentrations and critical levels/loads have been assumed to be the same as The Swale SPA. Milton Creek LWS is an extension of the Swale SPA and the project's ecologist has advised that the same habitats, ambient concentrations and critical levels/loads apply.
Consistent with the Institute of Air Quality Management's *"A guide to the assessment of air quality impacts on designated nature conservation sites"* [5], the PC as a % of the CL has been rounded to the nearest integer.

Table 5.4.4 Predicted Nutrient N Deposition at Designated Sites

Designated Site	Interest Feature	CL ($kgN.ha^{-1}.yr^{-1}$)	AC ($kgN.ha^{-1}.yr^{-1}$)	WKN + K3 PC ($kgN.ha^{-1}.yr^{-1}$)	WKN + K3 PC/CL (%)	WKN + K3 PEC ($kgN.ha^{-1}.yr^{-1}$)	WKN + K3 PEC/CL (%)
The Swale SPA	Breeding Lapwing	20	14.2	1.09	5	15.29	76
	Ringed plover	20	14.2	1.09	5	15.29	76
	Eurasian reed warbler	30	14.2	1.09	4	15.29	51
	Eurasian curlew	20	14.2	1.09	5	15.29	76
	Reed bunting	30	14.2	1.09	4	15.29	51
	Dark-bellied brent goose	20	14.2	1.09	5	15.29	76
	Common shelduck	20	14.2	1.09	5	15.29	76
	Eurasian teal	20	14.2	1.09	5	15.29	76
	Mallard	Not available	14.2	1.09	-	15.29	-
	Common moorhen	Not available	9.8	1.09	-	10.87	-
	Gadwall	Not available	9.8	1.09	-	10.87	-
	Grey plover	20	14.2	1.09	5	15.29	76
	Dunlin	20	14.2	1.09	5	15.29	76
	Common coot	Not available	9.8	1.09	-	10.87	-
	Common redshank	20	14.2	1.09	5	15.29	76
	Eurasian oystercatcher	20	14.2	1.09	5	15.29	76

Designated Site	Interest Feature	CL ($kgN.ha^{-1}.yr^{-1}$)	AC ($kgN.ha^{-1}.yr^{-1}$)	WKN + K3 PC ($kgN.ha^{-1}.yr^{-1}$)	WKN + K3 PC/CL (%)	WKN + K3 PEC ($kgN.ha^{-1}.yr^{-1}$)	WKN + K3 PEC/CL (%)
Medway Estuary and Marshes SPA	Common tern	30	13.2	0.11	0	13.32	44
	Red-throated diver	Not sensitive	10.8	0.11	-	10.94	-
	Eurasian curlew	20	13.2	0.11	1	13.32	67
	Common greenshank	20	13.2	0.11	1	13.32	67
	Little tern	30	13.2	0.11	0	13.32	44
	Hen harrier	30	13.2	0.11	0	13.32	44
	Merlin	30	13.2	0.11	0	13.32	44
	Ringed plover	20	13.2	0.11	1	13.32	67
	Short-eared owl	10	Not available	0.11	1	-	-
	Great crested grebe	20	13.2	0.11	1	13.32	67
	Great cormorant	Not available	13.2	0.11	-	13.32	-
	Dark-bellied brent goose	20	13.2	0.11	1	13.32	67
	Eurasian teal	20	13.2	0.11	1	13.32	67
	Mallard	20	13.2	0.11	1	13.32	67
	Northern shoveler	Not available	13.2	0.11	-	13.32	-
	Common shelduck	20	13.2	0.11	1	13.32	67
	Eurasian wigeon	20	13.2	0.11	1	13.32	67
	Northern pintail	20	13.2	0.11	1	13.32	67
	Common pochard	20	13.2	0.11	1	13.32	67
	Eurasian oystercatcher	20	13.2	0.11	1	13.32	67
	Pied avocet	20	13.2	0.11	1	13.32	67
	Grey plover	20	13.2	0.11	1	13.32	67
	Red knot	20	13.2	0.11	1	13.32	67
	Dunlin	20	13.2	0.11	1	13.32	67
	Black-tailed godwit	20	13.2	0.11	1	13.32	67
	Common redshank	20	13.2	0.11	1	13.32	67
	Ruddy turnstone	20	13.2	0.11	1	13.32	67
	Tundra swan	Not sensitive	13.2	0.11	-	13.32	-
	Common kingfisher	Not available	10.8	0.11	-	10.94	-

Designated Site	Interest Feature	CL ($kgN.ha^{-1}.yr^{-1}$)	AC ($kgN.ha^{-1}.yr^{-1}$)	WKN + K3 PC ($kgN.ha^{-1}.yr^{-1}$)	WKN + K3 PC/CL (%)	WKN + K3 PEC ($kgN.ha^{-1}.yr^{-1}$)	WKN + K3 PEC/CL (%)
Thames Estuary and Marshes SPA	Ringed plover	8	12.1	0.03	0	12.08	151
	Hen harrier	30	12.1	0.03	0	12.08	40
	Pied avocet	20	12.1	0.03	0	12.08	60
	Grey plover	20	12.1	0.03	0	12.08	60
	Red knot	20	12.1	0.03	0	12.08	60
	Dunlin	20	12.1	0.03	0	12.08	60
	Black-tailed godwit	20	12.1	0.03	0	12.08	60
	Common redshank	20	12.1	0.03	0	12.08	60
Queendown Warren SAC	Semi-natural dry grasslands and scrubland facies on calcareous substrates	15	15.4	0.04	0	15.44	103
The Swale Ramsar/SSSI	Intertidal habitats (coastal saltmarsh)	20	14.2	1.09	5	15.29	76
	Saltmarsh (coastal saltmarsh)	20	14.2	1.09	5	15.29	76
	Shingle & sea cliff (dunes, shingle & machair)	10	14.2	1.09	11	15.29	153
	Arable (horticultural & arable)	Not sensitive	-	-	-	-	-
	Standing water (standing open water)	No CL	-	-	-	-	-
	Waste land, industrial (no corresponding APIS	Not sensitive	-	-	-	-	-
Medway Estuary and Marshes Ramsar	Intertidal habitats (coastal saltmarsh)	20	13.2	0.11	1	13.32	67
	Saltmarsh (coastal saltmarsh)	20	13.2	0.11	1	13.32	67
	Shingle & sea cliff (dunes, shingle & machair)	10	13.2	0.11	1	13.32	133
	Wet grassland (grazing marsh)	20	13.2	0.11	1	13.32	67
	Dry grassland (grazing marsh)	20	13.2	0.11	1	13.32	67
	Bogs, marshes, fens (fen, marsh & swamp)	30	13.2	0.11	0	13.32	44
	Standing water (standing open water)	No CL	-	0.05	-	-	-
	Intertidal habitats (coastal saltmarsh)	20	13.2	0.11	1	13.32	67
Thames Estuary and Marshes Ramsar	Intertidal habitats (coastal saltmarsh)	20	12.1	0.03	0	12.08	60
	Saltmarsh (coastal saltmarsh)	20	12.1	0.03	0	12.08	60
	Shingle & sea cliff (dunes, shingle & machair)	10	12.1	0.03	0	12.08	121
	Wet grassland (grazing marsh)	20	12.1	0.03	0	12.08	60
	Dry grassland (grazing marsh)	20	12.1	0.03	0	12.08	60

Designated Site	Interest Feature	CL ($kgN.ha^{-1}.yr^{-1}$)	AC ($kgN.ha^{-1}.yr^{-1}$)	WKN + K3 PC ($kgN.ha^{-1}.yr^{-1}$)	WKN + K3 PC/CL (%)	WKN + K3 PEC ($kgN.ha^{-1}.yr^{-1}$)	WKN + K3 PEC/CL (%)
	Bogs, marshes, fens (fen, marsh & swamp)	30	12.1	0.03	0	12.08	40
	Standing water (standing open water)	No CL	-	0.02	-	-	-
Elmley NNR	Breeding Lapwing	20	14.2	1.09	5	15.29	76
	Ringed plover	20	14.2	1.09	5	15.29	76
	Eurasian reed warbler	30	14.2	1.09	4	15.29	51
	Eurasian curlew	20	14.2	1.09	5	15.29	76
	Reed bunting	30	14.2	1.09	4	15.29	51
	Dark-bellied brent goose	20	14.2	1.09	5	15.29	76
	Common shelduck	20	14.2	1.09	5	15.29	76
	Eurasian teal	20	14.2	1.09	5	15.29	76
	Mallard	Not available	14.2	1.09	-	15.29	-
	Common moorhen	Not available	9.8	1.09	-	10.87	-
	Gadwall	Not available	9.8	1.09	-	10.87	-
	Grey plover	20	14.2	1.09	5	15.29	76
	Dunlin	20	14.2	1.09	5	15.29	76
	Common coot	Not available	9.8	1.09	-	10.87	-
	Common redshank	20	14.2	1.09	5	15.29	76
	Eurasian oystercatcher	20	14.2	1.09	5	15.29	76
	Intertidal habitats (coastal saltmarsh)	20	14.2	1.09	5	15.29	76
	Saltmarsh (coastal saltmarsh)	20	14.2	1.09	5	15.29	76
	Arable (horticultural & arable)	Not sensitive	-	1.09	-	-	-
	Standing water (standing open water)	No CL	-	1.09	-	-	-
	Waste land, industrial (no corresponding APIS	Not sensitive	-	1.09	-	-	-
Milton Creek LWS	Breeding Lapwing	20	14.2	0.44	2	14.64	73
	Ringed plover	20	14.2	0.44	2	14.64	73
	Eurasian reed warbler	30	14.2	0.44	1	14.64	49
	Eurasian curlew	20	14.2	0.44	2	14.64	73
	Reed bunting	30	14.2	0.44	1	14.64	49
	Dark-bellied brent goose	20	14.2	0.44	2	14.64	73

Designated Site	Interest Feature	CL ($kgN.ha^{-1}.yr^{-1}$)	AC ($kgN.ha^{-1}.yr^{-1}$)	WKN + K3 PC ($kgN.ha^{-1}.yr^{-1}$)	WKN + K3 PC/CL (%)	WKN + K3 PEC ($kgN.ha^{-1}.yr^{-1}$)	WKN + K3 PEC/CL (%)
	Common shelduck	20	14.2	0.44	2	14.64	73
	Eurasian teal	20	14.2	0.44	2	14.64	73
	Mallard	Not available	14.2	0.44	-	14.64	-
	Common moorhen	Not available	9.8	0.44	-	10.22	-
	Gadwall	Not available	9.8	0.44	-	10.22	-
	Grey plover	20	14.2	0.44	2	14.64	73
	Dunlin	20	14.2	0.44	2	14.64	73
	Common coot	Not available	9.8	0.44	-	10.22	-
	Common redshank	20	14.2	0.44	2	14.64	73
	Eurasian oystercatcher	20	14.2	0.44	2	14.64	73
	Intertidal habitats (coastal saltmarsh)	20	14.2	0.44	2	14.64	73
	Saltmarsh (coastal saltmarsh)	20	14.2	0.44	2	14.64	73
	Arable (horticultural & arable)	Not sensitive	-	0.44	-	-	-
	Standing water (standing open water)	No CL	-	0.44	-	-	-
	Waste land, industrial (no corresponding APIS	Not sensitive	-	0.44	-	-	-

Note:

Critical loads (CLs) for nutrient nitrogen deposition are provided as a range. In this case, the lower limit of the CL range has been used in the assessment.

Consistent with the Institute of Air Quality Management's *"A guide to the assessment of air quality impacts on designated nature conservation sites"* [5],, the PC as a % of the CL has been rounded to the nearest integer.

Table 5.4.5 Predicted Acid Deposition at Designated Sites

Designated Site	Interest Feature	Critical Loads (keq.ha^{-1}.yr^{-1})			WKN + K3 PC (keq.ha^{-1}.yr^{-1})		WKN + K3 PC/CLF (%)
		Min N	Max N	Max S	N	S	
Queendown Warren SAC	Semi-natural dry grasslands and scrubland facies on calcareous substrates.	0.856	4.856	4	0.003	0.004	0

Notes:
CLF = Critical Load Function.
Consistent with the Institute of Air Quality Management's *"A guide to the assessment of air quality impacts on designated nature conservation sites"* [5], the PC as a % of the CL has been rounded to the nearest integer.

Annual-mean NOx

The maximum annual-mean NO_X WKN + K3 PCs only exceeds 1% of the critical level at the Swale SPA/SSSI/Ramsar, Elmley NNR; the effects can be screened out as insignificant at the other sites. At the Swale SPA/SSSI/Ramsar and Elmley NNR, the WKN + K3 PC is 13% of the critical level and based on the PCs alone the impacts are potentially significant; however, when the AC is added to the PCs, the PECs are only 54% of the critical level of 30 $\mu g.m^{-3}$ and the impacts can be screened out as insignificant.

For Milton Creek LWS, the WKN + K3 PC is less than 100% of the critical level and the impacts can be screened out as insignificant.

Annual-mean SO_2

The maximum annual-mean SO_2 WKN + K3 PCs only exceeds 1% of the critical level at the Swale SPA/SSSI/Ramsar and Elmley NNR and the effects can be screened out as insignificant at the other sites. At the Swale SPA/SSSI/Ramsar and Elmley NNR, the WKN + K3 PC is 5% of the critical level and based on the PCs alone the impacts are potentially significant; however, when the AC is added to the PCs, the PECs are only 6% of the critical level of 20 $\mu g.m^{-3}$ and the impacts can be screened out as insignificant.

For Milton Creek LWS, the WKN + K3 PC is less than 100% of the critical level and the impacts can be screened out as insignificant.

Annual-mean NH_3

The maximum annual-mean NH_3 WKN + K3 PCs only exceeds 1% of the critical level at the Swale SPA/SSSI/Ramsar and Elmley NNR and the effects can be screened out as insignificant at the other sites. At the Swale SPA/SSSI/Ramsar and Elmley NNR the WKN + K3 PCs are 3% of the critical level and based on the PCs alone the impacts are potentially significant; however, when the AC is added to the PCs, the PECs are only 33% of the critical level of 3 $\mu g.m^{-3}$ and the impacts can be screened out as insignificant.

For Milton Creek LWS, the WKN + K3 PC is less than 100% of the critical level and the impacts can be screened out as insignificant.

Nutrient N Deposition

The maximum nitrogen deposition PC exceeds 1% of the critical load at several interest features however when the AC is added to the PC, the PECs are below the critical loads for all but one interest feature and the impacts can be screened out as insignificant.. For Shingle & sea cliff (dunes, shingle & machair), the PEC is 153% of the critical load and the impacts can't be screened out. The results have been passed to the projects' ecologist to assess the effects.

For Milton Creek LWS, the WKN + K3 PC is less than 100% of the critical load and the impacts can be screened out as insignificant.

Acid Deposition

The maximum acid deposition PC is less than 1% of the critical load and the impacts can be screened out as insignificant.

Cumulative Impacts

Section 5.13 of Chapter 5: Air Quality sets outs the cumulative developments considered for this assessment. There are four developments where there was sufficient detail to allow a PC to be added to give a cumulative PEC for ecological receptors:

- Kemsley K4 CHP PC (EN010090 (18/501923/ADJ))
- Kemsley AD (SW/11/1291)
- Reserve Power Plant PC (18/500393/FULL)
- Garden of England Energy Facility (15/500348/COUNTY)

The PCs for each of these four developments are outlined in the table below. This has been added to the maximum PEC to give a Cumulative PEC.

Table 5.4.6 Predicted Annual-Mean NO_x Concentrations at Designated Sites

Designated Site	CL ($\mu g.m^{-3}$)	AC ($\mu g.m^{-3}$)	Proposed K3 PC ($\mu g.m^{-3}$)	WKN PC ($\mu g.m^{-3}$)	Kemsley K4 CHP PC (EN010090 (18/501923/ ADJ))	Kemsley AD (SW/11/1 291)	Reserve Power Plant PC (18/500393/ FULL)	Garden of England Energy Facility (15/500348/ COUNTY)	Cumulati ve PC	Cum ulativ e PC as % of CL	Cu mul ativ e PE C	Cumulati ve PEC as % of CL
The Swale SPA/Ramsar/SSSI	30	12.3	2.0	2.0	0.8	1.38	2.23	1.33	9.7	32	22.0	73
Medway Estuary and Marshes SPA/Ramsar		24.4	0.2	0.2	0.1	0.05	-	0.11	0.6	2	25.1	84
Thames Estuary and Marshes SPA/Ramsar		18.3	0.1	0.1	0.1	0.01	-	0.02	0.3	1	18.5	62
Queendown Warren SAC		18.7	0.1	0.1	0.1	0.01	-	0.02	0.2	1	19.0	63
Elmley NNR		12.3	2.0	2.0	0.8	1.38	2.23	1.33	9.7	32	22.0	73
Milton Creek LWS		12.3	0.9	0.7	0.8	1.38	2.23	1.33	7.3	24	19.7	66

Table 5.4.7 Predicted Annual-Mean SO_2 Concentrations at Designated Sites

Designated Site	CL ($\mu g.m^{-3}$)	AC ($\mu g.m^{-3}$)	Proposed K3 PC ($\mu g.m^{-3}$)	WKN PC ($\mu g.m^{-3}$)	Kemsley K4 CHP PC (EN010090 (18/501923 /ADJ))	Kemsley AD (SW/11/ 1291)	Reserve Power Plant PC (18/500393 /FULL)	Garden of England Energy Facility (15/500348/C OUNTY)	Cumulative PC	Cumulative PC as % of CL	Cumulative PEC	Cumulative PEC as % of CL
The Swale SPA/Ramsar/SSSI/	20	0.29	0.50	0.50	-	-	-	0.066	1.06	5	1.35	7
Medway Estuary and Marshes SPA/Ramsar		0.36	0.04	0.05	-	-	-	0.0053	0.10	1	0.46	2
Thames Estuary and Marshes SPA/Ramsar		0.32	0.01	0.02	-	-	-	0.001	0.03	0	0.35	2
Queendown Warren SAC		0.34	0.02	0.02	-	-	-	0.001	0.04	0	0.38	2
Elmley NNR		0.29	0.50	0.50	-	-	-	0.066	1.06	5	1.35	7
Milton Creek LWS		0.29	0.23	0.17	-	-	-	0.066	0.47	2	0.76	4

Table 5.4.8 Predicted Annual-Mean NH_3 Concentrations at Designated Sites

Designated Site	CL ($\mu g.m^{-3}$)	AC ($\mu g.m^{-3}$)	Proposed K3 PC ($\mu g.m^{-3}$)	WKN ($\mu g.m^{-3}$)	Kemsley K4 CHP PC (EN010090 (18/501923 /ADJ))	Kemsley AD (SW/11/ 1291)	Reserve Power Plant PC (18/500393/ FULL)	Garden of England Energy Facility (15/500348/C OUNTY)	Cumulative PC	Cumulative PC as % of CL	Cumulative PEC	Cumulative PEC as % of CL
The Swale SPA/Ramsar/SSSI	3	0.88	0.05	0.050	-	-	-	0.33	0.430	14	1.31	44
Medway Estuary and Marshes SPA/Ramsar		0.77	<0.005	0.005	-	-	-	0.026	0.036	1	0.81	27
Thames Estuary and Marshes SPA/Ramsar		0.76	<0.005	0.002	-	-	-	0.005	0.008	0	0.77	26
Queendown Warren SAC		1.01	<0.005	0.002	-	-	-	0.005	0.009	0	1.02	34

Elmley NNR		0.88	0.05	0.050	-	-	-	0.33	0.430	14	1.31	44
Milton Creek LWS		0.88	0.02	0.017	-	-	-	0.33	0.370	12	1.25	42

Notes:
The Swale SPA, Medway Estuary and Marshes SPA and Thames Estuary and Marshes SPA all cover the same geographical areas as the corresponding Ramsar and SSSI designations. Therefore, the values set out in Table 5.4.6, 5.4.7 and 5.4.8 represent the concentrations at all of these sites. Elmley NNR is within The Swale SPA/Ramsar/SSSI. APIS does not provide data for NNRs so the ambient concentrations and critical levels/loads have been assumed to be the same as The Swale SPA.
Consistent with the Institute of Air Quality Management's *"A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites"*, the PC as a % of the CL has been rounded to the nearest integer.

Table 5.4.9 Predicted Nutrient N Deposition at Designated Sites

Designated Site	Interest Feature	CL (kgN.ha^{-1}.yr^{-1})	AC (kgN.ha^{-1}.yr^{-1})	Proposed K3 PC (kgN.ha^{-1}.yr^{-1})	WKN PC (kgN.ha^{-1}.yr^{-1})	Kemsley K4 CHP PC (EN010090 (18/501923/ADJ))	Kemsley AD (SW/11/1291)	Reserve Power Plant PC (18/500393/FULL)	Garden of England Energy Facility (15/500348/COUNTY)	Cumulative PC (kgN.ha^{-1}.yr^{-1})	Cumulative PC/CL (%)	Cumulative PEC (kgN.ha^{-1}.yr^{-1})	Cumulative PEC/CL (%)
The Swale SPA	Breeding Lapwing	20	14.2	0.55	0.55	0.1	0.0142	1.92	1.9	5.0	25	19.2	96
	Ringed plover	20	14.2	0.55	0.55	0.1	0.0142	1.92	1.9	5.0	25	19.2	96
	Eurasian reed warbler	30	14.2	0.55	0.55	0.1	0.0142	1.92	1.9	5.0	17	19.2	64
	Eurasian curlew	20	14.2	0.55	0.55	0.1	0.0142	1.92	1.9	5.0	25	19.2	96
	Reed bunting	15	14.2	0.55	0.55	0.1	0.0142	1.92	1.9	5.0	17	19.2	64
	Dark-bellied brent goose	20	14.2	0.55	0.55	0.1	0.0142	1.92	1.9	5.0	25	19.2	96
	Common shelduck	20	14.2	0.55	0.55	0.1	0.0142	1.92	1.9	5.0	25	19.2	96
	Eurasian teal	20	14.2	0.55	0.55	0.1	0.0142	1.92	1.9	5.0	25	19.2	96
	Mallard	Not available	14.2	0.55	0.55	0.1	0.0142	1.92	1.9	5.0	-	19.2	-

Designated Site	Interest Feature	CL (kgN.ha^{-1}.yr^{-1})	AC (kgN.ha^{-1}.yr^{-1})	Proposed K3 PC (kgN.ha^{-1}.yr^{-1})	WKN PC (kgN.ha^{-1}.yr^{-1})	Kemsley K4 CHP PC (EN010090 (18/501923/ADJ))	Kemsley AD (SW/11/1291)	Reserve Power Plant PC (18/500393/FULL)	Garden of England Energy Facility (15/500348/COUNTY)	Cumulative PC (kgN.ha^{-1}.yr^{-1})	Cumulative PC/CL (%)	Cumulative PEC (kgN.ha^{-1}.yr^{-1})	Cumulative PEC/CL (%)
	Common moorhen	Not available	9.8	0.55	0.55	0.1	0.0142	1.92	1.9	5.0	-	14.8	-
	Gadwall	Not available	9.8	0.55	0.55	0.1	0.0142	1.92	1.9	5.0	-	14.8	-
	Grey plover	20	14.2	0.55	0.55	0.1	0.0142	1.92	1.9	5.0	25	19.2	96
	Dunlin	20	14.2	0.55	0.55	0.1	0.0142	1.92	1.9	5.0	25	19.2	96
	Common coot	Not available	9.8	0.55	0.55	0.1	0.0142	1.92	1.9	5.0	-	14.8	-
	Common redshank	20	14.2	0.55	0.55	0.1	0.0142	1.92	1.9	5.0	25	19.2	96
	Eurasian oystercatcher	20	14.2	0.55	0.55	0.1	0.0142	1.92	1.9	5.0	25	19.2	96
Medway Estuary and Marshes SPA	Common tern	30	13.2	0.05	0.06	0.01	0.0005	-	0.19	0.3	1	13.5	45
	Red-throated diver	Not sensitive	10.8	0.05	0.06	0.01	0.0005	-	0.19	0.3	-	11.1	-
	Eurasian curlew	20	13.2	0.05	0.06	0.01	0.0005	-	0.19	0.3	2	13.5	68
	Common greenshank	20	13.2	0.05	0.06	0.01	0.0005	-	0.19	0.3	2	13.5	68
	Little tern	30	13.2	0.05	0.06	0.01	0.0005	-	0.19	0.3	1	13.5	45
	Hen harrier	30	13.2	0.05	0.06	0.01	0.0005	-	0.19	0.3	1	13.5	45
	Merlin	30	13.2	0.05	0.06	0.01	0.0005	-	0.19	0.3	1	13.5	45

Designated Site	Interest Feature	CL (kgN.ha^{-1}.yr^{-1})	AC (kgN.ha^{-1}.yr^{-1})	Proposed K3 PC (kgN.ha^{-1}.yr^{-1})	WKN PC (kgN.ha^{-1}.yr^{-1})	Kemsley K4 CHP PC (EN010090 (18/501923/ADJ))	Kemsley AD (SW/11/1291)	Reserve Power Plant PC (18/500393/FULL)	Garden of England Energy Facility (15/500348/COUNTY)	Cumulative PC (kgN.ha^{-1}.yr^{-1})	Cumulative PC/CL (%)	Cumulative PEC (kgN.ha^{-1}.yr^{-1})	Cumulative PEC/CL (%)
	Ringed plover	20	13.2	0.05	0.06	0.01	0.0005	-	0.19	0.3	2	13.5	68
	Short-eared owl	10	Not available	0.05	0.06	0.01	0.0005	-	0.19	0.3	3	-	-
	Great crested grebe	20	13.2	0.05	0.06	0.01	0.0005	-	0.19	0.3	2	13.5	68
	Great cormorant	Not available	13.2	0.05	0.06	0.01	0.0005	-	0.19	0.3	-	13.5	-
	Dark-bellied brent goose	20	13.2	0.05	0.06	0.01	0.0005	-	0.19	0.3	2	13.5	68
	Eurasian teal	20	13.2	0.05	0.06	0.01	0.0005	-	0.19	0.3	2	13.5	68
	Mallard	20	13.2	0.05	0.06	0.01	0.0005	-	0.19	0.3	2	13.5	68
	Northern shoveler	Not available	13.2	0.05	0.06	0.01	0.0005	-	0.19	0.3	-	13.5	-
	Common shelduck	20	13.2	0.05	0.06	0.01	0.0005	-	0.19	0.3	2	13.5	68
	Eurasian wigeon	20	13.2	0.05	0.06	0.01	0.0005	-	0.19	0.3	2	13.5	68
	Northern pintail	20	13.2	0.05	0.06	0.01	0.0005	-	0.19	0.3	2	13.5	68
	Common pochard	20	13.2	0.05	0.06	0.01	0.0005	-	0.19	0.3	2	13.5	68
	Eurasian oystercatcher	20	13.2	0.05	0.06	0.01	0.0005	-	0.19	0.3	2	13.5	68
	Pied avocet	20	13.2	0.05	0.06	0.01	0.0005	-	0.19	0.3	2	13.5	68
	Grey plover	20	13.2	0.05	0.06	0.01	0.0005	-	0.19	0.3	2	13.5	68

Designated Site	Interest Feature	CL (kgN.ha^{-1}.yr^{-1})	AC (kgN.ha^{-1}.yr^{-1})	Proposed K3 PC (kgN.ha^{-1}.yr^{-1})	WKN PC (kgN.ha^{-1}.yr^{-1})	Kemsley K4 CHP PC (EN010090 (18/501923/ADJ))	Kemsley AD (SW/11/1291)	Reserve Power Plant PC (18/500393/FULL)	Garden of England Energy Facility (15/500348/COUNTY)	Cumulative PC (kgN.ha^{-1}.yr^{-1})	Cumulative PC/CL (%)	Cumulative PEC (kgN.ha^{-1}.yr^{-1})	Cumulative PEC/CL (%)
	Red knot	20	13.2	0.05	0.06	0.01	0.0005	-	0.19	0.3	2	13.5	68
	Dunlin	20	13.2	0.05	0.06	0.01	0.0005	-	0.19	0.3	2	13.5	68
	Black-tailed godwit	20	13.2	0.05	0.06	0.01	0.0005	-	0.19	0.3	2	13.5	68
	Common redshank	20	13.2	0.05	0.06	0.01	0.0005	-	0.19	0.3	2	13.5	68
	Ruddy turnstone	20	13.2	0.05	0.06	0.01	0.0005	-	0.19	0.3	2	13.5	68
	Tundra swan	Not sensitive	13.2	0.05	0.06	0.01	0.0005	-	0.19	0.3	-	13.5	-
	Common kingfisher	Not available	10.8	0.05	0.06	0.01	0.0005	-	0.19	0.3	-	11.1	-
Thames Estuary and Marshes SPA	Ringed plover	8	12.1	0.02	0.02	0.01	0.0001	-	0.03	0.1	1	12.1	152
	Hen harrier	30	12.1	0.02	0.02	0.01	0.0001	-	0.03	0.1	0	12.1	40
	Pied avocet	20	12.1	0.02	0.02	0.01	0.0001	-	0.03	0.1	0	12.1	61
	Grey plover	20	12.1	0.02	0.02	0.01	0.0001	-	0.03	0.1	0	12.1	61
	Red knot	20	12.1	0.02	0.02	0.01	0.0001	-	0.03	0.1	0	12.1	61
	Dunlin	20	12.1	0.02	0.02	0.01	0.0001	-	0.03	0.1	0	12.1	61
	Black-tailed godwit	20	12.1	0.02	0.02	0.01	0.0001	-	0.03	0.1	0	12.1	61
	Common redshank	20	12.1	0.02	0.02	0.01	0.0001	-	0.03	0.1	0	12.1	61
Queendown	Semi-natural dry grasslands and	15	15.4	0.02	0.02	0.01	0.0001	-	0.03	0.1	1	15.5	103

Designated Site	Interest Feature	CL (kgN.ha^{-1}.yr^{-1})	AC (kgN.ha^{-1}.yr^{-1})	Proposed K3 PC (kgN.ha^{-1}.yr^{-1})	WKN PC (kgN.ha^{-1}.yr^{-1})	Kemsley K4 CHP PC (EN010090 (18/501923/ADJ))	Kemsley AD (SW/11/1291)	Reserve Power Plant PC (18/500393/FULL)	Garden of England Energy Facility (15/500348/COUNTY)	Cumulative PC (kgN.ha^{-1}.yr^{-1})	Cumulative PC/CL (%)	Cumulative PEC (kgN.ha^{-1}.yr^{-1})	Cumulative PEC/CL (%)
Warren SAC	scrubland facies on calcareous substrates												
The Swale Ramsar/ SSSI	Intertidal habitats (coastal saltmarsh)	20	14.2	0.55	0.55	0.1	0.0174	1.92	1.87	5.0	25	19.2	96
	Saltmarsh (coastal saltmarsh)	20	14.2	0.55	0.55	0.1	0.0174	1.92	1.87	5.0	25	19.2	96
	Shingle & sea cliff (dunes, shingle & machair)	10	14.2	0.55	0.55	0.1	0.0174	1.92	1.87	5.0	50	19.2	192
	Arable (horticultural & arable)	Not sensitive	14.2	0.55	0.55	0.1	0.0174	1.92	1.87	3.9	-	3.9	-
	Standing water (standing open water)	No CL	14.2	0.55	0.55	0.1	0.0174	1.92	1.87	3.9	-	3.9	-
	Waste land, industrial (no corresponding APIS habitat)	Not sensitive	14.2	0.55	0.55	0.1	0.0174	1.92	1.87	3.9	-	3.9	-
Medway Estuary and Marshes Ramsar	Intertidal habitats (coastal saltmarsh)	20	13.2	0.05	0.06	0.01	0.0007	-	0.19	0.3	2	13.5	68
	Saltmarsh (coastal saltmarsh)	20	13.2	0.05	0.06	0.01	0.0007	-	0.19	0.3	2	13.5	68
	Shingle & sea cliff (dunes, shingle & machair)	10	13.2	0.05	0.06	0.01	0.0007	-	0.19	0.3	3	13.5	135
	Wet grassland (grazing marsh)	20	13.2	0.05	0.06	0.01	0.0007	-	0.19	0.3	2	13.5	68

Designated Site	Interest Feature	CL (kgN.ha^{-1}.yr^{-1})	AC (kgN.ha^{-1}.yr^{-1})	Proposed K3 PC (kgN.ha^{-1}.yr^{-1})	WKN PC (kgN.ha^{-1}.yr^{-1})	Kemsley K4 CHP PC (EN010090 (18/501923/ADJ))	Kemsley AD (SW/11/1291)	Reserve Power Plant PC (18/500393/FULL)	Garden of England Energy Facility (15/500348/COUNTY)	Cumulative PC (kgN.ha^{-1}.yr^{-1})	Cumulative PC/CL (%)	Cumulative PEC (kgN.ha^{-1}.yr^{-1})	Cumulative PEC/CL (%)
	Dry grassland (grazing marsh)	20	13.2	0.05	0.06	0.01	0.0007	-	0.19	0.3	2	13.5	68
	Bogs, marshes, fens (fen, marsh & swamp)	30	13.2	0.05	0.06	0.01	0.0007	-	0.19	0.3	1	13.5	45
	Standing water (standing open water)	No CL	13.2	0.05	0.06	0.01	0.0007	-	0.19	0.2	-	0.2	-
	Intertidal habitats (coastal saltmarsh)	20	13.2	0.05	0.06	0.01	0.0007	-	0.19	0.3	2	13.5	68
Thames Estuary and Marshes Ramsar	Intertidal habitats (coastal saltmarsh)	20	12.1	0.02	0.02	0.01	0.0002	-	0.03	0.1	0	12.1	61
	Saltmarsh (coastal saltmarsh)	20	12.1	0.02	0.02	0.01	0.0002	-	0.03	0.1	0	12.1	61
	Shingle & sea cliff (dunes, shingle & machair)	10	12.1	0.02	0.02	0.01	0.0002	-	0.03	0.1	1	12.1	121
	Wet grassland (grazing marsh)	20	12.1	0.02	0.02	0.01	0.0002	-	0.03	0.1	0	12.1	61
	Dry grassland (grazing marsh)	20	12.1	0.02	0.02	0.01	0.0002	-	0.03	0.1	0	12.1	61
	Bogs, marshes, fens (fen, marsh & swamp)	30	12.1	0.02	0.02	0.01	0.0002	-	0.03	0.1	0	12.1	40
	Standing water (standing open water)	No CL	12.1	0.02	0.02	0.01	0.002	-	0.03	0.1	-	0.1	-
Elmley NNR	Breeding Lapwing	20	14.2	0.55	0.55	0.1	0.0142	1.92	1.87	5.0	25	19.2	96
	Ringed plover	20	14.2	0.55	0.55	0.1	0.0142	1.92	1.87	5.0	25	19.2	96
	Eurasian reed warbler	30	14.2	0.55	0.55	0.1	0.0142	1.92	1.87	5.0	17	19.2	64

Designated Site	Interest Feature	CL (kgN.ha^{-1}.yr^{-1})	AC (kgN.ha^{-1}.yr^{-1})	Proposed K3 PC (kgN.ha^{-1}.yr^{-1})	WKN PC (kgN.ha^{-1}.yr^{-1})	Kemsley K4 CHP PC (EN010090 (18/501923/ADJ))	Kemsley AD (SW/11/1291)	Reserve Power Plant PC (18/500393/FULL)	Garden of England Energy Facility (15/500348/COUNTY)	Cumulative PC (kgN.ha^{-1}.yr^{-1})	Cumulative PC/CL (%)	Cumulative PEC (kgN.ha^{-1}.yr^{-1})	Cumulative PEC/CL (%)
	Eurasian curlew	20	14.2	0.55	0.55	0.1	0.0142	1.92	1.87	5.0	25	19.2	96
	Reed bunting	30	14.2	0.55	0.55	0.1	0.0142	1.92	1.87	5.0	17	19.2	64
	Dark-bellied brent goose	20	14.2	0.55	0.55	0.1	0.0142	1.92	1.87	5.0	25	19.2	96
	Common shelduck	20	14.2	0.55	0.55	0.1	0.0142	1.92	1.87	5.0	25	19.2	96
	Eurasian teal	20	14.2	0.55	0.55	0.1	0.0142	1.92	1.87	5.0	25	19.2	96
	Mallard	Not available	14.2	0.55	0.55	0.1	0.0142	1.92	1.87	5.0	-	19.2	-
	Common moorhen	Not available	9.78	0.55	0.55	0.1	0.0142	1.92	1.87	5.0	-	14.8	-
	Gadwall	Not available	9.78	0.55	0.55	0.1	0.0142	1.92	1.87	5.0	-	14.8	-
	Grey plover	20	14.2	0.55	0.55	0.1	0.0142	1.92	1.87	5.0	25	19.2	96
	Dunlin	20	14.2	0.55	0.55	0.1	0.0142	1.92	1.87	5.0	25	19.2	96
	Common coot	Not available	9.78	0.55	0.55	0.1	0.0142	1.92	1.87	5.0	-	14.8	-
	Common redshank	20	14.2	0.55	0.55	0.1	0.0142	1.92	1.87	5.0	25	19.2	96
	Eurasian oystercatcher	20	14.2	0.55	0.55	0.1	0.0142	1.92	1.87	5.0	25	19.2	96
	Intertidal habitats (coastal saltmarsh)	20	14.2	0.55	0.55	0.1	0.0174	1.92	1.87	5.0	25	19.2	96

Designated Site	Interest Feature	CL (kgN.ha^{-1}.yr^{-1})	AC (kgN.ha^{-1}.yr^{-1})	Proposed K3 PC (kgN.ha^{-1}.yr^{-1})	WKN PC (kgN.ha^{-1}.yr^{-1})	Kemsley K4 CHP PC (EN010090 (18/501923/ADJ))	Kemsley AD (SW/11/1291)	Reserve Power Plant PC (18/500393/FULL)	Garden of England Energy Facility (15/500348/COUNTY)	Cumulative PC (kgN.ha^{-1}.yr^{-1})	Cumulative PC/CL (%)	Cumulative PEC (kgN.ha^{-1}.yr^{-1})	Cumulative PEC/CL (%)
	Saltmarsh (coastal saltmarsh)	20	14.2	0.55	0.55	0.1	0.0174	1.92	1.87	5.0	25	19.2	96
	Arable (horticultural & arable)	Not sensitive	0	0.55	0.55	0.1	-	1.92	1.87	5.0	-	5.0	-
	Standing water (standing open water)	No CL	0	0.55	0.55	0.1	-	1.92	1.87	5.0	-	5.0	-
	Waste land, industrial (no corresponding APIS habitat)	Not sensitive	0	0.55	0.55	0.1	-	1.92	1.87	5.0	-	5.0	-
Milton Creek LWS	Breeding Lapwing	20	14.2	0.25	0.19	0.1	0.0142	1.92	1.87	4.3	22	18.5	93
	Ringed plover	20	14.2	0.25	0.19	0.1	0.0142	1.92	1.87	4.3	22	18.5	93
	Eurasian reed warbler	30	14.2	0.25	0.19	0.1	0.0142	1.92	1.87	4.3	14	18.5	62
	Eurasian curlew	20	14.2	0.25	0.19	0.1	0.0142	1.92	1.87	4.3	22	18.5	93
	Reed bunting	30	14.2	0.25	0.19	0.1	0.0142	1.92	1.87	4.3	14	18.5	62
	Dark-bellied brent goose	20	14.2	0.25	0.19	0.1	0.0142	1.92	1.87	4.3	22	18.5	93
	Common shelduck	20	14.2	0.25	0.19	0.1	0.0142	1.92	1.87	4.3	22	18.5	93
	Eurasian teal	20	14.2	0.25	0.19	0.1	0.0142	1.92	1.87	4.3	22	18.5	93
	Mallard	Not available	14.2	0.25	0.19	0.1	0.0142	1.92	1.87	4.3	-	18.5	-

Designated Site	Interest Feature	CL (kgN.ha^{-1}.yr^{-1})	AC (kgN.ha^{-1}.yr^{-1})	Proposed K3 PC (kgN.ha^{-1}.yr^{-1})	WKN PC (kgN.ha^{-1}.yr^{-1})	Kemsley K4 CHP PC (EN010090 (18/501923/ADJ))	Kemsley AD (SW/11/1291)	Reserve Power Plant PC (18/500393/FULL)	Garden of England Energy Facility (15/500348/COUNTY)	Cumulative PC (kgN.ha^{-1}.yr^{-1})	Cumulative PC/CL (%)	Cumulative PEC (kgN.ha^{-1}.yr^{-1})	Cumulative PEC/CL (%)
	Common moorhen	Not available	9.78	0.25	0.19	0.1	0.0142	1.92	1.87	4.3	-	14.1	-
	Gadwall	Not available	9.78	0.25	0.19	0.1	0.0142	1.92	1.87	4.3	-	14.1	-
	Grey plover	20	14.2	0.25	0.19	0.1	0.0142	1.92	1.87	4.3	22	18.5	93
	Dunlin	20	14.2	0.25	0.19	0.1	0.0142	1.92	1.87	4.3	22	18.5	93
	Common coot	Not available	9.78	0.25	0.19	0.1	0.0142	1.92	1.87	4.3	-	14.1	-
	Common redshank	20	14.2	0.25	0.19	0.1	0.0142	1.92	1.87	4.3	22	18.5	93
	Eurasian oystercatcher	20	14.2	0.25	0.19	0.1	0.0142	1.92	1.87	4.3	22	18.5	93
	Intertidal habitats (coastal saltmarsh)	20	14.2	0.25	0.19	0.1	0.0174	1.92	1.87	4.3	22	18.5	93
	Saltmarsh (coastal saltmarsh)	20	14.2	0.25	0.19	0.1	0.0174	1.92	1.87	4.3	22	18.5	93
	Arable (horticultural & arable)	Not sensitive	14.2	0.25	0.19	0.1	-	1.92	1.87	4.3	-	18.5	-
	Standing water (standing open water)	No CL	14.2	0.25	0.19	0.1	-	1.92	1.87	4.3	-	18.5	-
	Waste land, industrial (no corresponding APIS habitat)	Not sensitive	14.2	0.25	0.19	0.1	-	1.92	1.87	4.3	-	18.5	-

Note:

Critical loads (CLs) for nutrient nitrogen deposition are provided as a range. In this case, the lower limit of the CL range has been used in the assessment unless advised otherwise by the project's ecologist.

Consistent with the Institute of Air Quality Management's *"A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites"*, the PC as a % of the CL has been rounded to the nearest integer.

Table 5.4.10 Predicted Acid Deposition at Designated Sites

Designated Site	Interest Feature	Critical Loads (keq.ha^{-1}.yr^{-1})			Proposed K3 PC (keq.ha^{-1}.yr^{-1})		WKN PC (keq.ha^{-1}.yr^{-1})		Kemsley K4 CHP PC (EN010090 (18/501923/ADJ))		Kemsley AD (SW/11/1291)		Reserve Power Plant PC (18/500393/FULL)		Garden of England Energy Facility (15/500348/COUNTY)		Cumulative PC		PC as % of CLF (%)
		Min N	Max N	Max S	N	S	N	S	N	S	N	S	N	S	N	S	N	S	
Queendown Warren SAC	Semi-natural dry grasslands and scrubland facies on calcareous substrates.	0.856	4.856	4	0.001	0.002	0.002	0.002	0.0005	-	0.0001	-	-	-	0.001	-	0.005	0.004	0

Notes:

CLF = Critical Load Function.

Kemsley K4, Kemsley AD and the Reserve Power Plant do not emit SO_2 and so do not have PCs for S. For the Garden of England Energy Facility the breakdown of PC between N and S was not provided so has been assumed to be all S.

Consistent with the Institute of Air Quality Management's *"A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites"*, the PC as a % of the CL has been rounded to the nearest integer.

Annual-mean NOx

The maximum annual-mean NO_X cumulative PC only exceeds 1% of the critical level at the Swale SPA/SSSI/Ramsar, the Medway Estuary & Marshes SPA/Ramsar and Elmley NNR; the effects can be screened out as insignificant at the other sites. At the Swale SPA/SSSI/Ramsar & Elmley NNR and the Medway Estuary & Marshes SPA/Ramsar the cumulative PC is 32 and 2% of the critical level and based on the cumulative PCs alone the impact is potentially significant; however, when the AC is added to the PCs, the cumulative PECs are only 73 and 84% of the critical level of 30 $\mu g.m^{-3}$ and the impacts can be screened out as insignificant.

For Milton Creek LWS, the cumulative PC is less than 100% of the critical level and the impacts can be screened out as insignificant.

Annual-mean SO_2

The maximum annual-mean SO_2 cumulative PC only exceeds 1% of the critical level at the Swale SPA/SSSI/Ramsar and Elmley NNR and the effects can be screened out as insignificant at the other sites. At the Swale SPA/SSSI/Ramsar and Elmley NNR the cumulative PCs are 5% of the critical level and based on the cumulative PCs alone the impacts are potentially significant; however, when the AC is added to the PCs, the cumulative PECs are only 7% of the critical level of 20 $\mu g.m^{-3}$ and the impacts can be screened out as insignificant.

For Milton Creek LWS, the cumulative PC is less than 100% of the critical level and the impacts can be screened out as insignificant.

Annual-mean NH_3

The maximum annual-mean NH_3 cumulative PC only exceeds 1% of the critical level at the Swale SPA/SSSI/Ramsar and Elmley NNR and the effects can be screened out as insignificant at the other sites. At the Swale SPA/SSSI/Ramsar and Elmley NNR the cumulative PCs are 14% of the critical level and based on the cumulative PCs alone the impacts are potentially significant; however, when the AC is added to the PCs, the cumulative PECs are only 44% of the critical level of 3 $\mu g.m^{-3}$ and the impacts can be screened out as insignificant.

For Milton Creek LWS, the cumulative PC is less than 100% of the critical level and the impacts can be screened out as insignificant.

Nutrient N Deposition

The maximum nitrogen deposition cumulative PC does not exceed 1% of the critical load for a number of interest features and the effects can be screened out as insignificant. Where the cumulative PC

exceeds 1% of the critical load, the impact is potentially significant; however if the cumulative PEC is less than the CL, the impacts can be screened out as insignificant. For Shingle & sea cliff (dunes, shingle & machair) at The Swale SSSI/Ramsar, the cumulative PC exceeds 1% of the CL and the cumulative PEC exceeds the CL and the impacts are potentially significant. The results have been passed to the projects' ecologist to assess the effects in Chapter 11.

For Milton Creek LWS, the cumulative PC is less than 100% of the critical level and the impacts can be screened out as insignificant.

Acid Deposition

The maximum acid deposition cumulative PC does not exceed 1% of the critical load at Queendown Warren SAC and the impacts can be screened out as insignificant.

Cumulative Impacts at Sensitive Receptors

The above assessment does not consider the impacts of cumulative traffic as the areas of maximum impact will be different for stack and traffic emissions. Traffic emissions have been modelled at a selection of discrete receptor points at the closest point of the habitat site to a road adjacent to roads affected by the WKN and K3 proposed development. Only the Swale SPA/SSSI/Ramsar and the Medway Estuary and Marshes SPA/Ramsar are within 200 m of a road affected by the WKN and K3 proposed development.

The A249 passes through the Medway Estuary and Marshes SPA/Ramsar so receptors were selected at the roadside.

Cumulative traffic data for the WKN and K3 Proposed Development in the opening year of WKN, 2024 was modelled. The PC from the WKN and K3 stack emissions at each of the sensitive receptors was added to the road contribution to give a 'WKN + K3' PC that considers both stack and traffic emissions. To calculate the cumulative PEC, the maximum PCs for the developments in Table 5.4.5 were added to the highest AC for each habitat site and the WKN + K3 PC. These were compared with the lowest CL for each habitat site. The results are presented in Table 5.5.13 and 5.5.14.

Table 5.4.13 Cumulative NOx Predicted Environmental Concentrations – Sensitive Receptors

Habitat Site	WKN + K3 Proposed Development + Other cumulative developments Road Contribution ($\mu g.m^{-3}$)	WKN + K3 PC (stack emissions) ($\mu g.m^{-3}$)	WKN + K3 Proposed Development + Other cumulative developments PC as % of CL	Kemsley K4 CHP PC (EN010090 (18/501923/ADJ))	Kemsley AD (SW/11/1291)	Reserve Power Plant PC (18/500393/FULL)	Garden of England Energy Facility (15/500348/COUNTY)	Cumulative PEC ($\mu g.m^{-3}$)	Cumulative PEC as % of CL
The Swale SPA/SSSI/Ramsar	3.23	0.84	14	0.80	1.69	2.23	1.33	22.41	75
Medway Estuary and Marshes SPA/Ramsar	1.03	0.37	5	0.10	0.07	0.00	0.11	26.08	87

*Critical level is 30 $\mu g.m^{-3}$

Table 5.4.14 Cumulative N Deposition Predicted Process Contributions – Sensitive Receptors

Habitat Site	WKN + K3 PC (Traffic and Stack Emissions) ($kgN.ha^{-1}.yr^{-1}$)	Minimum CL	WKN + K3 PC as % of CL (Traffic and Stack Emissions) ($kgN.ha^{-1}.yr^{-1}$)	Kemsley K4 CHP PC (EN010090 (18/501923/ADJ))	Kemsley AD (SW/11/1291)	Reserve Power Plant PC (18/500393/FULL)	Garden of England Energy Facility (15/500348/COUNTY)	Cumulative PEC ($kgN.ha^{-1}.yr^{-1}$)	Cumulative PEC as % of CL
The Swale SPA/SSSI/Ramsar	0.41	15	3	0.1	0.0174	1.92	1.87	18.52	123
Medway Estuary and Marshes SPA/Ramsar	0.14	8	2	0.01	0.0007	-	0.19	13.55	169

For NOx, the cumulative PC as % of the CL exceeds 1% but, the PEC is less than the CL. On that basis, the cumulative effects are considered insignificant.

For N deposition the cumulative PC as % of the CL exceed 1% and the PEC is greater than CL and the impacts are potentially significant. The results have been passed to the projects' ecologist to assess the effects.

The cumulative PECs presented in Tables 5.4.13 and 5.4.14 can be considered highly conservative as the PCs from the other developments are the maximum impacts across a grid and are unlikely to occur at the same location as the maximum road contribution.

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1 Air Pollution Information Systems, www.apis.ac.uk

2 Approaches to modelling local nitrogen deposition and concentrations in the context of Natura 2000 - Topic 4

3 Air emissions risk assessment for your environmental permit

4 Data downloaded from APIS December 2017

5 IAQM *A guide to the assessment of air quality impacts on designated nature conservation sites*

Appendix 5.5: Traffic-Related Emissions

Methodology

Atmospheric Dispersion Modelling of Pollutant Concentrations

1.1 The ADMS-Roads model has been used in this assessment to predict the air quality impacts from changes in traffic on the local road network. This is a version of the Atmospheric Dispersion Modelling System (ADMS), a formally validated model developed in the UK by Cambridge Environmental Research Consultants Ltd (CERC) and widely used in the UK and internationally for regulatory purposes.

Model Input Data

Traffic Flow Data

1.2 Traffic data used in the assessment have been provided by the project's transport consultants, RPS. The traffic flow data provided for this assessment are summarised in Tables 5.5.1 to 5.5.4. The modelled road links are illustrated in Figure 5.2.

Table 5.5.1 Traffic Data Used Within the Assessment – WKN (Construction), 2021

Road Link Name	Speed ($km.hr^{-1}$)	Daily Two Way Vehicle Flow			
		Without Development		With Development	
		LDV	HDV	LDV	HDV
1 - Swale Way East of B2005 Grovehurst Roundabout	64.07	17091	3363	17905	3448
2 - Barge Way North of Swale Roundabout	44.40	5048	2608	5861	2694
3 - Barge Way, East of Fleet End Roundabout	62.70	2353	1243	3166	1329
4 - A249 South of Swale Way Junction	112.65	34594	5429	35373	5515
5 - A249 between the A2 and M2	112.65	49361	6596	50105	6679
6 - M2 West	112.65	62603	7440	62828	7492
7 - M2 East	112.65	58084	5378	58195	5384
8 - Swale Way north of Reams Way Junction	54.07	12876	1114	12876	1114

Road Link Name	Speed (km.hr^{-1})	Daily Two Way Vehicle Flow			
		Without Development		With Development	
		LDV	HDV	LDV	HDV
9 - Swale Way south of Reams Way Junction	54.96	12782	1132	12782	1132
10 - Swale Way south of Ridham Avenue Roundabout	74.19	11921	840	11921	840
11 - A249, North of Swale Way Junction	112.65	33130	2490	33130	2490

Notes: (km.hr^{-1}) = kilometres per hour

HDV = Heavy Duty Vehicle - vehicles greater than 3.5 t gross vehicle weight including buses

LDV = Light Duty Vehicle

Table 5.5.2 Traffic Data Used Within the Assessment – WKN (Operational), 2024

Road Link Name	Speed (km.hr^{-1})	Daily Two Way Vehicle Flow			
		Without Development		With Development	
		LDV	HDV	LDV	HDV
1 - Swale Way East of B2005 Grovehurst Roundabout	64.07	17091	3363	17166	3599
2 - Barge Way North of Swale Roundabout	44.40	5048	2608	5122	2846
3 - Barge Way, East of Fleet End Roundabout	62.70	2353	1243	2428	1481
4 - A249 South of Swale Way Junction	112.65	34594	5429	34665	5663
5 - A249 between the A2 and M2	112.65	49361	6596	49429	6833
6 - M2 West	112.65	62603	7440	62623	7565
7 - M2 East	112.65	58084	5378	58094	5400
8 - Swale Way north of Reams Way Junction	54.07	12876	1114	12877	1124
9 - Swale Way south of Reams Way Junction	54.96	12782	1132	12783	1142

Road Link Name	Speed ($km.hr^{-1}$)	Daily Two Way Vehicle Flow			
		Without Development		With Development	
		LDV	HDV	LDV	HDV
10 - Swale Way south of Ridham Avenue Roundabout	74.19	11921	840	11921	849
11 - A249, North of Swale Way Junction	112.65	33130	2490	33132	2499

Notes: ($km.hr^{-1}$) = kilometres per hour
HDV = Heavy Duty Vehicle - vehicles greater than 3.5 t gross vehicle weight including buses
LDV = Light Duty Vehicle

Table 5.5.3 Traffic Data Used Within the Assessment – WKN (Construction Phase) + K3 (Operation) + Cumulative Developments, 2021

Road Link Name	Speed ($km.hr^{-1}$)	Daily Two Way Vehicle Flow			
		Without Development		With Development	
		LDV	HDV	LDV	HDV
1 - Swale Way East of B2005 Grovehurst Roundabout	64.07	17447	3444	18260	3594
2 - Barge Way North of Swale Roundabout	44.40	5048	2682	5861	2833
3 - Barge Way, East of Fleet End Roundabout	62.70	2353	1318	3166	1468
4 - A249 South of Swale Way Junction	112.65	34934	5510	35714	5659
5 - A249 between the A2 and M2	112.65	49686	6676	50431	6824
6 - M2 West	112.65	62701	7488	62926	7581
7 - M2 East	112.65	58133	5385	58244	5403
8 - Swale Way north of Reams Way Junction	54.07	13233	1122	13233	1131
9 - Swale Way south of Reams Way Junction	54.96	13139	1140	13139	1149
10 - Swale Way south of Ridham Avenue Roundabout	74.19	11940	847	11940	857

Road Link Name	Speed ($km.hr^{-1}$)	Daily Two Way Vehicle Flow			
		Without Development		With Development	
		LDV	HDV	LDV	HDV
11 - A249, North of Swale Way Junction	112.65	33131	2491	33131	2500

Notes: ($km.hr^{-1}$) = kilometres per hour
HDV = Heavy Duty Vehicle - vehicles greater than 3.5 t gross vehicle weight including buses
LDV = Light Duty Vehicle

Table 5.5.4 Traffic Data Used Within the Assessment – WKN (Operational) + K3 (Operational) + Cumulative Developments, 2024

Road Link Name	Speed ($km.hr^{-1}$)	Daily Two Way Vehicle Flow			
		Without Development		With Development	
		LDV	HDV	LDV	HDV
1 - Swale Way East of B2005 Grovehurst Roundabout	64.07	17164	3372	17238	3672
2 - Barge Way North of Swale Roundabout	44.40	5048	2608	5122	2911
3 - Barge Way, East of Fleet End Roundabout	62.70	2353	1243	2428	1546
4 - A249 South of Swale Way Junction	112.65	35975	5495	36047	5792
5 - A249 between the A2 and M2	112.65	52023	6677	52091	6980
6 - M2 West	112.65	63288	7475	63308	7641
7 - M2 East	112.65	58261	5406	58271	5440
8 - Swale Way north of Reams Way Junction	54.07	12949	1124	12949	1143
9 - Swale Way south of Reams Way Junction	54.96	12855	1142	12855	1161
10 - Swale Way south of Ridham Avenue Roundabout	74.19	11993	849	11994	868

Road Link Name	Speed ($km.hr^{-1}$)	Daily Two Way Vehicle Flow			
		Without Development		With Development	
		LDV	HDV	LDV	HDV
11 - A249, North of Swale Way Junction	112.65	33635	2490	33637	2509

Notes: ($km.hr^{-1}$) = kilometres per hour
HDV = Heavy Duty Vehicle - vehicles greater than 3.5 t gross vehicle weight including buses
LDV = Light Duty Vehicle

1.3 The average speed on each road has been reduced by 10 $km.hr^{-1}$ to take into account the possibility of slow moving traffic near junctions and at roundabouts in accordance with LAQM.TG16.

Vehicle Emission Factors

1.4 The modelling has been undertaken using Defra's 2017 emission factor toolkit (version 8.0) which draws on emissions generated by the European Environment Agency (EEA) COPERT 5 emission calculation tool.

1.5 Emission factors for 2021 have been used for the traffic data shown in Table 5.5.1 and 5.5.3.

1.6 Emission factors for 2023, rather than 2024, have been used for the traffic data shown in Table 5.5.2 and 5.5.4. This is worse case as emissions from road vehicles are forecast to decrease over time. This is because less polluting, newer vehicles will become an increasing proportion of the traffic using the local road network.

Long-Term Pollutant Predictions

1.7 Annual-mean NO_x and PM_{10} concentrations have been predicted at representative sensitive receptors using ADMS-Roads, then added to relevant background concentrations. Primary NO in the NO_X emissions is converted to NO_2 to a degree determined by the availability of atmospheric oxidants locally and the strength of sunlight. For road traffic sources, annual-mean NO_2 concentrations have been derived from the modelled road-related annual-mean NO_x concentration using Defra's calculator [1].

Short-Term Pollutant Predictions

1.8 In order to predict the likelihood of exceedances of the hourly-mean AQS objectives for NO_2 and the daily-mean AQS objective for PM_{10}, the following relationships between the short-term and the annual-mean values at each receptor have been considered.

Hourly-Mean AQS Objective for NO_2

1.9 Research undertaken in support of LAQM.TG16 has indicated that the hourly-mean limit value and objective for NO_2 is unlikely to be exceeded at a roadside location where the annual-mean NO_2 concentration is less than 60 $\mu g.m^{-3}$. The threshold of 60 $\mu g.m^{-3}$ NO_2 has been used the guideline for considering a likely exceedance of the hourly-mean nitrogen dioxide objective.

Daily-Mean AQS Objective for PM_{10}

1.10 The number of exceedances of the daily-mean AQS objective for PM_{10} of 50 $\mu g.m^{-3}$ may be estimated using the relationship set out in LAQM.TG16:

*Number of Exceedances of Daily Mean of 50 $\mu g.m^{-3}$ = -18.5 + 0.00145 * (Predicted Annual-mean PM_{10})^3 + 206 / (Predicted Annual-mean PM_{10} Concentration)*

1.11 This relationship indicates that the daily-mean AQS objective for PM_{10} is likely to be met if the predicted annual-mean PM_{10} concentration is 31.8 $\mu g.m^{-3}$ or less.

1.12 The daily mean objective is therefore not considered further within this assessment if the annual-mean PM_{10} concentration is predicted to be less than 31.5 $\mu g.m^{-3}$.

Fugitive PM_{10} Emissions

1.13 Transport PM_{10} emissions arise from both the tailpipe exhausts and from fugitive sources such as brake and tyre wear and re-suspended road dust. Improvements in vehicle technologies are reducing PM_{10} exhaust emissions; therefore, the relative importance of fugitive PM_{10} emissions is increasing. Current official vehicle emission factors for particulate matter include brake dust and tyre wear which studies suggest may account for approximately one-third of the total particulate emissions from road transport; but not re-suspended road dust (which remains unquantified.)

Significance Criteria for Development Impacts on the Local Area

1.14 The EPUK & IAQM Land-Use Planning & Development Control: Planning For Air Quality document [**Error! Bookmark not defined.**] 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."

1.15 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 5.5.5 provides the EPUK & IAQM approach for describing the long-term air quality impacts at sensitive human-health receptors in the surrounding area.

Table 5.5.5 Impact Descriptors for Individual Sensitive Receptors

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

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.

1.16 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."*

1.17 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.

Uncertainty

1.18 All air quality assessment tools, whether models or monitoring measurements, have a degree of uncertainty associated with the results. 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).

1.19 The atmospheric dispersion model itself contributes some of this uncertainty, 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.

1.20 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 uncertainty range informed by an analysis of relevant, available data.

1.21 The atmospheric dispersion model used for this assessment, ADMS Roads, has been validated by its supplier and is widely used by professionals in the UK and overseas. A site-specific verification (calibration) provides additional certainty and is particularly important when air quality levels are close to exceeding the objectives/limit values.

1.22 LAQM.TG16 requires that local authorities verify the results of any detailed modelling undertaken for the purposes of fulfilling their R&A duties. Model verification refers to the checks that are carried out on model performance at a local level. Modelled concentrations are compared with the results of monitoring. Where there is a disparity between modelled and monitored concentrations, the first step is to review the appropriateness of the data inputs to determine whether the performance of the model can be improved. Once reasonable efforts have been made to reduce the uncertainties in the data inputs, an adjustment may be established and applied to reduce any remaining disparity between modelled and monitored concentrations. No adjustment factor is deemed necessary where the modelled concentrations are within 25% of the monitored concentrations.

1.23 For the verification and adjustment of NOx/NO_2 concentrations for R&A purposes, it is recommended that the comparison involves a combination of automatic and diffusion monitoring, rather than a single automatic monitor. This is to ensure any adjustment factor derived is representative of all locations modelled and not unduly weighted towards the characteristics at a single site. Where only diffusion tubes are used for the model verification, the study should consider a broad spread of monitoring locations across the study area to provide sufficient information relating to the spatial variation in pollutant concentrations.

1.24 Local Authorities generally implement a broad spread of monitoring, particularly in areas that are known to be sensitive to changes in air quality. Consequently, Local Authorities are usually able to verify the models they use for R&A purposes; however for individual developments, there is less likely to be a broad range of monitoring locations within the relevant study area. Notwithstanding this,

a small number of monitoring locations have been identified within the study area and a model verification study has been undertaken for the proposed development and is included in the section below.

1.25 The analysis of the component uncertainties indicates 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.

Model Verification

1.26 For the verification and adjustment of NO_x/NO_2 concentrations, the LAQM.TG16 guidance recommends that the comparison considers a broad spread of automatic and diffusion monitoring. Swale Borough Council monitors roadside NO_2 concentrations passively using diffusion tubes at 14 locations in the vicinity of the Application Site.

1.27 The concentrations monitored over recent years are provided in Table 5.5.6.

Table 5.5.6 Measured Annual-mean NO_2 Concentrations ($\mu g.m^{-3}$)

Site Code	Site Name	Annual Mean NO_2 Concentration				
		2011	2012	2013	2014	2015
ZW6	Newington (3)	28.5	30.4	34.8	32.9	29.7
SW76	155 Canterbury Road	37.9	40.7	33.8	30.7	31.6
SW75	109 Canterbury Road	26.7	26.9	24.6	22.4	21.0
SW90	Jncn Canterbury Road/ Goodnestone Road	ND	ND	31.6	29.1	30.7
SW56	126 East Street	46.5	39.8	42.8	42.5	38.7
SW58	Dover Street Filling Station	36.8	31.1	28.6	39.8	33.5
SW53	114 East Street. Sittingbourne	38.8	41	33.6	34.5	33.9
SW87	Canterbury Road	ND	36	33.2	31.7	33.8
SW62	Key Street	46.5	47.5	39.9	37.1	37.2
SW66	96/94 High Street	45	39.2	40.9	42.6	36.2
SW45	64 High Street	44.4	42	40.4	41.3	39.6
SW38	15a High Street	35.4	34.7	36.4	33.4	31.4
SW37	32 High Street	40.7	41.5	36.5	36.7	31.4
SW20	Newington Co-Op	37.3	34.2	33.4	35.3	31.2

ND= No data

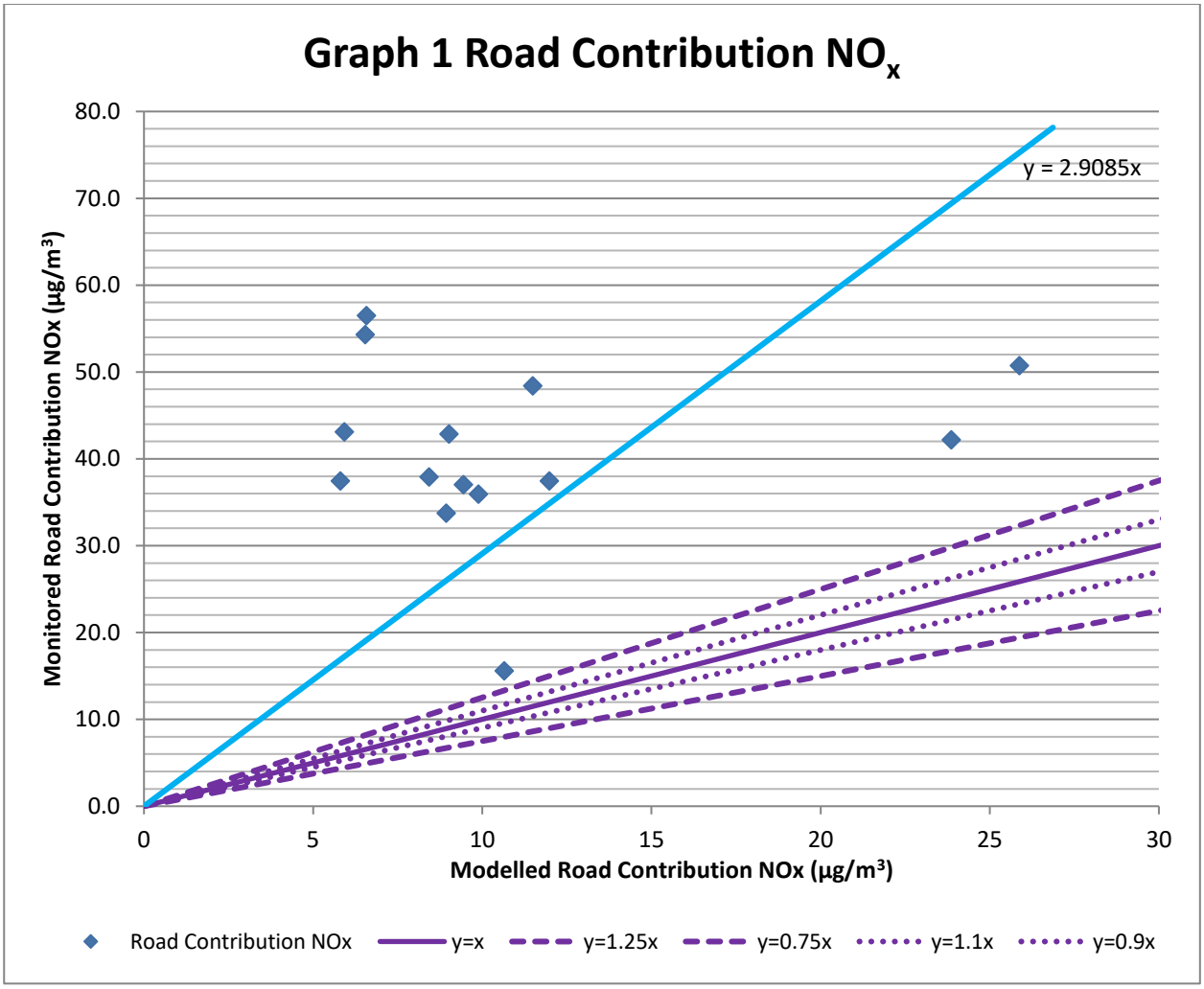
1.28 The monitored annual-mean NO_x road contributions have been derived from the monitored annual-mean NO_2 concentrations using the LAQM.TG16 calculator. The monitored annual-mean NO_x road contributions have then been compared with the modelled annual-mean NO_x road contributions. This comparison is provided in Table 5.5.7 below.

Table 5.5.7 Comparison of Monitored and Modelled Annual-mean Road NO_x Contribution ($\mu g.m^{-3}$)

Site Code	Site Name	Annual-mean Road NO_X Contribution ($\mu g.m^{-3}$)	
		Monitored	Modelled
ZW6	Newington (3)	33.7	8.9
SW76	155 Canterbury Road	37.9	8.4
SW75	109 Canterbury Road	15.6	10.6
SW90	Jncn Canterbury Road/ Goodnestone Road	35.9	9.9
SW56	126 East Street	54.3	6.5
SW58	Dover Street Filling Station	42.2	23.9
SW53	114 East Street. Sittingbourne	43.1	5.9
SW87	Canterbury Road	42.9	9.0
SW62	Key Street	50.7	25.9
SW66	96/94 High Street	48.4	11.5
SW45	64 High Street	56.5	6.6
SW38	15a High Street	37.5	12.0
SW37	32 High Street	37.5	5.8
SW20	Newington Co-Op	37.0	9.4

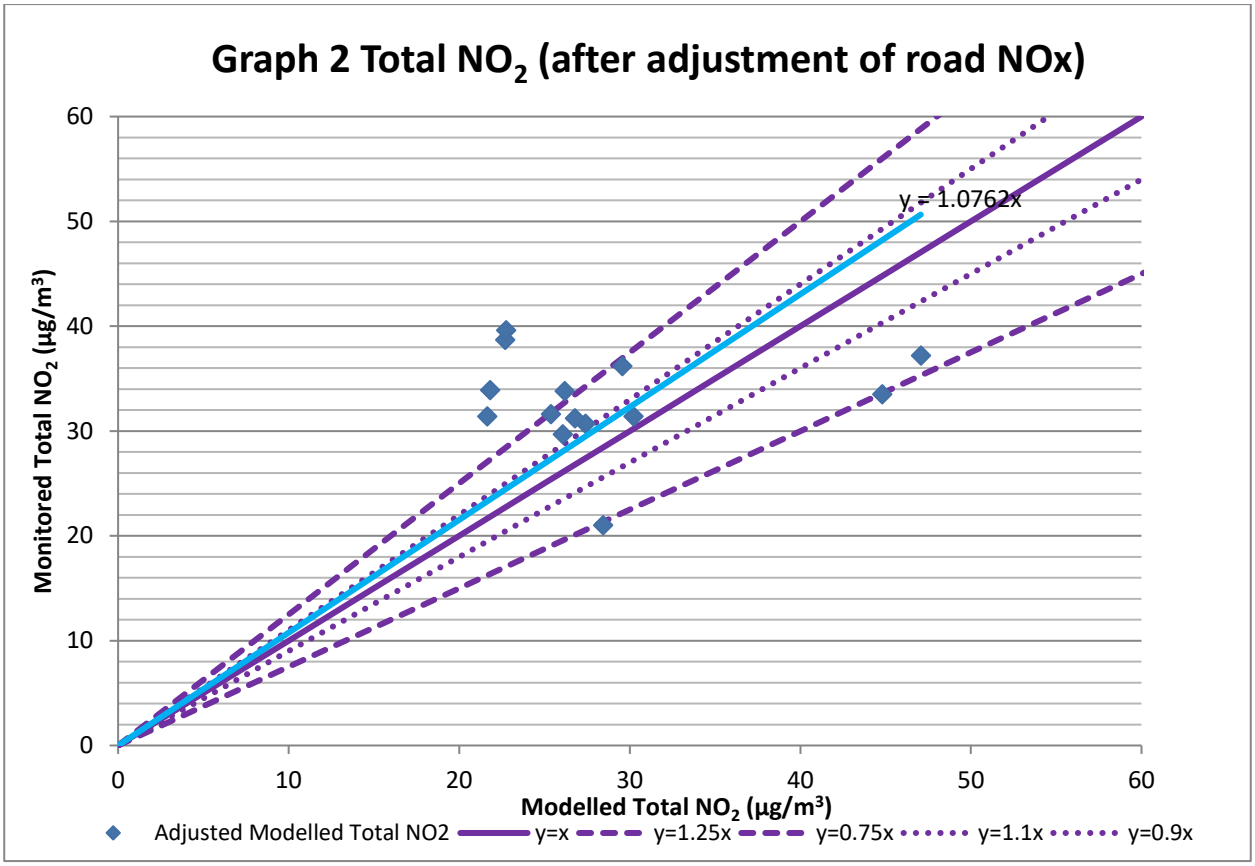
1.29 It should be borne in mind that the monitored concentrations are themselves only estimates to the true concentrations at each point; the EU Directive on air quality designates passive NO_2 samplers indicative measures with a potential uncertainty of +/-30 %. Ignoring any uncertainty errors in the monitoring results, Table 5.5.7 above indicates that the model is under-predicting at all monitoring locations.

1.30 The modelled annual-mean NO_x road contributions for the 14 concentrations have been plotted against the monitored annual-mean NO_x road contributions in Graph 1.



1.31 The modelled NO_x contributions have been multiplied by the gradient of the trend line (2.9085) to determine the corrected NO_x contributions.

1.32 Modelled annual-mean NO_2 concentrations have been derived from the corrected modelled annual-mean NO_x road contributions. The corrected modelled annual-mean NO_2 concentrations have been plotted against the monitored annual-mean NO_2 concentrations in Graph 2.



1.33 The majority of the corrected modelled annual-mean NO_2 concentrations are within 25% of the monitored annual-mean NO_2 concentrations. The correction factor therefore improves the modelled concentrations and has been applied to all predictions used within the assessment.

1.34 The fractional bias can also be used to determine whether the corrected model has a tendency to over or under-predict. The fractional bias is calculated as:

(Average Monitored NO_X Concentration – Average Predicted NO_x Concentration) / 0.5 x (Average Monitored NO_X + Average Predicted NOx Concentration)

1.35 Fractional bias values vary between +2 and -2 and has an ideal value of zero. A negative value suggests a model over-prediction and a positive value suggests a model under-prediction.

1.36 Table 5.5.8 sets out the average monitored concentration and the average predicted concentration.

Table 5.5.8 Comparison of Monitored and Adjusted Modelled Annual-mean Road NO_X Contribution ($\mu g.m^{-3}$)

Site Code	Site Code	Annual-mean Road NO_X Contribution ($\mu g.m^{-3}$)	
		Monitored	Corrected Modelled
ZW6	Newington (3)	33.7	26.0
SW76	155 Canterbury Road	37.9	24.5

Site Code	Site Code	Annual-mean Road NO_X Contribution ($\mu g.m^{-3}$)	
		Monitored	Corrected Modelled
SW75	109 Canterbury Road	15.6	31.0
SW90	Jncn Canterbury Road/ Goodnestone Road	35.9	28.8
SW56	126 East Street	54.3	19.0
SW58	Dover Street Filling Station	42.2	69.4
SW53	114 East Street. Sittingbourne	43.1	17.2
SW87	Canterbury Road	42.9	26.2
SW62	Key Street	50.7	75.2
SW66	96/94 High Street	48.4	33.4
SW45	64 High Street	56.5	19.1
SW38	15a High Street	37.5	34.8
SW37	32 High Street	37.5	16.9
SW20	Newington Co-Op	37.0	27.4
Average		**40.9**	**32.1**

1.37 The fractional bias for this study is therefore (40.9 – 32.1) / (0.5 x (40.9 + 32.1)) = 0.24. As the fractional bias is close to zero, the model is performing well.

References

1 http://laqm.defra.gov.uk/review-and-assessment/tools/tools.html

Appendix 5.6: Qualitative Odour Impact Assessment Methodology

Risk Assessment Methodology

1. The qualitative risk-ranking assessment of the odour impact of emissions from the proposed development site has been carried out using the method in the IAQM Guidance Appendix 1 (IAQM, 2014b) which provides examples of risk factors for odour source potential, pathway effectiveness and receptor sensitivity (set out in Table C.1).

Table C.1 IAQM Examples of Risk Factors for Odour Source, Pathway and Receptor

Source Odour Potential	Pathway Effectiveness	Receptor
Factors affecting the source odour potential include: • the magnitude of the odour release (taking into account odour-control measures) • how inherently odorous the compounds are • the unpleasantness of the odour	Factors affecting the odour flux to the receptor are: • distance from source to receptor the frequency (%) of winds from the source to receptor (or, qualitatively, the direction of receptors from source with respect to prevailing wind) • the effectiveness of any mitigation/control in reducing flux to the receptor • the effectiveness of dispersion/ dilution in reducing the odour flux to the receptor • topography and terrain	For the sensitivity of people to odour, the IAQM recommends that the air quality practitioner uses professional judgement to identify where on the spectrum between high and low sensitivity a receptor lies, taking into account the following general principles:
Large Source Odour Potential Magnitude – Larger Permitted processes of odorous nature or large STWs; materials usage hundreds of thousands of tonnes/m^3 per year; area sources of thousands of m^2. The compounds involved are very odorous (e.g. mercaptans), having very low Odour Detection Thresholds (ODTs) where known. Unpleasantness – processes classed as "Most offensive" in H4; or (where known) compounds/odours having unpleasant (-2) to very unpleasant (-4) hedonic score. Mitigation/control – open air operation with no containment, reliance solely on good management techniques and best practice.	**Highly Effective Pathway for Odour Flux to Receptor** Distance – receptor is adjacent to the source/site; distance well below any official set-back distances [a]. Direction – high frequency (%) of winds from source to receptor (or, qualitatively, receptors downwind of source with respect to prevailing wind). Effectiveness of dispersion/dilution - open processes with low-level releases, e.g. lagoons, uncovered effluent treatment plant, landfilling of putrescible wastes.	**High Sensitivity Receptor** - surrounding land where: • users` can reasonably expect enjoyment of a high level of amenity; and • the people would reasonably be expected to be present here continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land. Examples may include residential dwellings, hospitals, schools/education and tourist/cultural.
Medium Source Odour Potential Magnitude – smaller Permitted processes	**Moderately Effective Pathway for Odour Flux to Receptor**	**Medium Sensitivity Receptor** – surrounding land where:

Source Odour Potential	Pathway Effectiveness	Receptor
or small Sewage Treatment Works (STWs); materials usage thousands of tonnes/m^3 per year; area sources of hundreds of m^2. The compounds involved are moderately odorous. Unpleasantness – processes classed in H4 as "Moderately offensive"; or (where known) odours having neutral (0) to unpleasant (-2) hedonic score. Mitigation/control – some mitigation measures in place, but significant residual odour remains.	Distance – receptor is local to the source. Where mitigation relies on dispersion/dilution – releases are elevated, but compromised by building effects.	• users' would expect to enjoy a reasonable level of amenity, but wouldn't reasonably expect to enjoy the same level of amenity as in their home; or • people wouldn't reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land. Examples may include places of work, commercial/retail premises and playing/recreation fields.
Small Source Odour Potential Magnitude – falls below Part B threshold; materials usage hundreds of tonnes/m^3 per year; area sources of tens m^2. The compounds involved are only mildly odorous, having relatively high ODTs where known. Unpleasantness – processes classed as "Less offensive" in H4; or (where known) compounds/odours having neutral (0) to very pleasant (+4) hedonic score. Mitigation/control – effective, tangible mitigation measures in place (e.g. BAT, BPM) leading to little or no residual odour.	**Ineffective Pathway for Odour Flux to Receptor** Distance – receptor is remote from the source; distance exceeds any official set-back distances. Direction – low frequency (%) of winds from source to receptor (or, qualitatively, receptors upwind of source with respect to prevailing wind). Where mitigation relies on dispersion/ dilution – releases are from high level (e.g. stacks, or roof vents > 3 m above ridge height) and are not compromised by surrounding buildings	**Low Sensitivity Receptor** – surrounding land where: • the enjoyment of amenity would not reasonably be expected; or • there is transient exposure, where the people would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land. Examples may include industrial, farms, footpaths and roads.

Notes: [a] Minimum setback distances may be defined for some odorous activities

Source

2. The first step of this qualitative assessment is to estimate the odour-generating potential of the site activities, termed the "Source Odour Potential". This takes into account three factors:

   i. The scale (magnitude) of the release from the odour source, taking into account the effectiveness of any odour control or mitigation measures that are already in place. This involves judging the relative size of the release rate after mitigation and taking account of any pattern of release (e.g. intermittency). The assumption has been made, as required by the NPPF, that the pollution-control regimes applying to these sites will operate effectively and that the appropriate BAT standards of odour control will be enforced.

ii. How inherently odorous the emission is. In some cases it may be known whether the release has a low, medium or high odour detection threshold (ODT); this is the concentration at which an odour becomes detectable to the human nose. In most instances the odours released by a source will be a complex mixture of compounds and the detectability will not be known. However, for some industrial processes the odour will be due to one or a small number of known compounds and the detection thresholds will be a good indication of whether the release is highly odorous or mildly odorous.

iii. The relative pleasantness/unpleasantness* of the odour. Lists of relative pleasantness of different substances are given in the Environment Agency guidance H4 Odour Management (Environment Agency, 2011)

3. Using the example risk ranking in Table C.2, the Source Odour Potential can be categorised as small, medium or large.

Table C.2 H4 Offensiveness of Odour Emission Sources

Offensiveness	Odour Emission Sources
Most Offensive	Processes involving decaying animal or fish remains Processes involving septic effluent or sludge Biological landfill odours
Moderately Offensive	Intensive livestock rearing Fat frying (food processing) Sugar beet processing Well aerated green waste composting
Less Offensive	Brewery Confectionary Coffee

Pathway Effectiveness

4. Next, the effectiveness of the pollutant pathway as the transport mechanism for odour through the air to the receptor, versus the dilution/dispersion in the atmosphere, needs to be estimated. Anything that increases dilution and dispersion of the odorous pollutant plume as it travels from source (e.g. processes and plant) to receptor will reduce the concentration at the receptor, and hence reduce exposure. Important factors to consider here are:

i. The distance of sensitive receptors from the odour source.

* This can be measured in the laboratory as the hedonic tone, and when measured by the standard method and expressed on a standard nine-point scale it is termed the hedonic score.

ii. Whether these receptors are downwind (with respect to the predominant prevailing wind direction). Odour episodes often tend to occur during stable atmospheric conditions with low wind speed, which gives poor dispersion and dilution; receptors close to the source in all directions around it can be affected under these conditions. When conditions are not calm, it will be the downwind receptors that are affected. Overall therefore, receptors that are downwind with respect to the prevailing wind direction tend to be at higher risk of odour impact.

iii. The effectiveness of the point of release in promoting good dispersion, e.g. releasing the emissions from a high stack will - all other things being equal - increase the pathway, dilution and dispersion.

iv. The topography and terrain between the source and the receptor. The presence of topographical features such as hills and valleys, or urban terrain features such as buildings can affect air flow and therefore increase, or inhibit dispersion and dilution.

5. Using the example risk ranking in Table C.3, the pollutant pathway from source to receptor can be categorised as ineffective, moderately effective, or highly effective.

Odour Exposure Risk

6. In the third step, the estimates of Source Odour Potential and the Pathway Effectiveness are considered together to predict the risk of odour exposure (impact) at the receptor location, as shown by the example matrix in Table C.3.

Table C.3 Risk of Odour Exposure (Impact) at the Specific Receptor Location

		Source Odour Potential		
		Small	**Medium**	**Large**
Pathway Effectiveness	**Highly effective**	Low Risk	Medium Risk	High Risk
	Moderately effective	Negligible Risk	Low Risk	Medium Risk
	Ineffective	Negligible Risk	Negligible Risk	Low Risk

Assessment of the Effect of Odour Exposure

7. The next step is to estimate the effect of that odour impact on the exposed receptor, taking into account its sensitivity, as shown by the example matrix in Table C.4. The odour effects may range from negligible, through slight adverse and moderate adverse, up to substantial adverse.

Table C.4 Likely Magnitude of Odour Effect at the Specific Receptor Location

Risk of Odour Exposure	Receptor Sensitivity		
	Low	**Medium**	**High**
High	Slight Adverse Effect	Moderate Adverse Effect	Substantial Adverse Effect
Medium	Negligible Effect	Slight Adverse Effect	Moderate Adverse Effect
Low	Negligible Effect	Negligible Effect	Slight Adverse Effect
Negligible	Negligible Effect	Negligible Effect	Negligible Effect

8. This procedure results in a prediction of the likely odour effect at each sensitive receptor. The next step is to estimate the overall odour effect on the surrounding area, taking into account the different magnitude of effects at different receptors, and the number of receptors that experience these different effects*. This requires the competent and suitably experienced Air Quality Practitioner to apply professional judgement.

9. This procedure results in a prediction of the likely odour effect at each sensitive receptor. The next step is to estimate the overall odour effect on the surrounding area, taking into account the different magnitude of effects at different receptors, and the number of receptors that experience these different effects*. This requires the competent and suitably experienced Air Quality Practitioner to apply professional judgement.

* Unless there is only a small number of local receptors, then a representative selection of receptors will have been used in the assessment. This final stage of considering the overall effect needs to take into account how many receptors these selected ones represent.

* Unless there is only a small number of local receptors, then a representative selection of receptors will have been used in the assessment. This final stage of considering the overall effect needs to take into account how many receptors these selected ones represent.

planning
transport
design
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infrastructure

Document 3.1 – ES Volume 2

Appendix 11.2: Habitats Regulation Assessment Report

Wheelabrator Kemsley (K3 Generating Station) and Wheelabrator Kemsley North (WKN) Waste to Energy Facility DCO

September 2019 -Submission Version **PINS ref: EN010083**

WHEELABRATOR KEMSLEY GENERATING STATION (K3) AND WHEELABRATOR KEMSLEY NORTH (WKN) WASTE TO ENERGY FACILITY DCO:

HABITATS REGULATIONS ASSESSMENT REPORT

WHEELABRATOR TECHNOLOGIES INC

WHEELABRATOR KEMSLEY (K3 GENERATING STATION) AND WHEELABRATOR KEMSLEY NORTH (WKN) WASTE TO ENERGY FACILITY DEVELOPMENT CONSENT ORDER:

HABITATS REGULATIONS ASSESSMENT REPORT

August 2019

Our Ref: ECO00047_871

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Project Number/Document Reference:	**Wheelabrator Kemsley (K3 Generating Station) and Wheelabrator Kemsley North (WKN) Waste to Energy facility Development Consent Order: Habitats Regulations Assessment Report**
Status:	**For planning**

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1 INTRODUCTION

1.1 The need for an Appropriate Assessment is set out in Article 6(3) of the Habitats Directive and interpreted into British law by Regulation 63 of the Conservation of Species and Habitats Regulations (2017) (Table 1.1).

Table 1.1: Legislative Basis for a Habitats Regulations Assessment

The legislative basis for Habitat Regulations Assessment		
Habitats Directive	Article 6(3)	Any plan or project not directly connected with or necessary to the management of a Special Protection Area (SPA) or Special Area of Conservation (SAC) but likely to have a significant effect thereon, either individually or in-combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives.
Habitats Regulations	Regulation 63	A competent authority, before deciding to give any consent for a plan or project which is likely to have a significant effect on a European site shall make an appropriate assessment of the implications for the site in view of that sites conservation objectives

1.2 The Habitats Directive applies the precautionary principle to relevant designated areas, in so much as plans and projects can only be permitted having ascertained that there will be no adverse effect on the integrity of a SPA or SAC, collectively termed Natura 2000 sites. This is in contrast to Environmental Impact Assessment requirements where the findings (as documented in an Environmental Statement) should be 'taken into account' during preparation of the plan or project.

1.3 Under Government advice, Proposed SPAs (pSPA) should also be treated as having protection under the Habitats Regulations.

1.4 It is Government policy (as outlined in Section 176 of the National Planning Policy Framework) for sites designated under the Convention on Wetlands of International Importance (Ramsar sites) to be treated as having equivalent status to Natura 2000 sites. As such, information to inform an Appropriate Assessment needs to cover features of any relevant Ramsar site.

1.5 In undertaking an assessment, competent authorities (in this case the appropriate Secretary of State) must have regard to both direct and indirect effects on an interest feature of the Natura 2000 site, as well as cumulative effects. This may include consideration of features and issues outside the boundary of a Natura 2000 site. The Planning Inspectorate guidance states that an assessment should be proportionate to the geographical scope of the plan or project and that it need not be done in any more detail, or using more resources, than is useful for its purpose (Planning Inspectorate (PINS), 2016).

1.6 Plans and projects for which it is not possible to conclude that there would be no adverse effect on the integrity of Natura 2000 sites may still be permitted if there are no alternatives and there are Imperative Reasons of Overriding Public Interest (IROPI) as to why they should go ahead. In such cases, compensation would be necessary to ensure the overall integrity of the site network.

2 SCOPE AND OBJECTIVES

2.1 Whilst it is the responsibility of the competent authority to determine whether it can be concluded there is no adverse effect, it is the responsibility of applicants to submit sufficient information to enable such a determination to be made.

2.2 The purpose of this report is therefore to collate and provide sufficient information to enable the Secretary of State to undertake a Habitat Regulations Assessment (HRA) of the potential effects of the DCO application for the WKN Proposed Development and the K3 Proposed Development on land at Kemsley, Sittingbourne, Kent on the Natura 2000 network. It draws upon information within the Environmental Statement, notably Chapter 11 Ecology, but purposely does not repeat the detail contained within the Environmental Statement. Instead, it provides sufficient standalone information, with references to other more detailed sections where necessary, for the Secretary of State to be able to make an informed decision on the potential effects of the proposed development on Natura 2000 sites.

2.3 The following sites should be included in the scope of a Habitats Regulations Assessment:

- All Natura 2000 sites shown to be linked to the proposed development through a known 'pathway'.

2.4 As set out in Chapter 3 of the ES, at the time of scoping, the intention was to apply for an extension to K3 as consented to comprise a power upgrade from 49.9MW to 75MW and an increase in annual permissible waste throughput of 107,000tpa. Whilst this remains the practical effect of the DCO application, in order to accord with the Planning Act 2008 the DCO application seeks permission for the construction and operation of a 75MW generating station with a total annual throughput of 657,000 tpa (i.e. K3 as consented by the planning permission dated 6 March 2012 granted by Kent County Council, together with subsequent material and non-material variations thereto).

2.5 Given this, the baseline conditions are taken to be that prior to the construction of K3, and so are as assessed in the 2010 Ecology and Nature Conservation Chapter of the Environmental Statement and associated Habitats Regulations Assessment (RPS, 2010; Document 3.3 submitted with the application).

2.6 For the purposes of this Habitats Regulations Assessment, therefore, the assessment of effects of K3 uses the conclusions of the original HRA from 2010 but, in relation to the K3 Proposed Development and its practical effect,

2.7 The key activities in relation to the K3 and WKN Proposed Developments are therefore:

- Site preparation and enabling works;
- Piling (method TBC, assume at this stage percussive impact) to establish appropriate foundations;
- Main construction;

- Commissioning of the facility; and
- Decommissioning.

2.8 The key activities in relation to the practical effect of the K3 Proposed Developments are:

- Operation of the facility; and
- Decommissioning.

2.9 As set out in Chapter 2 of the ES, decommissioning will comprise the rendering inoperable of K3 and the WKN Proposed Developments and removal/demolition of key plant and equipment. An appropriately-worded requirement for the written approval of a method statement for the decommissioning and demolition of both K3 and the WKN Proposed Development will be included within the DCO.

2.10 At this stage, the prediction of the nature of such effects is not possible. However, they could include a range of activities that would be similar to those undertaken during construction and would therefore be subject to any necessary mitigation/avoidance measures which may be similar to those identified in Section 6 below. On this basis, the activities of decommissioning and demolition of both K3 and the WKN Proposed Development and effects that may arise from such activities are considered to be analogous to those arising in construction.

2.11 No Natura 2000 sites or Ramsar sites lie wholly or partly within the boundary of the area covered by the DCO application. The locations of the Nature 2000 sites in relation to the application boundary can be seen in Figure 11.1 of the ES.

2.12 Based on the nature of the proposed development and the findings of the technical chapters of the Environmental Statement, it has been decided that the following eight Natura 2000 and Ramsar sites require consideration as to whether they could be affected:

- Swale SPA;
- Swale Ramsar;
- Medway Estuary and Marshes SPA;
- Medway Estuary and Marshes Ramsar;
- Thames Estuary and Marshes SPA;
- Thames Estuary and Marshes Ramsar;
- Queendown Warren SAC; and
- Outer Thames Estuary SPA.

3 METHODOLOGY

Process

3.1 The stages of HRA are described below, adapted from Government guidance. The stages are essentially iterative, being revisited as necessary in response to more detailed information, recommendations and any relevant changes to the plan until no significant adverse effects remain.

Stage 1 – Qualifying Interest Features

- Collect information on identified Natura 2000 and Ramsar sites and their conservation objectives.

Stage 2 – Likely Significant Effect

- Determine whether, in the absence of mitigation/avoidance measures, the planning application is likely to have a significant effect on relevant Natura 2000 and Ramsar sites.

Stage 3 – Appropriate Assessment

- Assess the likely significant effects of the outline planning application on the conservation objectives of relevant Natura 2000 and Ramsar sites and determine whether no adverse effect can be concluded both alone and in-combination with other plans or projects.

Stage 4 – In-combination

- Undertake a similar assessment of the proposal to that described above but in combination with other plans and projects that could act, collectively, to result in an adverse effect on a Natura 2000 or Ramsar site.

Stage 1 – Qualifying Interest Features

3.2 Natural England has provided copies of the relevant citations and confirmed both the conservation objectives and Regulation 33 (English Nature 2001) advice to be taken into account. The conservation objectives provide the basis for determining what is currently, or may cause, a significant effect, and for informing the scope of appropriate assessments.

3.3 Natural England has confirmed that the assessment should focus on the qualifying features listed within the official Natura 2000 citations as these are the features for which the site is legally designated.

3.4 In addition to qualifying interest features, it is necessary to explore the environmental features and conditions required to maintain the integrity of the eight Natura 2000 and Ramsar sites, as well as both current condition and trends in environmental processes.

Stage 2 - Likely Significant Effect

3.5 The second stage is to determine whether there is a likely to be a significant effect. This is essentially a risk assessment to decide whether a more detailed assessment is required, and if so, the scope of the issues and features to be addressed. This involves identifying the potential pathways through which the DCO application could affect the interest features of relevant Natura 2000 and Ramsar site, and then assessing in broad terms the magnitude of each effect to determine whether it is likely to have a significant effect. In making this determination, we have taken into account the risk of an effect not just on those sites within the administrative boundary of Swale Borough Council, but in line with best practice, considered potential ways in which the application could impact upon other relevant Natura 2000 or Ramsar sites.

3.6 The main purpose of this stage is to screen out those aspects of the proposal that can be considered not likely to have a significant effect, as well as those features of each relevant Natura 2000 and Ramsar site that are not likely to be significantly affected. Judgements have been based on sound reasoning and within the context of best available knowledge on the various ways in which development of the nature proposed could impact on the interest features of the relevant Natura 2000 and Ramsar sites. At this stage, they are made without consideration of mitigation/avoidance measures. If it cannot be concluded with confidence that adverse effects are unlikely, then under the precautionary principle, it is assumed that the issue requires more detailed consideration.

3.7 The WKN Site comprises hard standing and industrial buildings. Therefore, no surveys have been undertaken on the WKN Site. However, a suite of ecological surveys of the surroundings have also been completed to inform other developments within the wider Kemsley Paper Mill site, including targeted breeding bird surveys, assessment of roosting Marsh Harriers, and intertidal waterbird surveys of the Swale in the vicinity of the Proposed Development.

3.8 The methodology for the breeding bird surveys involved standard territory (registration) mapping techniques as outlined in Gilbert *et al.*. (1998) and Bibby *et al.*. (2000). Full survey methods and details of visits are available in the respective technical survey reports (RPS, 2009, 2016).

3.9 The survey methodology for the intertidal surveys involved monthly counts of the waterbirds using the Kemsley foreshore. Full survey methods and details of visits are available in the respective technical survey reports (RPS, 2009, 2016). 2018 surveys are currently ongoing although data from February, March, April and May have been used in the current assessment. These surveys followed the same methodology as previous surveys and will be reported when completed in February 2019 with the final ES submission.

Stage 3 - Appropriate Assessment

3.10 When a plan or project cannot be 'screened out' as being unlikely to have a significant effect on a Natura 2000 or Ramsar site, it is necessary to progress to explore whether there are any adverse effects, including whether any suitable avoidance or mitigation measures can be incorporated to avoid or reduce those adverse effects. . Experience suggests that the best approach to addressing this is on a site by site basis, with avoidance / mitigation

measures focused on the environmental conditions needed to maintain site integrity. This is in line with Department for Communities and Local Government / PINS guidance that the level of detail of the assessment, whilst meeting the relevant requirements of the Habitats Regulations, should be 'appropriate' to the level of plan or project that it addresses.

Stage 4 – In-combination Assessment

3.11 The Habitats Regulations require that a decision to grant permission can only be made once the Competent Authority is satisfied that no adverse effects on the integrity of the Natura 2000 sites in question are likely both alone and in-combination with other plans and projects. Therefore, Stage 4 of the HRA process requires the identification of other plans and projects that might affect the interest features of the relevant Natura 2000 sites in combination with the outline planning application and decide whether there any adverse effects that might occur in-combination that did not occur when considered alone.

4 STAGE 1 – QUALIFYING INTEREST FEATURES

The Swale

4.1 The boundary of The Swale SPA / Ramsar site lies 0.16 km to the east of the area covered by the proposal.

4.2 The Swale Estuary separates the Isle of Sheppey from the Kent mainland. To the west it adjoins the Medway Estuary, to the east the outer Thames Estuary. It consists of a complex of grazing marsh with ditches, intertidal saltmarshes and mud-flats. The grazing marsh is the most extensive in Kent and there is much diversity both in the salinity of the dykes (which range from fresh to strongly brackish) and in the topography of the fields.

4.3 The Swale Ramsar was designated in 1993. In addition to qualifying under Criterion 3a by virtue of regularly supporting over 20,000 waterfowl, with an average peak count of 57,600 birds for the five winter period 1986/1987 to 1990/1991, and under Criterion 3c by supporting, in winter, internationally important populations of four species of migratory waterfowl, the Swale also qualifies under Criterion 2a of the Ramsar Convention by supporting a number of species of rare plants and invertebrates (Table 4.1).

Table 4.1: Qualifying Plant and Invertebrate Species for the Swale Ramsar

Ramsar Criteria	Scientific Name	Species Name
Nationally rare and scarce plant species	*Lactuca saligna*	Least Lettuce
	Peucedanum officinale	Hogs Fennel
	Bupleurum tenuissimum	Slender Hare's-ear
	Spartina maritima	Small Cord-grass
	Inula crithmoides	Golden Samphire
	Ranunculus baudotii	Brackish Water Crowfoot
	Ceratophyllum submersum	Soft Hornwort
	Carex divisa	Divided Sedge
	Trifolium squamosum	Sea Clover
	Hordeum marinum	Sea Barley
Red Data Book invertebrates	*Bagous cylindrus*	An aquatic weevil
	Erioptera bivittata	A cranefly
	Lejops vittata	A hoverfly
	Poecilobothrus ducalis	A small dancefly
	Micronecta minutissima	A water bug
	Malachius vulneratus	A beetle
	Philonthus punctus	A predatory rove beetle
	Campsicnemus magius	A small dolichopodid fly

Ramsar Criteria	Scientific Name	Species Name
	Elachiptera rufifrons *Myopites eximia*	A small chloropid fly A picture-winged fly

4.4 The intertidal flats are extensive, especially in the east of the site, and support a dense invertebrate fauna. These invertebrates, together with beds of algae and Eelgrass *Zostera spp.,* are important food sources for waterbirds. Locally there are large Mussel Mytilus edulis beds formed on harder areas of substrate. The wide diversity of coastal habitats combine to support important numbers of waterbirds throughout the year.

4.5 The diverse mix of habitats within the Swale support internationally important populations of wintering birds. It supports outstanding numbers of waterfowl with some species regularly occurring in nationally or internationally important numbers. The Swale SPA was classified in 1985 and extended in 1993. The qualifying bird interest features listed in the Ramsar citation, SPA Citation (as provided by Natural England in their Section 42 response) are provided in Table 4.2.

4.6 The Conservation Objectives for the SPA (as set out in http://publications.naturalengland.org.uk/publication/5745862701481984?category=6528471664689152) are to ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring;

- The extent and distribution of the habitats of the qualifying features;
- The structure and function of the habitats of the qualifying features;
- The supporting processes on which the habitats of the qualifying features rely;
- The population of each of the qualifying features; and,
- The distribution of the qualifying features within the site.

4.7 During severe winter weather elsewhere, the Swale can assume even greater national and international importance as a cold weather refuge. Wildfowl and waders from many other areas arrive, attracted by the relatively mild climate, compared with continental European areas, and the abundant food resources available.

Table 4.2: Qualifying Bird Species of The Swale

	Scientific Name	SPA Citation	Ramsar	Assessment Criteria
Regularly used by 1% or more of the GB population of an Annex 1 species during passage				
Redshank	*Tringa totoanus*	-	1,712 individuals, representing an average of 1.4% of the British population	269
Migratory Wintering species regularly occurring in internationally-important numbers over winter				
Dark-bellied Brent Goose	*Branta bernicla bernicla*	2,850 representing 1.6% of the world population and 3.1% of the British winter population	2,850 representing 1.6% of the world population and 3.1% of the British wintering population	1,961
Grey Plover	*Pluvialis squatarola*	-	1,550 representing 1% of the East Atlantic Flyway population and 7.3% of the British population	2,021
Dunlin	*Calidris alpina*	13,000 representing 3% of British wintering population	-	13,000
Assemblage				
Regularly supporting over 20,000 waterfowl over winter	-	57,600	57,600	65,588
Diverse assemblage of breeding birds	-	-	-	-

4.8 The 1993 Citation for The Swale describes 17 species occurring within the over-wintering assemblage in nationally- or internationally-important numbers but does not name them. Therefore, Natural England's advice for the K3 application, (Section 42 Response dated 19/04/17), based on the BTO's Wetland Bird Survey (WeBS) data, is that the following species should be considered as important components of the assemblage:

- European white-fronted goose;
- Shelduck;
- Teal;
- Shoveler;
- Oystercatcher;
- Golden Plover;
- Lapwing;
- Dunlin;
- Black-tailed Godwit;
- Green Sandpiper;
- Dark-bellied Brent Goose;
- Wigeon;
- Pintail;
- Little Egret;
- Avocet;
- Grey Plover;
- Sanderling;
- Ruff;
- Bar-tailed Godwit;
- Greenshank;
- Knot; and
- Curlew.

4.9 With respect to the breeding assemblage, The Swale Citation lists a number of species in the 'typical assemblage of breeding species' for grazing marsh:

- Shelduck;
- Coot;
- Mallard;
- Moorhen;
- Lapwing;

- Redshank;
- Reed Warbler; and
- Reed Bunting.

4.10 Natural England's Section 42 advice for that project was that this should be expanded to include breeding ducks, waders, Yellow Wagtail and Marsh Harrier. Given the proximity of the developments, the S42 advice with respect to the K3/K4 developments has been taken as also applying to the WKN Proposed Development.

Medway Estuary and Marshes

4.11 The boundary of the Medway Estuary and Marshes SPA and Ramsar site lies just over 2 km from the area covered by the Proposal site.

4.12 The Medway Estuary forms a single tidal system with the Swale to the east and joins the outer Thames Estuary between the Isle of Grain and Sheerness. It has a complex arrangement of tidal channels, which drain around islands of saltmarsh. 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. Together these form the largest area of intertidal habitats of value for nature conservation in Kent and are representative of the estuarine habitats found on the North Kent coast. Grazing marshes intersected by dykes and fleets are present in places inside the sea walls around the estuary.

4.13 The Medway Estuary and Marshes Ramsar site was designated in 1993. In addition to qualifying under Criterion 3a by virtue of regularly supporting over 20,000 waterfowl with an average peak count of 53,900 birds recorded in the five-year winter period 1986/1987 to 1990/1991, and under Criterion 3c by regularly supporting internationally or nationally important wintering populations of migratory species of waterfowl, the Medway Estuary and Marshes Ramsar also qualifies under Criterion 2a of the Ramsar Convention by supporting a number of species of rare plants and animals (Table 4.3).

4.14 The Medway Estuary and Marshes SPA was classified in 1993 and the citation prepared for that classification has been used to inform this assessment. The qualifying bird interest features listed in the SPA Citation and Ramsar citation, together with the criteria used for this assessment (in line with Natural England advice this is whichever provides the strongest protection) are presented in Table 4.4.

4.15 The Conservation Objectives for the SPA (as set out in http://publications.naturalengland.org.uk/publication/6672791487119360) are to ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring;

- The extent and distribution of the habitats of the qualifying features;
- The structure and function of the habitats of the qualifying features;
- The supporting processes on which the habitats of the qualifying features rely;

- The population of each of the qualifying features; and,
- The distribution of the qualifying features within the site.

Table 4.3 Medway Estuary and Marshes Ramsar Qualifying Plant and Invertebrate Species

Ramsar Criteria	Scientific Name	Species Name
Nationally-scarce plant species	*Hordeum marinum*	Sea Barley
	Parapholis incurva	Curved Hard-grass
	Polypogon monspeliensis	Annual Beard-grass
	Puccinellia fasciculate	Borrer's Saltmarsh-grass
	Bupleurum tenuissimum	Slender Hare`s-ear
	Trifolium squamosum	Sea Clover
	Chenopodium botryodes	Small Goose-foot
	Rumex maritimus	Golden Dock
	Ranunculus baudotii	Brackish Water-crowfoot
	Inula crithmoides	Golden Samphire
	Salicornia perennis	Perennial Glasswort
	Salicornia pusilla	One-flowered Glasswort
British Red Data Book invertebrates	*Polistichus connexus*	A ground beetle
	Cephalops perspicuus	A fly
	Poecilobothrus ducalis	A dancefly
	Anagnota collini	A fly
	Baris scolopacea	A weevil
	Berosus spinosus	A water beetle
	Malachius vulneratus	A beetle
	Philonthus punctus	A rove beetle
	Malacosoma castrensis	Ground Lackey Moth
	Atylotus latistriatus	A horsefly
	Campsicnemus magius	A fly
	Cantharis fusca	A soldier beetle
	Limonia danica	A cranefly

Table 4.4: Qualifying Bird Species of Medway Estuary and Marshes

	Scientific Name	SPA Citation	Ramsar	Assessment Criteria
Annex 1 Species Regularly Breeding in Numbers of European Importance				
Avocet	*Recurvirosta avosetta*	28 pairs representing 7% of the breeding population in Britain	-	28 pairs
Little Tern	*Sterna albifrons*	24 pairs representing 1% of the breeding population in Britain	-	28 pairs
Annex 1 Species Regularly Wintering in Numbers of European Importance				
Avocet	*Recurvirosta avosetta*	70 representing 7% of the population in Britain	-	314
Annex 1 Species Regularly On Passage in Numbers of European Importance				
Grey Plover	*Pluvialis squatarola*	-	3103 individuals, representing an average of 1.2% of the population	1,337
Redshank	*Tringa totanus*	3709 individuals, representing an average of 1.4% of the population	3709 individuals, representing an average of 1.4% of the population	
Migratory Species Regularly Wintering in Numbers of European Importance				
Dark-bellied Brent Goose	*Branta bernicla bernicla*	4,130 representing 2.4% of the world population and 4.6% of British winter population	4,130 representing 2.4% of the world population and 4.6% of British winter population	4,130
Shelduck	*Tadorna tadorna*	5,900 representing 2.3% of the North West European population and 7.9% of the British winter population	5,900 representing 2.3% of the North West European population and 7.9% of the British winter population	5,900
Pintail	*Anas acuta*	980 representing 1.4% of the North West European wintering and 3.9% of the British winter	980 representing 1.4% of the North West European wintering and 3.9% of the British winter	980

	Scientific Name	SPA Citation	Ramsar	Assessment Criteria
		population	population	
Ringed Plover	*Charadrius hiaticula*	740 representing 1.4% of the East Atlantic Flyway population and 3.2% of the British wintering population	740 representing 1.4% of the East Atlantic Flyway population and 3.2% of the British wintering population	768
Knot	*Calidris canutus*	3,690 representing 1.0% of the East Atlantic Flyway and 1.6% of the British wintering population	3,690 representing 1.0% of the East Atlantic Flyway and 1.6% of the British wintering population	3,690
Dunlin	*Calidris alpina*	22,900 representing 1.6% of the East Atlantic Flyway and 5.3% of the British wintering population	22,900 representing 1.6% of the East Atlantic Flyway and 5.3% of the British wintering population	25,936
Regularly supports in winter a diverse assemblage of wintering species	-	53,900	47,637	65,496
Diverse assemblage of breeding migratory waterfowl	-	-	-	-

4.16 The 1993 citation for the Medway Estuary and Marshes SPA lists 18 species of waterfowl within the over-wintering assemblage occurring in internationally- or nationally-important numbers:

- Dark-bellied brent geese;
- Shelduck;
- Pintail;
- Ringed plover;
- Grey plover;
- Knot;
- Dunlin;
- Redshank;

- Great crested grebe;
- Wigeon;
- Teal;
- Shoveler;
- Oystercatcher;
- Black-tailed godwit;
- Curlew;
- Spotted redshank;
- Greenshank; and
- Turnstone

4.17 The Citation also lists 18 species comprising the diverse assemblage of wintering species including:

- Red-throated Diver;
- Great Crested Grebe;
- Cormorant;
- Shelduck;
- Mallard;
- Teal;
- Shoveler;
- Pochard;
- Oystercatcher;
- Ringed Plover;
- Dunlin;
- Redshank;
- Bewick's Swan;
- Hen Harrier;
- Merlin;
- Golden Plover;
- Short-eared Owl; and

- Kingfisher.

4.18 With respect to the breeding assemblage, the Citation lists the following species:

- Oystercatcher;
- Lapwing;
- Ringed Plover;
- Redshank;
- Shelduck;
- Mallard;
- Teal;
- Shoveler; and
- Common Tern.

Thames Estuary and Marshes

4.19 The boundary of the Thames Estuary and Marshes SPA and Ramsar site lies 8.7 km from the area covered by the Proposal site.

4.20 The Thames Estuary and Marshes consists of an extensive mosaic of grazing marsh, saltmarsh, mudflats and shingle characteristic of the estuarine habitats of north Kent. Freshwater pools and some areas of woodland provide additional variety and complement the estuarine habitats. Whilst the majority is situated in Kent along the south shore of the Thames estuary, additional areas are located along the north shore of the Thames Estuary.

4.21 The Thames Estuary and Marshes Ramsar was designated in 2000. In addition to qualifying under Criterion 5 as it is used regularly by over 20,000 waterfowl in any season and under Criterion 6 as it is used regularly by 1% or more of the biogeographic populations of migratory species of waterfowl, it also qualifies under Criterion 2a of the Ramsar Convention by supporting a number of species of rare plants and animals (Table 4.5).

4.22 The Thames Estuary and Marshes SPA was classified in 2000. The qualifying bird interest features listed in the SPA Citation Ramsar citation, together with the criteria used for this assessment (in line with Natural England advice this is whichever provides the strongest protection) are presented in Table 4.6.

4.23 The Conservation Objectives for the SPA (as set out in http://publications.naturalengland.org.uk/publication/4698344811134976) are to ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring;

- The extent and distribution of the habitats of the qualifying features;

- The structure and function of the habitats of the qualifying features;
- The supporting processes on which the habitats of the qualifying features rely;
- The population of each of the qualifying features; and,
- The distribution of the qualifying features within the site.

Table 4.5 Qualifying Plant and Invertebrate Species for the Thames Estuary and Marshes Ramsar

Ramsar Criteria	Scientific Name	Species Name
Nationally rare plant species	*Chenopodium chenopodioides*	Saltmarsh Goosefoot
Nationally scarce plant species	*Alopecurus bulbosus*	Bulbous Foxtail
	Bupleurum tenuissimum	Slender Hare's-ear
	Carex divisa	Divided Sedge
	Hordeum marinum	Sea Barley
	Inula crithmoiodes	Golden Samphire
	Polypogon monspeliensis	Annual Beard Grass
	Puccinellia fasciculate	Borrer's Saltmarsh-grass
	Puccinellia rupestris	Stiff Saltmarsh-grass
	Salicornia pusilla	Glasswort
	Stratiotes aloides	Water Soldier
	Trifolium glomeratum	Clustered Clover
	Trifolium squamosum	Sea Clover
	Zostera angustifolia	Narrow-leaved Eelgrass
	Zostera noltii	Dwarf Eelgrass
Endangered invertebrate species	*Bagous longitarsis*	A weevil
Vulnerable invertebrate species	*Henestaris halophilus*	A groundbug
	Bagous cylindrus	A weevil
	Polystichus connexus	A ground beetle
	Erioptera bivittata	A cranefly
	Hybomitra expollicata	A horse fly
	Lejops vittata	A hoverfly
	Poecilobothrus ducalis	A dancefly
	Pteromicra leucopeza	A snail killing fly
	Philanthus triangulum	A solitary wasp
	Lestes dryas	A damselfly
Rare invertebrate species	*Cercyon bifenestratus*	A water beetle
	Hydrochus elongates	A water beetle
	H.ignicollis	A water beetle
	Ochthebius exaratus	A water beetle
	Hydrophilus piceus	A water beetle
	Malachius vulneratus	A beetle

Ramsar Criteria	Scientific Name	Species Name
	Philonthus punctus	A rove beetle
	Telmatophilus brevicollis	A fungus beetle
	Campsicnemus magius	A fly
	Haematopota bigoti	A horsefly
	Stratiomys longicornis	A soldier fly
	Baryphyma duffeyi.	A spider

Table 4.6 Qualifying Bird Species of the Thames Estuary and Marshes

	Scientific Name	SPA Citation	Ramsar	Assessment Criteria
Annex 1 Species Regularly Wintering in Numbers of European Importance				
Avocet	*Recurvirosta avosetta*	283 representing 28.3% of British wintering population	-	283
Hen Harrier	*Circus cyaneus*	7 representing 1.0% of the British wintering population	-	7
Migratory species regularly occurringon passage				
Ringed Plover	*Charadrius hiaticula*	1,324 individuals - passage 2.6% Europe/ Northern Africa (win)	595 individuals, representing an average of 1.8% of the GB population (5 year peak mean 1998/9-2002/3)	541
Migratory species regularly occurring over winter				
Grey Plover	*Pluvialis squatarola*	2,593 representing 1.7% of the East Atlantic wintering population	2,593 representing 1.7% of the East Atlantic wintering population	2,593
Knot	*Calidris canutus*	4,848 representing 1.4% of Northeast Canada/ Greenland/Iceland/ North West Europe population	4,848 representing 1.4% of Northeast Canada/ Greenland/Iceland/ North West Europe population	4,848
Dunlin	*Calidris alpina*	29,646 representing 2.1% of North Siberia/Europe/ West Africa population	29,646 representing 2.1% of North Siberia/Europe/ West Africa	29,646

	Scientific Name	SPA Citation	Ramsar	Assessment Criteria
			population	
Black-tailed Godwit	*Limosa limosa*	1,699 representing 2.4% of the Iceland breeding population	1,699 representing 2.4% of the Iceland breeding population	1,699
Redshank	*Tringa totanus*	3,251 representing 28.3% of the Eastern Atlantic wintering population	3,251 representing 28.3% of the Eastern Atlantic wintering population	3,251
Assemblage regularly supporting over 20,000 waterfowl		75,019	75,019	75,019

Queendown Warren SAC

4.24 Queendown Warren is approximately 9.3 km south west of the DCO Boundary. The qualifying interest feature at Queendown Warren is *Bromus erectus* grassland of the Annex I priority habitat Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*) (important orchid sites). This priority habitat type comprises calcareous grasslands containing an important assemblage of rare and scarce species, including Early Spider-orchid *Ophrys sphegodes*, Burnt Orchid *Orchis ustulata* and Man Orchid *Aceras anthropophorum*. Important orchid assemblage sites are defined in the Interpretation Manual of European Union Habitats (European Commission DG Environment 2007) as localities which meet one or more of the following criteria:

- hosts a rich suite of orchid species;
- hosts an important population of at least one orchid species considered not very common on the national territory; or
- hosts one or several orchid species considered to be rare, very rare or exceptional on the national territory.

4.25 The conservation objectives for the site are to ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring;

- The extent and distribution of qualifying natural habitats;

- The structure and function (including typical species) of qualifying natural habitats; and
- The supporting processes on which qualifying natural habitats rely.

4.26 The key environmental conditions that support the features of European interest are:

- maintenance of grazing;
- minimal recreational trampling;
- minimal air pollution – nitrogen deposition may cause reduction in diversity, and sulphur deposition can cause acidification;
- absence of direct fertilisation; and
- well-drained soils.

Outer Thames Estuary SPA

4.27 The Outer Thames Estuary SPA is located where the North Sea and the Thames Estuary meet (8 km north east of the DCO Boundary), extending north to the sea off Great Yarmouth on the East Norfolk Coast. It supports the largest assemblage of wintering red-throated diver (*Gavia stellata*) in the UK, an estimated population of 6,466 individuals, which is 38% of the wintering population of Great Britain.

4.28 the recently-confirmed extension to the SPA also includes:

- Little Tern: 746 individuals (2011-2015) or 19.64% of GB population; and
- Common Tern: 532 individuals (2011-2015) or 2.66% of GB population.

4.29 The conservation objectives for both SPA (http://publications.naturalengland.org.uk/publication/4927106139029504) are to Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring;

- The extent and distribution of the habitats of the qualifying features;
- The structure and function of the habitats of the qualifying features;
- The supporting processes on which the habitats of the qualifying features rely;
- The population of each of the qualifying features; and
- The distribution of the qualifying features within the site.

Supporting Habitats

4.30 Whilst the qualifying species listed for SPA and Ramsar sites are referred to as interest features, the ecologically important habitats supporting each feature have also been

identified as sub-features. The supporting habitats of The Swale SPA, Medway Estuary and Marshes SPA and Thames Estuary and Marshes SPA are presented in Table 4.7.

4.31 The Medway Estuary and Marshes SPA and Ramsar site, the Thames Estuary and Marshes SPA and Ramsar site and The Swale SPA and Ramsar site include terrestrial, intertidal and subtidal areas. Some species, such as the internationally important wintering population of Hen Harrier on the Thames Estuary and Marshes SPA, are dependent on the terrestrial supporting habitats, notably areas of grazing marsh. Other qualifying species also use areas of the Natura 2000 sites above the highest astronomical tide for breeding (e.g. Avocet), feeding (e.g. Curlew and Redshank), or roosting when displaced from mudflats at high tide.

Table 4.7 Percentage of Supporting Habitat Sub-features

	Swale SPA	Medway SPA	Thames SPA
Estuaries, mudflats, sandflats and lagoons	39.0	67.0	57.3
Saltmarsh	5.0	15.0	1.5
Shingle and sea cliff	1.0	-	0.9
Standing water	2.0	1.0	5.6
Bogs, marshes and fens	-	1.0	3.7
Dry grassland	-	1.0	1.9
Wet grassland	-	15.0	29.1
Other arable land	47.0	-	-
Other land (waste land, industrial sites, etc.)	6.0	-	-
Total	100%	100%	100%

4.32 The intertidal and subtidal components of the Medway Estuary and Marshes SPA and Ramsar site, the Thames Estuary and Marshes SPA and Ramsar site and the Swale SPA and Ramsar site are termed European marine sites. Under Regulation 33(2a) of the Habitats Regulations, 2010, Natural England has a duty to advise other relevant authorities as to the conservation objectives of each European marine site. Conservation objectives focus on the habitat conditions necessary to support the interest features in recognition that bird populations may change as a reflection of national or international trends. Sub-features are identified which describe the key habitats within the marine site component of the SPA.

Marine Component of the Swale SPA

Internationally Important Assemblage of Waterfowl including Internationally Important Population of Regularly Occurring Migratory Bird Species

4.33 The two key supporting sub-features (habitats) are:

- Mudflats; and
- Saltmarsh.

4.34 Mudflats are a rich source of invertebrates and provide the main feeding ground for wintering species such as Grey Plover and Redshank, which occur on the SPA in internationally important numbers, and the other nationally important waterfowl species which contribute to the waterfowl assemblage. In addition mudflats do support plant life, including eel-grass and algae. These are valuable as food for the internationally important populations of Dark-bellied Brent Goose and Wigeon that occur on the SPA, especially when inland feeding sites are frozen.

4.35 Saltmarsh is the predominantly vegetated part of the intertidal zone and its importance for birds is again for high tide roosting and feeding. Whilst the characteristics of the vegetation varies because the plants are adapted to a particular degree of tidal exposure, areas of Saltmarsh within the Swale SPA also varies because of grazing by domestic livestock. Where the vegetation is kept short by grazing livestock, wildfowl which are themselves grazers, including Wigeon and Dark-bellied Brent Goose, can feed. Around high tide, the creeks within the saltmarsh are the only exposed areas of mud, as mudflats in the lower parts of the estuary are still covered by the tide. Wading birds will feed within these creeks. Where there is shallow water within the saltings it is especially suitable for dabbling duck.

4.36 Subject to natural change, the conservation objective for these sub-features is to maintain them in favourable condition.

Marine Component of the Medway SPA

Internationally Important Populations of Regularly Occurring Annex 1 Species

4.37 The four key supporting sub-features (habitats) are:

- Mudflats;
- Saltmarsh;
- Shallow inshore waters; and
- Shingle beaches.

4.38 In summer, the mudflats provide a feeding area for Avocet, which are known to move their young into the intertidal area when feeding grounds on the landward side of the sea walls

become unsuitable. The mudflats are also a rich source of invertebrates for wintering Avocet which occur on the SPA in internationally important numbers.

4.39 Saltmarsh is the predominantly vegetated part of the intertidal and varies because the plants at each level within its vertical profile are adapted to their particular degree of tidal exposure. The importance of the saltmarshes for birds is for high tide roosting by Avocet.

4.40 Shallow in-shore waters are listed as a sub-feature for the Medway (but not the Swale) because they are used by Little Tern, an Annex 1 species which occurs in nationally important numbers.

4.41 Shingle beaches, such as those that occur in Stoke Saltings, are used for nesting by Little Tern. They prefer a shallow sloping shoreline that provides protection against flooding.

4.42 Subject to natural change the conservation objective for these sub-features is to maintain them in favourable condition.

Internationally Important Assemblage of Waterfowl including Internationally Important Populations of Regularly Occurring Migratory Bird Species

4.43 The three key supporting sub-features (habitats) are:

- Mudflats;
- Saltmarsh; and
- Shallow coastal waters.

4.44 The mudflats in the Medway Estuary and Marshes SPA provide the main feeding ground for wintering species which occur on the SPA in internationally important numbers, such as Knot, Grey Plover, Dunlin and Redshank, as well as other nationally important waterfowl species which contribute to the waterfowl assemblage.

4.45 The saltmarsh in the Medway Estuary and Marshes SPA provide roosting and feeding grounds for wintering species which occur in internationally important numbers, as well as other nationally important waterfowl species which contribute to the waterfowl assemblage.

4.46 Great Crested Grebe feed in the shallow waters of the Medway, and at the time of classification, occurred in nationally important numbers.

4.47 Subject to natural change the conservation objective for these sub-features is to maintain them in favourable condition.

Marine Component of the Thames Estuary and Marshes SPA

Internationally Important Populations of Regularly Occurring Annex 1 Species

4.48 The two key supporting sub-features (habitats) are:

- Mudflats; and
- Saltmarsh.

4.49 Mudflats are extensive within the Thames Estuary and Marshes SPA, with over 2,250 ha on the south bank of the Thames. The mudflats are a rich source of invertebrates (shell fish and worms) and provide feeding grounds for wintering avocet. The mudflats at Higham and Mucking in the west of the site are particularly important for this species.

4.50 Saltmarshes are not extensive in the Thames Estuary and Marshes SPA, but nevertheless provide important high tide roost sites for birds, particularly at Higham in the west of the site. Shallow water within the saltings also provide suitable habitat for feeding birds.

4.51 Subject to natural change the conservation objective for these sub-features is to maintain them in favourable condition.

Internationally Important Assemblage of Waterfowl including Internationally Important Populations of Regularly Occurring Migratory Bird Species

4.52 The three key supporting sub-features (habitats) are:

- Mudflats;
- Saltmarsh; and
- Intertidal shingle.

4.53 Mudflats are a rich source of invertebrates and provide the main feeding ground for wintering species such as Dunlin, Knot and Black-tailed Godwit, which occur on the SPA in internationally important numbers, and the other nationally important waterfowl species which contribute to the waterfowl assemblage. In addition, mudflats do support plant life, including algae and some very limited eel-grass and algae. These can be valuable as food for wildfowl, especially when inland feeding sites are frozen. Mudflats also provide important roosting areas for internationally important assemblages of waterfowl and its qualifying species.

4.54 Saltmarsh is not extensive in the Thames Estuary and Marshes SPA, but nevertheless provide important high tide roost sites for the internationally important assemblage of waterfowl and its qualifying species. Upper saltmarsh in particular provide high tide roost sites. The vegetation varies because the plants at each level within its vertical profile are adapted to their particular degree of tidal exposure. Also in parts, the vegetation varies because of grazing by domestic livestock. Where the vegetation is kept short by grazing livestock, wildfowl which are themselves grazers, including Teal, can feed. Where there is shallow water within the saltings, it is especially suitable for dabbling duck.

4.55 Small areas of intertidal shingle and cobble beaches on the south bank of the Thames provide important roost sites for wading birds displaced from the mudflats at high tide.

4.56 Subject to natural change the conservation objective for these sub-features is to maintain them in favourable condition.

Queendown Warren SAC

4.57 The Queendown Warren SAC, on the south-facing slope of a dry chalk valley, comprises grassland and woodland. The former has a diverse flora and there are a good variety of invertebrates present, including the Adonis blue butterfly. Potter's Wood is mainly sweet chestnut coppice with oak standards, but with beech, hazel and other species along the southern edge. Uncommon plant species occur, such as lady orchid and yellow bird's nest.

5 STAGE 2 - LIKELY SIGNIFICANT EFFECT

5.1 This section deals with the screening of likely significant negative effects on the qualifying feature and sub-features of the relevant Natura 2000 and Ramsar sites as a result of the construction and operation of the proposed project.

5.2 To aid clarity, the likely significant effects of the K3 Proposed Development, the practical effect of the K3 Proposed Development and the WKN Proposed Development are described in turn.

5.3 The possibility of the development proposed within the DCO application having a likely significant effect on any of the designated sites identified in Section 4 is discussed for each of impact pathway in turn below.

5.4 Screening matrices for all the sites identified in Section 3 above are provided in Appendix 1.

5.5 The environmental pathways that could lead to a significant effect due to the K3 or WKN Proposed Developments (meaning the Site, laydown area and access roads) may be summarised as:

- Direct loss or damage of habitats within a designated site or of nearby areas used by interest species;
- Change in management regimes (e.g. grazing / mowing of marshland) of habitats within a designated site or of nearby areas used by interest species;
- Loss of future space to allow for managed realignment to avoid coastal squeeze;
- Urbanisation that results in over shadowing, reduction of sight lines or which hinders flight paths;
- Air quality;
- Water quality;
- Hydrological changes, including in the balance of saline and non-saline conditions;
- Disturbance (activity, recreation, noise and lighting); and
- Introduction or spread of non-native invasive species.

K3 Proposed Development

5.6 As described above, for the purposes of assessing the K3 Proposed Development, the baseline scenario is K3 prior to construction. A detailed HRA was submitted with the 2010 application and is provided within the documents that support this application (Document 3.3). This was augmented by additional information submitted during the determination of the existing permission. The 2010 HRA considered the effect of the construction and

operation of K3 at 49.9MW. It concluded that the following potential effects could not be screened out without further assessment:

- Urbanisation;
- Air quality;
- Hydrological changes; and
- Disturbance

5.7 All other effects could be screened out as there were considered not likely to have a significant effect.

5.8 K3 as consented is at an advanced stage of construction and due to be fully operational by the end of 2019. All planning conditions of relevance to ecology have been discharged. No further external construction work is required by way of consequence of the practical effect of the K3 Proposed Development. The screening undertaken as part of the 2010 ES therefore remains a robust assessment for the consideration of the construction and operation of K3 as consented.

Practical effect of the K3 Proposed Development

5.9 Given that the practical effect of the K3 Proposed Development comprises only an uplift in power generation and an increase in throughput of waste, the environmental pathways that could lead to a significant effect are operational and may be summarised as:

- Air quality; and
- Disturbance due to increased traffic noise

5.10 Given that there are no construction activities pursuant to the practical effect K3 Proposed Development and no changes to the physical form of the facility proposed, all other potential pathways can be excluded at this stage.

Air quality

5.11 Levels of understanding of air quality effects on semi-natural habitats and qualifying interest species of Natura 2000 sites are relatively in their infancy. The Air Pollution Information System (APIS) is a publicly available support tool for UK conservation and regulatory agencies, industry and local authorities to help assess the potential effects of air pollutants on habitats and species. It aims to enable a consistent approach to air pollution assessment across the UK. This specifically includes informing assessments required under the Habitats Regulations. Consequently, reference has been made to the information contained within the APIS website.

5.12 Appendix 5.4 of the ES (Document 3.1) provides an analysis of the combined impacts of emissions to air of the K3 Proposed Development with the WKN Proposed Development, along with any other committed developments on the features of interest of the surrounding designated sites along with the supporting habitats. Based on current Environment Agency guidelines and the Institute of Air Quality Management Position Statement, for all pollutants

(NO_x, NH_3, SO_2, 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 the majority of interest features and supporting habitats of the designated sites. Therefore, all impacts as a result of the operation of both the K3 Proposed Development with the WKN Proposed Development are negligible and, as such, are not significant. On this basis, the impacts of both developments in isolation is also not significant.

5.13 The only interest features where this was not the case was Eurasian reed warbler and reed bunting species within the breeding assemblage for The Swale SPA with respect to nutrient nitrogen deposition where the PC>1% of the minimum critical load and the relevant minimum critical load is already exceeded. Both species are associated with reedbed habitats within which they breed across The Swale. Neither species has been recorded breeding within the DCO boundary nor within the reedbed to the north of the WKN Site. However, they may be present in the wider area, Coldharbour Fleet to the north west, for example.

5.14 Notwithstanding this, reedbed habitats in north Kent are unlikely to be very sensitive to nutrient nitrogen deposition. The APIS website from which the information with respect to critical loads is derived incorporates reedbed with other wetland habitats such as marsh and fens. It notes that the minimum critical load for these habitats listed on APIS and used in Appendix 5.4 (15 $kgN.ha^{-1}.yr^{-1}$) represents more upland habitats that will be naturally more nutrient poor and therefore more susceptible to species composition change due to atmospheric nitrogen input. Reedbeds are, by their nature, monospecific, dominated by common reed. As such, their susceptibility to competitive exclusion by other graminoid species is considered very low. The upper end of the critical load range is therefore considered more appropriate for these habitats, set within grazing marsh which are higher nutrient systems due to the underlying nutrient status of the soils within the flood plain on which they form. Using the upper critical load for this habitat of 30 $kgN.ha^{-1}.yr^{-1}$ is therefore more appropriate meaning that the PC becomes ≤1% of this critical load and, as such, is not significant.

Disturbance

5.15 Although the operational noise of K3 will not change as a result of the K3 Proposed Development, the additional HGV movements to facilitate the increased throughput may generate noise levels sufficient to cause disturbance to birds using the nearby designated sites. The potential for such disturbance is considered very limited, however. Research with respect to the effects of road noise on foraging intertidal birds is limited (Cutts, Phelps & Burdon 2009), although there is some evidence that breeding birds (including waders) may be negatively affected by road noise (Reijnen, Roppen & Veenbaas. 1997). Distances within which such effects may be observed vary with species, but may be up to 190 m in grassland habitats adjacent to roads with 10,000 average annual daily traffic (AADT) movements (Cutts, Phelps & Burdon 2009). The closest point of the highway network used by the HGVs to the designated sites is at the roundabout at the junction of Barge Way with the North Gate of the Kemsley Paper Mill. This is some 400 m from intertidal habitats of The Swale SPA/Ramsar/SSSI and circa 100 m from the grazing marsh habitats of that site.

5.16 Traffic modelling for the K3 Proposed Development show traffic numbers on Barge Way adjacent to the North Gate would be 3,664 AADT (see Traffic Assessment), uplifted from 3,569 at baseline (i.e. a change of 68 AADT or 1.2%).

5.17 Although the exact relationship between AADT, distance from road and degree of disturbance is not fully elucidated, the potential for disturbance due to traffic noise is considered highly limited due to:

- the distance between the traffic and the designated site. Although a distance of 190 m within which habitat degradation may occur is suggested for roads with 10,000 AADT, given that the predicted future AADT is circa 1/3 of this, it is likely that any buffer around Barge Way would be substantially smaller; and
- the absolute increase in AADT is extremely small (<2%) with a correspondingly small increase in absolute noise.

5.18 Consequently, it is concluded that the effects of disturbance due to traffic noise on qualifying features of any nearby Ramsar sites as well as breeding, passage and wintering birds of any nearby SPAs can be screened out, as no likely significant effects are anticipated.

WKN Proposed Development

5.19 The WKN Site is currently used as a laydown area for the construction of K3 as consented. Therefore, it was historically expected to be returned to its original state (scrub / grassland / rubble mosaic). The WKN Proposed Development baseline will therefore be the WKN Site, as existed prior to the use of the WKN Site as laydown, as informed by the surveys completed at the time, as described in Appendix 11.3. This is considered a worst-case scenario as it allows the WKN Proposed Development to account for the loss of habitat that occurred during the original site clearance.

5.20 Given the above, the environmental pathways that could lead to a significant effect due to the construction and operation of the WKN Proposed Development (meaning the WKN Site, laydown area and access roads) may be summarised as:

- Direct loss or damage of habitats within a designated site or of nearby areas used by interest species;
- Change in management regimes (e.g. grazing / mowing of marshland) of habitats within a designated site or of nearby areas used by interest species;
- Loss of future space to allow for managed realignment to avoid coastal squeeze;
- Urbanisation that results in over shadowing, reduction of sight lines or which hinders flight paths;
- Air quality;
- Water quality;

- Hydrological changes, including in the balance of saline and non-saline conditions;
- Disturbance (activity, recreation, noise and lighting); and
- Introduction or spread of non-native invasive species

Direct loss or damage of habitats used by interest species

5.21 As the development is a minimum of 160 m from the SPA, SAC or Ramsar sites, the proposal will not result in any direct loss of any designated habitat within any designated site.

5.22 The WKN Site does not support any of the plant species listed on the Swale Ramsar citation, nor does it have any habitat suitable of supporting such species. Therefore, impacts occurring from direct loss can be screened out, as no likely significant effects are anticipated.

5.23 Prior to clearance, the WKN Site comprised bare ground, rubble piles and ephemeral habitats. The laydown area comprises scrub and bare ground. Both areas are unlikely to support populations of any qualifying invertebrate species of the Swale Ramsar site or Medway Estuary and Marshes Ramsar site. These species are mostly reliant on saline/brackish ditch habitats typical of these sites, which are not present with the WKN Site.

5.24 Following bird surveys of the WKN Site in 2009/2010, 2016 and 2018 (see appendices in Ecology Chapter) no qualifying bird species of either The Swale SPA and Ramsar site or Medway Estuary and Marshes SPA and Ramsar site were recorded utilising the WKN Site for roosting or breeding.

5.25 The WKN Site also provides no suitable habitat for any of the cited SPA / Ramsar wintering species for foraging. The WKN Site does not contain any habitat suitable for wintering Ramsar/SPA Citation species or associated assemblage.

5.26 There is no evidence that the WKN Site regularly supports significant numbers of roosting birds either of qualifying individual species or assemblages of The Swale SPA / Ramsar site or the Medway Estuary and Marshes SPA / Ramsar site.

5.27 There is no evidence that the WKN Site is regularly used as a significant feeding or roosting site during passage or winter by any qualifying species of either The Swale SPA / Ramsar site or the Medway Estuary and Marshes SPA / Ramsar site.

5.28 Consequently, it is concluded that the effects of direct habitat loss on qualifying features of any nearby Ramsar sites as well as breeding, passage and wintering birds of any nearby SPAs can be screened out, as no likely significant effects are anticipated.

Change in habitat management regimes

5.29 The majority of the existing land use immediately surrounding, and in the vicinity of the WKN Site is in industrial use, pertaining to the Kemsley Paper Mill. A capped tip lies to the south of the site.

5.30 The current management regimes for the SPA / Ramsar sites focus on maintaining the habitats for the qualifying breeding and waterbird assemblages (Natural England, 2014).

5.31 Given the distance from the SPA / Ramsar sites, the WKN Proposed Development will therefore result in no change to current management regimes of any sub-feature of an SPA or Ramsar during either the construction, operation or demolition of the facility.

5.32 Therefore, impacts occurring from a change in habitat management regimes can be screened out, as no likely significant effects are anticipated at any designated site.

Loss of future space to allow for managed realignment

5.33 There is evidence that rising sea levels are causing intertidal habitats, notably saltmarsh and mudflats, to migrate landwards across all the designated sites under consideration. However, such landward migration can be rendered impossible due the presence of sea walls and other flood defences, resulting in a reduction in both the extent and quality of some sub-features through coastal squeeze. The removal or landward relocation of defences is seldom possible in existing built up areas and new development which takes place immediately behind sea walls and flood defences can result in it no longer being possible to move the defences landwards to accommodate replacement of eroded or drowned out intertidal habitats.

5.34 The WKN Site is located to the west of The Swale and is currently used as the laydown area for K3; prior to this, it comprised bare ground and ephemeral habitats.

5.35 Given that much of the site is already made land, it can be concluded that impacts occurring from a loss of future space can be screened out, as no likely significant effects are anticipated at any designated site.

Urbanisation

5.36 Industrial development has the potential to overshadow areas of habitat within designated sites, or areas used by the interest features of such sites, as well as obstruct flight paths and lines of sight, reducing the appeal of the habitat or increasing the risk of fatalities through collisions.

5.37 The proposed buildings will be visible from part of the intertidal area within the Swale SPA which supports wintering populations of waterbirds. The buildings nearest the Swale SPA / Ramsar boundary will be in keeping with other buildings in the area and the tallest building will be set around 240 metres away from the boundary of the Swale SPA / Ramsar site.

5.38 The WKN Proposed Development is located directly northwards of the K3 Proposed Development coupled with the presence of the existing Kemsley Paper Mill to the west, the WKN Site is not seen as being strategically located between the Swale SPA /Ramsar site and the Medway Estuary and Marshes SPA / Ramsar site in terms of flight paths. Therefore, no further assessment is required in terms of the movement of birds between the Medway Estuary and Marshes and the Swale.

5.39 Consequently, although the intertidal area surrounding the site is considered to be of importance for the birds of the Swale SPA/Ramsar, given the highly urban setting of the

site and backdrop of existing industrial buildings, there is little potential for increased urbanisation to impact the interest features for which the SPA/Ramsar are designated.

5.40 Therefore, any impacts occurring from increased urbanisation can be screened out, as no likely significant effects are anticipated at any designated site.

Air quality

5.41 The two air quality issues during construction are dust and increased traffic emissions.

Construction/demolition dust

5.42 The potential for dust release exists during the construction & demolition phases, with potential sources including site clearance, earthworks, building demolition and vehicle movements.

5.43 Based on studies elsewhere, it is anticipated that the majority of dust would be deposited in the area immediately surrounding the source (up to 50 metres away) and that no change in level of exposure is expected beyond 300 metres from the site.

5.44 The boundary of the Swale SPA and Ramsar site is over 160 metres to the east of the WKN Site and therefore outside the area potentially most affected.

5.45 The closest part of the Medway Estuary and Marshes SPA and Ramsar to the Proposal site where construction works is 2.1 km to the north and therefore outside the area potentially affected by dust. This, and more distant designated sites can be screened out as no likely significant effects are anticipated.

Traffic – construction/demolition

5.46 For sensitive ecological receptors, the IAQM Guidance on the assessment of dust from demolition and construction sets out 50 m as the distance from the site boundary and from the site traffic route(s) within which there could potentially be nuisance dust and PM10 effects. There is scrub habitat along the access road that is within 50 m of construction/demolition traffic, but the nearest designated site boundary is located over 160 metres to the east of the WKN Site and therefore outside the area potentially most affected.

5.47 It can therefore be concluded that in relation to dust relating to construction/demolition traffic, impacts can be screened out for all designated sites, as no likely significant effects are anticipated.

Traffic - Operational

5.48 The major impacts of air pollutants on coastal habitats and grasslands in the UK as a result of traffic are ozone, nitrogen deposition and acidification. According to the Department for Transport's Transport Analysis Guidance, the contribution of vehicle emissions from the roadside to local pollution levels is not significant beyond 200 metres from a road (Department for Transport 2009). This is therefore the distance that has been used to determine whether Natura 2000 and Ramsar sites are likely to be significantly affected by traffic emissions associated with the proposed development.

5.49 The Highways Agency (now Highways England) DMRB (Design Manual for Roads and Bridges) methodology sets out a range of criteria for when assessment of effects due to increases in traffic are necessary. The key criterion with respect to the WKN Proposed Development is the AADT of Heavy Duty Vehicles (HDV) where a change of at least 200 movements is required. As shown in Chapter 4 of the ES, the AADT of HDVs would go from 1,243 to 1,481, an increase of 241 associated with the WKN Proposed Development. As this is greater than the 200 AADT threshold set out in the DMRB, further analysis has been undertaken.

5.50 The operational effects of air quality arising from traffic have been modelled in Appendix 5.4 of Chapter 5 (Table 5.4.13 & 5.4.14). Modelling was undertaken at a selection of discrete receptor points at the closest point of the habitat site to a road adjacent to roads affected by the WKN Proposed Development.

5.51 The cumulative traffic data for the WKN Proposed Development and K3 Proposed Development together in the opening year of the WKN Proposed Development, 2024 was also modelled. The PC from the WKN and K3 stack emissions at each of the sensitive receptors was added to the road contribution to give a 'WKN + K3' PC that considers both stack and traffic emissions.

5.52 Only the Swale SPA/SSSI/Ramsar and the Medway Estuary and Marshes SPA/Ramsar are within 200 m of a road affected by the WKN Proposed Development and K3 Proposed Development. The A249 passes through the Medway Estuary and Marshes SPA/Ramsar so receptors were selected at the roadside.

5.53 For NO_x, the cumulative PC as % of the CL is less than 1% for the Medway Estuary and Marshes SPA/Ramsar. At both the Swale SPA/SSSI/Ramsar and the Medway Estuary and Marshes SPA/Ramsar, the PEC is less than the CL. On that basis, the cumulative effects are considered insignificant.

5.54 For N deposition the cumulative PC as % of the CL is >1% for both the Medway Estuary and Marshes SPA/Ramsar and the Swale SPA/SSSI/Ramsar. However, the critical loads presented in Table 5.4.14 are the lowest on APIS for these sites. The minimum critical load used for The Swale SPA/Ramsar is 15 $kgN.ha^{-1}.yr^{-1}$ listed on APIS as representing Eurasian reed warbler and reed bunting. As described above, this critical load though is for upland habitats that will be naturally more nutrient poor and therefore more susceptible to species composition change due to atmospheric nitrogen input. Using the more appropriate upper critical load for this lowland reedbed habitat of 30 $kgN.ha^{-1}.yr^{-1}$ means that the PC becomes $\leq$1% of this critical load and, as such, is not significant.

5.55 The minimum critical load used for the Medway Estuary & Marshes SPA/Ramsar is 8 $kgN.ha^{-1}.yr^{-1}$ listed on APIS as representing acid stable dune grasslands for both interest feature species of breeding tern. As for hen harrier and merlin, while the tern species will both use such habitats elsewhere in the country, within the Medway Estuary system, both species breed mainly on the many salt marsh islands (Burntwick Island, for example) that occur in the river channel. As such, a more appropriate critical load would be that for early-pioneer salt marsh of 30 kgN.ha-1.yr^{-1}. Using this figure, the cumulative PEC is only 45% of the critical load meaning that the cumulative PEC does not exceed the critical load and, as

such, cumulative effects in combination with the K3 and WKN Proposed Developments are not significant.

5.56 The cumulative PECs presented in Appendix 5.4 can be considered highly conservative as the PCs from the other developments are the maximum impacts across a grid and are unlikely to occur at the same location as the maximum road contribution. On this basis, all impacts as a results of traffic emissions are negligible, and as such, are not significant..

Operational emissions

5.57 The principal source of operational emissions will be gases exhausted from the stack after treatment in the flue gas treatment system. The combustion of waste during the operation of the WKN Proposed Development will give rise to atmospheric emissions of a number of substances in low concentrations which will be regulated under the Waste Incineration Directive (WID) 2000/76/EC.

5.58 The methods for screening of potential likely significant effects with respect to operational emissions is described in Chapter 5 Air Quality while the data relating to designated sites is presented in Appendix 5.4.

5.59 For all pollutants (NO_x, NH_3, SO_2, nutrient nitrogen deposition and acid deposition), either the PEC did not exceed the EQS or the PC was ≤1% of the EQS for all interest features of all designated sites in the study area.

5.60 The only interest features where this was not the case was Eurasian reed warbler and reed bunting for The Swale SPA with respect to nutrient nitrogen deposition where the PC>1% of the minimum critical load and the relevant minimum critical load is already exceeded. Both species are associated with reedbed habitats within which they breed across The Swale. Neither species has been recorded breeding within the DCO boundary nor within the reedbed to the north of the WKN Site. However, they may be present in the wider area, Coldharbour Fleet to the north west, for example.

5.61 Notwithstanding this, reedbed habitats in north Kent are unlikely to be very sensitive to nutrient nitrogen deposition. The APIS website from which the information with respect to critical loads is derived incorporates reedbed with other wetland habitats such as marsh and fens. It notes that the minimum critical load for these habitats listed on APIS and used in Appendix 5.4 (15 $kgN.ha^{-1}.yr^{-1}$) represents more closely upland habitats that will be naturally more nutrient poor and therefore more susceptible to species composition change due to atmospheric nitrogen input. Reedbeds are, by their nature, monospecific, dominated by common reed. As such, their susceptibility to competitive exclusion by other graminoid species is considered very low. The upper end of the critical load range is therefore considered more appropriate for these habitats, set within grazing marsh which are higher nutrient systems due to the underlying nutrient status of the soils within the flood plain on which they form. Using the upper critical load for this habitat of 30 $kgN.ha^{-1}.yr^{-1}$ is therefore more appropriate meaning that the PC becomes ≤1% of this critical load and, as such, is not significant.

5.62 Impacts occurring from operational air quality issues on all designated sites can therefore be screened out, as no likely significant effects are anticipated.

Water quality

5.63 The quality of the water entering Natura 2000 and Ramsar sites is an important determinant of habitat condition and hence the species they support. Poor water quality can have a range of ecological impacts.

5.64 Likely significant effects on The Swale SPA/Ramsar site cannot be excluded due to the relatively close proximity of the nearest boundary to the proposed site.

5.65 There is a substantially greater separation distance between the proposed site and other designated sites. This means that direct effects on water quality by the proposed project are either not possible as there is no direct mechanism by which they could occur, or dilution effects mean they would not be significant. This means that they can be screened out, as no likely significant effects are anticipated.

Hydrological changes

5.66 WKN Proposed Development will use two drainage systems. The first drainage system will collect clean surface water runoff (for example from building roof areas) and store it in the lagoon. The second drainage system will collect 'dirty' runoff (for example from the FGT area) and store it in the 'dirty' water tank. This 'dirty' water will then be used in the process as required (for example for ash quenching).

5.67 The clean water will be stored in the lagoon and used to top up the 'dirty' water tank. If the lagoon has reached the maximum acceptable capacity it will be discharged at a controlled rate into The Swale. It is currently intended that discharge would be via a separate pipe to that used by K3, albeit with pipe sitting adjacent to that of K3 in the sea wall.

5.68 The Marine Licence for the construction of the outfall associated with the Kemsley Generating Station Outfall (MMO Ref: L/2017/00482/1) included the option to construct two discharge pipes – one for K3 and a second for the Incinerator Bottom Ash (IBA) facility, planning permission for which was previously granted for development on the WKN Site. The IBA permission will not now be implemented but a second Marine Licence (MMO Ref L-2017-00482-2) has been granted covering the WKN outfall included provision for discharge. Thesupporting technical work supporting the licence application identified that the operation of the second outfall would not result in any significant effects on The Swale SPA/Ramsar. Discharge from the WKN Proposed Development would be clean, uncontaminated surface water. On this basis, therefore, no likely significant effects of the operation of the outfall on any designated site due to changes in hydrology are predicted.

5.69 No hydrological changes to other designated sites as a result of the operation of the WKN Proposed Development are predicted.

Disturbance

5.70 Disturbance can be caused by visible activity (construction, operation or recreation) noise and lighting. Because of the relative complexity of these issues, and their ability to have impacts on waterbirds within several hundred metres depending on the nature of the activity and the receptors, likely significant effects due to this impact pathway cannot be

excluded at the Swale SPA/Ramsar without further assessment and/or application of mitigation as necessary.

5.71 For other designated sites, the separation distances between their boundaries and the proposed site means that disturbance impacts can be screened out, as no likely significant effects are anticipated.

Introduction or spread of non-native invasive species

5.72 The movement of people and traffic, as well as importation of material and plants to a site, can result in the introduction of non-native species to a site. The only non-native invasive species currently known to be in the area, though not on the WKN Site, is Japanese Knotweed. No importation of soil s required to build the WKN Proposed Development and no final planting is proposed that could inadvertently import non-native invasive species to site.

5.73 The issue of introducing and spread of non-native species is therefore screened out from further consideration in this assessment on the grounds of not likely to have a significant effect.

6 STAGE 3 – APPROPRIATE ASSESSMENT

K3 Proposed Development

6.1 A summary of the outcomes of Stage 2 is presented in Table 6.1, as described in the HRA that accompanied the 2010 ES and subsequent information. Mitigation is also included where appropriate. Integrity matrices are provided in Appendix 2.

Table 6.1 Summary of Stage 2 Conclusions – K3 Proposed Development

	Screening Outcome	Designated Site	Feature
Direct loss of habitats	No Likely Significant Effect		
Change in management regimes	No Likely Significant Effect		
Loss of future space for managed realignment	No Likely Significant Effect		
Urbanisation	Through to Stage 3	Swale SPA / Ramsar site	Breeding Marsh Harrier Wintering birds
		Medway Estuary and Marshes SPA / Ramsar site	Wintering birds (Knot and Redshank only)
Air quality	Through to Stage 3 (Operational emissions only)	Swale SPA / Ramsar	Grazing marsh sub-feature / Ramsar plant and invertebrate species / wintering birds / breeding Marsh Harrier
		Medway Estuary and Marshes SPA / Ramsar site	Grazing marsh sub-feature / Ramsar plant and invertebrate species / wintering birds / breeding birds
		Thames Estuary and Marshes SPA / Ramsar site	Grazing marsh sub-feature / Ramsar plant and invertebrate species / wintering birds / breeding birds

		Queensdown Warren SAC	Chalk grassland
Water quality	No Likely Significant Effect		
Hydrological changes	Through to Stage 3	Swale SPA / Ramsar site	Mudflat sub-feature / wintering birds /
		Medway Estuary and Marshes SPA / Ramsar site	Wintering birds (Knot and Redshank only)
Disturbance	Through to Stage 3 (noise and lighting only)	Swale SPA / Ramsar site	Breeding Marsh Harrier / Wintering birds
		Medway Estuary and Marshes SPA / Ramsar site	Wintering birds (Knot and Redshank only)
Introduction or spread of non-native invasives	No Likely Significant Effect		

6.2 The conclusion of the subsequent Appropriate Assessment in the original HRA document from the 2010 ES in relation to each of the above impacts where likely significant effects could not be excluded was that no adverse effect on integrity was predicted. This conclusion is still considered robust.

Practical Effect of K3 Proposed Development

6.3 No likely significant effects were predicted as occurring as a result of the Practical Effect of the K3 Proposed Development. Therefore, no further assessment is necessary.

WKN Proposed Development

6.4 A summary of the outcomes of Stage 2 is presented in Table 6.2, and Appropriate Assessment for the relevant impact pathways provided below this. Mitigation is also included where appropriate. Integrity matrices are provided in Appendix 2.

Table 6.2 Summary of Stage 2 Conclusions – WKN Proposed Development

Impact Pathway	Screening Outcome	Designated Site	Feature
Direct loss of habitats	No Likely Significant Effect		

Change in management regimes	No Likely Significant Effect		
Loss of future space for managed realignment	No Likely Significant Effect		
Urbanisation	No Likely Significant Effect		
Air quality (construction dust)	Likely Significant Effect cannot be excluded	The Swale SPA / Ramsar	All
Air quality all other issues	No Likely Significant Effect		
Water quality	Likely Significant Effect cannot be excluded	The Swale SPA / Ramsar	All
Hydrological changes	No Likely Significant Effect		
Disturbance	Likely Significant Effect cannot be excluded	The Swale SPA / Ramsar	All
Introduction or spread of non-native invasives	No Likely Significant Effect		

Air quality (construction/demolition dust)

6.5 Whilst studies suggest most dust from construction/demolition of the WKN Proposed Development would be deposited in the area immediately surrounding the source (up to 50 m, which is outside the boundary of the Swale SPA/Ramsar site), and that no change in level of exposure is expected beyond 300 m from the site, this does mean that some impacts are possible within The Swale SPA/Ramsar boundary, which is located 160 m to the east of the WKN Site.

6.6 To ensure compliance with relevant standards and guidelines relating to dust and airborne particulate matter, various techniques not relating to the avoidance or reduction in effect on a European site will be implemented during the construction/demolition phases. Such measures will be included within a Construction Environmental Management Plan and are expected to include:

- commitment to the considerate contractor's scheme;

- minimisation of dust generation wherever appropriate (e.g. cutting rather than breaking);
- damping down when conditions require;
- wheel and body washing of vehicles where appropriate; and
- vehicles carrying material to be sheeted as required;

6.7 Following the implementation of such mitigation measures, no adverse effect on site integrity of the Swale SPA/Ramsar site is anticipated as a result of the WKN Proposed Development due to dust, either during construction or demolition.

Water quality

6.8 Poor water quality can result in a range of impacts. These include:

- at high levels, toxic chemicals and metals can result in immediate death of aquatic life, and can have detrimental effects even at lower levels, including increased vulnerability to disease and changes in wildlife behaviour;
- some industrial chemicals and components of sewage effluent are suspected to interfere with the functioning of the endocrine system, possibly having negative effects on the reproduction and development of aquatic life; and
- eutrophication, the enrichment of plant nutrients in water, increases plant growth with high levels of macroalgal growth potentially smothering the mudflats used as feeding areas by qualifying bird species. The decomposition of organic matter that often accompanies eutrophication can deoxygenate water. In the marine environment, nitrogen is the limiting plant nutrient and so eutrophication is associated with discharges containing available nitrogen.

6.9 Because The Swale SPA/Ramsar site is within 160 m of the proposed development, measures are required to prevent the release of contaminated water into the SPA, directly or otherwise.

6.10 Table 10:14 of Chapter 10 Water Environment in the ES provides details of general industry guideline and best practice measures to be incorporated into the decommissioning and constructional phases of the WKN Proposed Development. Such measures will be secured within the CEMP. Table 10:15 provides the mitigation measures that will be incorporated into the operational phase.

6.11 Process water from the WKN Proposed Development will be reused within the process to ensure no discharge of such water occurs.

6.12 The construction of the proposed second outfall for the WKN Proposed Development into The Swale (Work No.7) will follow the same methodology/timing restrictions set out in the approved Marine Licence for the first outfall constructed to serve K3 (ref MLA/2017/00316). This approach is codified in the amended Marine Licence submitted to the MMO. The

application for the amended Marine Licence includes an ecological appraisal of the potential effects on the marine component of the SPA/Ramsar (Appendix 11.7).

6.13 This concluded that, assuming all the methodological/timing restrictions set out in the Marine Licence were adhered to, there would be no impacts on The Swale from the construction of the outfall. As such, all impacts due to the outfall are considered to be not significant and are not discussed further in this assessment.

6.14 Implementation of these measures during both construction and operational phases of the proposed development limits the risk of a significant pollution incident. Following implementation of mitigation measures, no adverse effect on site integrity of the Swale SPA/Ramsar site is anticipated as a result of the proposed project.

Disturbance

Visible Disturbance - Recreation

6.15 The movement of people and plant during both the construction phase and operation of the WKN Proposed Development may be visible to waterbirds using the intertidal areas of the Swale SPA / Ramsar site. Such activity can disturb birds through causing increased anxiety and flight. The alert distance and flight initiation distance responses to disturbance are in general species specific and affected by the relevant habituation of the birds present to human contact and thus may vary between migration to overwintering periods. The greatest effect is associated with human presence on the intertidal zone of estuaries (Cutts *et al.*. 2013, Davidson and Rothwell 1993).

6.16 People from a wide-ranging catchment area use the shoreline of the Swale for recreational activity. This includes waterborne activities e.g. personal watercraft on Long Reach of the Swale by Kingsferry Bridge, sailing on the Swale and land-based activities e.g. dog walking. Activities of walkers (particularly dog walkers) and water-borne recreation can, particularly if carried out in winter, have a significant disturbing effect upon large numbers of waterfowl thus increasing energetic expenditure (as birds have to take flight more frequently) and competition on the less disturbed mudflats. Ultimately, this can result in increased mortality rates for designated species. That being said, the ornithological component of this SPA can be assumed to be highly habituated to anthropogenic activity.

6.17 The potential for disturbance to SPA / Ramsar Citation species from recreational activities by either construction or subsequent operational staff is considered low. Whilst there is access to the Saxon Shore Way from the wider Kemsley Paper Mill, currently very little or no use is made of this by Kemsley Mill staff. It is possible that there will be increased recreational usage made of the Saxon Shore Way during both construction of the site, as Sittingbourne is within potential travel distance over lunch break. However, it should be bourne in mind that Milton Creek is outside the SPA and that dogs will not be permitted on site. It is anticipated that few if any construction and operational staff will access the Swale SPA.

6.18 Consequently, it is concluded that activity disturbance in the form increased recreation as a result of the WKN Proposed Development will not compromise the conservation objectives

of The Swale SPA and no adverse effect on site integrity of the Swale SPA/Ramsar site is anticipated as a result of the WKN Proposed Development.

Lighting

6.19 Lighting during the construction, operational and demolition phases of the proposed development has the potential to disturb the qualifying species of the Swale SPA / Ramsar site. Available research indicates that ecological impacts following introduction of lighting could potentially include:

- disruption of the daily rhythms of some species of plant resulting in changes in growth and flowering times;
- prolonged settling of nocturnal insects resulting in reduced feeding, breeding and egg laying;
- reduced ability of female moths such as the Ground Lackey Moth to attract males and increased mortality of larvae due to delayed or failure to produce wintering pupae; and
- disruption of nocturnal bird behaviour such as roosting and feeding,

6.20 Although there is limited data on the extent to which the area covered be the application is used by birds at night, given that, prior to development, the site was bare ground with ephemeral habitats, it is considered highly unlikely that any SPA / Ramsar citation species would be using the WKN Site.

6.21 Further to this, given the distance of the proposed development to the SPA / Ramsar light from the proposed development does not have the potential to illuminate either the terrestrial or inter-tidal habitats above that which it is currently. As per the relevant requirement within the DCO, all lighting will be designed as per best practice standards to ensure that no additional light spill above the current situation would occur. Therefore, this issue does not compromise the conservation objectives of The Swale SPA/Ramsar and no adverse effect is predicted. The lighting strategy is provided in Appendix 11.8.

Visual disturbance – Activity (Construction, Operation and demolition)

6.22 Studies of construction phase disturbance do suggest that disturbance is less significant when human presence is restricted to the edge of inter-tidal areas and even less significant when set back from intertidal areas. Cutts *et al..* (2013) determined that with respect to visual disturbance, high impact activities occur exclusively within or directly adjacent to the intertidal area. Observable effects have however been recorded within 300m of activities (Cutts *et al.*. 2009), thus as the Proposal site is approximately 160 metres from the boundary of the Swale SPA / Ramsar, at its closest, site works could potentially result in disturbance to foraging or roosting birds dependent on the species present, their activity and habituation.

6.23 Further consideration of visual disturbance is provided below on a species-by-species basis for the SPA feature species.

Noise - Operation

6.24 Under normal operating conditions, the WKN Proposed Development will produce a low hum, rather than any loud, sudden noises that might elicit a disturbance response from nearby interest-feature birds using the intertidal areas of The Swale. It will furthermore not result in noise levels of greater than 55dB L_{Amax} within the SPA (Figures 7.3 & 7.5 from Chapter 7 of the ES). On this basis, therefore, it can be stated that the issue of operational noise-related disturbance will not compromise the objectives of the Swale SPA.

Noise – Construction/demolition

6.25 The Proposal site has the potential to generate noise during both site preparation and construction stages, notably as a result of ground clearance, vehicle movements, construction of the outfall and piling. Similar activities associated with demolition may have similar effects. Very loud noise (which can be defined as greater than 80 dBL_{Amax}) and percussive noises have the potential to disturb birds, increasing time spent alert and in flight, reducing the available time to feed and increasing mortality.

6.26 Waterbirds often respond to disturbance in their environment by deviations from their current and predominant behaviour (Platteeuw & Henkens 1997). Birds disturbed while foraging thus generally experience a loss of foraging time whilst birds at roost must locate an alternative safe roost site with the necessary associated flight/movement, these actions both have potential accompanying implications for energy budgets. Regular disturbance thus has the potential to reduce the carrying capacity of sites for water birds (Platteeuw & Henkens 1997).

6.27 The effects of disturbance during construction work on the Humber estuary have been studied by the Institute of Estuarine and Coastal Studies (i.e. Cutts *et al.* 2009, Cutts *et al.* 2013). These studies have noted that disturbance to feeding waders varies according to the level and type of construction activity. Birds are liable to habituation to regular noise and ongoing background or regular noise is likely to be more readily assimilated by waterfowl than sudden irregular noise events at a similar decibel level (Cutts *et al.* 2013). For instance irregular piling noise above 70 dB levels was noted to cause high to moderate disturbance whereas regular piling noise, or irregular noise at lower levels, was accepted by the birds (Cutts *et al.*. 2009).

6.28 The effects of disturbance are dependent on the spatial and temporal extents of the disturbance, with temporary and spatially limited disturbance less likely to impact on the survival of a species. This will depend on how much foraging time is lost and how much additional energy expenditure occurs because of the disturbance, and whether individual birds can compensate (Davidson & Rothwell 1993). Where alternative habitat is available, or birds can quickly return after a disturbance, most birds will be able to overcome the effect of disturbance by increasing food intake rates (Swennen *et al.*. 1989 in Davidson & Rothwell 1993), and/or extending the length of time that they feed (Davidson & Rothwell 1993). However, as estuarine birds can only feed during low tide when mudflats are uncovered this can limit their ability to compensate. This limiting factor becomes more important in cold weather when birds need to feed for longer to meet their energy requirements (Woodward *et al.* 2015).

6.29 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. The following effects have been noted:

- noise events from aircraft at a level of 60 dBA caused no noticeable disruption to typical activity budgets of waterbirds (Flemming *et al.*. 2000);
- harlequin duck reacted with alert behaviour to noise generated by military jets, especially when the noise exceeded 80 dBA (Goudie & Jones 2004);
- black duck, American wigeon, gadwall and green-winged teal were not adversely affected by aircraft disturbance (using a time activity budget approach) at below 85 dBA (Conomy *et al.*. 1998); and
- noise events at 100 dBA could cause temporary or permanent hearing impairment if the subject is within 15 m and chronic, intense noise may induce physiological stress in some birds if they cannot avoid exposure (West *et al.*., 2007).

6.30 Birds have been shown to habituate to regular, loud noise events, although this may vary between species, for example black ducks became habituated to loud aircraft noises whilst wood ducks did not under the same circumstances (Conomy *et al.*., 1998).

6.31 Short, sharp percussive noise, most familiar as gunshot but also produced during construction processes by for instance the hammering in of metal piles, has been shown to cause disturbance. The following effects have been noted:

- Cutts *et al.*. (2013) suggests that for a sharp, sudden noise to qualify as a high level effect, it must be over 60 dB, and over 55 dB for a medium level effect;
- shooting can cause temporary disruption of normal activities of waterbirds, altering their diurnal rhythms and increasing recorded escape flight distances, as well as displacing waterbirds from their preferred feeding and roosting habitats (Madsen & Fox, 1995 & Mahaulpatha *et al.*., 2000); and
- on heavily disturbed days, including those when shooting was occurring, brent geese fed at night during mid-winter in order to balance their daily energy budget (Riddington *et al.*., 1996).

6.32 Different species of bird however have different tolerance thresholds and susceptibility to disturbance impacts (i.e. Redshank is notably sensitive to disturbance in severe weather as it feeds on very small prey relative to its size (Burton *et al*. 2006) and therefore construction works and other operations impact upon different species in differing ways dependent on the weather conditions at the time of works. As such species-specific consideration of impact is warranted where suitable information is available. Such an approach is possible at the WKN Proposed Development due to the wealth of historic coastal bird survey information collected to inform the K3 development. Noise disturbance impacts on the species listed individually and that make up the assemblages on the citations for The Swale SPA/ Ramsar sites are considered on a species by species basis along with visual

disturbance below. This assessment has drawn on the available historic bird survey information to determine spatial and temporal distributions.

Dark-Bellied Brent Goose (*Branta bernicula bernicula*)

6.33 Dark-Bellied Brent Goose have been irregularly recorded within the Swale survey area during survey work undertaken in 2009, 2016 and 2018. The species has been recorded in the months of January, February, March, April, October, November and December. Over the course of 93 survey visits completed, Dark-Bellied Brent Goose were recorded on nine occasions with a peak count of 250 individuals recorded in February 2018. Dark-Bellied Brent Goose were primarily recorded during high tide surveys with records largely consisted of foraging and roosting individuals/ flocks.

6.34 The recorded spatial distribution of Dark-Bellied Brent Goose over the course the high tide cycle is presented in Figure 6.1. This figure shows the median density of birds per 50m grid square over all years survey and as such provides a summary of the relative importance of habitats within the survey area. It is clear from this figure that the majority of Dark Bellied Brent Goose records are associated with the mouth of Milton Creek (~570m from the WKN Site boundary) and the opposite eastern bank of the Swale (~400m from the WKN Site boundary).

6.35 Brent Geese are a species highly sensitive to noise disturbance and they react in a variable manner to visual disturbance (Smit & Visser, 1993). Smit & Visser, 1993 found that geese react to up to 92% of aircraft passes although this declined to 64% with habituation. Cutts *et al.*. (2013) suggest that the sensitivity of Brent Geese to visual disturbance varies depending on their activity. When foraging they tolerate disturbance relatively nearby with an average proximity to disturbance threshold of 105m for first reaction. When roosting or loafing the birds are far more sensitive, with the range for first reaction increasing to 205m. Cutts (2013) conclude that if geese are within 400m of works then consideration should be given to mitigation for visual disturbance.

6.36 Cutts *et al.* (2013) also suggest that Brent Geese are very sensitive to noise stimuli and a minimum approach distance of at least 100m is expected. At this distance Cutts (2013) estimated a noise required to create high level disturbance would be 110-115dB at source.

6.37 The favoured areas for Dark-Belied Brent Goose on the eastern bank of The Swale (circa 370m to 400m from the WKN Site boundary) will be subject to a low noise disturbance stimuli (Cutts *et al.* 2013) with an LAmax of between 50-55 dB and a low/ moderate visual disturbance stimuli. Whilst utilised habitat at the mouth of Milton Creek would also be subject to a low noise disturbance stimuli (Cutts *et al.* 2013) with an LA_{max} of between 50-55dB and limited/ no visual disturbance stimuli through the screening of the WKN Site by the K3 development and coastal scrub.

6.38 On this basis, therefore, it can be stated that the issue of construction phase noise or visual related disturbance will not compromise the objectives of the Swale SPA with regards to Dark-Bellied Brent Goose.

Dunlin *(Calidris Alpina)*

6.39 Dunlin have been regularly recorded within the Swale survey area during survey work undertaken in 2009, 2016 and 2018. The species has been recorded in the months of January, February, March, April, May, August, September, October, November and December. Over the course of 93 survey visits completed, Dunlin were recorded on 56 occasions with a peak count of 1,600 individuals recorded in January 2010. Dunlin were recorded during both high tide and low tide surveys although peak counts were associated with high tide and roosting activity.

6.40 The recorded spatial distribution of Dunlin over the course the high tide and low tide cycle is presented in Figures 6.2 and 6.3. These figures show the median density of birds per 50m grid square over all the years of survey and provide an indication of the relative importance of habitats within the survey area at both high tide and low tide. It is clear from Figure 6.2 that the highest density of Dunlin records at high tide are associated with the opposite eastern bank of the Swale (~400m from the WKN Site boundary). It is also clear from Figure 6.3 that as the tide recedes Dunlin spread out across the intertidal zone and are present across a wider area at a low density but with the highest density of Dunlin records also associated with the opposite eastern bank of the Swale (~250-300m from the Proposal site boundary).

6.41 Dunlin are very tolerant of moderate and high level visual disturbance and tend to habituate to various works fairly quickly (Cutts *et al.* 2009, 2013). They are tolerant of people and plant, allowing approach as close as 50-90m before flushing when confronted with a lone walker on the mudflat and foraging <50m from plant.

6.42 Dunlin are also considered not particularly sensitive to noise stimuli, and Cutts *et al.*. (2013) suggest a noise level of >60dB at the bird as unlikely to disturb and up to 72dB at the bird as acceptable with some caution.

6.43 The favoured roost site for Dunlin on the eastern bank of the Swale at high tide, located ~400m from the WKN Site boundary, will be subject to a low noise disturbance stimuli (Cutts *et al.*. 2013) with an L_{Amax} of between 50-55dB and low/moderate level visual disturbance stimuli (Cutts *et al.*. 2013). However, based on the distance of works from the roost site (~400m) coupled with the general tolerance of Dunlin to visual disturbance no significant effect is likely.

6.44 The favoured foraging areas for Dunlin are also on the eastern bank of the Swale at low tide, located ~250-300m from the WKN Site boundary, will be subject to a low noise disturbance stimuli (Cutts *et al.*. 2013) with an L_{Amax} of between 50-55dB and low/ moderate level visual disturbance stimuli (Cutts *et al.et al..* 2013). However, based on the distance of works from the foraging habitat (>250m) coupled with the general tolerance of Dunlin to visual disturbance no significant effect is likely.

6.45 On this basis, therefore, it can be stated that the issue of construction phase noise or visual related disturbance will not compromise the objectives of The Swale SPA with regards to Dunlin.

Redshank (*Tringa Totanus*)

6.46 Redshank have been regularly recorded within The Swale survey area during survey work undertaken in 2009, 2016 and 2018. The species has been recorded in the months of January, February, March, April, May, July, August, September, October, November and December. Over the course of 93 survey visits completed, Redshank were recorded on 84 occasions with a peak count of 425 individuals recorded in October 2009. Redshank were recorded during both high tide and low tide surveys although peak counts were associated with high tide and roosting activity.

6.47 The recorded spatial distribution of Redshank over the course the high tide and low tide cycle is presented in Figures 6.4 and 6.5. These figures show the median density of birds per 50m grid square over all the years of survey and provide an indication of the relative importance of habitats within the survey area at both high tide and low tide. It is clear from Figure 6.4 that the highest density of Redshank records at high tide are associated with the area of saltmarsh present at the mouth of Milton Creek (~570m from the WKN Site boundary) and the area of saltmarsh to the north of the site boundary adjacent to the water treatment works(~40-90m from the WKN Site boundary).

6.48 It is also clear from Figure 6.5 that as the tide recedes Redshank disperse across the intertidal zone and are present across a wider area at a low density within the study area. The highest density of Redshank records during low tide surveys is associated with the area of saltmarsh present at the mouth of Milton Creek (~570m from the WKN Site boundary) with a lower density of birds also using the area of saltmarsh to the north of the site boundary adjacent to the water treatment works (~40-90m from the WKN Site boundary).

6.49 Cutts *et al.* (2013) identify Redshank as very tolerant of visual disturbance stimuli but conversely as particularly sensitive to noise stimuli, especially in conjunction with visual stimuli. As such they suggest a 100m zone of consideration for visual stimuli when starting works and recommend efforts be incorporated to avoid high level disturbance when birds are present within this zone. Cutts *et al.* (2013) also recommend noise limits of up to 70dB as acceptable at the bird but advise caution at noise levels in excess of 55dB (60dB in a highly-disturbed area).

6.50 The highest density foraging and roosting areas for Redshank at the mouth of Milton Creek (~570m from the WKN Site boundary), will be subject to a low noise disturbance stimuli (Cutts *et al.* 2013) with an L_{Amax} of between 50-55dB and low/ moderate level visual disturbance stimuli (Cutts *et al.* 2013). However, based on the distance of works from the foraging habitat (>400m) coupled with the general tolerance of Redshank to visual disturbance no significant effect is likely to birds using this habitat resource.

6.51 The lower density aggregation area located around the saltmarsh to the north of the site boundary adjacent to the water treatment works (~40-170m from the WKN Site boundary) will be subject to a moderate/ high noise disturbance stimuli (Cutts *et al.* 2013) with an L_{Amax} of between 55-65dB and low/ moderate level visual disturbance stimuli (Cutts *et al.* 2013). This combination of noise and potential visual disturbance is likely to result in a reduced suitability of this intertidal habitat and disturbance to the Redshank (~median 200-250 Redshank at low and high tide) using this area in the absence of mitigation.

Grey Plover (*Pluvialis squatarola*)

6.52 Grey Plover have been regularly recorded within the Swale survey area during survey work undertaken in 2009, 2016 and 2018. The species has been recorded in the months of January, February, March, April, May, August, September, October, November and December. Over the course of 93 survey visits completed, Redshank were recorded on 59 occasions with a peak count of 75 individuals recorded in October 2016. Grey Plover were recorded during both high tide and low tide surveys although peak counts were associated with high tide and a mixture of foraging and roosting activity.

6.53 The recorded spatial distribution of Grey Plover over the course the high tide and low tide cycle is presented in Figures 6.6 and 6.7. These figures show the median density of birds per 50m grid square over all the years of survey and provide an indication of the relative importance of habitats within the survey area at both high tide and low tide. It is clear from Figure 6.6 that the highest density of Grey Plover records at high tide are associated with the opposite eastern bank of The Swale (~400m from the WKN Site boundary) with secondary aggregation associated with the area of saltmarsh present at the mouth of Milton Creek (~570m from the WKN Site boundary.

6.54 As with previous species it can be seen from Figure 6.7 that as the tide recedes Grey Plover disperse across the intertidal zone and are present across a wider area at a low density (1-2 per $50m^2$) within the study area. The highest density of Grey Plover recorded during low tide surveys is associated with the opposite eastern bank of the Swale (~300-350m from the WKN Site boundary).

6.55 There is limited data on Grey Plover's tolerance to disturbance although what is available suggests that Grey Plover are a relatively tolerant species, the ability of Grey Plover to habituate to works is however an unknown.

6.56 Cutts *et a*l. (2013) classify Grey Plover as tolerant of moderate and high level visual disturbance, and suggest a visual disturbance consideration buffer of 200m to works. They also suggest that Grey Plover are moderately sensitive to noise stimuli and due to their wary nature the minimum approach distance can be expected at least 150m.

6.57 The high density aggregation areas for Grey Plover associated with the opposite eastern bank of the Swale (~300-400m from the WKN Site boundary) and the saltmarsh at the mouth of Milton Creek (~400m from the WKN Site boundary) will be subject to a low noise disturbance stimuli (Cutts *et al*. 2013) with an L_{Amax} of between 50-55dB and low/ moderate level visual disturbance stimuli (Cutts *et al*. 2013). This combination of low noise stimuli and potential visual disturbance in light of Grey Plover's relative tolerance of visual disturbance makes any reduced suitability of this intertidal habitat and disturbance to Grey Plover unlikely.

6.58 On this basis, therefore, it can be stated that the issue of construction phase noise or visual related disturbance will not compromise the objectives of the Swale SPA with regards to Grey Plover.

European White-fronted Goose

6.59 European White-fronted Goose have only been recorded on a single occasion during survey work undertaken in 2009, 2016 and 2018. This species was recorded during high tide surveys in November 2009 with a peak count of 15. In light of the low numbers and lack of regular use of the survey area no viable pathway of interaction between the scheme and European White-fronted Goose associated with The Swale is considered probable.

6.60 On this basis, therefore, it can be stated that the issue of construction phase noise or visual related disturbance will not compromise the objectives of the Swale SPA with regards to European White-fronted Goose.

Shelduck

6.61 Shelduck have been recorded on a regular basis during survey work undertaken in 2009, 2016 and 2018. The species has been recorded in all except June with a peak count of 155 individuals recorded in December 2009. Over the course of 93 survey visits completed, Shelduck were recorded on 88 occasions. Shelduck were recorded during both high tide and low tide surveys although peak counts were associated with high tide and a mixture of foraging and roosting activity.

6.62 The recorded spatial distribution of Shelduck over the course of the high tide and low tide cycle is presented in Figures 6.8 and 6.9. These figures show the median density of birds per 50m grid square over all the years of survey and provide an indication of the relative importance of habitats within the survey area at both high tide and low tide. It is clear from Figure 6.8 that the highest density of Shelduck records at high tide are associated with the opposite eastern bank of the Swale (~400m from the WKN Site boundary) with secondary lower density aggregation associated with the area of saltmarsh present at the mouth of Milton Creek (~570m from the WKN Site boundary).

6.63 At low tide this species, as with other species, disperse across the intertidal zone and are present across a wider area at a low density (see Figure 6.9) as the tide recedes. The highest density of Shelduck recorded during low tide surveys is associated with the opposite eastern bank of the Swale (~200-350m from the WKN Site boundary).

6.64 Cutts *et al*. (2013) identify Shelduck as extremely sensitive to moderate and high level visual disturbance and identify 500m as distance over which the potential for visual disturbance should be considered. They also note Shelduck as quite sensitive to noise stimuli and define a sudden aural disturbance threshold of 60dB and any noise above 72dB.

6.65 The high density aggregation areas for Shelduck associated with the opposite eastern bank of the Swale (~200-400m from the WKN Site boundary) and the saltmarsh at the mouth of Milton Creek (~570m from the WKN Site boundary) will be subject to a low noise disturbance stimuli (Cutts *et al*. 2013) with an L_{Amax} of between 50-55dB and low/ moderate level visual disturbance stimuli (Cutts *et al.* 2013). As such given this species sensitivity to visual disturbance at distances up to 500m it is likely that works at the WKN Site will reduce the suitability of this intertidal habitat at both the high tide roost site and low tide foraging areas in the absence of mitigation.

Shoveler

6.66 Shoveler have only been recorded on a five occasions during survey work undertaken in 2009, 2016 and 2018. The species has been recorded in all except June with a peak count of 5 individuals recorded in January 2010. In light of the low numbers and lack of regular use of the survey area no viable pathway of interaction between the scheme and Shoveler associated with the Swale is considered probable.

6.67 On this basis, therefore, it can be stated that the issue of construction phase noise or visual related disturbance will not compromise the objectives of the Swale SPA with regards to Shoveler.

Teal

6.68 Teal have been regularly recorded within the Swale survey area during survey work undertaken in 2009, 2016 and 2018. The species has been recorded in the months of January, February, March, April, May, August, September, October, November and December. Over the course of 111 survey visits completed, Teal were recorded on 86 occasions with a peak count of 400 individuals recorded in December 2016. Teal were recorded during both high tide and low tide surveys although peak counts were associated with low tide and roosting activity.

6.69 The recorded spatial distribution of Teal over the course of the high tide and low tide cycle is presented in Figures 6.10 and 6.11. These figures show the median density of birds per 50m grid square over all the years of survey and provide an indication of the relative importance of habitats within the survey area at both high tide and low tide. It is clear from Figure 6.10 that the highest density of Teal records at high tide are associated with the opposite eastern bank of The Swale (~400m from the WKN Site boundary) and the area of saltmarsh present to the north of site adjacent to the water treatment works (~100m from the WKN Site boundary).

6.70 At low tide this species, as with other species, disperse across the intertidal zone and are present across a wider area at a lower density (see Figure 6.11) as the tide recedes. The highest density of Teal recorded during low tide surveys is associated with Milton Creek (~570m from the WKN Site boundary).

6.71 Cutts *et al*. (2013) do not specifically consider Teal and there is limited available research on the interaction between construction noise and visual stimulus and this species. Burton *et al*. (2002) reviewed bird densities during construction works at Cardiff Bay and recorded a reduction in Teal density in adjacent count sectors to construction works. This paper does not however provide any indication of a clear effect distance but does clearly demonstrate Teal are sensitive to construction disturbance. Klein *et al*. 1995 investigated the distance of migrant ducks (American Wigeon Anas americana, Eurasian Teal, Northern Pintail A. acuta and Northern Shoveler A. clypeata) along an access road in Florida and noted these dusk species remained more than 80 m from the road even at low visitation levels suggesting a minimum combined noise and visual disturbance threshold distance of ~80m.

6.72 The high density aggregation areas for Teal at high tide (opposite eastern bank of the Swale (~400m) and saltmarsh present to the north of site (~100m)) will be subject to a low

to moderate noise disturbance stimuli (Cutts *et al*. 2013) with an L_{Amax} of between 50-65dB and low/ moderate level visual disturbance stimuli (Cutts *et al*. 2013). As such given this species has been shown to react to construction disturbance stimuli it is likely that works at the WKN Site will reduce the habitat suitability at the high tide aggregation sites in the absence of mitigation. No impact on the highest density low tide aggregation sites are considered likely given the distance separating these from works (~700m).

Oystercatcher

6.73 Oystercatcher have been regularly recorded within the Swale survey area during survey work undertaken in 2009, 2016 and 2018. The species has been recorded in all months except June. Over the course of 111 survey visits completed, Oystercatcher were recorded on 111 occasions with a peak count of 845 individuals recorded in December 2009. Oystercatcher were recorded during both high tide and low tide surveys although peak counts were associated with high tide and roosting activity.

6.74 The recorded spatial distribution of Oystercatcher over the course of the high tide and low tide cycle is presented in Figures 6.12 and 6.13. These figures show the median density of birds per 50m grid square over all the years of survey and provide an indication of the relative importance of habitats within the survey area at both high tide and low tide. It is clear from Figures 6.12 and 6.13 that the highest density of Oystercatcher records at high tide and low tide are associated with the opposite eastern bank of the Swale (~275-400m from the WKN Site boundary).

6.75 Oystercatchers are relatively tolerant of visual and aural disturbance stimuli and will habituate rapidly to ongoing activity, they have also been shown to tolerate regular noise of up to 60dB with no observable disturbance effect (Cutts *et al*. 2013). Cutts *et al*. (2013) also suggest a 200m threshold distance from a potential disturbance source.

6.76 The high density aggregation areas for Oystercatcher at high and low tide on the opposite eastern bank of The Swale (~270-400m) will be subject to a low noise disturbance stimuli (Cutts *et al*. 2013) with an L_{Amax} of between 50-55dB during piling and low/ moderate level visual disturbance stimuli (Cutts *et al*. 2013). As such given this species has been shown to not react to construction disturbance stimuli of 60dB and is tolerant of visual stimuli works at the WKN Site are considered unlikely to affect Osytercatcher.

6.77 On this basis, therefore, it can be stated that the issue of construction phase noise or visual related disturbance will not compromise the objectives of The Swale SPA/Ramsar with regards to Oystercatcher.

Golden Plover

6.78 Golden Plover have only been recorded on two occasions during survey work undertaken in 2009, 2016 and 2018. This species was recorded during high tide surveys in October and December 2009 with a peak count of 190. In light of lack of regular use of the survey area no viable pathway of interaction between the scheme and Golden Plover associated with the Swale is considered probable.

6.79 On this basis, therefore, it can be stated that the issue of construction phase noise or visual related disturbance will not compromise the objectives of The Swale SPA/Ramsar with regards to Golden Plover.

Lapwing

6.80 Lapwing have been regularly recorded within The Swale survey area during survey work undertaken in 2009, 2016 and 2018. The species has been recorded in all months except June and July. Over the course of 111 survey visits completed, Lapwing were recorded on 54 occasions with a peak count of 409 individuals recorded in December 2016. Lapwing were only recorded during both high tide surveys and were largely roosting.

6.81 The recorded spatial distribution of Lapwing over the course of the high tide cycle is presented in Figure 6.14. This figure shows the median density of birds per 50m grid square over all the years of survey and provides an indication of the relative importance of habitats within the survey area at high tide. It is clear from Figure 6.14 that the highest density of Lapwing records at high tide are associated with the opposite eastern bank of the Swale (~275-400m from the WKN Site boundary), the area of saltmarsh at the mouth of Milton Creek (~570m from the WKN Site) and the saltmarsh present to the north adjacent to the water treatment works (~100-150m from the WKN Site boundary).

6.82 Cutts *et al*. (2013) describe Lapwing as reasonably tolerant of moderate level visual disturbance stimuli and describe no response to visual disturbance at c. 300-400m. However, they do recommend further consideration of birds where closer than 300m with regards visual disturbance stimuli. Cutts *et al*. (2013) also describe Lapwings as moderately sensitive to noise stimuli and suggest caution where noise levels in excess of 55dB are likely.

6.83 The high density aggregation areas for Lapwing at high tide on the opposite eastern bank of the Swale (~275-400m) and at the mouth of Milton Creek will be subject to a low noise disturbance stimuli (Cutts *et al*. 2013) with an L_{Amax} of between 50-55dB during piling and low/moderate level visual disturbance stimuli (Cutts *et al.* 2013). As such given this species has been shown to not react to be tolerant of disturbance at these distances construction disturbance works at the WKN Site are considered unlikely to affect Lapwing at these locations.

6.84 However roosting birds located at the saltmarsh present to the north of site (adjacent to the water treatment works (~100-150m) will also be subject to a low/moderate visual disturbance stimuli (visible movement of plant) and moderate noise disturbance stimuli of 60-65dB during piling. As such works at the WKN Site are considered likely to affect disturb/ displace Lapwing at this location in the absence of mitigation.

Black-tailed Godwit

6.85 Black-tailed Godwit have been regularly recorded within the Swale survey area during survey work undertaken in 2009, 2016 and 2018. The species has been recorded in all months except June. Over the course of 111 survey visits completed, were recorded on 93 occasions with a peak count of 1,500 individuals recorded in February 2009. Black-tailed

Godwit were recorded during high and low tide surveys although the largest densities of birds were associated with high tide and roosting.

6.86 The recorded spatial distribution of Black-tailed Godwit over the course of the high tide cycle is presented in Figure 6.15. This figure shows the median density of birds per 50m grid square over all the years of survey and provides an indication of the relative importance of habitats within the survey area at high tide. It is clear from Figure 6.15 that the highest density of Black-tailed Godwit records at high tide are associated with the opposite eastern bank of the Swale (~400m from the WKN Site boundary) and the area of saltmarsh at the mouth of Milton Creek (~450m from the WKN Site).

6.87 At low tide this species again appears to disperse across the intertidal zone and are present across a wider area at a lower density (see Figure 6.16) as the tide recedes. The highest density and aggregations of Black-tailed Godwit recorded during low tide surveys were associated with the mouth of Milton Creek (~450m from the WKN Site boundary), the eastern bank of The Swale (~350m from the WKN boundary) and the western bank of The Swale to the north of the WKN Site (~350m).

6.88 Cutts *et al*. (2013) describe Black-tailed Godwit as an under-studied species with regard disturbance impacts, but are considered tolerant of moderate visual disturbance and noise disturbance. Gill *et al*. (2001) also suggest that the species is tolerant of disturbance. Cutts et al. (2013) suggest a 250m threshold for visual disturbance and again suggest caution above 55dB due to a lack of relevant research.

6.89 The high density aggregation areas for Black-tailed Godwit will be subject to a low noise disturbance stimuli (Cutts *et al*. 2013) with an LAmax of between 50-55dB during piling and low/moderate level visual disturbance stimuli (Cutts *et al*. 2013). As such given this species relevant tolerance of visual and noise disturbance coupled with the distance from no disturbance effect is considered likely.

6.90 On this basis, therefore, it can be stated that the issue of construction phase noise or visual related disturbance will not compromise the objectives of the Swale SPA with regards to Black-tailed Godwit.

Green Sandpiper

6.91 Green Sandpiper have been irregularly recorded within the Swale survey area during survey work undertaken in 2009, 2016 and 2018. The species has been recorded January, February, March, April, October, November and December. Over the course of 111 survey visits completed, were recorded on 16 occasions with a peak count of 3 individuals recorded in February and October 2009. Green Sandpiper were recorded during both high tide surveys and low tide surveys. However, in light of the lack of regular use of the survey area no viable pathway of interaction between the scheme and Green Sandpiper associated with the Swale is considered probable.

6.92 On this basis, therefore, it can be stated that the issue of construction phase noise or visual related disturbance will not compromise the objectives of the Swale SPA with regards to Green Sandpiper.

Wigeon

6.93 Wigeon have been regularly recorded within the Swale survey area during survey work undertaken in 2009, 2016 and 2018. The species has been recorded in all months except June, July, August and September. Over the course of 111 survey visits completed, this species were recorded on 60 occasions with a peak count of 595 individuals recorded in January 2010. Wigeon were recorded during high and low tide surveys although the largest densities of birds were associated with high tide and roosting.

6.94 The recorded spatial distribution of Wigeon over the course of the high tide cycle is presented in Figure 6.17. This figure shows the median density of birds per 50m grid square over all the years of survey and provides an indication of the relative importance of habitats within the survey area at high tide. It is clear from Figure 6.17 that the highest density of Wigeon records at high tide are associated with the opposite eastern bank of the Swale (~400m from the WKN Site boundary), the area of saltmarsh at the mouth of Milton Creek (~450m from the WKN Site), the area of saltmarsh adjacent to the water treatment works and in the channel of the Swale (~100-200m from the WKN Site boundary).

6.95 At low tide this species appears to converge in higher densities along the eastern bank of the Swale (see Figure 6.18) as the tide recedes with lower density aggregation areas present at the mouth of Milton Creek (~400m) and the saltmarsh adjacent to the water treatment works (~150m).

6.96 Cutts *et al.* (2013) do not specifically consider Wigeon and there is limited available research on the interaction between construction noise and visual stimulus and this species. Burton *et al.* (2002) reviewed bird densities during construction works at Cardiff Bay and recorded a reduction in Wigeon density in adjacent count sectors to construction works. This paper does not however provide any indication of a clear effect distance but does clearly demonstrate Wigeon are sensitive to construction disturbance.

6.97 The high density aggregation areas for Wigeon at high tide and low tide will be subject to a low to moderate noise disturbance stimuli (Cutts *et al.* 2013) with an L_{Amax} of between 50-65dB and low/ moderate level visual disturbance stimuli (Cutts *et al.* 2013). As such given this species has been shown to react to construction disturbance stimuli it is likely that works at the WKN Site will reduce the habitat suitability of both the high and low tide aggregation sites in the absence of mitigation.

Pintail

6.98 Pintail have been irregularly recorded within the Swale survey area during survey work undertaken in 2009, 2016 and 2018. The species has been recorded in January, February, March, October and December only. Over the course of 111 survey visits completed, this species were recorded on 13 occasions with a peak count of 218 individuals recorded in January 2010. Pintail were recorded during high and low tide surveys although the largest densities of birds were associated with high tide and roosting.

6.99 The recorded spatial distribution of Pintail over the course of the high and low tide cycle is presented in Figures 6.19 and 6.20. These figures show the median density of birds per 50m grid square over all the years of survey and provides an indication of the relative

importance of habitats within the survey area. It is clear from these figures that the highest density of Pintail records at both high tide and low tide are associated with the opposite eastern bank of The Swale (~400m from the WKN Site boundary).

6.100 Cutts *et al.* (2013) do not specifically consider Pintail and there is limited available research on the interaction between construction noise and visual stimulus and this species. Klein *et al.* 1995 investigated the distance of migrant ducks (American Wigeon *Anas americana*, Eurasian Teal, Northern Pintail *A. acuta* and Northern Shoveler *A. clypeata*) along an access road in Florida and noted these duck species remained more than 80 m from the road even at low visitation levels suggesting a minimum combined noise and visual disturbance threshold distance of ~80m.

6.101 The high-density aggregation areas for Pintail at high tide and low tide will be subject to a low noise disturbance stimuli (Cutts *et al.* 2013) with an L_{Amax} of between 50-55dB and low/ moderate level visual disturbance stimuli (Cutts *et al.* 2013). As such given the distances between the aggregation areas of this species and the WKN Site no disturbance is considered likely.

6.102 On this basis, therefore, it can be stated that the issue of construction phase noise or visual related disturbance will not compromise the objectives of the Swale SPA with regards to Pintail.

Little Egret

6.103 Little Egret have been regularly recorded within the Swale survey area during survey work undertaken in 2009, 2016 and 2018. The species has been recorded in all months except June. Over the course of 111 survey visits completed, this species were recorded on 79 occasions with a peak count of 50 individuals recorded in September 2016. Pintail were recorded during high and low tide surveys although the largest densities of birds were associated with high tide and roosting.

6.104 The recorded spatial distribution of Little Egret over the course of the high tide and low tide cycle is presented in Figures 6.21 and 6.22. These figures show the median density of birds per 50m grid square over all the years of survey and provides an indication of the relative importance of habitats within the survey area. It is clear from these figures that the highest density of Little Egret records at both high tide and low tide are associated with the saltmarsh at the mouth of Moulton Creek (~400m from the WKN Site boundary). The low tide spatial distribution does however differ from high tide in supporting a wider low bird density distribution across wider extents of the study area.

6.105 Cutts *et al.* (2013) do not specifically consider Little Egret and there is little publically available information or research on the interaction between construction noise and visual stimulus and this species.

6.106 The high-density aggregation areas for Litte Egret at high tide and low tide will be subject to a low noise disturbance stimuli (Cutts *et al.* 2013) with an L_{Amax} of between 50-55dB and low visual disturbance stimuli – works are unlikely to be visible (Cutts *et al.* 2013). As such given the distances between the aggregation areas of this species and the WKN Site no disturbance is considered likely.

6.107 On this basis, therefore, it can be stated that the issue of construction phase noise or visual related disturbance will not compromise the objectives of The Swale SPA with regards to Little Egret.

Avocet

6.108 Avocet have been regularly recorded within The Swale survey area during survey work undertaken in 2009, 2016 and 2018. The species has been recorded in all months except June and August. Over the course of 111 survey visits completed, this species were recorded on 94 occasions with a peak count of 125 individuals recorded in December 2016. Avocet were recorded during both high and low tide surveys.

6.109 The recorded spatial distribution of Avocet over the course of the high and low tide cycles are presented in Figures 6.23 and Figure 6.24. These figure shows the median density of birds per 50m grid square over all the years of survey and provide an indication of the relative importance of habitats within the survey area at high tide. It is clear from Figures 6.23 that the highest density of Avocet records at high tide are associated with the opposite eastern bank of the Swale (~400m from the WKN Site boundary) with a lower density/ aggregation area on the western bank of the Swale adjacent to the K3 site (~220m from the WKN Site boundary).

6.110 At low tide this species appears to disperse across the study area as the tide recedes, and is found at lower densities mostly along the eastern bank of the Swale (see Figure 1.37) - ~300-400m from the WKN Site.

6.111 Cutts *et al.* (2013) do not specifically consider Avocet and there is limited available research on the interaction between construction noise and visual stimulus and this species. Recent research on the Mersey by Bonnington and Smith (2018) identified no significant effect on bird density of the wading bird group of species (including Avocet) during construction works. This does suggest some tolerance of these species to construction disturbance.

6.112 The high density aggregation areas for Avocet at high tide and low tide will be subject to a low to moderate noise disturbance stimuli (Cutts *et al.* 2013) with an L_{Amax} of between 50-65dB and a moderate visual disturbance stimuli – works are likely to be visible (Cutts *et al.* 2013). As such given the distances between the aggregation areas of this species and the WKN Site disturbance is considered possible in the absence of mitigation, especially at the aggregation area on the western bank of the Swale adjacent to the K3 site (~220m from the WKN Site boundary).

Sanderling

6.113 Sanderling have not been recorded within the Swale survey area during any survey work undertaken in 2009, 2016 and 2018. In light of lack of regular use of the survey area no viable pathway of interaction between the scheme and Sanderling associated with the Swale SPA/Ramsar is considered probable.

6.114 On this basis, therefore, it can be stated that the issue of construction phase noise or visual related disturbance will not compromise the objectives of the Swale SPA/Ramsar with regards to Sanderling.

Ruff

6.115 Ruff have not been recorded within The Swale survey area during any survey work undertaken in 2009, 2016 and 2018. In light of lack of regular use of the survey area no viable pathway of interaction between the scheme and Ruff associated with the Swale SPA/Ramsar is considered probable.

6.116 On this basis, therefore, it can be stated that the issue of construction phase noise or visual related disturbance will not compromise the objectives of The Swale SPA/Ramsar with regards to Ruff.

Bar-tailed Godwit

6.117 Bar-tailed Godwit have been regularly recorded within the Swale survey area during survey work undertaken in 2009, 2016 and 2018. The species has been recorded in all months except May, June or July. Over the course of 111 survey visits completed, they were recorded on 67 occasions with a peak count of 30 individuals recorded in January 2019. Bar-tailed Godwit were recorded during both high and low tide.

6.118 The recorded spatial distribution of Bar-tailed Godwit over the course of the high tide cycle is presented in Figure 6.25. This figure shows the median density of birds per 50m grid square over all the years of survey and provides an indication of the relative importance of habitats within the survey area at high tide. It is clear from Figure 6.25 that the highest density of Bar-tailed Godwit records at high tide are associated with the opposite eastern bank of the Swale (~400m from the WKN Site boundary).

6.119 At low tide this species again appears to disperse across the intertidal zone and are present across a wider area at a lower density (see Figure 6.26) as the tide recedes. The highest density and aggregations of Bar-tailed Godwit recorded during low tide surveys were associated the eastern bank of the Swale (~350m from the WKN boundary).

6.120 Cutts *et al.* (2013) describe Bar-tailed Godwit as an under-studied species with regard disturbance impacts, but are considered tolerant of moderate visual disturbance and noise disturbance. Gill *et al.*. (2001) also suggest that the species is tolerant of disturbance. Cutts *et al.* (2013) suggest a 200m threshold for visual disturbance and again suggest caution above 55dB due to a lack of relevant research.

6.121 The high-density aggregation areas for Bar-tailed Godwit at will be subject to a low to moderate noise disturbance stimuli (Cutts *et al.* 2013) with an L_{Amax} of between 50-65dB during piling and low/ moderate level visual disturbance stimuli (Cutts *et al.* 2013). As such given this species relative tolerance to visual and aural disturbance coupled with the distance from the WKN Site no disturbance effect is considered likely.

6.122 On this basis, therefore, it can be stated that the issue of construction phase noise or visual related disturbance will not compromise the objectives of the Swale SPA with regards to Bar-tailed Godwit.

Greenshank

6.123 Greenshank have been regularly recorded within the Swale survey area during survey work undertaken in 2009, 2016 and 2018. The species has been recorded in all months except June. Over the course of 111 survey visits completed, they were recorded on 64 occasions with a peak count of 13 individuals recorded in October 2018. Greenshank were recorded during both high and low tide surveys.

6.124 The recorded spatial distribution of Bar-tailed Godwit over the course of the high and low tide cycle are presented in Figures 6.27 and 6.28. These figures show the median density of birds per 50m grid square over all the years of survey and provide an indication of the relative importance of habitats within the survey area. It is clear from both of these figures that the highest density of Greenshank records are associated with Milton Creek (~600m south pf the WKN Site boundary).

6.125 The high density aggregation areas for Greenshank will be subject to a low noise disturbance stimuli (Cutts *et al.* 2013) with an L_{Amax} of between <50dB during piling and no visual disturbance stimuli – no line of site to the WKN Site (Cutts *et al.* 2013). As such no disturbance effect is considered likely.

6.126 On this basis, therefore, it can be stated that the issue of construction phase noise or visual related disturbance will not compromise the objectives of The Swale SPA/Ramsar with regards to Greenshank.

Knot

6.127 Knot have been irregularly recorded within the Swale survey area during survey work, undertaken in 2009, 2016 and 2018. The species has been recorded in January, February, March, October, November and December. Over the course of 111 survey visits completed, they were recorded on 32 occasions with a peak count of 940 individuals recorded in January 2010. Knot have been recorded during both high and low tide, although peak counts were associated with high tide and roosting activity.

6.128 The recorded spatial distribution of Knot over the course of the high and low tide cycle are presented in Figures 6.29 and Figure 6.30. These figures show the median density of birds per 50m grid square over all the years of survey and provides an indication of the relative importance of habitats within the survey area. It is clear from these figures that the highest density of Knot records are associated with the opposite eastern bank of the Swale (~400m from the WKN Site boundary) and the mouth of Milton Creek (~400m from the WKN Site boundary).

6.129 Cutts *et al.* (2013) consider Knot a relatively tolerant species that habituates to works rapidly although highly sensitive to noise disturbance, moving away from stimuli readily. Cutts *et al.* suggest a visual disturbance threshold of 100m and caution at noise levels above 55 dB.

6.130 The high density aggregation areas for Knot will be subject to a low noise disturbance stimuli (Cutts *et al.* 2013) with an L_{Amax} of between 50-55dB during piling and low/moderate level visual disturbance stimuli – visible plant movements likely (Cutts *et al.* 2013). As such

given this species relative tolerance to visual disturbance coupled with the low predicted noise levels no disturbance effect is considered likely.

6.131 On this basis, therefore, it can be stated that the issue of construction phase noise or visual related disturbance will not compromise the objectives of The Swale SPA/Ramsar with regards to Knot.

Curlew

6.132 Curlew have been regularly recorded within the Swale survey area during survey work, undertaken in 2009, 2016 and 2018. The species has been recorded in all months except June. Over the course of 111 survey visits completed, they were recorded on 106 occasions with a peak count of 152 individuals recorded in March 2009. Curlew have been recorded during both high and low tide, although peak counts were associated with high tide and roosting activity.

6.133 The recorded spatial distribution of Curlew over the course of the high and low tide cycle are presented in Figures 6.31 and Figure 6.32. These figures show the median density of birds per 50m grid square over all the years of survey and provides an indication of the relative importance of habitats within the survey area. It is clear from these figures that Curlew are present across the survey area at low densities (<50m from the Proposal Site Boundary) through both the high and low tide cycles with a notable high density aggregation associated with the opposite eastern bank of the Swale (~400m from the WKN Site boundary).

6.134 Cutts *et al*. (2013) consider Curlew an extremely wary species that does not habituate to works rapidly and are also particularly intolerant of people. Cutts *et al*. suggest a visual disturbance threshold of 300m and caution at noise levels above 55 dB.

6.135 The high density aggregation areas for Curlew will be subject to a low noise disturbance stimuli (Cutts *et al*. 2013) with an L_{Amax} of between 50-55dB during piling and low/ moderate level visual disturbance stimuli – visible plant movements likely (Cutts *et al*. 2013). However, given the distance from the WKN Site to the high density aggregation area (>300m) coupled with the low predicted noise levels no disturbance effect is considered likely at this location. A possible disturbance effect/ displacement is however likely across the wider low density areas in the absence of mitigation.

Marsh Harrier

6.136 The reedbed to the north of the WKN Site has supported breeding and roosting Marsh Harrier every year that surveys have been undertaken between 2009 and 2018. Additional observations of breeding Marsh Harrier have been made most years in between the surveys during clearance of reptiles from the K3 site, for example.

6.137 The reedbed is within 50 m from the main WKN Site and surrounded by the access road, construction access road and laydown area.

6.138 While anecdotal evidence suggests that the effect of disturbing activity on breeding Marsh Harrier during the construction phase of WKN is unlikely to be significant (supported by the continued presence of breeding Marsh Harrier during the construction of K3 and the DS

Smith AD Plant), some doubt remained during the original 2009 assessment of K3. The S106 Agreement for K3 therefore included the requirement to create a new reedbed at Hartey Fen on the Isle of Sheppey as part of the RSPB's habitat creation scheme to return farmland to grazing marsh and associated habitats (including reedbed). This was intended to provide alternative breeding habitat, should the Marsh Harrier choose to abandon the Kemsley reedbed, particularly during construction of K3.

6.139 Such a reedbed has been created and signed off as complete by the RSPB.

6.140 The provision of the reedbed ensures that alternative breeding habitat is also available during the construction of WKN, should the birds choose to abandon the Kemsley reedbed due to increased disturbance.

6.141 To further avoid any activity disturbance related to human activity during construction, a 2.4 m closed-board wooden fence has been erected along the northern site boundary of the WKN Site prior to the construction of K3. This will be maintained for the construction of WKN and extended around the laydown area and along the construction access road.

6.142 There will be no direct entry of the reedbed to the north of the assessment boundary by people or machinery as a result the proposed development. The need to mitigate any indirect affects arising from disturbance from activities during construction of the proposed development will be dependent upon whether Marsh Harrier nest in the reedbed, the stage of breeding that the Marsh Harrier has reached (nest building, sitting on eggs or feeding chicks) and the nature of the activity. The following activities will not occur within the distances listed of the nest site in the event that Marsh Harrier is found breeding in the Kemsley reedbed during construction:

6.143 Activities that only involve the movement of vehicles:

- Nest building 100 m
- Eggs 100 m
- Chicks 50 m

6.144 Activities that involve people outside of vehicles and construction activities such as excavation, concrete pouring and assembly:

- Nest building 200 m
- Eggs 200 m
- Chicks 100 m

6.145 Given that the hoarding erected is screening such activities within the main development site, this is aimed at preventing any development activities occurring within the buffer zone between the edge of the DCO boundary and the edge of the reedbed.

6.146 Further, within the final stages of the construction, a palisade fence at least 2 m high, will be installed around much of the perimeter including along the northern boundary near to

the reedbed. As well as securing the site, this will ensure human activity within the development is not visible to Marsh Harrier using the reedbed once operational.

6.147 The extent that activities would cause disturbance of the Marsh Harrier is considered further limited when account is taken of:

- The haul road is already heavily trafficked by HGVs associated with the activities of the Kemsley Paper Mill;
- The regular disturbance from activity on the track way immediately to the north of the reedbed running to the Knauf gypsum jetty. This can involve up to 30 20-tonne tipper lorry movements an hour with vehicles travelling at speed up the private road. No impact (in the form of flight from nest) of such lorry movement on the breeding pair of Marsh Harrier was observed during any of the surveys undertaken; and
- The fact that marsh harriers are frequently tolerant of human disturbance (Ruddock and Whitfield 2007).

6.148 Consequently, it is concluded that activity disturbance on the breeding Marsh Harrier using the site in the form of plant (machinery) or people movement during the construction of the proposed development does not compromise the conservation objectives of the Swale SPA.

Adopted mitigation with respect to piling/visual disturbance

6.149 In the absence of mitigation, a number of species listed on the citations of The Swale SPA/Ramsar are considered likely to be negatively impacted by construction activities through the pathway of noise/visual disturbance based on their sensitivity and/or spatial distribution. These are:

- Redshank;
- Shelduck;
- Teal;
- Lapwing;
- Wigeon;
- Avocet;
- Curlew; and
- Marsh Harrier

6.150 Therefore, in order to ensure these species are not disturbed during construction of WKN that could compromise their ability to survive, the following mitigation strategy will be implemented:

- Erection of a visual screen along the periphery of the WKN Site to remove any

visual disturbance stimuli;

- No impact piling between the months January and February inclusive;
- Limited impact piling is permissible between the months of November and December provided that any impact piling activity does not accrue to more than a total of 10 days consecutively or otherwise;
- No impact piling during the period when Marsh Harrier are breeding (April to August inclusive);
- Impact piling is permissible unrestricted outside of these time periods.

6.151 Construction of the new outfall will follow the same avoidance methods as for the first outfall, i.e. will only take place between 1st April and 31st September. This avoidance measure will be secured via the Marine Licence.

6.152 On this basis, therefore, it can be stated that the issue of construction/demolition phase noise or visual related disturbance will not compromise the objectives of The Swale SPA/Ramsar with regards to the above species.

Conclusion

6.153 Following the Appropriate Assessment provided above, and provision of mitigation measures as appropriate, it is concluded that the DCO application for the WKN Proposed Development will not compromise the conservation objectives of Natura 2000 sites, and there will be no adverse effect on site integrity.

7 STAGE 4 – IN-COMBINATION ASSESSMENT

7.1 The purpose of this section is to assess the cumulative effects of the WKN Proposed Development and K3 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. In order to ensure that all of the cumulative impacts from the K3 Proposed Development, WKN Proposed Development and the two combined are assessed both individually and cumulatively, the following methodology has been proposed:

- Baseline + K3 Proposed Development + other relevant cumulative developments within the zone of influence of the K3 Proposed Development
- K3 as consented + the practical effect of the K3 Proposed Development + WKN Proposed Development + other relevant cumulative developments within the zone of influence of the K3 Proposed Development
- Baseline + K3 Proposed Development + WKN Proposed Development + other relevant cumulative developments within the zone of influence of the K3 and WKN Proposed Developments
- K3 as consented + the practical effect of the K3 Proposed Development + WKN Proposed Development + other relevant cumulative developments within the zone of influence of the K3 and WKN Proposed Developments
- K3 as consented + WKN Proposed Development + other relevant cumulative developments within the zone of influence of the WKN Proposed Developments

7.2 All of the developments set out in the DCO Scoping Opinion have been reviewed for relevance to ecology. A number are not considered any further as there are either no overlapping pathways by which cumulative effects on ecological receptors could occur (for example, residential developments), or distance (i.e. are too far away). Those that have been included are generally those that result in emissions to air.

7.3 The following planning applications have been considered further (planning references have been given for each project):

- 28. 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 Paper Mill Ridham Avenue Sittingbourne Kent ME10 2TD. Permitted February 2017.

- 8. 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.

- 1. 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.

- 18. 16/506935/COUNTY County Matters application for steam pipeline connecting the Ridham Dock Biomass Facility to the Kemsley 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.

- 5. SW/15/500348 – Construction of advanced thermal conversion and energy facility (4Evergreen Technologies Ltd.)

- 17. 17/505073/FULL Erection of a tile factory including service yard, storage yard and car parking area.

- 2. 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.

- 14. SW/13/1495 Variation of condition 9 of planning permission SW/11/548 (use of building 15B to install and operate materials recycling facility (MRF) and a refuse derived fuel (RDF) facility and to use existing weighbridge, weighbridge office, site office and washroom/toilets to the south of building 15a) to allow an increase of HGV movements from 58 to 98 (49 in and 49 out) for a temporary period of 12 months;

- 16. EN010090 (18/501923/ADJ) Application for an Order Granting Development Consent to decommission the existing K1 CHP on the site and build, commission and operate a new CHP plant;

7.4 The potential for cumulative effects between the proposed DCO 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.

7.5 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; and

- The Medway Estuary and Marshes Ramsar, SPA and SSSI.

7.6 Cumulative impacts from emissions to air are addressed separately below, followed by an assessment of other potential impacts not related to such emissions.

Cumulative emissions to air

7.7 Appendix 5.4 sets out an assessment of the cumulative impacts of emissions to air from all of the developments above for which data are available. here are four developments where

there was sufficient detail to allow a PC to be added to give a cumulative PEC for ecological receptors:

- Kemsley K4 CHP PC (EN010090 (18/501923/ADJ))
- Kemsley AD (SW/11/1291)
- Reserve Power Plant PC (18/500393/FULL)
- Garden of England Energy Facility (15/500348/COUNTY)

7.8 The PCs for each of these four developments were added to the maximum PEC from the WKN and K3 Proposed developments to give a Cumulative PEC.

7.9 This shows that for the majority of receptors, there is no effect (i.e. either the cumulative PC<1% of the EQS and/or the cumulative PEC<EQS) of the other developments operating with the K3 Proposed Development and WKN Proposed Development.

7.10 As set out in Appendix 5.4, those features where an effect cannot immediately be excluded are shown in Table 5.4.11. This included Eurasian reed warbler and reed bunting for The Swale SPA and hen harrier/Merlin for the Medway Estuary & Marshes SPA with respect to nutrient nitrogen deposition where the cumulative PC>1% of the minimum critical load and the relevant minimum critical load is already exceeded. All species are associated with reedbed and grazing marsh habitats within which they breed or hunt across the two SPAs.

7.11 Both habitats in north Kent are unlikely to be very sensitive to nutrient nitrogen deposition. The APIS website from which the information with respect to critical loads is derived incorporates reedbed with other wetland habitats such as marsh and fens. It notes that the minimum critical load for these habitats listed on APIS and used in Appendix 5.4 (15 $kgN.ha^{-1}.yr^{-1}$ for reed warbler and reed bunting and 10 $kgN.ha^{-1}.yr^{-1}$ for hen harrier and merlin) represents more closely upland habitats (including, heathland) that these species are also associated with elsewhere in the country and that will be naturally more nutrient poor and therefore more susceptible to species composition change due to atmospheric nitrogen input than those in Kent. Reedbeds are, by their nature, monospecific, dominated by common reed. As such, their susceptibility to competitive exclusion by other graminoid species is considered very low. The upper end of the critical load range is therefore considered more appropriate for these habitats, set within grazing marsh which are higher nutrient systems due to the underlying nutrient status of the soils within the flood plain on which they form. Using the upper critical load for this habitat of 30 $kgN.ha^{-1}.yr^{-1}$ is therefore more appropriate meaning that the cumulative PEC does not exceed the critical load and, as such, cumulative effects in combination with the K3 and WKN Proposed Developments are not significant.

7.12 With respect to hen harrier and merlin, the 10 $kgN.ha^{-1}.yr^{-1}$ critical load used represents upland habitats (including, heathland) that these species are also associated with elsewhere in the country and that will be naturally more nutrient poor and therefore more susceptible to species composition change due to atmospheric nitrogen input than the grazing marsh habitats over which they forage during winter in Kent. The majority of such habitats within the Medway system are agriculturally-improved to a greater or lesser extent

and therefore the upper end of the critical load range is considered more appropriate for these habitats of 30 kgN.ha^{-1}.yr^{-1}. On this basis, any cumulative PEC will not exceed the critical load and, as such, cumulative effects in combination with the WKN and K3 Proposed Developments would not be significant

7.13 Table 5.4.11 also shows an exceedance from the cumulative PEC of the minimum critical load for nutrient nitrogen for both species of breeding tern at the Medway Estuary & Marshes SPA. The minimum critical load used is 8 kgN.ha^{-1}.yr^{-1} listed on APIS as representing acid stable dune grasslands. As for hen harrier and merlin, while the tern species will both use such habitats elsewhere in the country, within the Medway Estuary system, both species breed mainly on the many salt marsh islands (Burntwick Island, for example) that occur in the river channel. As such, a more appropriate critical load would be that for early-pioneer salt marsh of 30 kgN.ha^{-1}.yr^{-1}. Using this figure, the cumulative PEC is only 45% of the critical load meaning that the cumulative PEC does not exceed the critical load and, as such, cumulative effects in combination with the K3 and WKN Proposed Developments are not significant.

7.14 Table 5.4.11 also shows two supporting habitats as having exceedances for nutrient nitrogen (shingle & sea cliff on The Swale Ramsar/SSSI and Medway Estuary & Marshes Ramsar/SSSI). However, the closest area of this habitat type within The Swale is on the eastern end of the Isle of Sheppey some 12 km from any of the developments considered. While modelling has not been undertaken in this location, given the distance, cumulative effects are considered very unlikely. The modelling presented in Appendix 5.4 combines the maximum PCs from each development to give a summed PC. This is highly conservative as there would be very little overlap between where these maximum rates of deposition occurred; none of them will occur 12 km from the K3 and WKN Proposed Developments. The nearest shingle habitats to the K3 and WKN Proposed Developments within the Medway Estuary & Marshes Ramsar/SSSI are to the north west, on the north of Deadman's Island and the southern edge of the Isle of Grain where the Medway meets the Thames Estuary & Marshes Ramsar/SSSI. While some shingle beaches may be potentially very susceptible to atmospheric nitrogen inputs, in particular where the shingle is stable and becoming vegetated, the shingle that occurs in these locations within the Medway is mostly tidal, being inundated by sea water on a twice-daily basis. This means that, in this location, they are considered to be insensitive to atmospheric nutrient nitrogen deposition with their nutrient status controlled by that of the inundating tide. On this basis, no in-combination effects are predicted.

16/507687/COUNTY IBA Recycling Facility

7.15 A detailed consideration of these impacts is provided in the Ecology Statement that accompanied this planning application.

7.16 The IBA development is not going to be constructed and WKN will be located on the land previously allocated for the IBA. Therefore, given this, there will be no in-combination effects between this application and either the WKN Proposed Development or K3 Proposed Development.

16/501484/COUNTY Gypsum Recycling Building

7.17 Various developments have been proposed or are being constructed at the Countrystyle Recycling Ltd. site 350 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 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.

7.18 Given this, the lack of impacts associated with either of these pathways identified above from the K3 Proposed Development, no in-combination effects are considered likely.

7.19 WKN is not anticipated to have any impact upon water quality, and the embedded mitigation measures to be included are eliminating the impacts upon wintering birds. Therefore, no in-combination effects are likely with the WKN Proposed Development.

SW/11/1291 - Kemsley AD Plant (DS Smith Paper)

7.20 The proposed Kemsley AD Plant is located on the far side of the reedbed immediately to the north of the DCO boundary. It is currently being commissioned, having been constructed during 2017/2018. In-combination impacts to the Swale SPA/Ramsar could occur via cumulative changes to air quality. Such effects are considered above. No other in-combination effects are considered likely. .

14/500327/OUT New Offices

7.21 The proposed creation of up to 8,000 m2 of new Class B1 and B2 floor space along with the extension of the Milton Creek Country Park 495 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 either individually with K3 / WKN, or cumulatively, with both WKN and K3; therefore, there are no in-combination effects.

14/502737/EIASCO and 16/506935/COUNTY – Works at Ridham Docks

7.22 Ridham Docks is 1.6 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 Developments, either K3 or WKN individually, or when considering both in-combination.

SW/15/500348 – Construction of advanced thermal conversion and energy facility (4Evergreen Technologies Ltd.)

7.23 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. There are therefore potential impacts through cumulative changes to air quality. Such effects are considered above. No other in-combination effects are considered likely..

17/505073/FULL Erection of a tile factory including service yard, storage yard and car parking area.

7.24 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.

7.25 Therefore, no residual impacts remain that could result in in-combination impacts with either K3 / WKN developments individually, or when assessed in-combination.

15/500348/COUNTY | Install advance thermal conversion and energy facility at Kemsley Fields Business Park

7.26 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).

7.27 As part of the planning application, an assessment of the potential ecological effects of these emissions was completed (Environmental Compliance 2014). There are therefore potential impacts through cumulative changes to air quality. Such effects are considered above. No other in-combination effects are considered likely..

18/500393/FULL Erection of a natural gas fuelled reserve power plant with a maximum export capacity of up to 12MW.

7.28 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.

7.29 There are therefore potential impacts through cumulative changes to air quality. Such effects are considered above. No other in-combination effects are considered likely..

SW/14/0224 – Application for a solar farm;

7.30 An application for a solar farm, on 38 hectares of arable farmland on the Tonge Corner Farm, near Sittingbourne, Kent.

7.31 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. 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.

7.32 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.

7.33 Given this, the lack of impacts associated with any of these pathways identified above from the proposed K3 and WKN developments (individually and in-combination) and that all other developments on the site are minor and not considered to have any effect on The Swale.

SW/12/1211 – Construction of materials recycling facilities and waste transfer station.

7.34 Prior to development, the land comprised hardstanding with a thin strip of ruderal vegetation present. The application site was located nearby to The Swale SPA and Ramsar, and so a HRA was undertaken.

7.35 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 with either the K3 development, or WKN development individually, or when they are assessed in-combination.

7.36 Overall, there would be no significant effect between the proposed DCO application and any of the developments described above.

SW/13/1495

7.37 Variation of condition 9 of planning permission SW/11/548, to increase the number of HGV movements from 58 to 98 (49 in and 49 out) for a period of 12 months. The application does not provide any additional details on whether this increase in vehicular movement will impact any of the nearby designated sites. However, the 12 months sought will not overlap with the construction period of WKN. Therefore, no cumulative impacts are anticipated, either with K3 or WKN individually, or when they are assessed together.

EN010090 (18/501923/ADJ)

7.38 It is possible that the general construction activity within the proposed development of WKN (in combination with K4) could further make the reedbed unattractive to Marsh Harrier. 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 K4.

7.39 There are therefore potential impacts through cumulative changes to air quality. Such effects are considered above. No other in-combination effects are considered likely..

7.40 In order to ensure that all of the cumulative impacts from the K3 Proposed Development, WKN Proposed Development and the two combined are assessed both individually and cumulatively, the following methodology has been used:

Baseline + K3 Proposed Development + other relevant cumulative developments within the zone of influence of the K3 Proposed Development

K3 as consented + the practical effect of the K3 Proposed Development + WKN Proposed Development + other relevant cumulative developments within the zone of influence of the K3 Proposed Development

Baseline + K3 Proposed Development + WKN Proposed Development + other relevant cumulative developments within the zone of influence of the K3 and WKN Proposed Developments

K3 as consented + the practical effect of the K3 Proposed Development + WKN Proposed Development + other relevant cumulative developments within the zone of influence of the K3 and WKN Proposed Developments

K3 as consented + WKN Proposed Development + other relevant cumulative developments within the zone of influence of the WKN Proposed Developments

7.41 Under all five scenarios, no significant cumulative effects on any Natura 2000 site have been identified.

7.42 Additionally, existing operational projects near to the DCO Boundary that could act in-combination with the WKN/K3 Proposed Developments have been reviewed for relevance. The following have therefore been considered:

- Existing operations at Kemsley Paper Mill;
- Existing operations from other industry in the area, in particular the Knauf factory, those at Ridham Docks, Sittingbourne GPark (including the Morrison's distribution depot) and Countrystyle Recycling; and
- Activities that discharge water into the designated sites.

7.43 All existing industrial operations, listed above, where any potential dust generation could occur will be implementing standard dust control measures, the control of which would have been a consideration at consenting stage for the activity. Therefore, given that these

operations will be avoiding the generation of dust, there is no potential for any in-combination effect.

7.44 All existing discharges to The Swale or Medway are regulated by the Environment Agency, including through the Environmental Permitting process, with the consents for such discharge subject to their own Habitats Regulations Assessment. The consents granted are periodically reviewed through the Review of Consents process to ensure they are all still appropriate with any necessary amendments made, depending on the findings. Moreover, discharge from the WKN/K3 Proposed Developments has also been the subject of a Water Framework Directive assessment and Marine Conservation Zone Assessment (Appendix 11.7 of the ES). Therefore, given this tight control of discharges (including that from Kemsley Paper Mill), there is no potential for in-combination effects.

7.45 The only pathway by which disturbance impacts could occur in combination with WKN/K3 Proposed Developments from operational activities would be through loud, sudden noise generation that could illicit startle responses. By their nature, industrial activities can result in occasional, sudden noise generation. However, any activities that would result in frequent occurrences of such noise would have been subject to their own controls at consenting stage, through the Habitats Regulations Assessment process; they may be subject to timing restrictions etc. to avoid the periods of the year when birds using the SPA are most vulnerable, for example. Therefore, when such avoidance mechanisms are combined with those described in the here, there is no potential for in-combination effects.

7.46 All avoidance measures for both K3 and WKN Proposed Developments are to secured by Requirements within the DCO and represent industry standard practices meaning there is high confidence they are effective.

Summary

7.47 No likely significant effect, beyond those identified alone in Sections 5 and 6 above, are considered likely in combination with any of the other projects described above.

8 REFERENCES

Bonnington C. & Smith D. (2018) Do bridge construction activities influence birds using the River Mersey, in northwest England?, Bird Study, 65:3, 346-356

Burton, N. H. K., Rehfisch, M. M. and Clark, N. A. (2002). Impacts of disturbance from construction work on the densities and feeding behaviour of waterbirds using the intertidal mudflats of Cardiff Bay. UK. Environmental Management No. 30: p865-871.

Burton, N. H., Rehfisch, M. M., Clark, N. A. And Dodd, S. G. (2006), Impacts of sudden winter habitat loss on the body condition and survival of redshank Tringa totanus. Journal of Applied Ecology, 43: 464-473

Conomy, J.T., Dubousky, J.A., Collazo, J.A. and Fleming, W.J. (1998) Do Black Ducks and Wood Ducks habituate to aircraft disturbance? The Journal of Wildlife Management 62, 1135-1142.

Conomy, J.T., Collazo, J.A., Dubousky, J.A. and Fleming, W.J. (1998) Dabbling duck behaviour and aircraft activity in coastal North Carolina. Journal of Wildlife Management 62, 1127-1134

Cutts, N., Phelps, A. & Burdon D. (2009) Construction and Waterfowl: Defining Sensitivity, Response, Impacts and Guidance. Institute of Estuarine and Coastal Studies, University of Hull.

Davidson, N. and Rothwell, P. (1993). Wader Study Group Bulletin 68, Disturbance to Waterfowl on Estuaries.

Department for Transport. (2009). Transport Analysis Guidance – WebTAG Unit 3.3.3: Local Air Quality

English Nature (2001). *Swale and Medway European Marine Site: English Nature's advice given under Regulation 33 (2) of the Conservation Regulations 1994*. English Nature.

Fleming, W.J., Dubovsky, J.A., Collazo, J.A., Temple, Jr., E.R. and Conomy, J.T. (2000) An overview of studies to assess the effects of military aircraft training activites on waterfowl at Piney Island, North Carolina. In Institute for Environmental Monitoring and Research 2001. Terra borealis, no.2: Effects of Noise on Wildlife Conference. Conference proceedings. Happy Valley-Goose Bay, Labrador August 22-23 2000, p.50-51. Institute for Environmental Monitoring and Research, Happy Valley-Goose Bay.

Goudie, R.I. and Jones, I.L. (2004). Dose-response relationships of Harlequin duck behaviour to noise from low-level military jet over-flights in central Labrador. Environmental Conservation 31: 1-10

Highways England (2007) Design Manual for Roads and Bridges (DMRB) Vol.11, Section 3, Part 1 HA 207/07 – Air Quality.

Klein, M.L., Humphrey, S.R. & Percival, F. (1995). Effects of ecotourism on distribution of waterbirds in a wildlife refuge. Conservation Biology 9: 1454–1465.

Madsen, J. and Fox, A.D. (1995) Impacts of hunting disturbance on waterbirds – a review. Wildlife Biology 1, 193-207

Mahaulpatha, D., Mahaulpatha, T., Nakane, K. and Fujii, T. (2000) Factors affecting the distribution of waterfowl in the inland water of the Saijo Basin in Western Japan. Japanese Journal of Ornithology 49, 167-173

Platteeuw M, Henkens R (1997) Possible impacts of disturbance to waterbirds: individuals, carrying capacity and populations. Wildfowl 48:225–236

The Planning Inspectorate (2016) Advice Note 10: *Habitat Regulations Assessment relevant to nationally significant infrastructure projects*

Reijnen R., Foppen R. & Veenbaas G. (1997) Disturbance by traffic of breeding birds: evaluation of the effect and considerations in planning and managing road corridors. Biodiversity and Conservation 6: 567-581

Riddington, R., Hassall, M., Lane, S.J., Turner, P.A. and Walters, R. (1996) The impact of disturbance on the behaviour and energy budgets of Brent Geese Branta b. bernicla. Bird Study 43, 269-279

RPS (2009). Kemsley Sustainable Energy Plant: Bird Surveys 2009. RPS Unpublished report

RPS (2016). Kemsley Sustainable Energy Plant: Bird Surveys 2016. RPS Unpublished report

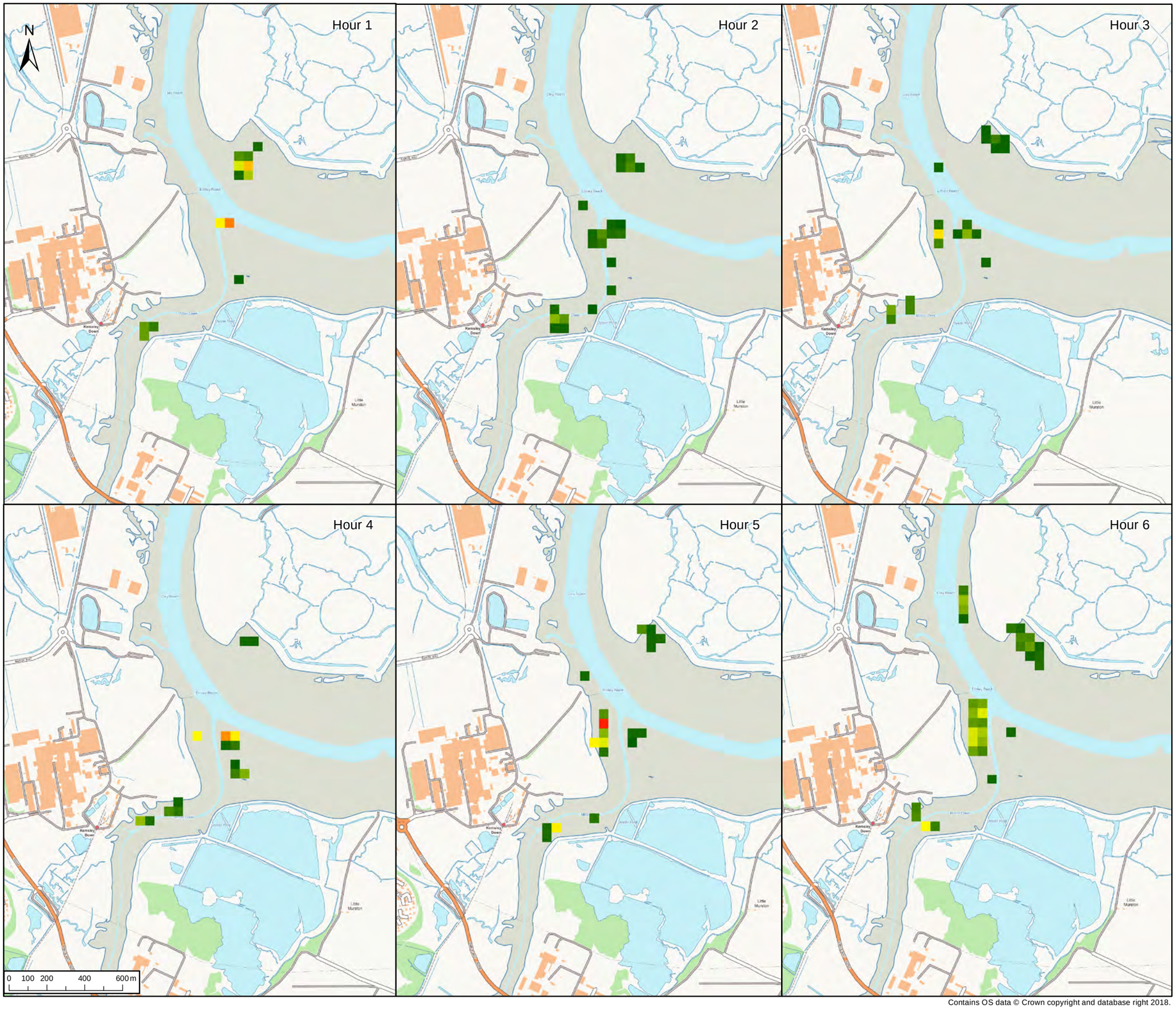
Ruddock, M.& Whitfield, D.P. (2007) A Review of Disturbance Distances in Selected Bird Species. A report from Natural Research (Projects) Ltd to Scottish Natural Heritage

Smit, C.J. & Visser, G.J.M. 1993. Effects of disturbance on shorebirds: a summary of existing knowledge from the Dutch Wadden Sea and Delta area. Wader Study Group Bull. 68: 6-19.

West, E.W., Dooling, R.J., Popper, A.N., Buehler, D.M. (2007) Noise impacts on birds: Assessing take of endangered species. The Journal of the Acoustical Society of America 122, 3082

Woodward, I.D., Calbrade, N.A. & Holt, C.A. (2015) BTO Research Report No. 668. Humber Estuary Bird Decline Investigation 2014.

Figures



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Legend

Bird density

High : 110.87

Low : 1

Rev	Description	Date	Initial	Checked

RPS

Willow Mere House, Compass Point Business Park
Stocks bridge Way, St. Ives, Cambs, PE27 5JL
T: 01480 466 335 **E**: rpscm@rpsgroup.com **F**: 01480 466 911

Client: Wheelabrator Technologies

Project: Kemsley K3/WKN

Title: Density of Brent Goose recorded in high water survey

Status	Drawn By	PM/Checked By
Final	KM	MS
Job Ref	**Scale @ A3**	**Date**
ECO00047	1:20,000	OCT 18
Drawing Number		**Rev**
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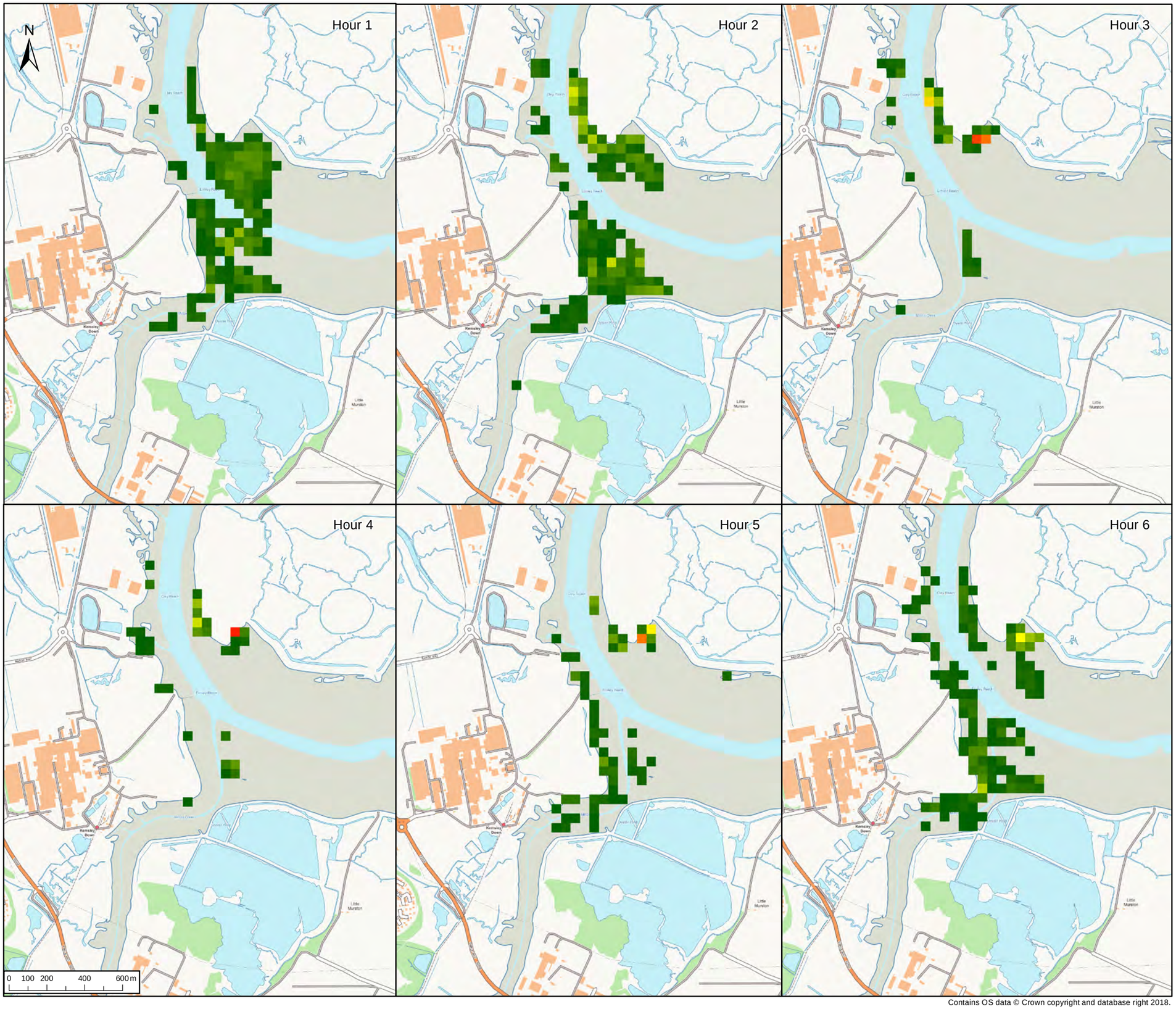

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Legend

Bird denisty

High : 949.07

Low : 1

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T: 01480 466 335 **E**: rpscm@rpsgroup.com **F**: 01480 466 911

Client: Wheelabrator Technologies

Project: Kemsley K3/WKN

Title: Density of Dunlin recorded in high water survey

Status	Drawn By	PM/Checked By
Final	KM	MS
Job Ref	**Scale @ A3**	**Date**
ECO00047	1:20,000	OCT 18
Drawing Number		**Rev**
Figure 6.2		01

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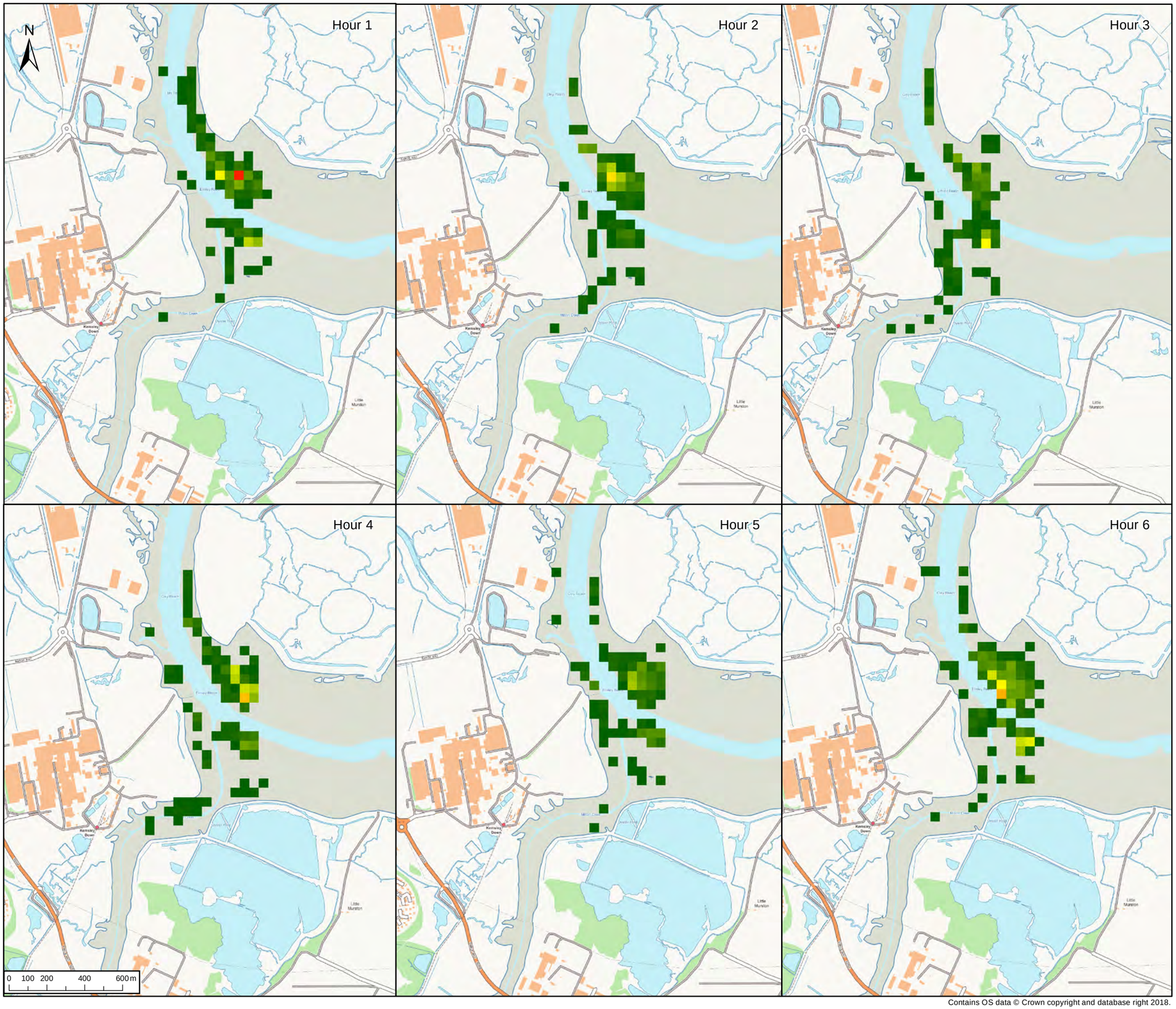

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Legend

Bird density

High : 287.31

Low : 1

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Client: Wheelabrator Technologies

Project: Kemsley K3/WKN

Title: Density of Dunlin recorded in low water survey

Status	Drawn By	PM/Checked By
Final	KM	MS
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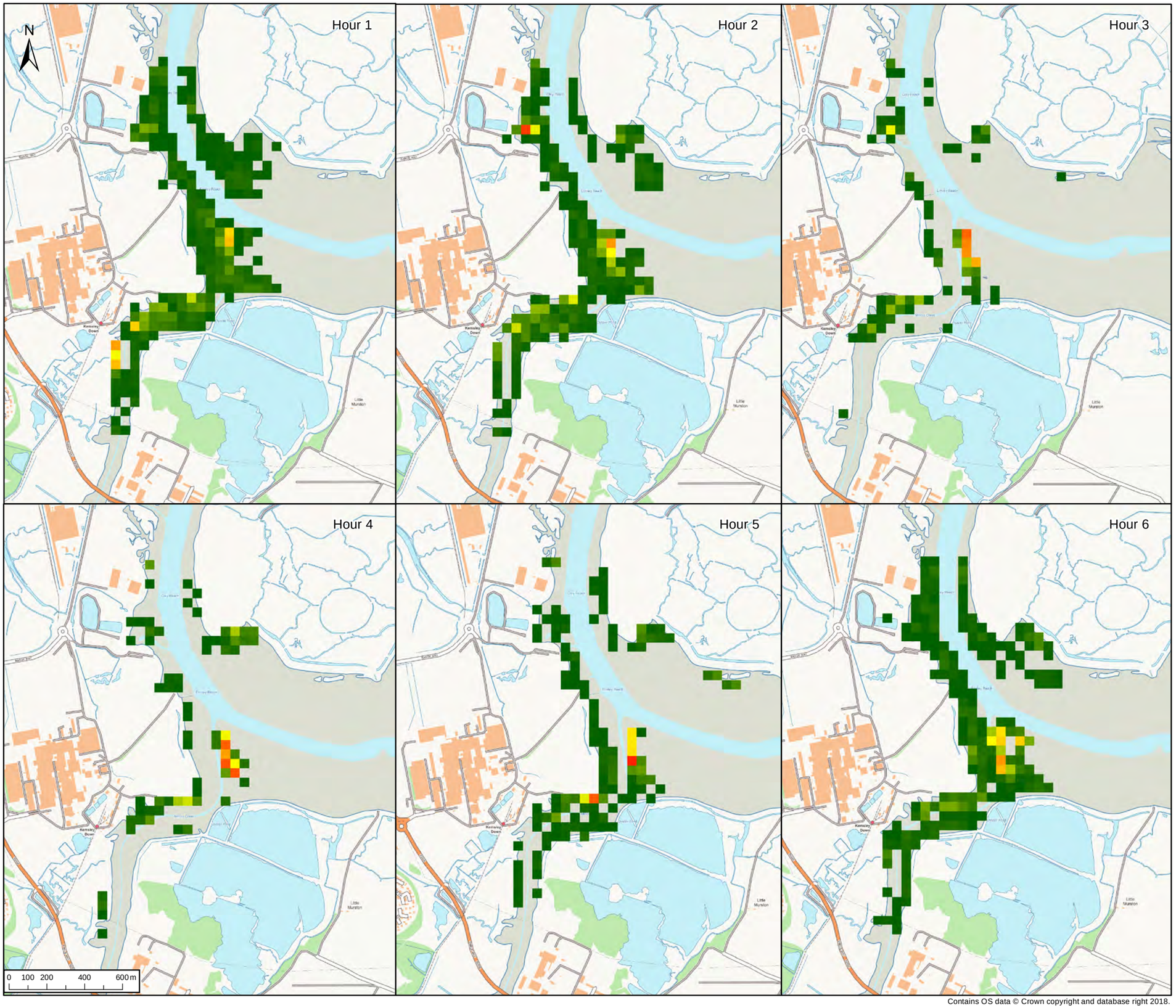

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Legend

Bird density

High : 231.95

Low : 1

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Client: Wheelabrator Technologies

Project: Kemsley K3/WKN

Title: Density of Redshank recorded in high water survey

Status	Drawn By	PM/Checked By
Final	KM	MS
Job Ref	**Scale @ A3**	**Date**
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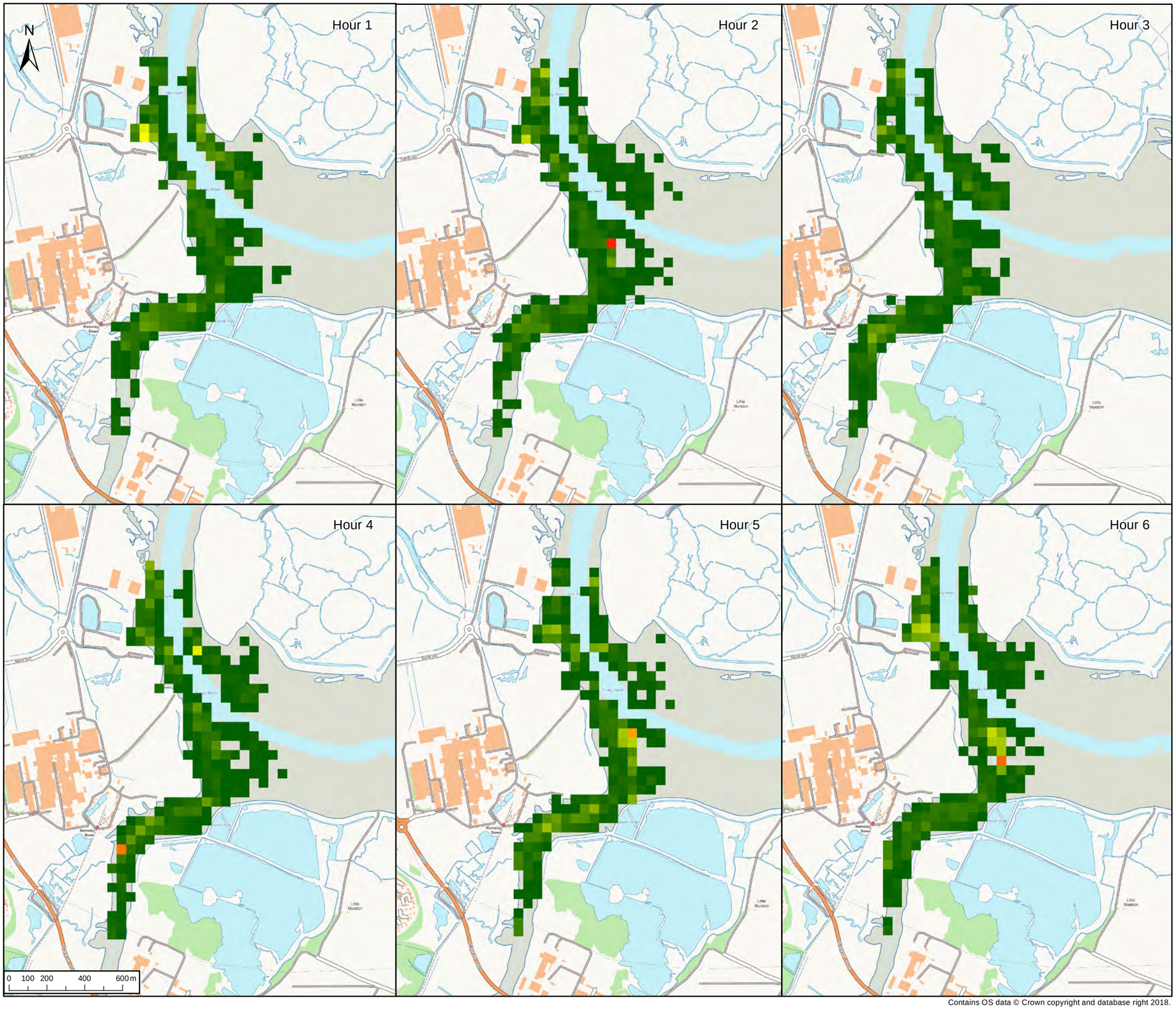

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Legend

Bird density

High : 137

Low : 1

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Client: Wheelabrator Technologies

Project: Kemsley K3/WKN

Title: Density of Redshank recorded in low water survey

Status	Drawn By	PM/Checked By
Final	KM	MS
Job Ref	**Scale @ A3**	**Date**
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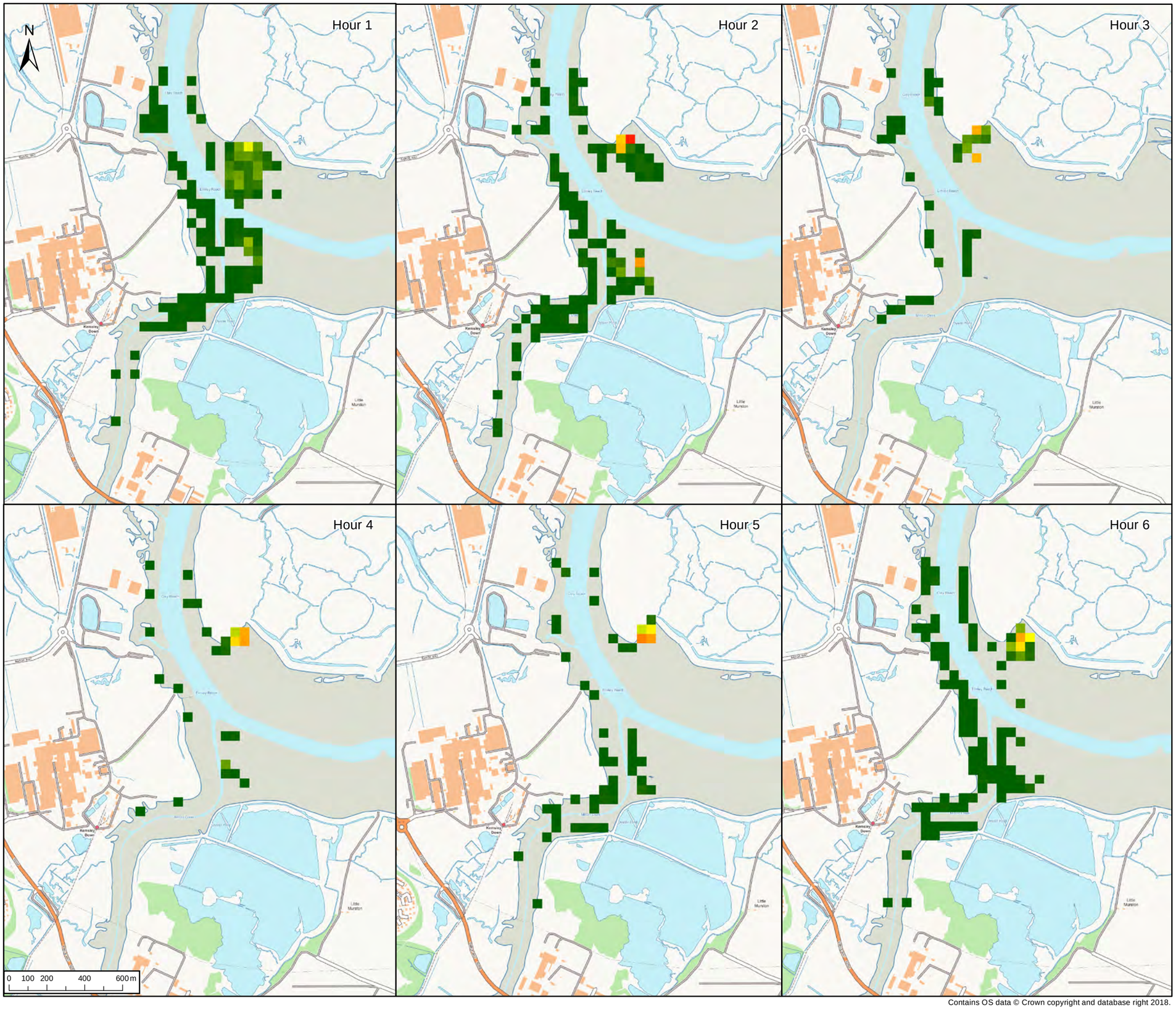

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Legend

Bird density

High : 74.57

Low : 1

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Client: Wheelabrator Technologies

Project: Kemsley K3/WKN

Title: Density of Grey Plover recorded in high water survey

Status	Drawn By	PM/Checked By
Final	KM	MS
Job Ref	**Scale @ A3**	**Date**
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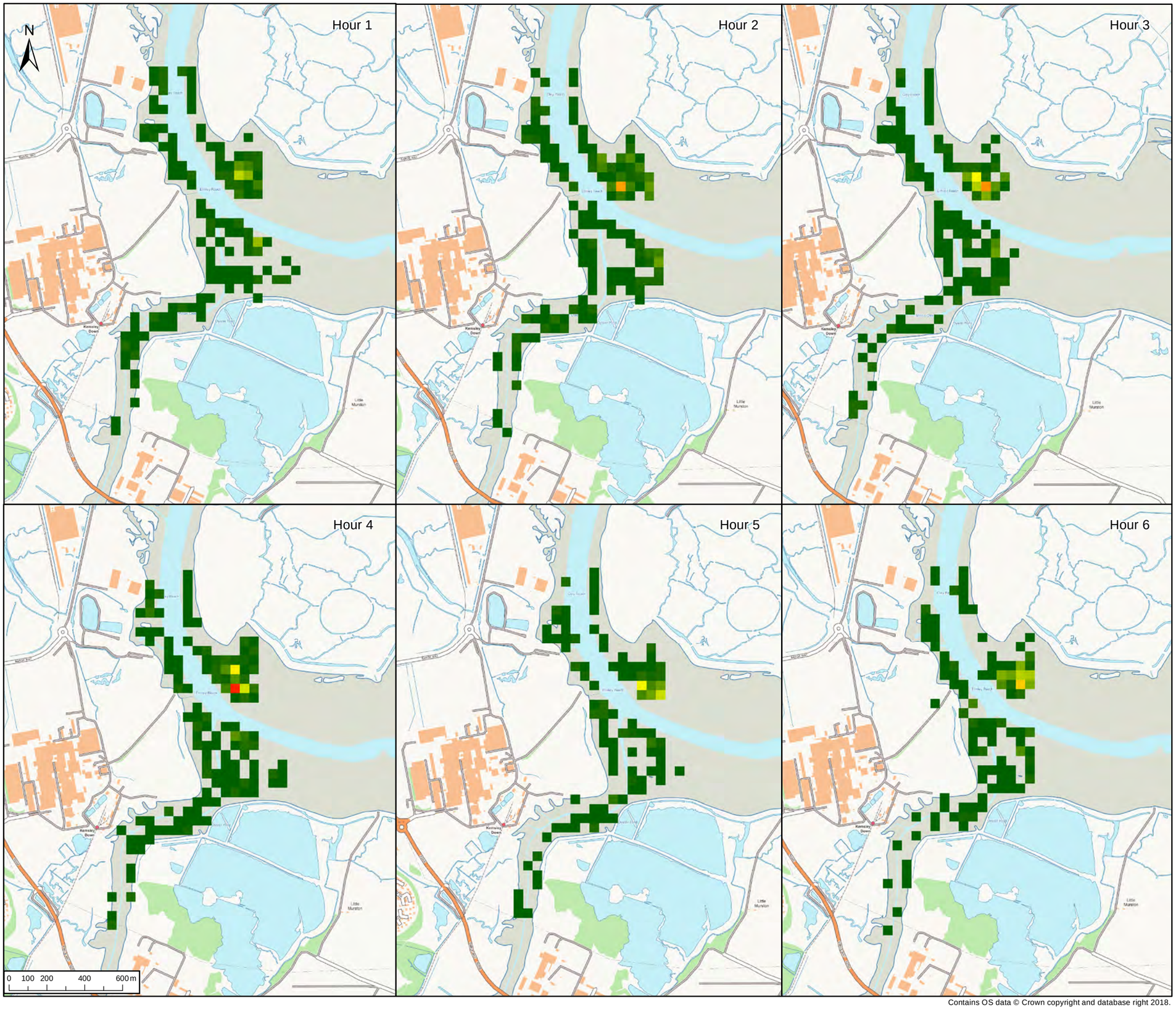

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Legend

Bird density

High : 25.84

Low : 1

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Client: Wheelabrator Technologies

Project: Kemsley K3/WKN

Title: Density of Grey Plover recorded in low water survey

Status	Drawn By	PM/Checked By
Final	KM	MS
Job Ref	**Scale @ A3**	**Date**
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Bird density

High : 84.67

Low : 1

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Client: Wheelabrator Technologies

Project: Kemsley K3/WKN

Title: Density of Shelduck recorded in high water survey

Status	Drawn By	PM/Checked By
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Job Ref	**Scale @ A3**	**Date**
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Figure 6.8		01

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Legend

Bird density

High : 29.8519

Low : 1

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T: 01480 466 335 **E**: rpscm@rpsgroup.com **F**: 01480 466 911

Client: Wheelabrator Technologies

Project: Kemsley K3/WKN

Title: Density of Shelduck recorded in low water survey

Status	Drawn By	PM/Checked By
Final	KM	MS
Job Ref	**Scale @ A3**	**Date**
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Legend

Bird density

High : 5

Low : 1

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T: 01480 466 335 **E**: rpscm@rpsgroup.com **F**: 01480 466 911

Client: Wheelabrator Technologies

Project: Kemsley K3/WKN

Title: Density of Shoveler recorded in high water survey

Status	Drawn By	PM/Checked By
Final	KM	MS
Job Ref	**Scale @ A3**	**Date**
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Figure 6.10		01

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Legend

Bird density

High : 2

Low : 1

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T: 01480 466 335 **E**: rpscm@rpsgroup.com **F**: 01480 466 911

Client: Wheelabrator Technologies

Project: Kemsley K3/WKN

Title: Density of Shoveler recorded in low water survey

Status	Drawn By	PM/Checked By
Final	KM	MS
Job Ref	**Scale @ A3**	**Date**
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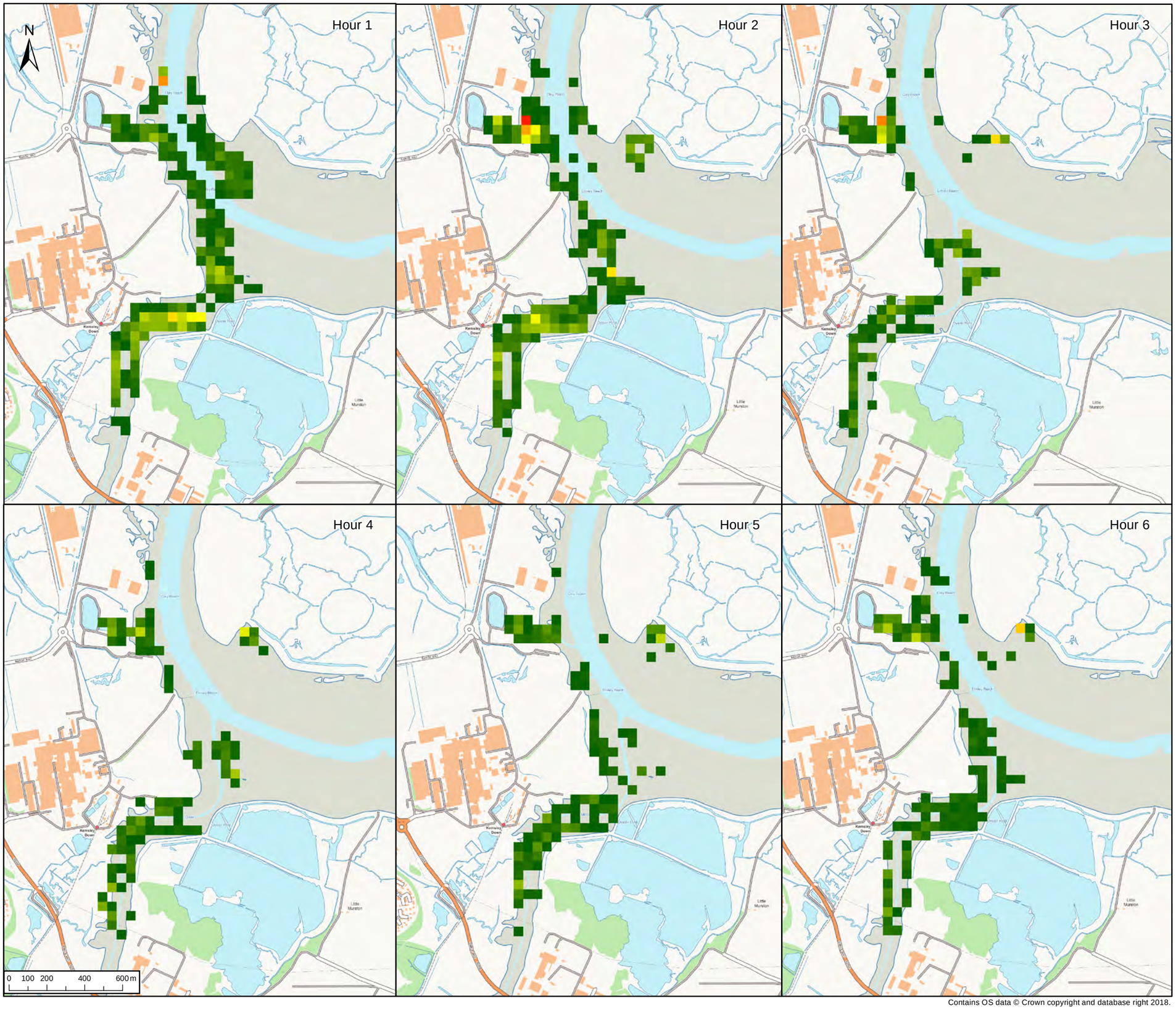

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Legend

Bird density

High : 149.17

Low : 1

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T: 01480 466 335 **E**: rpscm@rpsgroup.com **F**: 01480 466 911

Client: Wheelabrator Technologies

Project: Kemsley K3/WKN

Title: Density of Teal recorded in high water survey

Status	Drawn By	PM/Checked By
Final	KM	MS
Job Ref	**Scale @ A3**	**Date**
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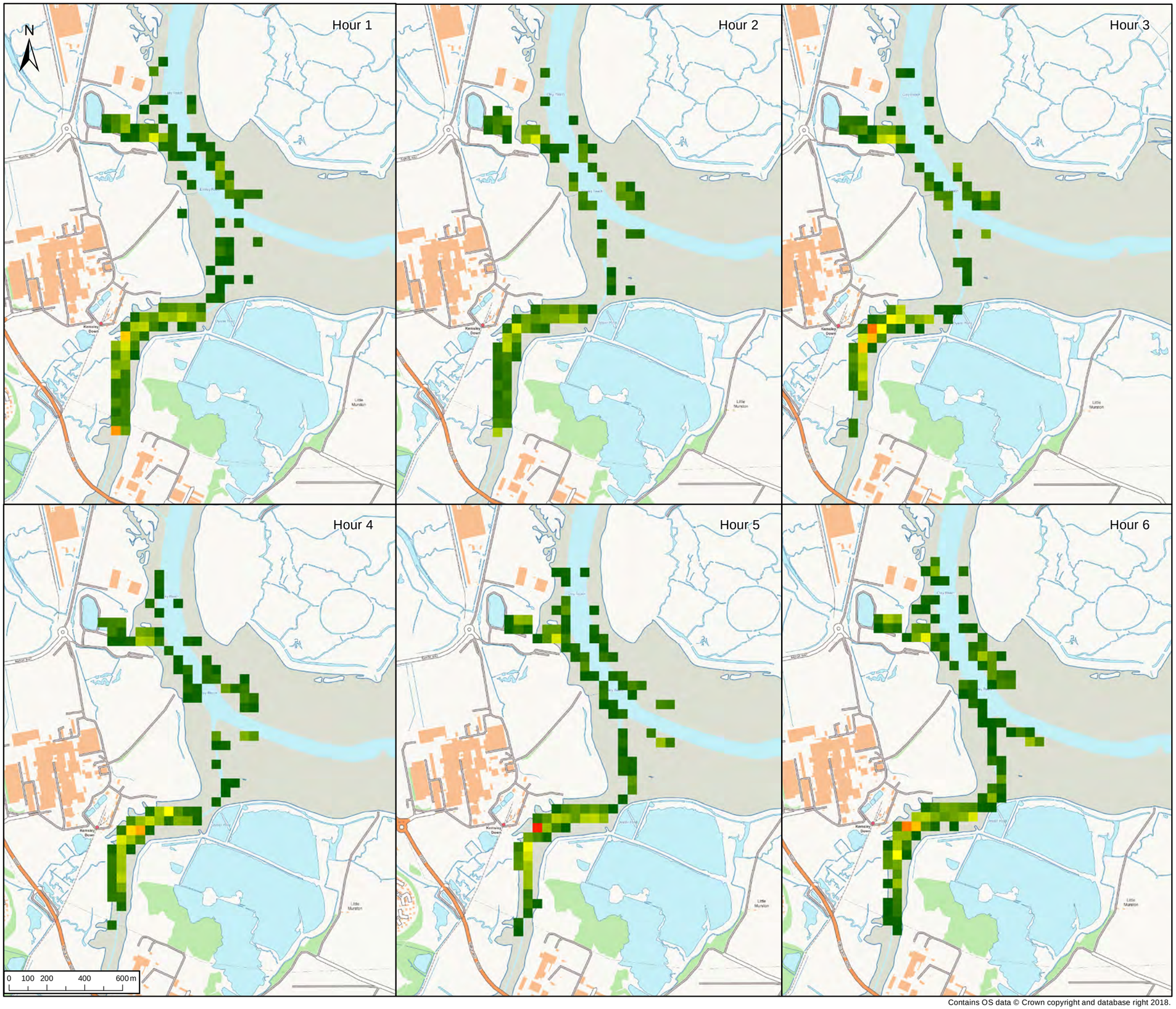

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Legend

Bird density

High : 151.01

Low : 1

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T: 01480 466 335 **E**: rpscm@rpsgroup.com **F**: 01480 466 911

Client: Wheelabrator Technologies

Project: Kemsley K3/WKN

Title: Density of Teal recorded in low water survey

Status	Drawn By	PM/Checked By
Final	KM	MS
Job Ref	**Scale @ A3**	**Date**
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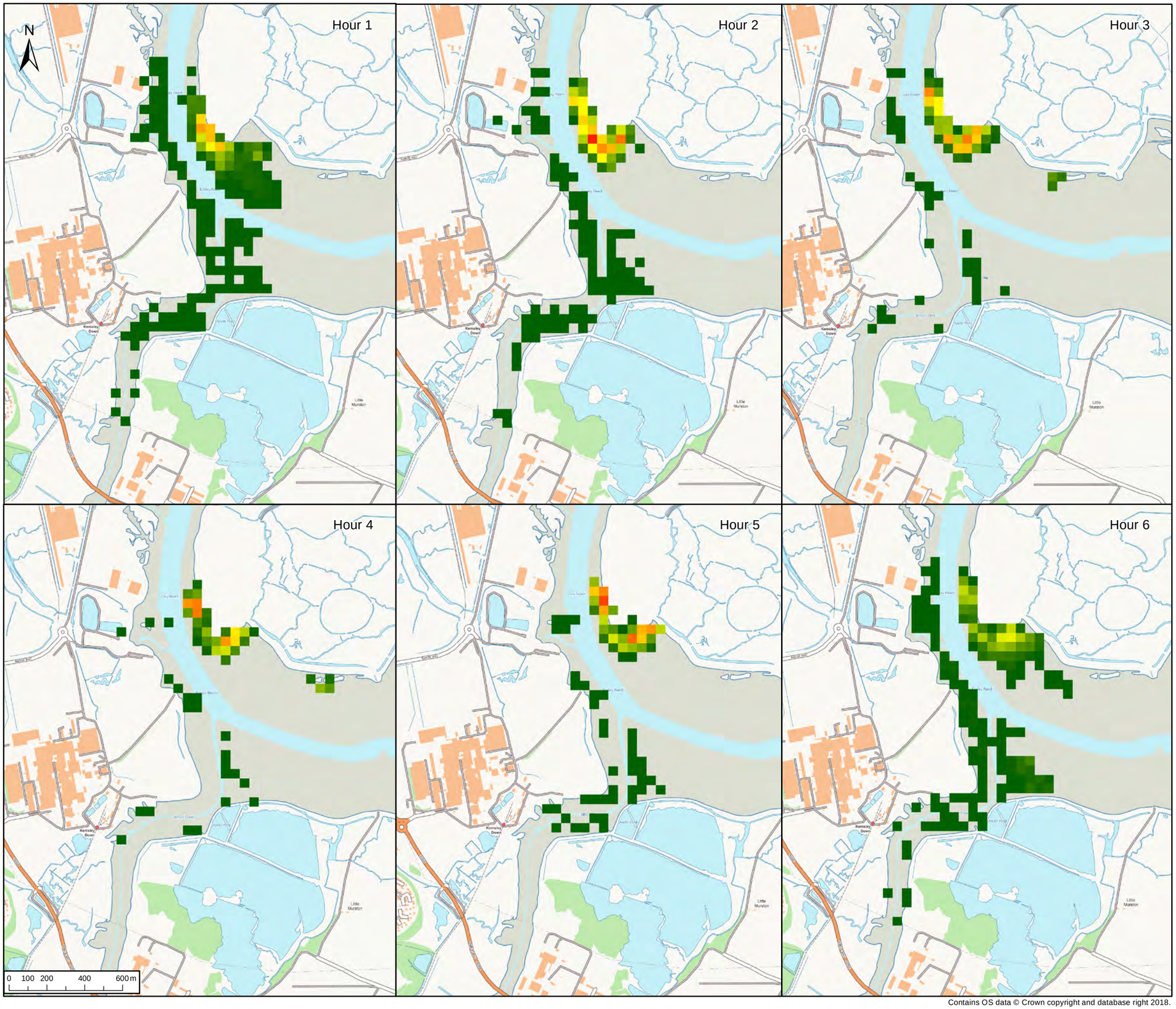

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Legend

Bird density

High : 490.94

Low : 0

Rev	Description	Date	Initial	Checked

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Willow Mere House, Compass Point Business Park
Stocks bridge Way, St. Ives, Cambs, PE27 5JL
T: 01480 466 335 **E**: rpscm@rpsgroup.com **F**: 01480 466 911

Client: Wheelabrator Technologies

Project: Kemsley K3/WKN

Title: Density of Oystercatcher recorded in high water survey

Status	Drawn By	PM/Checked By
Final	KM	MS
Job Ref	**Scale @ A3**	**Date**
ECO00047	1:20,000	OCT 18
Drawing Number		**Rev**
Figure 6.14		01

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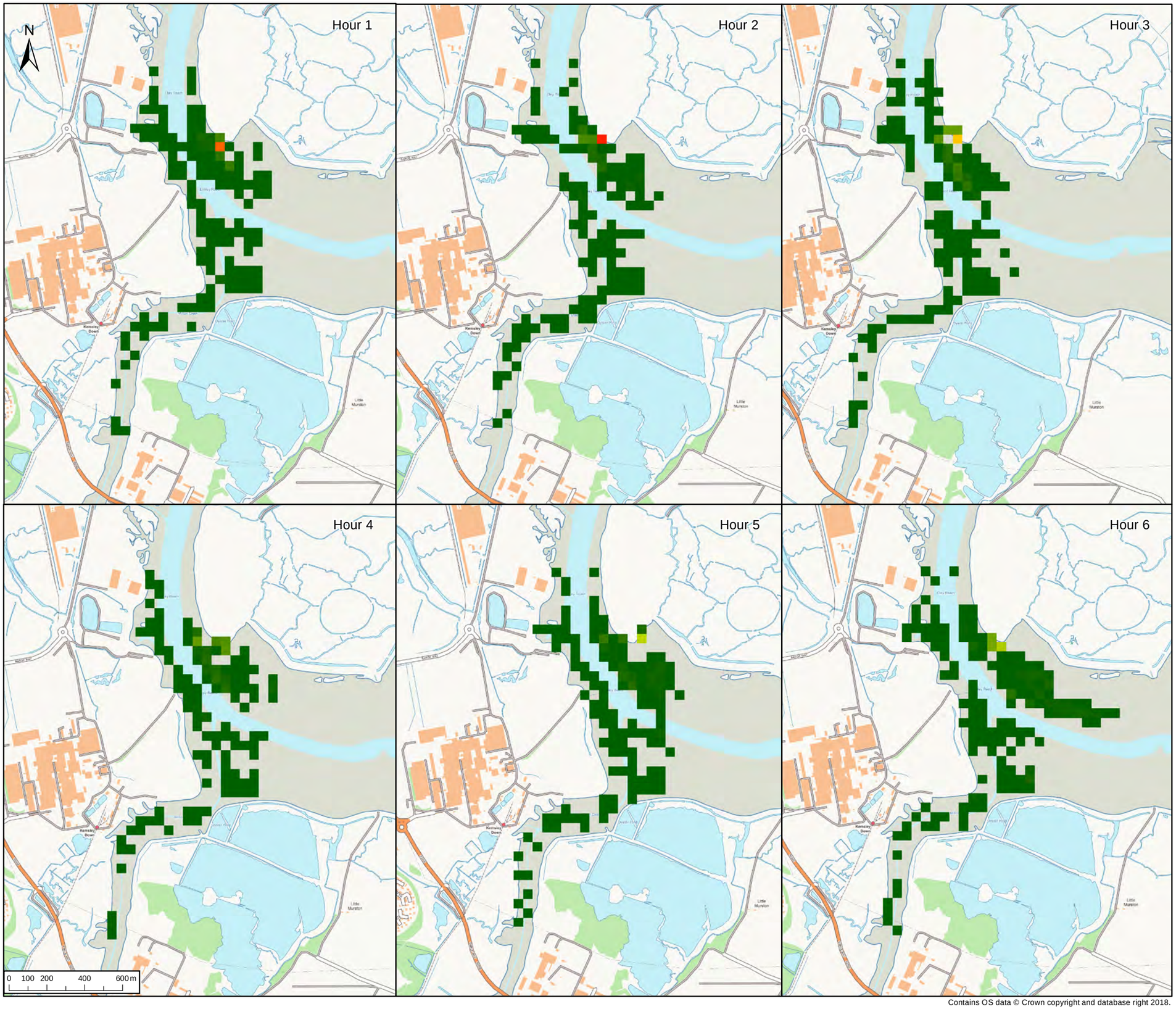

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Legend

Bird density

High : 315.56

Low : 1

Rev	Description	Date	Initial	Checked

RPS

Willow Mere House, Compass Point Business Park
Stocks bridge Way, St. Ives, Cambs, PE27 5JL
T: 01480 466 335 **E**: rpscm@rpsgroup.com **F**: 01480 466 911

Client: Wheelabrator Technologies

Project: Kemsley K3/WKN

Title: Density of Oystercatcher recorded in low water survey

Status	Drawn By	PM/Checked By
Final	KM	MS
Job Ref	**Scale @ A3**	**Date**
ECO00047	1:20,000	OCT 18
Drawing Number		**Rev**
Figure 6.15		01

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Legend

Bird density

High : 281.62

Low : 1

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Willow Mere House, Compass Point Business Park
Stocks bridge Way, St. Ives, Cambs, PE27 5JL
T: 01480 466 335 **E**: rpscm@rpsgroup.com **F**: 01480 466 911

Client: Wheelabrator Technologies

Project: Kemsley K3/WKN

Title: Density of Lapwing recorded in high water survey

Status	Drawn By	PM/Checked By
Final	KM	MS
Job Ref	**Scale @ A3**	**Date**
ECO00047	1:20,000	OCT 18
Drawing Number		**Rev**
Figure 6.16		01

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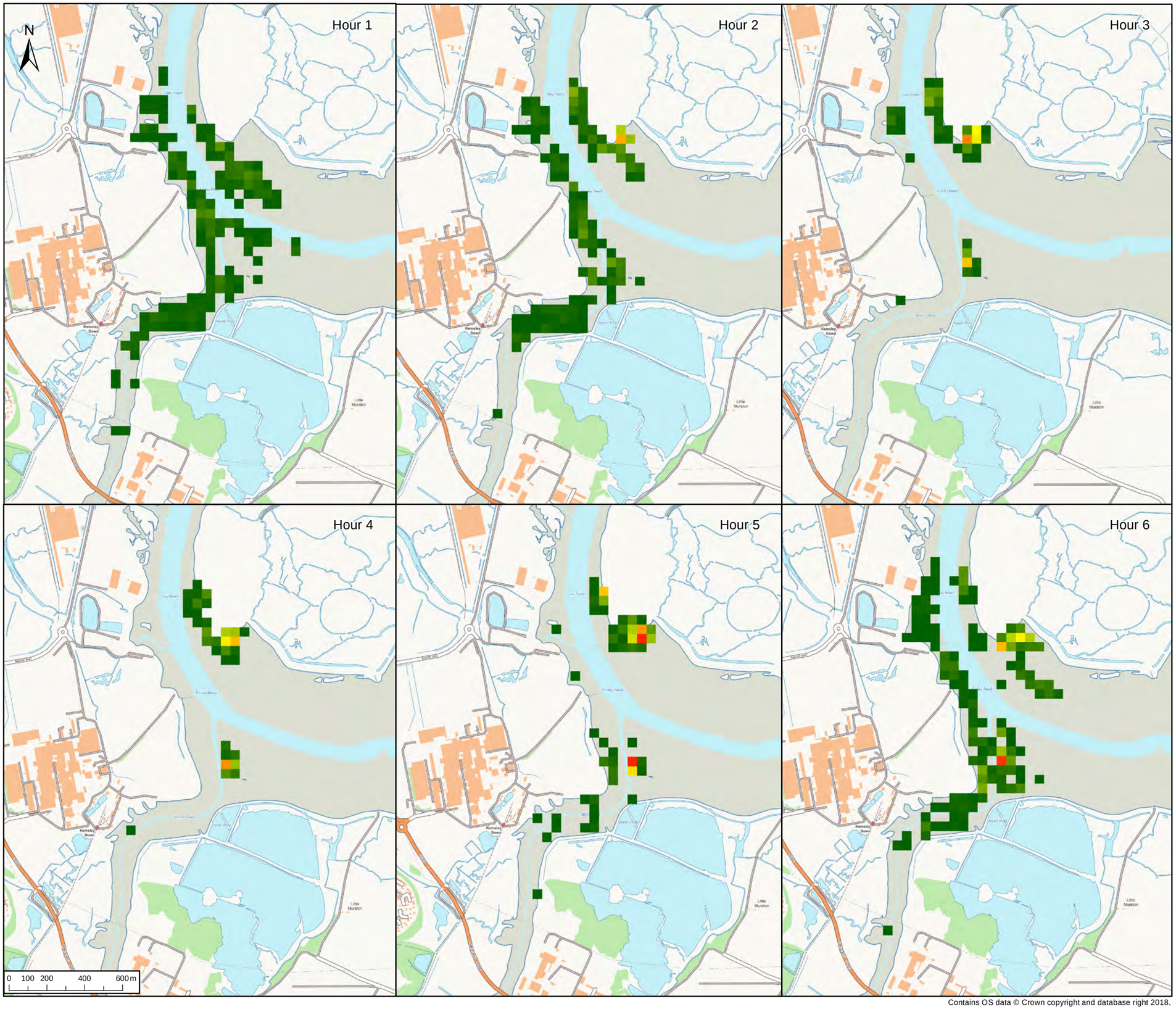

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Legend

Bird denisty

High : 691.17

Low : 0

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Willow Mere House, Compass Point Business Park
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T: 01480 466 335 **E**: rpscm@rpsgroup.com **F**: 01480 466 911

Client: Wheelabrator Technologies

Project: Kemsley K3/WKN

Title: Density of Black-tailed Godwit recorded in high water survey

Status	Drawn By	PM/Checked By
Final	KM	MS
Job Ref	**Scale @ A3**	**Date**
ECO00047	1:20,000	OCT 18
Drawing Number		**Rev**
Figure 6.17		01

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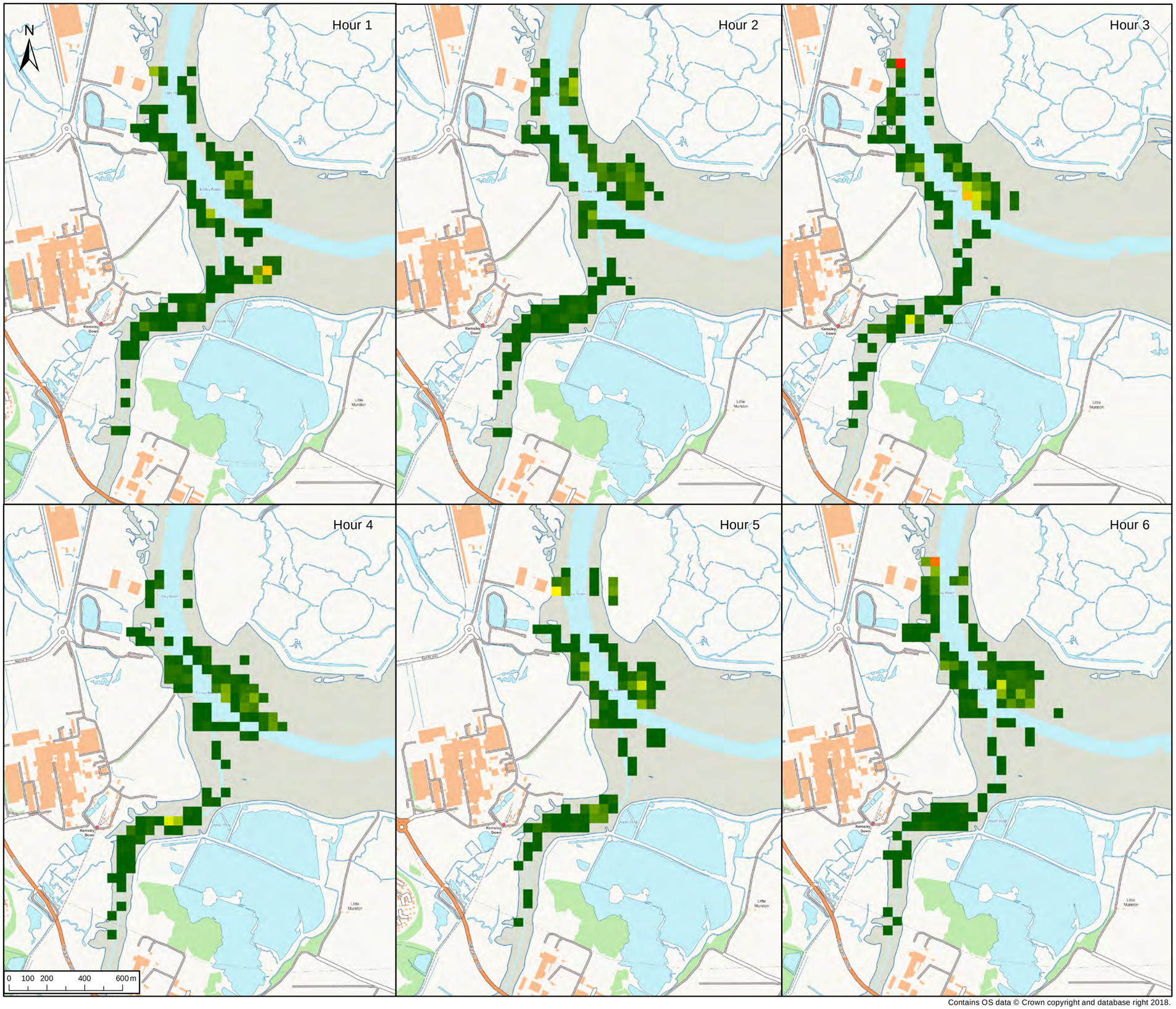

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Legend

Bird density

High : 276.92

Low : 1

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T: 01480 466 335 **E**: rpscm@rpsgroup.com **F**: 01480 466 911

Client: Wheelabrator Technologies

Project: Kemsley K3/WKN

Title: Density of Black-tailed Godwit recorded in low water survey

Status	Drawn By	PM/Checked By
Final	KM	MS
Job Ref	**Scale @ A3**	**Date**
ECO00047	1:20,000	OCT 18
Drawing Number		**Rev**
Figure 6.18		01

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Legend

Bird density

High : 2

Low : 1

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T: 01480 466 335 **E**: rpscm@rpsgroup.com **F**: 01480 466 911

Client: Wheelabrator Technologies

Project: Kemsley K3/WKN

Title: Density of Green Sandpiper recorded in high water survey

Status	Drawn By	PM/Checked By
Final	KM	MS
Job Ref	**Scale @ A3**	**Date**
ECO00047	1:20,000	OCT 18
Drawing Number		**Rev**
Figure 6.19		01

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Legend

Bird density

High : 3

Low : 1

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Stocks bridge Way, St. Ives, Cambs, PE27 5JL
T: 01480 466 335 **E**: rpscm@rpsgroup.com **F**: 01480 466 911

Client: Wheelabrator Technologies

Project: Kemsley K3/WKN

Title: Density of Green Sandpiper recorded in low water survey

Status	Drawn By	PM/Checked By
Final	KM	MS
Job Ref	**Scale @ A3**	**Date**
ECO00047	1:20,000	OCT 18
Drawing Number		**Rev**
Figure 6.20		01

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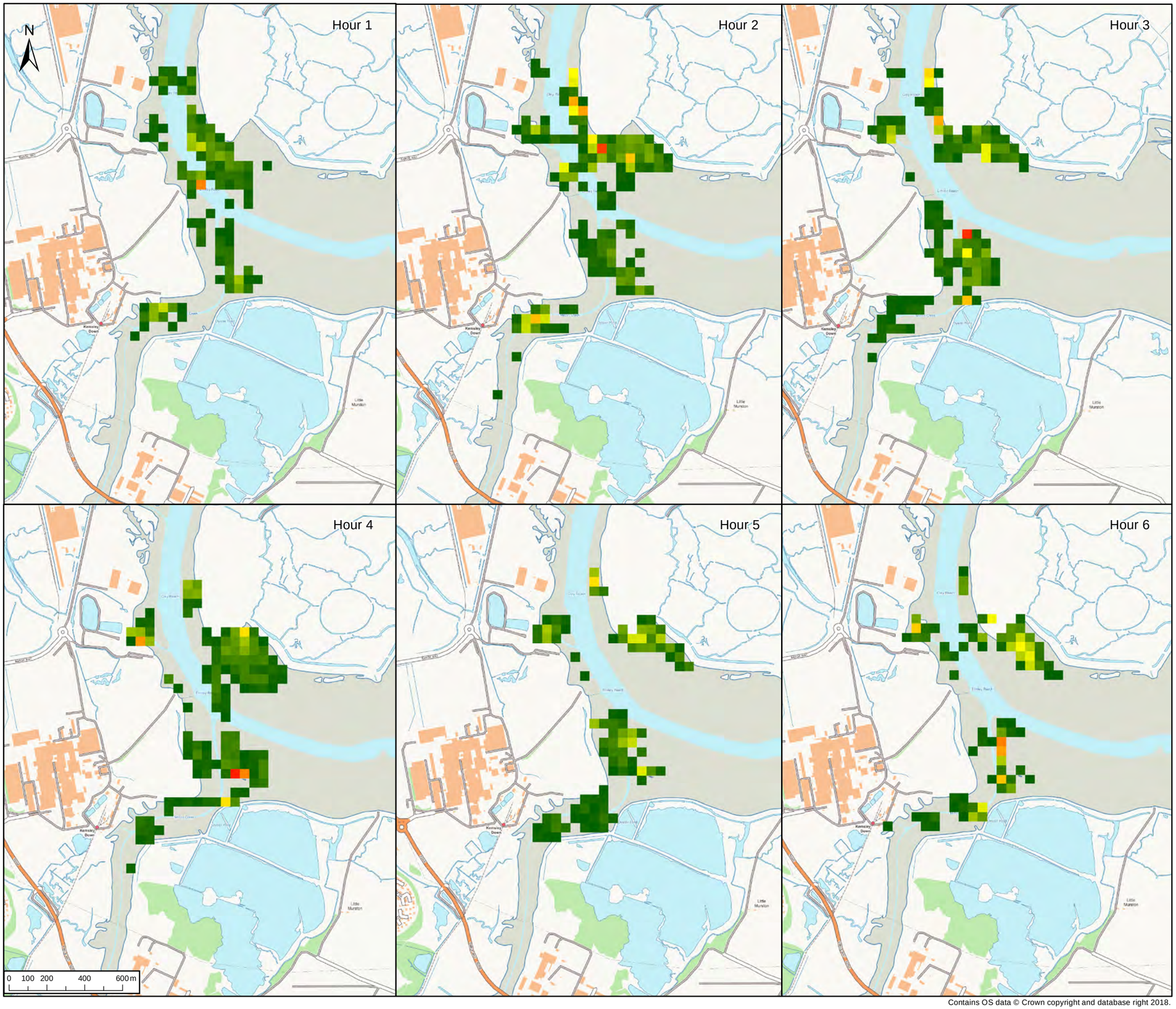

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Legend

Bird density

High : 190.74

Low : 1

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T: 01480 466 335 **E**: rpscm@rpsgroup.com **F**: 01480 466 911

Client: Wheelabrator Technologies

Project: Kemsley K3/WKN

Title: Density of Wigeon recorded in high water survey

Status	Drawn By	PM/Checked By
Final	KM	MS
Job Ref	**Scale @ A3**	**Date**
ECO00047	1:20,000	OCT 18
Drawing Number		**Rev**
Figure 6.21		01

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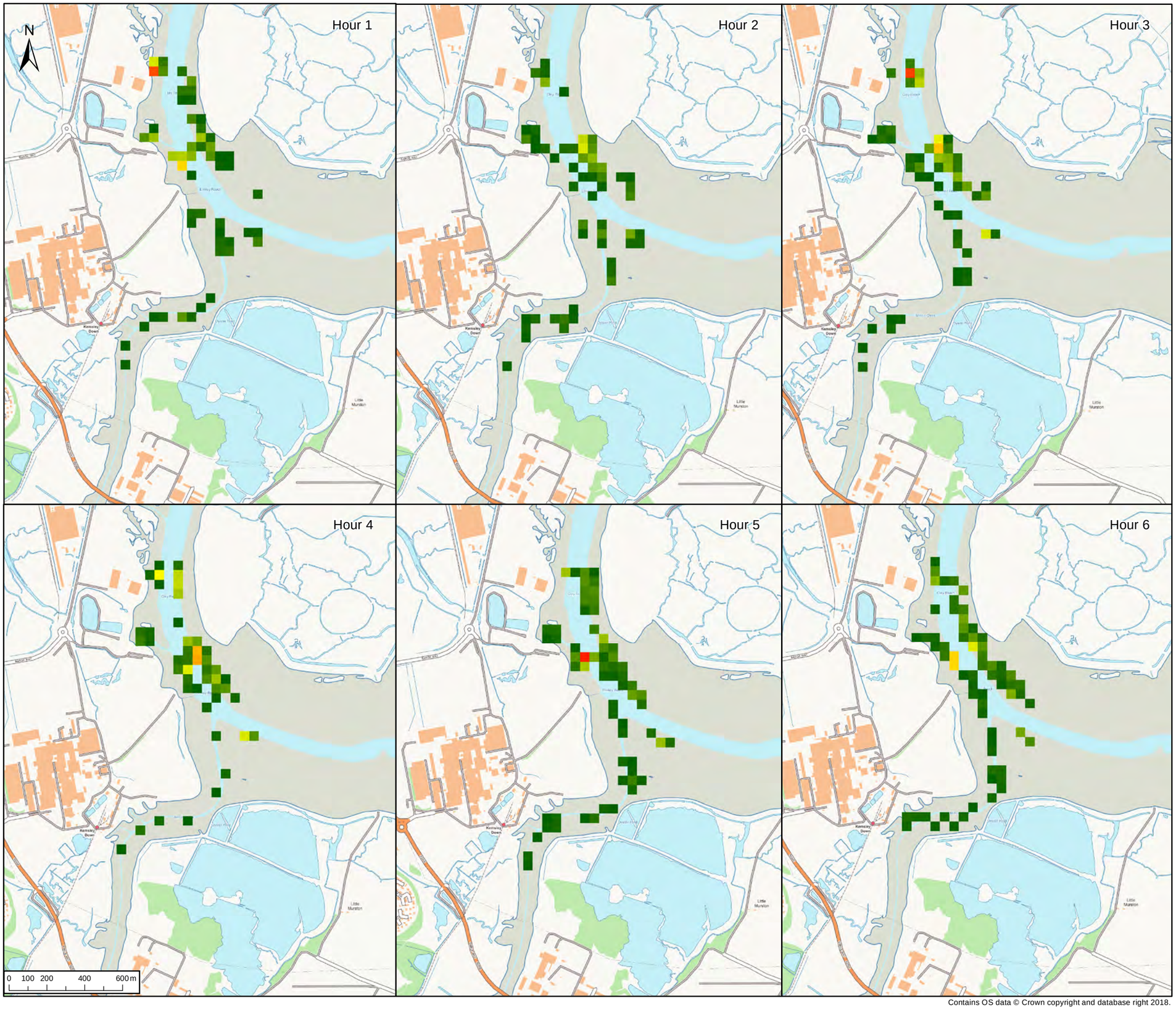

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Legend

Bird density

High : 149.24

Low : 1

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T: 01480 466 335 **E**: rpscm@rpsgroup.com **F**: 01480 466 911

Client: Wheelabrator Technologies

Project: Kemsley K3/WKN

Title: Density of Wigeon recorded in low water survey

Status	Drawn By	PM/Checked By
Final	KM	MS
Job Ref	**Scale @ A3**	**Date**
ECO00047	1:20,000	OCT 18
Drawing Number		**Rev**
Figure 6.22		01

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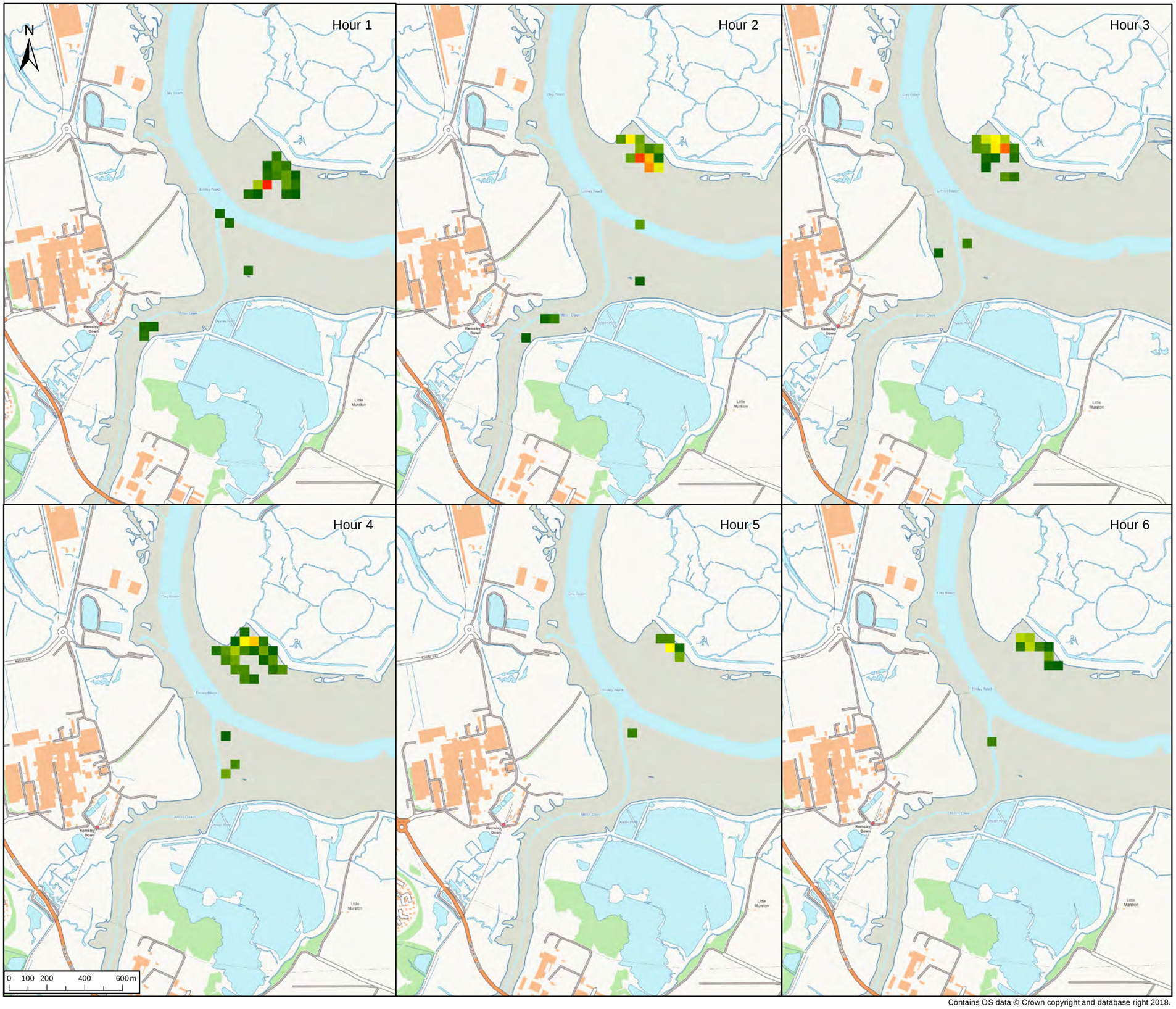
Document: V:\GIS temp (other offices work)\Kemsley K5\Drawings\47-0037-001 Wigeon LW.mxd



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Legend

Bird density

High : 66.75

Low : 1

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T: 01480 466 335 **E**: rpscm@rpsgroup.com **F**: 01480 466 911

Client: Wheelabrator Technologies

Project: Kemsley K3/WKN

Title: Density of Pintail recorded in high water survey

Status	Drawn By	PM/Checked By
Final	KM	MS
Job Ref	**Scale @ A3**	**Date**
ECO00047	1:20,000	OCT 18
Drawing Number		**Rev**
Figure 6.23		01

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Legend

Bird density

High : 63

Low : 1

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T: 01480 466 335 **E**: rpscm@rpsgroup.com **F**: 01480 466 911

Client: Wheelabrator Technologies

Project: Kemsley K3/WKN

Title: Density of Pintail recorded in low water survey

Status	Drawn By	PM/Checked By
Final	KM	MS
Job Ref	**Scale @ A3**	**Date**
ECO00047	1:20,000	OCT 18
Drawing Number		**Rev**
Figure 6.24		01

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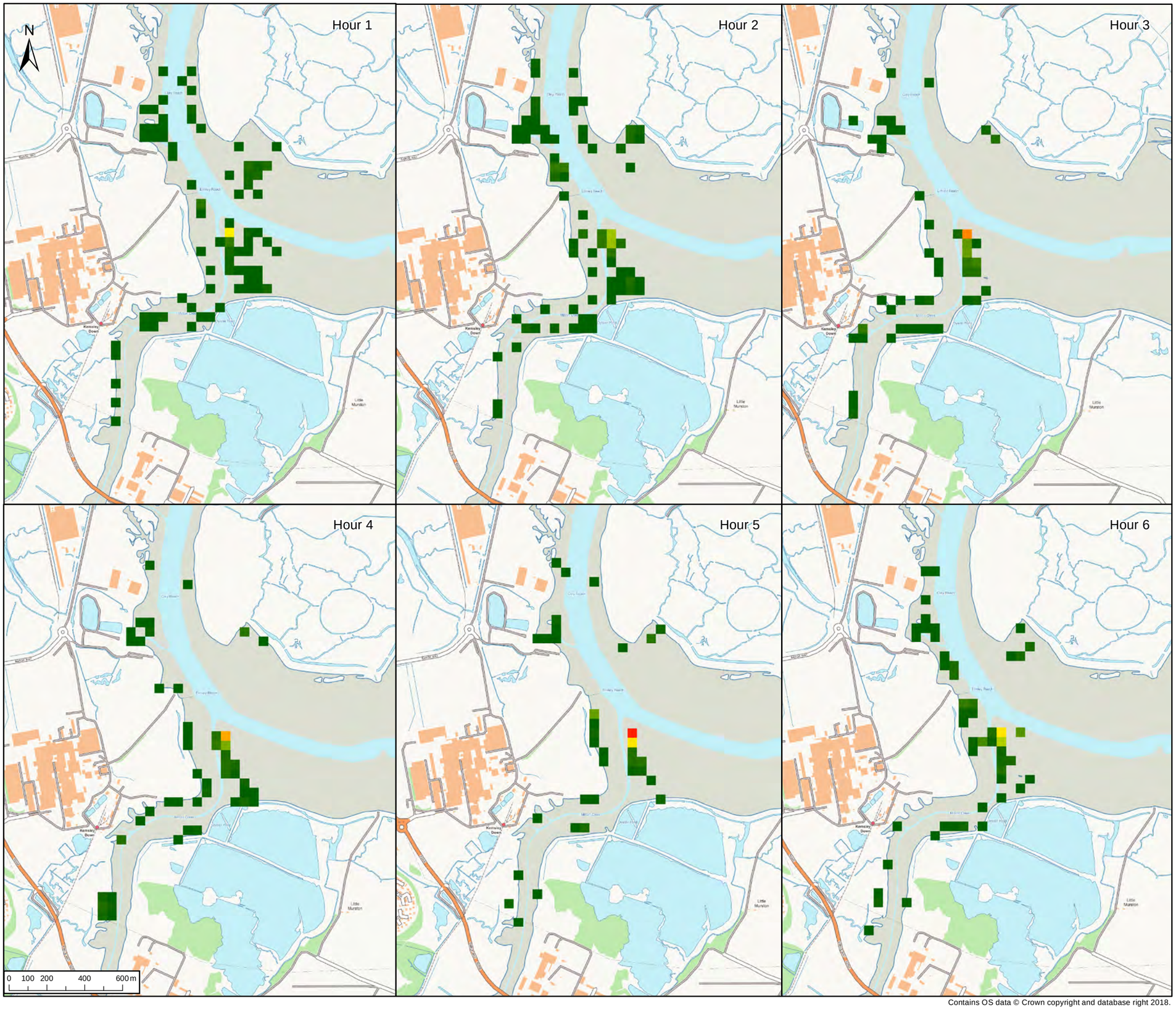

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Legend

Bird density

High : 57.41

Low : 1

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T: 01480 466 335 **E**: rpscm@rpsgroup.com **F**: 01480 466 911

Client: Wheelabrator Technologies

Project: Kemsley K3/WKN

Title: Density of Little Egret recorded in high water survey

Status	Drawn By	PM/Checked By
Final	KM	MS
Job Ref	**Scale @ A3**	**Date**
ECO00047	1:20,000	OCT 18
Drawing Number		**Rev**
Figure 6.25		01

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Legend

Bird density

High : 46

Low : 1

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T: 01480 466 335 **E**: rpscm@rpsgroup.com **F**: 01480 466 911

Client: Wheelabrator Technologies

Project: Kemsley K3/WKN

Title: Density of Little Egret recorded in low water survey

Status	Drawn By	PM/Checked By
Final	KM	MS
Job Ref	**Scale @ A3**	**Date**
ECO00047	1:20,000	OCT 18
Drawing Number		**Rev**
Figure 6.26		01

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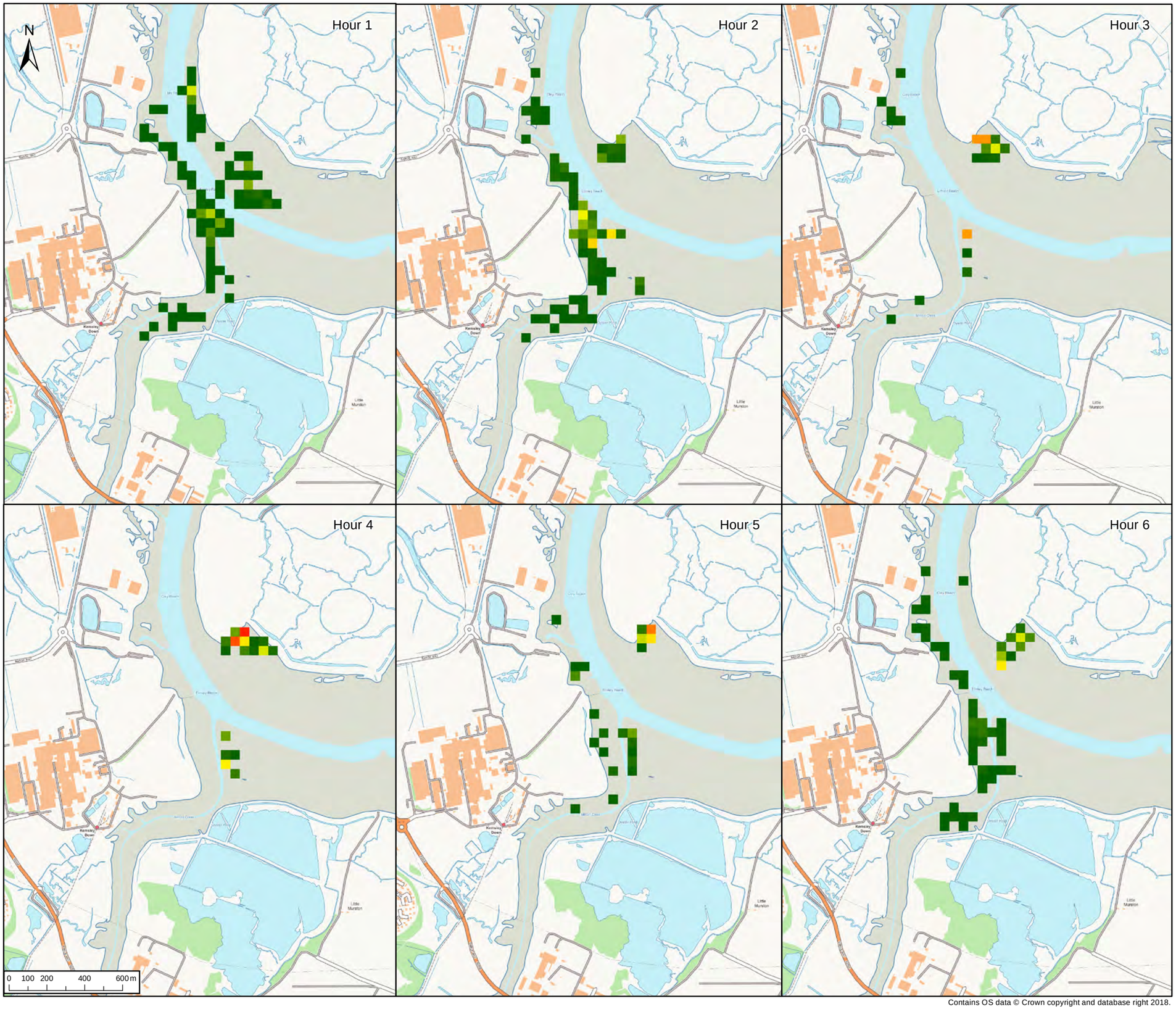

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Legend

Bird denisty

High : 110.93

Low : 11

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T: 01480 466 335 **E**: rpscm@rpsgroup.com **F**: 01480 466 911

Client: Wheelabrator Technologies

Project: Kemsley K3/WKN

Title: Density of Avocet recorded in high water survey

Status	Drawn By	PM/Checked By
Final	KM	MS
Job Ref	**Scale @ A3**	**Date**
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Drawing Number		**Rev**
Figure 6.27		01

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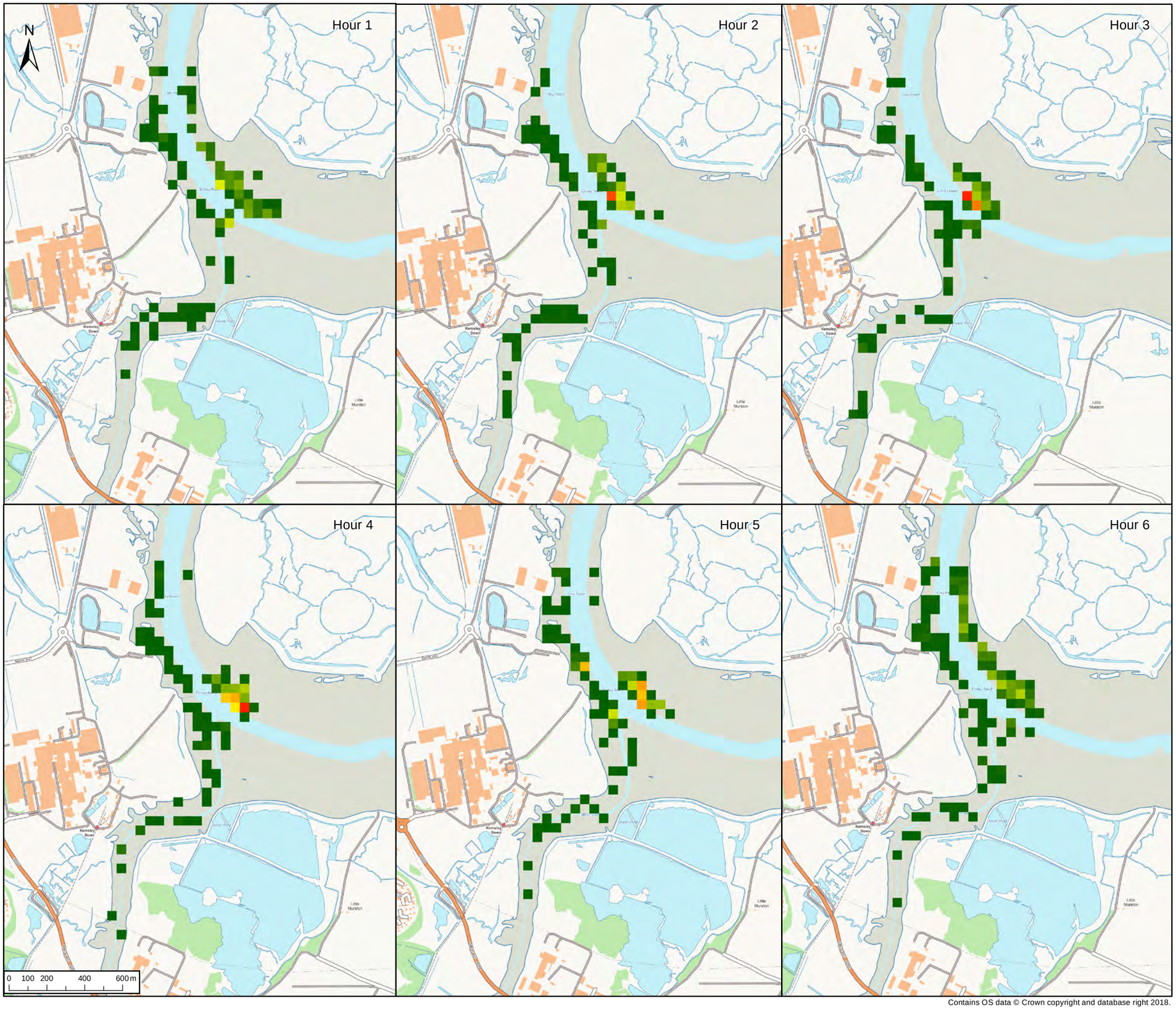

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Legend

Bird density

High : 97.49

Low : 1

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T: 01480 466 335 **E**: rpscm@rpsgroup.com **F**: 01480 466 911

Client: Wheelabrator Technologies

Project: Kemsley K3/WKN

Title: Density of Avocet recorded in low water survey

Status	Drawn By	PM/Checked By
Final	KM	MS
Job Ref	**Scale @ A3**	**Date**
ECO00047	1:20,000	OCT 18
Drawing Number		**Rev**
Figure 6.28		01

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Legend

Bird density

High : 16

Low : 1

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Willow Mere House, Compass Point Business Park
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T: 01480 466 335 **E**: rpscm@rpsgroup.com **F**: 01480 466 911

Client: Wheelabrator Technologies

Project: Kemsley K3/WKN

Title: Density of Bar-tailed Godwit recorded in high water survey

Status	Drawn By	PM/Checked By
Final	KM	MS
Job Ref	**Scale @ A3**	**Date**
ECO00047	1:20,000	OCT 18
Drawing Number		**Rev**
Figure 6.29		01

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Legend

Bird density

High : 25

Low : 1

Rev	Description	Date	Initial	Checked

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Stocks bridge Way, St. Ives, Cambs, PE27 5JL
T: 01480 466 335 **E**: rpscm@rpsgroup.com **F**: 01480 466 911

Client: Wheelabrator Technologies

Project: Kemsley K3/WKN

Title: Density of Bar-tailed Godwit recorded in low water survey

Status	Drawn By	PM/Checked By
Final	KM	MS
Job Ref	**Scale @ A3**	**Date**
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Figure 6.30		01

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Legend

Bird density

High : 12

Low : 1

Rev	Description	Date	Initial	Checked

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T: 01480 466 335 **E**: rpscm@rpsgroup.com **F**: 01480 466 911

Client: Wheelabrator Technologies

Project: Kemsley K3/WKN

Title: Density of Greenshank recorded in high water survey

Status	Drawn By	PM/Checked By
Final	KM	MS
Job Ref	**Scale @ A3**	**Date**
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Drawing Number		**Rev**
Figure 6.31		01

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Legend

Bird density

High : 4.5

Low : 1

Rev	Description	Date	Initial	Checked

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Willow Mere House, Compass Point Business Park
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T: 01480 466 335 **E**: rpscm@rpsgroup.com **F**: 01480 466 911

Client: Wheelabrator Technologies

Project: Kemsley K3/WKN

Title: Density of Greenshank recorded in low water survey

Status	Drawn By	PM/Checked By
Final	KM	MS
Job Ref	**Scale @ A3**	**Date**
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Drawing Number		**Rev**
Figure 6.32		01

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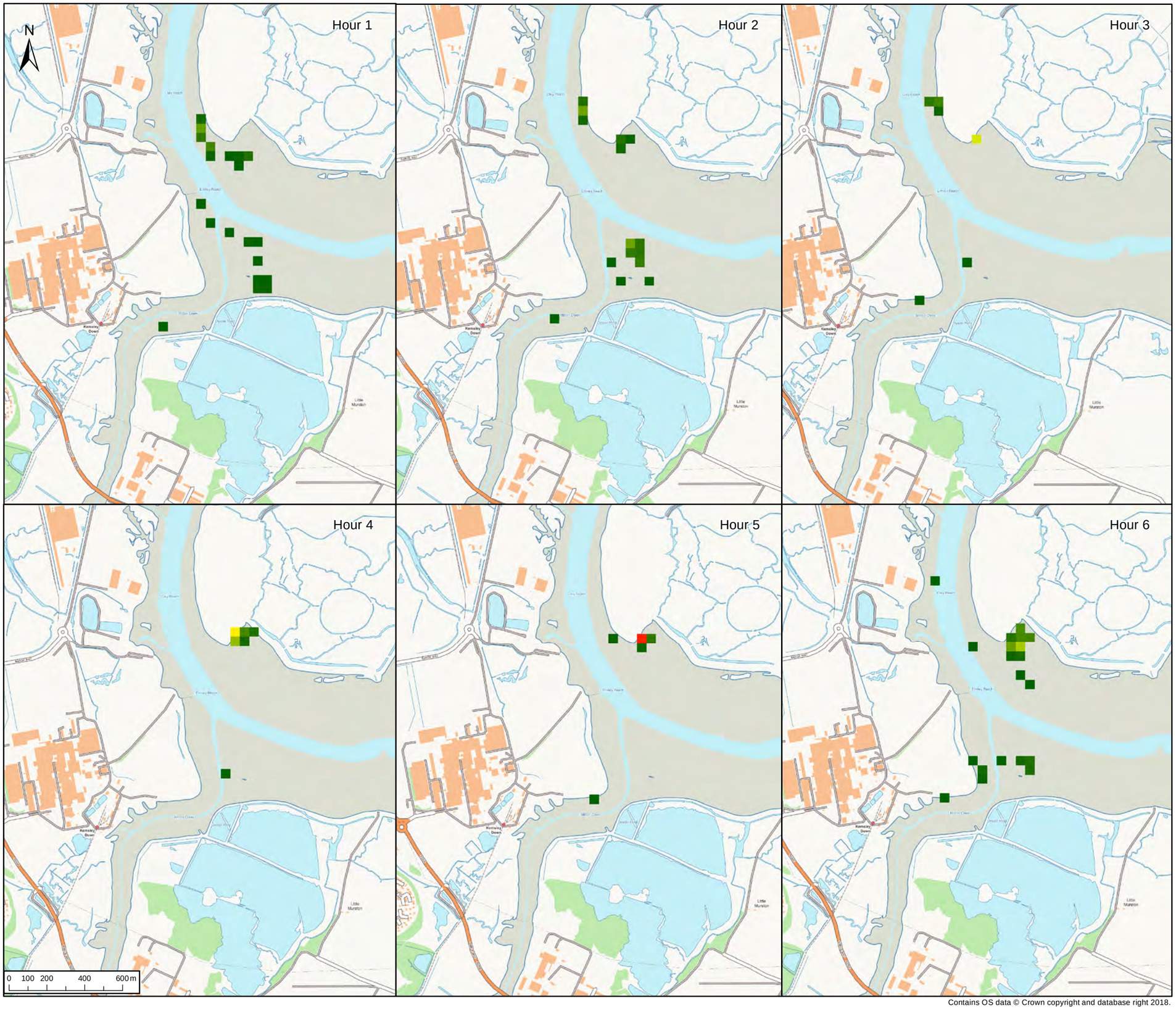

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Legend

Bird density

High : 1102.03

Low : 1

Rev	Description	Date	Initial	Checked

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T: 01480 466 335 **E**: rpscm@rpsgroup.com **F**: 01480 466 911

Client: Wheelabrator Technologies

Project: Kemsley K3/WKN

Title: Density of Knot recorded in high water survey

Status	Drawn By	PM/Checked By
Final	KM	MS
Job Ref	**Scale @ A3**	**Date**
ECO00047	1:20,000	OCT 18
Drawing Number		**Rev**
Figure 6.33		01

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Legend

Bird density

High : 130.89

Low : 1

Rev	Description	Date	Initial	Checked

RPS

Willow Mere House, Compass Point Business Park
Stocks bridge Way, St. Ives, Cambs, PE27 5JL
T: 01480 466 335 **E**: rpscm@rpsgroup.com **F**: 01480 466 911

Client: Wheelabrator Technologies

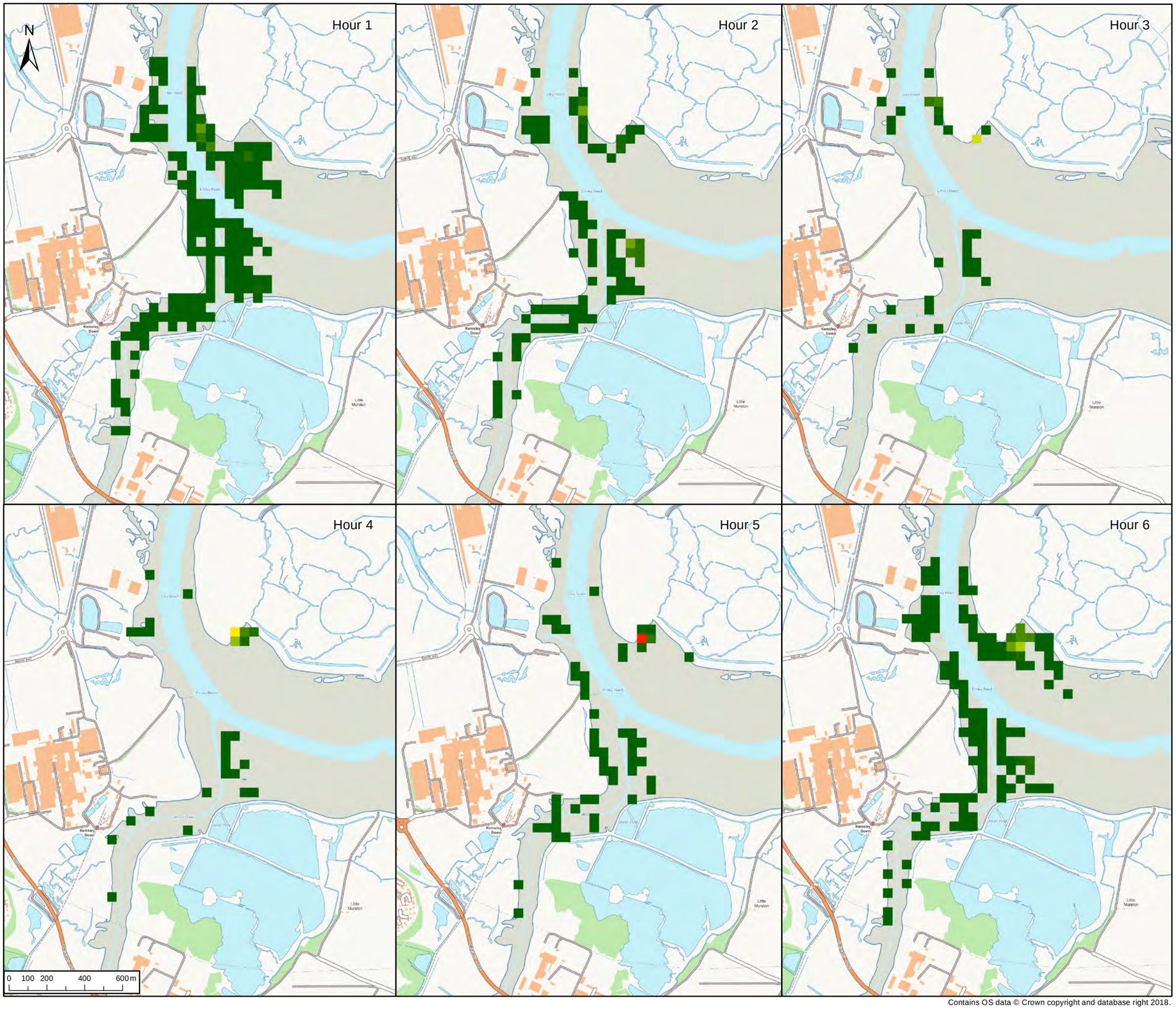
Project: Kemsley K3/WKN

Title: Density of Knot recorded in low water survey

Status	Drawn By	PM/Checked By
Final	KM	MS
Job Ref	**Scale @ A3**	**Date**
ECO00047	1:20,000	OCT 18
Drawing Number		**Rev**
Figure 6.34		01

rpsgroup.com/uk

Document: V:\GIS temp (other offices work)\Kemsley K5\Drawings\47-0021-001 Knot LW.mxd



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Legend

Bird denisty

High : 1092.03

Low : 1

Rev	Description	Date	Initial	Checked

RPS

Willow Mere House, Compass Point Business Park
Stocks bridge Way, St. Ives, Cambs, PE27 5JL
T: 01480 466 335 **E**: rpscm@rpsgroup.com **F**: 01480 466 911

Client: Wheelabrator Technologies

Project: Kemsley K3/WKN

Title: Density of Curlew recorded in high water survey

Status	Drawn By	PM/Checked By
Final	KM	MS
Job Ref	**Scale @ A3**	**Date**
ECO00047	1:20,000	OCT 18
Drawing Number		**Rev**
Figure 6.35		01

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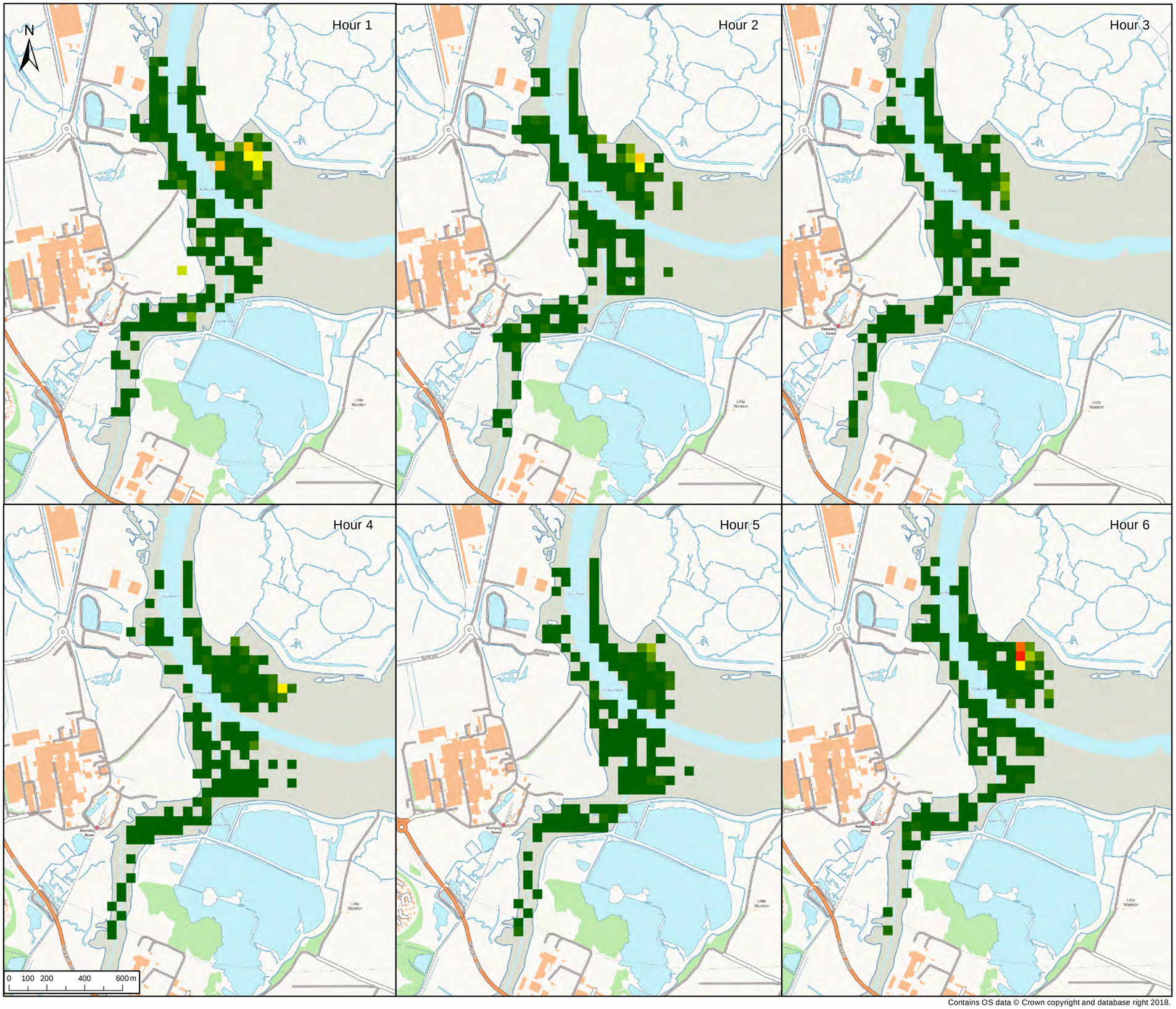
Document: V:\GIS temp (other offices work)\Kemsley K5\Drawings\47-0010-001 Curlew HW.mxd



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Legend

Bird density

High : 23.79

Low : 1

Rev	Description	Date	Initial	Checked

RPS

Willow Mere House, Compass Point Business Park
Stocks bridge Way, St. Ives, Cambs, PE27 5JL
T: 01480 466 335 **E**: rpscm@rpsgroup.com **F**: 01480 466 911

Client: Wheelabrator Technologies

Project: Kemsley K3/WKN

Title: Density of Curlew recorded in low water survey

Status	Drawn By	PM/Checked By
Final	KM	MS
Job Ref	**Scale @ A3**	**Date**
ECO00047	1:20,000	OCT 18
Drawing Number		**Rev**
Figure 6.36		01

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Appendices

Appendix 1

WKN/K3 DCO – Habitats Regulations Assessment Screening Matrices

Note that Construction below refers to WKN only. Construction effects of the K3 Proposed Development were addressed in the 2010 ES with a conclusion of no significant effect/no adverse effect on integrity.

Operation and Decommissioning are for both WKN Proposed Development and the practical effect of the K3 with any separation noted in the supporting evidence.

Matrix 1 – Screening of Likely Significant Effects: The Swale SPA

Name of European Site	**The Swale Special Protection Area**																													
EU Code	UK9012011																													
Distance to Proposal site	160 m																													
European site features	Direct loss or damage of habitats used by interest species			Change in Habitat Management Regime			Loss of future space to allow for managed realignment			Urbanisation			Air quality - dust			Air quality - emissions			Hydrological Changes			Water quality			Disturbance			Introduction or spread of non-native invasive species		
	C	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*
Migratory Wintering species regularly occurring in internationally-important numbers over winter – **Dark**	× a	× a	× a	× b	× b	× b	× c	× c	× c	× d	× d	× d	✓ e	× f	✓ e	× g	× h	× g	× i	× i	× i	✓ j	✓ j	× j	✓ k	✓ k	× k	× l	× l	× l

bellied brent geese																													
Migratory Wintering species regularly occurring in internationally-important numbers over winter – **Dunlin**	× a	× a	× a	× b	× b	× b	× c	× c	× c	× d	× d	× d	✓ e	× f	✓ e	× g	× h	× g	× i	× i	× i	✓ j	✓ j	× j	✓ k	✓ k	× k	× l	× l	× l
Regularly supporting over 20,000 waterfowl over winter	× a	× a	× a	× b	× b	× b	× c	× c	× c	× d	× d	× d	✓ e	× f	✓ e	× g	× h	× g	× i	× i	× i	✓ j	✓ j	× j	✓ k	✓ k	× k	× l	× l	× l
Diverse assemblage of breeding birds	× a	× a	× a	× b	× b	× b	× c	× c	× c	× d	× d	× d	✓ e	× f	✓ e	× g	× h	× g	× i	× i	× i	✓ j	✓ j	× j	✓ k	✓ k	× k	× l	× l	× l

Evidence supporting conclusions

a.	No likely significant effect from direct loss of habitat on any interest feature. None of the surveys undertaken on site as being used by interest feature species. Therefore, it does not support habitat suitable for any citation species (ref HRAR para 5.16 – 5.23).
b.	Given the distance from the SPA, the DCO application will result in no change to current management regimes of any supporting habitat of The Swale SPA during either the construction of WKN or the operation/demolition of either WKN or K3 (ref HRAR para 5.24 – 5.27).
c.	The site comprises mostly hard standing and bare ground, with ruderal vegetation and dense scrub, it is circa 160 m from The Swale SPA. No loss of land for managed realignment is therefore expected (ref HRAR para 5.28 – 5.30).
d.	The Proposal Site is 160 m from The Swale SPA and set against a backdrop of existing industrial buildings. No likely significant effect on any interest feature from increased urbanisation is therefore predicted (ref HRAR para 5.31 – 5.35).
e.	Based on studies elsewhere, it is anticipated that the majority of dust generated during construction/demolition would be deposited in the area immediately surrounding the source (up to 50 metres away) and that no change in level of exposure is expected beyond 300 metres from the site. The boundary of the Swale SPA site is 160 metres east of the proposal site and therefore outside the area potentially most affected. However, likely significant effects cannot be excluded without further assessment and/or application of mitigation as necessary.
f.	No dust-generating activities are associated with the operational phase of K3 / WKN. Therefore, no likely significant effect is predicted on any interest feature.
g.	All emissions arising from construction traffic are either below the necessary EQS, the Process Contribution is <1% of the EQS or the habitats are not considered sensitive to changes in air quality. Therefore, no likely significant effect is predicted from traffic emissions during construction (ref HRAR para 5.43-5.50).
h.	No likely significant effects from operational emissions are predicted on any interest feature or supporting habitat as all process contributions are <1% and/or the predicted environmental concentration is less than the Environmental Quality Standard and/or the features are not considered sensitive (ref HRAR para 5.51 – 5.56).
i.	The first drainage system will collect clean surface water runoff (for example from building roof areas) and store it in the lagoon. The second drainage system will collect 'dirty' runoff (for example from the FGT area) and store it in the 'dirty' water tank. This 'dirty' water will then be used in the process as required (for example for ash quenching). The clean water will be stored in the lagoon and used to top up the 'dirty' water tank. If the lagoon has reached the maximum acceptable capacity it will be discharged at a controlled rate into the Swale. Therefore, no hydrological changes to terrestrial areas of The Swale SPA will occur as a result of the proposed development (ref HRAR para 5.60-63).
j.	In the absence of mitigation, likely significant effects on The Swale SPA due to changes in water quality cannot be excluded due to the relatively close proximity of the nearest boundary to the proposed site.
k.	Because of the relative complexity of these issues, and their ability to have impacts on waterbirds/breeding marsh harrier within several hundred metres depending on the nature of the activity and the receptors, likely significant effects due to disturbance cannot be excluded at The Swale SPA without further assessment and/or application of mitigation as necessary.

I.	The only non-native invasive species currently known to be in the area, though not on the proposal site, is Japanese Knotweed. No importation of material is required to build WKN and no final planting is proposed that could inadvertently import non-native invasive to site, as such no likely significant effect is predicted (ref HRAR para 5.67 – 5.68).

Matrix 2 – Screening of Likely Significant Effects: The Swale Ramsar

Name of European Site	**The Swale Ramsar**																													
EU Code	N/A																													
Distance to Proposal site	160 m																													
	Direct loss or damage of habitats used by interest species			Change in Habitat Management Regime			Loss of future space to allow for managed realignment			Urbanisation			Air quality - dust			Air quality - emissions			Hydrological Changes			Water quality			Disturbance			Introduction or spread of non-native invasive species		
European site features	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*
Ramsar Criterion 2 - **Nationally rare and scarce plant species**	× a	× a	× a	× b	× b	×b	× c	× c	× c	× d	× d	× d	✓ e	× f	✓ e	× g	× h	× g	× i	× i	× i	✓ j	✓ j	× j	✓ k	✓ k	× k	× l	× l	× l
Ramsar Criterion 2 - **Red Data Book invertebrates**	× a	× a	× a	× b	× b	×b	× c	× c	× c	× d	× d	× d	✓ e	× f	✓ e	× g	× h	× g	× i	× i	× i	✓ j	✓ j	× j	✓ k	✓ k	× k	× l	× l	× l
Ramsar Criterion 5 – **Overwinter assemblage of international importance**	× a	× a	× a	× b	× b	×b	× c	× c	× c	× d	× d	× d	✓ e	× f	✓ e	× g	× h	× g	× i	× i	× i	✓ j	✓ j	× j	✓ k	✓ k	× k	× l	× l	× l

Ramsar Criterion 6 - Numbers of International Importance during spring/autumn passage **Redshank**	× a	× a	× a	× b	× b	×b	× c	× c	× c	× d	× d	× d	✓ e	× f	✓ e	× g	× h	× g	× i	× i	× i	✓ j	✓ j	× j	✓ k	✓ k	× k	× l	× l	× l
Ramsar Criterion 6 - Regularly Wintering in Numbers of International Importance - **Dark bellied brent geese**	× a	× a	× a	× b	× b	×b	× c	× c	× c	× d	× d	× d	✓ e	× f	✓ e	× g	× h	× g	× i	× i	× i	✓ j	✓ j	× j	✓ k	✓ k	× k	× l	× l	× l
Ramsar Criterion 6 - Regularly Wintering in Numbers of International Importance - **Grey Plover**	× a	× a	× a	× b	× b	×b	× c	× c	× c	× d	× d	× d	✓ e	× f	✓ e	× g	× h	× g	× i	× i	× i	✓ j	✓ j	× j	✓ k	✓ k	× k	× l	× l	× l

Evidence supporting conclusions

a.	No likely significant effect from direct loss of habitat on any interest feature. None of the surveys undertaken on site have identified the site as being used by interest feature species. Therefore, it does not support habitat suitable for any citation species (ref HRAR para 5.16 – 5.23).
b.	Given the distance from the Ramsar, the DCO application will result in no change to current management regimes of any supporting habitat of The Swale Ramsar during either the construction of WKN or the operation/demolition of either WKN or K3 (ref HRAR para 5.24 – 5.27).
c.	The site comprises mostly hard standing and bare ground, with ruderal vegetation and dense scrub, it is circa 160 m from The Swale Ramsar. No loss of land for managed realignment is therefore expected (ref HRAR para 5.28 – 5.30).
d.	The Proposal Site is 160 m from The Swale Ramsar and set against a backdrop of existing industrial buildings. No likely significant effect on any interest feature from increased urbanisation is therefore predicted (ref HRAR para 5.31 – 5.35).
e.	Based on studies elsewhere, it is anticipated that the majority of dust generated during construction/demolition would be deposited in the area immediately surrounding the source (up to 50 metres away) and that no change in level of exposure is expected beyond 300 metres from the site. The boundary of the Swale Ramsar site is 160 metres east of the proposal site and therefore outside the area potentially most affected. However, likely significant effects cannot be excluded without further assessment and/or application of mitigation as necessary.
f.	No dust-generating activities are associated with the operational phase of K3 / WKN. Therefore, no likely significant effect is predicted on any interest feature.
g.	All emissions arising from construction traffic are either below the necessary EQS, the Process Contribution is <1% of the EQS or the habitats are not considered sensitive to changes in air quality. Therefore, no likely significant effect is predicted from traffic emissions during construction (ref HRAR para 5.43-5.50).
h.	No likely significant effects from operational emissions are predicted on any interest feature or supporting habitat as all process contributions are <1% and/or the predicted environmental concentration is less than the Environmental Quality Standard and/or the features are not considered sensitive (ref HRAR para 5.51 – 5.56).
i.	The first drainage system will collect clean surface water runoff (for example from building roof areas) and store it in the lagoon. The second drainage system will collect 'dirty' runoff (for example from the FGT area) and store it in the 'dirty' water tank. This 'dirty' water will then be used in the process as required (for example for ash quenching). The clean water will be stored in the lagoon and used to top up the 'dirty' water tank. If the lagoon has reached the maximum acceptable capacity it will be discharged at a controlled rate into the Swale. Therefore, no hydrological changes to terrestrial areas of The Swale Ramsar will occur as a result of the proposed development (ref HRAR para 5.60-63).
j.	In the absence of mitigation, likely significant effects on The Swale Ramsar due to changes in water quality cannot be excluded due to the relatively close proximity of the nearest boundary to the proposed site.
k.	Because of the relative complexity of these issues, and their ability to have impacts on waterbirds/breeding marsh harrier within several hundred metres depending on the nature of the activity and the receptors, likely significant effects due to disturbance cannot be excluded at The Swale Ramsar without further assessment and/or application of mitigation as necessary.

I.	The only non-native invasive species currently known to be in the area, though not on the proposal site, is Japanese Knotweed. No importation of material is required to build WKN and no final planting is proposed that could inadvertently import non-native invasive to site, as such no likely significant effect is predicted (ref HRAR para 5.67 – 5.68).

Matrix 3 – Screening of Likely Significant Effects: Medway Estuary and Marshes SPA

Name of European Site	**Medway Estuary and Marshes SPA**
EU Code	UK9012031

Distance to Proposal site	2.1 km																													
European site features	Direct loss or damage of habitats used by interest species			Change in Habitat Management Regime			Loss of future space to allow for managed realignment			Urbanisation			Air quality - dust			Air quality – emissions			Hydrological Changes			Water quality			Disturbance			Introduction or spread of non-native invasive species		
	C	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*
Regularly supporting more than 1% of the GB breeding population of an Annex 1 species in summer – **Avocet**	× a	× a	× a	× b	× b	× b	× c	× c	× c	× d	× d	× d	× e	× e	× e	× f	× g	× f	× h	× h	× h	× i	× i	× i	× j	× j	× j	× k	× k	× k
Regularly supporting more than 1% of the GB breeding population of an	× a	× a	× a	× b	× b	× b	× c	× c	× c	× d	× d	× d	× e	× e	× e	× f	× g	× f	× h	× h	× h	× i	× i	× i	× j	× j	× j	× k	× k	× k

Annex 1 species in summer – **Little tern**																														
Annex 1 Species Regularly Wintering in Numbers of European Importance - **Avocet**	× a	× a	× a	× b	× b	× b	× c	× c	× c	× d	× d	× d	× e	× e	× e	× f	× g	× f	× h	× h	× h	× i	× i	× i	× j	× j	× j	× k	× k	× k
Annex 1 Species Regularly on Passage in Numbers of European Importance – **Grey Plover**	× a	× a	× a	× b	× b	× b	× c	× c	× c	× d	× d	× d	× e	× e	× e	× f	× g	× f	× h	× h	× h	× i	× i	× i	× j	× j	× j	× k	× k	× k
Annex 1 Species Regularly on Passage in Numbers of European Importance – **Common**	× a	× a	× a	× b	× b	× b	× c	× c	× c	× d	× d	× d	× e	× e	× e	× f	× g	× f	× h	× h	× h	× i	× i	× i	× j	× j	× j	× k	× k	× k

Redshank																													
Migratory Species Regularly Wintering in Numbers of European Importance - **Dark-bellied Brent Goose**	× a	× a	× a	× b	× b	× b	× c	× c	× c	× d	× d	× d	× e	× e	× e	× f	× g	× f	× h	× h	× h	× i	× i	× i	× j	× j	× j	× k	× k	× k
Migratory Species Regularly Wintering in Numbers of European Importance - **Shelduck**	× a	× a	× a	× b	× b	× b	× c	× c	× c	× d	× d	× d	× e	× e	× e	× f	× g	× f	× h	× h	× h	× i	× i	× i	× j	× j	× j	× k	× k	× k
Migratory Species Regularly Wintering in Numbers of European Importance - **Pintail**	× a	× a	× a	× b	× b	× b	× c	× c	× c	× d	× d	× d	× e	× e	× e	× f	× g	× f	× h	× h	× h	× i	× i	× i	× j	× j	× j	× k	× k	× k
Migratory Species Regularly Wintering in Numbers	× a	× a	× a	× b	× b	× b	× c	× c	× c	× d	× d	× d	× e	× e	× e	× f	× g	× f	× h	× h	× h	× i	× i	× i	× j	× j	× j	× k	× k	× k

of European Importance - **Ringed plover**																													
Migratory Species Regularly Wintering in Numbers of European Importance - **Knot**	× a	× a	× a	× b	× b	× b	× c	× c	× c	× d	× d	× d	× e	× e	× e	× f	× g	× f	× h	× h	× h	× i	× i	× i	× j	× j	× j	× k	× k	× k
Migratory Species Regularly Wintering in Numbers of European Importance - **Dunlin**	× a	× a	× a	× b	× b	× b	× c	× c	× c	× d	× d	× d	× e	× e	× e	× f	× g	× f	× h	× h	× h	× i	× i	× i	× j	× j	× j	× k	× k	× k
Regularly supports in winter a diverse assemblage of wintering species	× a	× a	× a	× b	× b	× b	× c	× c	× c	× d	× d	× d	× e	× e	× e	× f	× g	× f	× h	× h	× h	× i	× i	× i	× j	× j	× j	× k	× k	× k

Regularly supports over 20,000 waterfowl	× a	× a	× a	× b	× b	× b	× c	× c	× c	× d	× d	× d	× e	× e	× e	× f	× g	× f	× h	× h	× h	× i	× i	× i	× j	× j	× j	× k	× k	× k
Diverse assemblage of breeding migratory waterfowl	× a	× a	× a	× b	× b	× b	× c	× c	× c	× d	× d	× d	× e	× e	× e	× f	× g	× f	× h	× h	× h	× i	× i	× i	× j	× j	× j	× k	× k	× k

Evidence supporting conclusions

a.	No likely significant effect from direct loss of habitat on any interest feature. None of the surveys undertaken on site have identified the site as being used by interest feature species. Therefore, it does not support habitat suitable for any citation species (ref HRAR para 5.16 – 5.23).
b.	Given the distance from the SPA, the DCO application will result in no change to current management regimes of any supporting habitat of the SPA during either the construction of WKN or the operation/demolition of either WKN or K3 (ref HRAR para 5.24 – 5.27)).
c.	The site is already developed land and >2 km from the Medway Estuary & Marshes SPA. No loss of land for managed realignment is therefore expected (ref HRAR para 5.28 – 5.30).
d.	The Proposal Site is 2.1 km from the Medway Estuary and Marshes SPA and set against a backdrop of existing industrial buildings. No likely significant effect on any interest feature from increased urbanisation is therefore predicted (ref HRAR para 5.31 – 5.35).
e.	Based on studies elsewhere, it is anticipated that the majority of dust generated would be deposited in the area immediately surrounding the source (up to 50 metres away) and that no change in level of exposure is expected beyond 300 metres from the site. The boundary of the SPA site is over 2 km to the north of the proposal site and therefore outside the area potentially affected by any dust. Therefore, no likely significant effect is predicted on any interest feature.

f.	All emissions arising from construction traffic are either below the necessary EQS, the Process Contribution is <1% of the EQS or the habitats are not considered sensitive to changes in air quality. Therefore, no likely significant effect is predicted from traffic emissions during construction (ref HRAR para 5.43-5.50).
g.	No likely significant effects from operational emissions are predicted on any interest feature or supporting habitat as all process contributions are <1% and/or the predicted environmental concentration is less than the Environmental Quality Standard (ref HRAR para 5.51 – 5.56).
h.	The first drainage system will collect clean surface water runoff (for example from building roof areas) and store it in the lagoon. The second drainage system will collect 'dirty' runoff (for example from the FGT area) and store it in the 'dirty' water tank. This 'dirty' water will then be used in the process as required (for example for ash quenching). The clean water will be stored in the lagoon and used to top up the 'dirty' water tank. If the lagoon has reached the maximum acceptable capacity it will be discharged at a controlled rate into the Swale. Therefore, no hydrological changes to terrestrial areas of the Medway Estuary & Marshes SPA or area which supports a SPA species will occur as a result of the proposed development (ref HRAR para 5.60- 5.63).
i.	Given the distance between the proposal site and the SPA, no changes to water quality are anticipated (ref HRAR para 5.59).
j.	Given the distance between the proposal site and the SPA, no likely significant effect on any interest feature is predicted from disturbance (ref HRAR para 5.65).
k.	The only non-native invasive species currently known to be in the area, though not on the Proposal site, is Japanese Knotweed. No importation of material is required to build WKN and no final planting is proposed that could inadvertently import non-native invasive to site, as such no likely significant effect is predicted (ref HRAR para 5.66 – 5.67).

Matrix 4 – Screening of Likely Significant Effects: Medway Estuary and Marshes Ramsar

Name of European Site	**Medway Estuary and Marshes Ramsar**									
EU Code	N/A									
Distance to Proposal site	2.1 km									
European site features	Direct loss or damage of habitats used by interest species	Change in Habitat Management Regime	Loss of future space to allow for managed realignment	Urbanisation	Air quality - dust	Air quality – emissions	Hydrological Changes	Water quality	Disturbance	Introduction or spread of non-native invasive species

	C	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*
Ramsar Criterion 2 - **Nationally rare and scarce plant species**	× a	× a	× a	× b	× b	× b	× c	× c	× c	× d	× d	× d	× e	× e	× e	× f	× g	× f	× h	× h	× h	× i	× i	× i	× j	× j	× j	× k	× k	× k
Ramsar Criterion 2 - **Red Data Book invertebrates**	× a	× a	× a	× b	× b	× b	× c	× c	× c	× d	× d	× d	× e	× e	× e	× f	× g	× f	× h	× h	× h	× i	× i	× i	× j	× j	× j	× k	× k	× k
Ramsar Criterion 5 – **Overwintering assemblage of international importance**	× a	× a	× a	× b	× b	× b	× c	× c	× c	× d	× d	× d	× e	× e	× e	× f	× g	× f	× h	× h	× h	× i	× i	× i	× j	× j	× j	× k	× k	× k
Ramsar Criterion 6 - Regularly on Passage in Numbers of International Importance – **Grey Plover**	× a	× a	× a	× b	× b	× b	× c	× c	× c	× d	× d	× d	× e	× e	× e	× f	× g	× f	× h	× h	× h	× i	× i	× i	× j	× j	× j	× k	× k	× k

Ramsar Criterion 6 - Species Regularly on Passage in Numbers of International Importance – **Common Redshank**	× a	× a	× a	× b	× b	× b	× c	× c	× c	× d	× d	× d	× e	× e	× e	× f	× g	× f	× h	× h	× h	× i	× i	× i	× j	× j	× j	× k	× k	× k
Ramsar Criterion 6 - Regularly Wintering in Numbers of International Importance - **Dark-bellied Brent Goose**	× a	× a	× a	× b	× b	× b	× c	× c	× c	× d	× d	× d	× e	× e	× e	× f	× g	× f	× h	× h	× h	× i	× i	× i	× j	× j	× j	× k	× k	× k
Ramsar Criterion 6 - Regularly Wintering in Numbers of International Importance - **Shelduck**	× a	× a	× a	× b	× b	× b	× c	× c	× c	× d	× d	× d	× e	× e	× e	× f	× g	× f	× h	× h	× h	× i	× i	× i	× j	× j	× j	× k	× k	× k

Ramsar Criterion 6 - Regularly Wintering in Numbers of International Importance – **Pintail**	× a	× a	× a	× b	× b	× b	× c	× c	× c	× d	× d	× d	× e	× e	× e	× f	× g	× f	× h	× h	× h	× i	× i	× i	× j	× j	× j	× k	× k	× k
Ramsar Criterion 6 - Regularly Wintering in Numbers of International Importance - **Ringed plover**	× a	× a	× a	× b	× b	× b	× c	× c	× c	× d	× d	× d	× e	× e	× e	× f	× g	× f	× h	× h	× h	× i	× i	× i	× j	× j	× j	× k	× k	× k
Ramsar Criterion 6 - Regularly Wintering in Numbers of International Importance - **Knot**	× a	× a	× a	× b	× b	× b	× c	× c	× c	× d	× d	× d	× e	× e	× e	× f	× g	× f	× h	× h	× h	× i	× i	× i	× j	× j	× j	× k	× k	× k
Ramsar Criterion 6 - Regularly Wintering in Numbers of International Importance - **Dunlin**	× a	× a	× a	× b	× b	× b	× c	× c	× c	× d	× d	× d	× e	× e	× e	× f	× g	× f	× h	× h	× h	× i	× i	× i	× j	× j	× j	× k	× k	× k

Evidence supporting conclusions

a.	No likely significant effect from direct loss of habitat on any interest feature. None of the surveys undertaken on site have identified the site as being used by interest feature species. Therefore, it does not support habitat suitable for any citation species (ref HRAR para 5.16 – 5.23).
b.	Given the distance from the Ramsar, the DCO application will result in no change to current management regimes of any supporting habitat of the SPA during either the construction of WKN or the operation/demolition of either WKN or K3 (ref HRAR para 5.24 – 5.27).
c.	The site is already developed land and >2 km from the Medway Estuary & Marshes Ramsar. No loss of land for managed realignment is therefore expected (ref HRAR para 5.28 – 5.30).
d.	The Proposal Site is 2.1 km from the Medway Estuary and Marshes Ramsar and set against a backdrop of existing industrial buildings. No likely significant effect on any interest feature from increased urbanisation is therefore predicted (ref HRAR para 5.31 – 5.35).
e.	Based on studies elsewhere, it is anticipated that the majority of dust generated would be deposited in the area immediately surrounding the source (up to 50 metres away) and that no change in level of exposure is expected beyond 300 metres from the site. The boundary of the Ramsar site is over 2 km to the north of the proposal site and therefore outside the area potentially affected by any dust. Therefore, no likely significant effect is predicted on any interest feature.
f.	All emissions arising from construction traffic are either below the necessary EQS, the Process Contribution is <1% of the EQS or the habitats are not considered sensitive to changes in air quality. Therefore, no likely significant effect is predicted from traffic emissions during construction (ref HRAR para 5.43-5.50).
g.	No likely significant effects from operational emissions are predicted on any interest feature or supporting habitat as all process contributions are <1% and/or the predicted environmental concentration is less than the Environmental Quality Standard (ref HRAR para 5.51 – 5.56).
h.	The first drainage system will collect clean surface water runoff (for example from building roof areas) and store it in the lagoon. The second drainage system will collect 'dirty' runoff (for example from the FGT area) and store it in the 'dirty' water tank. This 'dirty' water will then be used in the process as required (for example for ash quenching). The clean water will be stored in the lagoon and used to top up the 'dirty' water tank. If the lagoon has reached the maximum acceptable capacity it will be discharged at a controlled rate into the Swale. Therefore, no hydrological changes to terrestrial areas of the Medway Estuary & Marshes Ramsar or area which supports a Ramsar species will occur as a result of the proposed development (ref HRAR para 5.60- 5.63).
i.	Given the distance between the proposal site and the Ramsar, no changes to water quality are anticipated (ref HRAR para 5.59).
j.	Given the distance between the proposal site and the Ramsar, no likely significant effect on any interest feature is predicted from disturbance (ref HRAR para 5.65).
k.	The only non-native invasive species currently known to be in the area, though not on the Proposal site, is Japanese Knotweed. No importation of material is required to build WKN and no final planting is proposed that could inadvertently import non-native invasive to site, as such no likely significant effect is predicted (ref HRAR para 5.66 – 5.67).

Matrix 5 – Screening of Likely Significant Effects: Thames Estuary and Marshes SPA

Name of European Site	**Thames Estuary and Marshes SPA**																													
EU Code	UK9012021																													
Distance to Proposal site	8.7 km																													
European site features	Direct loss or damage of habitats used by interest species			Change in Habitat Management Regime			Loss of future space to allow for managed realignment			Urbanisation			Air quality – dust			Air quality - emissions			Hydrological Changes			Water quality			Disturbance			Introduction or spread of non-native invasive species		
	C	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*
Annex 1 Species Regularly Wintering in Numbers of European Importance – **Avocet**	× a	× a	× a	× b	× b	× b	× c	× c	× c	× d	× d	× d	× e	× e	× e	× f	× g	× f	× h	× h	× h	× i	× i	× i	× j	× j	× j	× k	× k	× k
Annex 1 Species Regularly Wintering in Numbers of European Importance – **Hen harrier**	× a	× a	× a	× b	× b	× b	× c	× c	× c	× d	× d	× d	× e	× e	× e	× f	× g	× f	× h	× h	× h	× i	× i	× i	× j	× j	× j	× k	× k	× k

Migratory species regularly occurring on passage – **Ringed plover**	× a	× a	× a	× b	× b	× b	× c	× c	× c	× d	× d	× d	× e	× e	× e	× f	× g	× f	× h	× h	× h	× i	× i	× i	× j	× j	× j	× k	× k	× k
Migratory Species Regularly Wintering in Numbers of European Importance - **Dunlin**	× a	× a	× a	× b	× b	× b	× c	× c	× c	× d	× d	× d	× e	× e	× e	× f	× g	× f	× h	× h	× h	× i	× i	× i	× j	× j	× j	× k	× k	× k
Migratory Species Regularly Wintering in Numbers of European Importance - **Knot**	× a	× a	× a	× b	× b	× b	× c	× c	× c	× d	× d	× d	× e	× e	× e	× f	× g	× f	× h	× h	× h	× i	× i	× i	× j	× j	× j	× k	× k	× k
Migratory Species Regularly Wintering in Numbers of European Importance – **Black-tailed godwit**	× a	× a	× a	× b	× b	× b	× c	× c	× c	× d	× d	× d	× e	× e	× e	× f	× g	× f	× h	× h	× h	× i	× i	× i	× j	× j	× j	× k	× k	× k
Migratory Species Regularly Wintering	× a	× a	× a	× b	× b	× b	× c	× c	× c	× d	× d	× d	× e	× e	× e	× f	× g	× f	× h	× h	× h	× i	× i	× i	× j	× j	× j	× k	× k	× k

in Numbers of European Importance - **Redshank**																													
Migratory Species Regularly Wintering in Numbers of European Importance - **Grey plover**	× a	× a	× a	× b	× b	× b	× c	× c	× c	× d	× d	× d	× e	× e	× e	× f	× g	× f	× h	× h	× h	× i	× i	× i	× j	× j	× j	× k	× k	× k
Assemblage regularly supporting over 20,000 waterfowl	× a	× a	× a	× b	× b	× b	× c	× c	× c	× d	× d	× d	× e	× e	× e	× f	× g	× f	× h	× h	× h	× i	× i	× i	× j	× j	× j	× k	× k	× k

Evidence supporting conclusions

a.	No likely significant effect from direct loss of habitat on any interest feature. None of the surveys undertaken on site have identified the site as being used by interest feature species. Therefore, it does not support habitat suitable for any citation species (ref HRAR para ref HRAR para 5.16 – 5.23).
b.	Given the distance from the SPA, the DCO application will result in no change to current management regimes of any supporting habitat of the SPA during either the construction or operation of the plant (ref HRAR para 5.24 – 5.27).
c.	The site is already surrounded by developed land and 8.7 km from the Thames Estuary & Marshes SPA. No loss of land for managed realignment is therefore expected (ref HRAR para 5.28 – 5.30).
d.	The proposal site is 8.7 km from the Thames Estuary and Marshes SPA and set against a backdrop of existing industrial buildings. No likely significant effect on any interest feature from increased urbanisation is therefore predicted (ref HRAR para 5.31 – 5.35).

e.	Based on studies elsewhere, it is anticipated that the majority of dust generated during construction would be deposited in the area immediately surrounding the source (up to 50 metres away) and that no change in level of exposure is expected beyond 300 metres from the site. The boundary of the SPA site is 8.7 km to the north east of the proposal site and therefore outside the area potentially affected by any dust. Therefore, no likely significant effect is predicted on any interest feature.
f.	Given the distance to the designated site (8.7 km), no effect from construction traffic emissions are predicted (ref HRAR para 5.53).
g.	No likely significant effects from operational emissions are predicted on any interest feature or supporting habitat as all process contributions are <1% and/or the predicted environmental concentration is less than the Environmental Quality Standard (ref HRAR para 5.51 – 5.56).
h.	The first drainage system will collect clean surface water runoff (for example from building roof areas) and store it in the lagoon. The second drainage system will collect 'dirty' runoff (for example from the FGT area) and store it in the 'dirty' water tank. This 'dirty' water will then be used in the process as required (for example for ash quenching). The clean water will be stored in the lagoon and used to top up the 'dirty' water tank. If the lagoon has reached the maximum acceptable capacity it will be discharged at a controlled rate into the Swale. Therefore, no hydrological changes to terrestrial areas of the SPA or area which supports a SPA species will occur as a result of the proposed development (ref HRAR para 5.60- 5.63).
i.	Given the distance between the proposal site and the SPA, no changes to water quality are anticipated (ref HRAR para 5.59).
j.	Given the distance between the proposal site and the SPA, no likely significant effect on any interest feature is predicted from disturbance (ref HRAR para 5.65).
k.	The only non-native invasive species currently known to be in the area, though not on the Proposal site, is Japanese Knotweed. No importation of material is required to build WKN and no final planting is proposed that could inadvertently import non-native invasive to site, as such no likely significant effect is predicted (ref HRAR para 5.66 – 5.67).

Matrix 6 – Screening of Likely Significant Effects: Thames Estuary and Marshes Ramsar

Name of European Site	**Thames Estuary and Marshes Ramsar**									
EU Code	N/A									
Distance to Proposal site	8.7 km									
European site features	Direct loss or damage of habitats used	Change in Habitat Management Regime	Loss of future space to allow for	Urbanisation	Air quality – dust	Air quality - emissions	Hydrological Changes	Water quality	Disturbance	Introduction or spread of non-native

	by interest species						managed realignment																							
	C	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*
Ramsar Criterion 2 - **Nationally rare and scarce plant species**	× a	× a	× a	× b	× b	× b	× c	× c	× c	× d	× d	× d	× e	× e	× e	× f	× g	× f	× h	× h	× h	× i	× i	× i	× j	× j	× j	× k	× k	× k
Ramsar Criterion 2 - **Red Data Book invertebrates**	× a	× a	× a	× b	× b	× b	× c	× c	× c	× d	× d	× d	× e	× e	× e	× f	× g	× f	× h	× h	× h	× i	× i	× i	× j	× j	× j	× k	× k	× k
Ramsar Criterion 5 – **Overwintering assemblage of international importance**	× a	× a	× a	× b	× b	× b	× c	× c	× c	× d	× d	× d	× e	× e	× e	× f	× g	× f	× h	× h	× h	× i	× i	× i	× j	× j	× j	× k	× k	× k
Ramsar Criterion 6 - Species Regularly occurring on passage in Numbers of International Importance - **Ringed plover**	× a	× a	× a	× b	× b	× b	× c	× c	× c	× d	× d	× d	× e	× e	× e	× f	× g	× f	× h	× h	× h	× i	× i	× i	× j	× j	× j	× k	× k	× k

Ramsar Criterion 6 - Species Regularly Wintering in Numbers of International Importance - **Knot**	× a	× a	× a	× b	× b	× b	× c	× c	× c	× d	× d	× d	× e	× e	× e	× f	× g	× f	× h	× h	× h	× i	× i	× i	× j	× j	× j	× k	× k	× k
Ramsar Criterion 6 - Species Regularly Wintering in Numbers of International Importance - **Dunlin**	× a	× a	× a	× b	× b	× b	× c	× c	× c	× d	× d	× d	× e	× e	× e	× f	× g	× f	× h	× h	× h	× i	× i	× i	× j	× j	× j	× k	× k	× k
Ramsar Criterion 6 - Species Regularly Wintering in Numbers of International Importance - **Ringed plover**	× a	× a	× a	× b	× b	× b	× c	× c	× c	× d	× d	× d	× e	× e	× e	× f	× g	× f	× h	× h	× h	× i	× i	× i	× j	× j	× j	× k	× k	× k
Ramsar Criterion 6 - Species Regularly Wintering in Numbers of International	× a	× a	× a	× b	× b	× b	× c	× c	× c	× d	× d	× d	× e	× e	× e	× f	× g	× f	× h	× h	× h	× i	× i	× i	× j	× j	× j	× k	× k	× k

Importance - **Dark-bellied brent goose**																														
Ramsar Criterion 6 - Species Regularly Wintering in Numbers of International Importance - **Shelduck**	× a	× a	× a	× b	× b	× b	× c	× c	× c	× d	× d	× d	× e	× e	× e	× f	× g	× f	× h	× h	× h	× i	× i	× i	× j	× j	× j	× k	× k	× k
Ramsar Criterion 6 - Species Regularly occurring on passage in Numbers of International Importance – **Grey plover**	× a	× a	× a	× b	× b	× b	× c	× c	× c	× d	× d	× d	× e	× e	× e	× f	× g	× f	× h	× h	× h	× i	× i	× i	× j	× j	× j	× k	× k	× k
Ramsar Criterion 6 - Species Regularly occurring on passage in Numbers of International Importance – **Redshank**	× a	× a	× a	× b	× b	× b	× c	× c	× c	× d	× d	× d	× e	× e	× e	× f	× g	× f	× h	× h	× h	× i	× i	× i	× j	× j	× j	× k	× k	× k

Evidence supporting conclusions

a.	No likely significant effect from direct loss of habitat on any interest feature. None of the surveys undertaken on site have identified the site as being used by interest feature species. Therefore, it does not support habitat suitable for any citation species (ref HRAR para ref HRAR para 5.16 – 5.23).
b.	Given the distance from the Ramsar, the DCO application will result in no change to current management regimes of any supporting habitat of the SPA during construction of WKN, or the operation/demolition of K3 or WKN (ref HRAR para 5.24 – 5.27).
c.	The site is already surrounded by developed land and 8.7 km from the Thames Estuary & Marshes Ramsar. No loss of land for managed realignment is therefore expected (ref HRAR para 5.28 – 5.30).
d.	The proposal site is 8.7 km from the Thames Estuary and Marshes Ramar and set against a backdrop of existing industrial buildings. No likely significant effect on any interest feature from increased urbanisation is therefore predicted (ref HRAR para 5.31 – 5.35).
e.	Based on studies elsewhere, it is anticipated that the majority of dust generated during construction would be deposited in the area immediately surrounding the source (up to 50 metres away) and that no change in level of exposure is expected beyond 300 metres from the site. The boundary of the Ramsar site is 8.7 km to the north east of the proposal site and therefore outside the area potentially affected by any dust. Therefore, no likely significant effect is predicted on any interest feature.
f.	Given the distance to the designated site (8.7 km), no effect from construction traffic emissions are predicted (ref HRAR para 5.53).
g.	No likely significant effects from operational emissions are predicted on any interest feature or supporting habitat as all process contributions are <1% and/or the predicted environmental concentration is less than the Environmental Quality Standard (ref HRAR para 5.51 – 5.56).
h.	The first drainage system will collect clean surface water runoff (for example from building roof areas) and store it in the lagoon. The second drainage system will collect 'dirty' runoff (for example from the FGT area) and store it in the 'dirty' water tank. This 'dirty' water will then be used in the process as required (for example for ash quenching). The clean water will be stored in the lagoon and used to top up the 'dirty' water tank. If the lagoon has reached the maximum acceptable capacity it will be discharged at a controlled rate into the Swale. Therefore, no hydrological changes to terrestrial areas of the Ramsar or area which supports a Ramsar species will occur as a result of the proposed development (ref HRAR para 5.60- 5.63).
i.	Given the distance between the proposal site and the Ramsar, no changes to water quality are anticipated (ref HRAR para 5.59).
j.	Given the distance between the proposal site and the Ramsar, no likely significant effect on any interest feature is predicted from disturbance (ref HRAR para 5.65).
k.	The only non-native invasive species currently known to be in the area, though not on the Proposal site, is Japanese Knotweed. No importation of material is required to build WKN and no final planting is proposed that could inadvertently import non-native invasive to site, as such no likely significant effect is predicted (ref HRAR para 5.66 – 5.67).

Matrix 7 – Screening of Likely Significant Effects: Outer Thames Estuary SPA

Name of European Site	**Outer Thames Estuary SPA**																													
EU Code	**UK9020309**																													
Distance to Proposal site	>9 km																													
European site features	Direct loss or damage of habitats used by interest species			Change in Habitat Management Regime			Loss of future space to allow for managed realignment			Urbanisation			Air quality - dust			Air quality - emissions			Hydrological Changes			Water quality			Disturbance			Introduction or spread of non-native invasive species		
	C	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*
Red throated diver	× a	× a	× a	× b	× b	× b	× c	× c	× c	× d	× d	× d	× e	× e	× e	× f	× g	× f	× h	× h	× h	× i	× i	× i	× j	× j	× j	× k	× k	× k
Common tern	× a	× a	× a	× b	× b	× b	× c	× c	× c	× d	× d	× d	× e	× e	× e	× f	× g	× f	× h	× h	× h	× i	× i	× i	× j	× j	× j	× k	× k	× k
Little tern	× a	× a	× a	× b	× b	× b	× c	× c	× c	× d	× d	× d	× e	× e	× e	× f	× g	× f	× h	× h	× h	× i	× i	× i	× j	× j	× j	× k	× k	× k

Evidence supporting conclusions

a.	No likely significant effect from direct loss of habitat on any interest feature. None of the surveys undertaken on site have identified the site as being used by interest feature species. Therefore, it does not support habitat suitable for any citation species (ref HRAR para ref HRAR para 5.16 – 5.23).
b.	Given the distance from the SPA, the DCO application will result in no change to current management regimes of any supporting habitat of the SPA during either the construction or operation of the plant (ref HRAR para 5.24 – 5.27).
c.	The site is already surrounded by developed land and 9 km from the Thames Estuary & Marshes SPA. No loss of land for managed realignment is therefore expected (ref HRAR para 5.28 – 5.30).
d.	The proposal site is 9 km from the Thames Estuary and Marshes SPA and set against a backdrop of existing industrial buildings. No likely significant effect on any interest feature from increased urbanisation is therefore predicted (ref HRAR para 5.31 – 5.35).
e.	Based on studies elsewhere, it is anticipated that the majority of dust generated during construction would be deposited in the area immediately surrounding the source (up to 50 metres away) and that no change in level of exposure is expected beyond 300 metres from the site. The boundary of the SPA site is 9 km to the north east of the proposal site and therefore outside the area potentially affected by any dust. Therefore, no likely significant effect is predicted on any interest feature.
f.	Given the distance to the designated site (9 km), no effect from construction traffic emissions are predicted (ref HRAR para 5.53).
g.	No likely significant effects from operational emissions are predicted on any interest feature or supporting habitat as all process contributions are <1% and/or the predicted environmental concentration is less than the Environmental Quality Standard (ref HRAR para 5.51 – 5.56).
h.	The first drainage system will collect clean surface water runoff (for example from building roof areas) and store it in the lagoon. The second drainage system will collect 'dirty' runoff (for example from the FGT area) and store it in the 'dirty' water tank. This 'dirty' water will then be used in the process as required (for example for ash quenching). The clean water will be stored in the lagoon and used to top up the 'dirty' water tank. If the lagoon has reached the maximum acceptable capacity it will be discharged at a controlled rate into the Swale. Therefore, no hydrological changes to terrestrial areas of the SPA or area which supports a SPA species will occur as a result of the proposed development (ref HRAR para 5.60- 5.63).
i.	Given the distance between the proposal site and the SPA, no changes to water quality are anticipated (ref HRAR para 5.59).
j.	Given the distance between the proposal site and the SPA, no likely significant effect on any interest feature is predicted from disturbance (ref HRAR para 5.65).
k.	The only non-native invasive species currently known to be in the area, though not on the Proposal site, is Japanese Knotweed. No importation of material is required to build WKN and no final planting is proposed that could inadvertently import non-native invasive to site, as such no likely significant effect is predicted (ref HRAR para 5.66 – 5.67).

Matrix 8 – Screening of Likely Significant Effects: Queendown Warren SAC

Name of European Site	**Queendown Warren SAC**																													
EU Code	UK0012833																													
Distance to Proposal site	>9 km																													
European site features	Direct loss or damage of habitats used by interest species			Change in Habitat Management Regime			Loss of future space to allow for managed realignment			Urbanisation			Air quality – dust			Air quality - emissions			Hydrological Changes			Water quality			Disturbance			Introduction or spread of non-native invasive species		
	C	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*
6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites)	× a	× a	× a	× b	× b	× b	× c	× c	× c	× d	× d	× d	× e	× e	× e	× f	× g	× f	× h	× h	× h	× i	× i	× i	× j	× j	× j	× k	× k	× k

Evidence supporting conclusions

a.	No likely significant effect from direct loss of habitat on any interest feature given the distance to the SAC (ref HRAR para ref HRAR para 5.16 – 5.23).
b.	Given the distance from the SAC, the DCO application will result in no change to current management regimes of any supporting habitat of the SAC during either the construction or operation of the plant (ref HRAR para 5.24 – 5.27).
c.	The site is already surrounded by developed land and 9 km from SAC. No loss of land for managed realignment is therefore expected (ref HRAR para 5.28 – 5.30).
d.	The proposal site is 9 km from the SAC and set against a backdrop of existing industrial buildings. No likely significant effect on any interest feature from increased urbanisation is therefore predicted (ref HRAR para 5.31 – 5.35).
e.	Based on studies elsewhere, it is anticipated that the majority of dust generated during construction would be deposited in the area immediately surrounding the source (up to 50 metres away) and that no change in level of exposure is expected beyond 300 metres from the site. The boundary of the SAC site is 9 km to the north east of the proposal site and therefore outside the area potentially affected by any dust. Therefore, no likely significant effect is predicted on any interest feature.
f.	Given the distance to the designated site (9 km), no effect from construction traffic emissions are predicted (ref HRAR para 5.53).
g.	No likely significant effects from operational emissions are predicted on any interest feature or supporting habitat as all process contributions are <1% and/or the predicted environmental concentration is less than the Environmental Quality Standard (ref HRAR para 5.51 – 5.56).
h.	The first drainage system will collect clean surface water runoff (for example from building roof areas) and store it in the lagoon. The second drainage system will collect 'dirty' runoff (for example from the FGT area) and store it in the 'dirty' water tank. This 'dirty' water will then be used in the process as required (for example for ash quenching). The clean water will be stored in the lagoon and used to top up the 'dirty' water tank. If the lagoon has reached the maximum acceptable capacity it will be discharged at a controlled rate into the Swale. Therefore, no hydrological changes to terrestrial areas of the SPA or area which supports a SPA species will occur as a result of the proposed development (ref HRAR para 5.60- 5.63).
i.	Given the distance between the proposal site and the SPA, no changes to water quality are anticipated (ref HRAR para 5.59).
j.	Given the distance between the proposal site and the SPA, no likely significant effect on any interest feature is predicted from disturbance (ref HRAR para 5.65).
k.	The only non-native invasive species currently known to be in the area, though not on the Proposal site, is Japanese Knotweed. No importation of material is required to build WKN and no final planting is proposed that could inadvertently import non-native invasive to site, as such no likely significant effect is predicted (ref HRAR para 5.66 – 5.67).

Appendix 2:

WKN – Habitats Regulations Assessment Integrity Matrices

Matrix 9 – Integrity matrices: The Swale SPA

Name of European Site	The Swale SPA																				
EU Code	UK9012011																				
Distance to Proposal site	160 m																				
	Air Quality - dust			Water quality			Disturbance – Activity			Disturbance – Recreation			Disturbance – Noise			Disturbance - Lighting			In-combination effects		
European site features	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*
Migratory Wintering species regularly occurring in internationally-important numbers over winter – **Dark bellied brent geese**	× a	× a	× a	× b	× b	× b	× c	× c	× c	× d	× d	× d	× e	× f	× e	× g	× g	× g	× h	× h	× h
Migratory Wintering species regularly occurring in internationally-important numbers over winter – **Dunlin**	× a	× a	× a	× b	× b	× b	× c	× c	× c	× d	× d	× d	× e	× f	× e	× g	× g	× g	× h	× h	× h

Regularly supporting over 20,000 waterfowl over winter	× a	× a	× a	× b	× b	× b	× c	× c	× c	× d	× d	× d	× e	× f	× e	× g	× g	× g	× h	× h	× h
Diverse assemblage of breeding birds	× a	× a	× a	× b	× b	× b	× c	× c	× c	× d	× d	× d	× e	× f	× e	× g	× g	× g	× h	× h	× h

Evidence supporting conclusions

a.	Whilst studies suggest most dust from construction of the proposed project would be deposited in the area immediately surrounding the source (up to 50 m, which is outside the boundary of the Swale SPA), and that no change in level of exposure is expected beyond 300 m from the site, this does mean that some impacts are possible within the Swale SPA boundary, which is located 160 m to the north east of the Proposal site. To ensure compliance with relevant standards and guidelines relating to dust and airborne particulate matter, various techniques not relating to the avoidance or reduction in effect on a European site will be implemented during the construction phase. This will ensure that dust is managed in line with good practice such that a conclusion of no adverse effect on integrity, once mitigation is incorporated, can be reached (ref HRAR – para 6.2-6.4). It is assumed that similar avoidance measures would be included, as necessary, within any demolition plan to ensure no adverse effect on the SPA.
b.	A site-wide surface water pollution prevention system will be developed to prevent the discharge of any contaminated surface water from the site. The overall philosophy for the design of the surface water pollution prevention system for the site is to manage surface water sustainably and to ensure that discharged waters do not constitute a pollution risk. Therefore, a conclusion of no adverse effect on integrity can be reached, once this mitigation is included (ref HRAR – 6.5-6.11). It is assumed that similar avoidance measures would be included, as necessary, within any demolition plan to ensure no adverse effect on the SPA.
c.	It is considered there is a limited potential for disturbance to waterbirds to be caused by activity associated with the Proposal when account is taken of the fact that, given the distance to The Swale from the proposal site and existing, intervening buildings. To ensure no visual disturbance On this basis, a conclusion of no adverse effect on integrity can be reached (ref HRAR – 6.19 - 6.20).
d.	The potential for disturbance to SPA Citation species from recreational activities by either construction or subsequent operational/demolition staff is considered low. Whilst there is access to the Saxon Shore Way from the wider Kemsley Paper Mill, currently very little or no use is made

	of this by Kemsley Mill staff. It is possible that there will be increased recreational usage made of the Saxon Shore Way during both construction/demolition of the site, as Sittingbourne is within potential travel distance over lunch break. However, it should be borne in mind that Milton Creek is outside the SPA and that dogs will not be permitted on site. It is anticipated that few if any construction, operational or demolition staff will access the Swale SPA. On this basis, no adverse effect on integrity is predicted (ref HRAR – 6.12 – 6.15).
e.	An assessment of the potential for each of the interest feature/intertidal assemblage bird species to be susceptible to noise disturbance, based on survey data undertaken across the intertidal area between 2009 and 2018 has been undertaken (ref HRAR - 6.22 – 6.132). This has concluded that, subject to the implementation of suitable avoidance measures (ref HRAR – 6.147-148), no adverse effect on integrity with respect to the interest feature/intertidal assemblage is predicted. It is assumed that similar avoidance measures would be included, as necessary, within any demolition plan to ensure no adverse effect on the SPA.
f.	Under normal operating conditions, the Proposed Development will produce a low hum, rather than any loud, sudden noises that might elicit a disturbance response from nearby interest-feature birds using the intertidal areas of The Swale. It will furthermore not result in noise levels of greater than 55 dBL_{Amax} within the SPA. On this basis, no adverse effect on integrity is predicted (ref HRAR – para 6.21).
g.	Given the distance of the proposed development to the SPA, and that there is further development between the Proposal Site and designated site, light from the proposed development does not have the potential to illuminate either the terrestrial or inter-tidal habitats above that which it is currently. All lighting will be designed as per best practice standards to ensure that no additional light spill above the current situation would occur. On this basis, no adverse effect on integrity is predicted (ref HRAR – 6.16 – 6.18, DCO Requirement 22). It is assumed that similar avoidance measures would be included, as necessary, within any demolition plan to ensure no adverse effect on the SPA.
h.	The in-combination assessment has concluded that there are no adverse effects on the integrity of designated sites, either because there are no ecological pathways via which to do this, or because the in-combination modelling (for noise, air, etc) do not exceed the maximum thresholds. Therefore, no adverse effect on integrity is predicted (ref HRAR Section 7). At this stage, in-combination effects with demolition of WKN/K3 are impossible to predict, given the uncertainty over timing. However, assuming all necessary mitigation/avoidance measures are adopted during demolition, adverse effects on integrity are considered highly unlikely.

Matrix 9 – Integrity matrices: The Swale Ramsar

Name of European Site	The Swale Ramsar
EU Code	N/A
Distance to Proposal site	160 m

	Air Quality - dust			Water quality			Disturbance – Activity			Disturbance – Recreation			Disturbance – Noise			Disturbance - Lighting			In-combination effects		
European site features	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*
Ramsar Criterion 2 - **Nationally rare and scarce plant species**	× a	× a	× a	× b	× b	× b	× c	× c	× c	× d	× d	× d	× e	× f	× e	× g	× g	× g	× h	× h	× h
Ramsar Criterion 2 - **Red Data Book invertebrates**	× a	× a	× a	× b	× b	× b	× c	× c	× c	× d	× d	× d	× e	× f	× e	× g	× g	× g	× h	× h	× h
Ramsar Criterion 5 – **Overwinter assemblage of international importance**	× a	× a	× a	× b	× b	× b	× c	× c	× c	× d	× d	× d	× e	× f	× e	× g	× g	× g	× h	× h	× h
Ramsar Criterion 6 - Regularly Wintering in Numbers of International Importance **Redshank**	× a	× a	× a	× b	× b	× b	× c	× c	× c	× d	× d	× d	× e	× f	× e	× g	× g	× g	× h	× h	× h
Ramsar Criterion 6 - Regularly Wintering in Numbers of International	× a	× a	× a	× b	× b	× b	× c	× c	× c	× d	× d	× d	× e	× f	× e	× g	× g	× g	× h	× h	× h

Importance - **Dark bellied brent geese**																					
Ramsar Criterion 6 - Regularly Wintering in Numbers of International Importance - **Grey Plover**	× a	× a	× a	× b	× b	× b	× c	× c	× c	× d	× d	× d	× e	× f	× e	× g	× g	× g	× h	× h	× h

Evidence supporting conclusions

a.	Whilst studies suggest most dust from construction of the proposed project would be deposited in the area immediately surrounding the source (up to 50 m, which is outside the boundary of the Swale Ramsar), and that no change in level of exposure is expected beyond 300 m from the site, this does mean that some impacts are possible within the Swale Ramsar boundary, which is located 160 m to the north east of the Proposal site. To ensure compliance with relevant standards and guidelines relating to dust and airborne particulate matter, various techniques not relating to the avoidance or reduction in effect on a European site will be implemented during the construction phase. This will ensure that dust is managed in line with good practice such that a conclusion of no adverse effect on integrity, once mitigation is incorporated, can be reached (ref HRAR – para 6.2-6.4). It is assumed that similar avoidance measures would be included, as necessary, within any demolition plan to ensure no adverse effect on the Ramsar.
b.	A site-wide surface water pollution prevention system will be developed to prevent the discharge of any contaminated surface water from the site. The overall philosophy for the design of the surface water pollution prevention system for the site is to manage surface water sustainably and to ensure that discharged waters do not constitute a pollution risk. Therefore, a conclusion of no adverse effect on integrity can be reached, once this mitigation is included (ref HRAR – 6.5-6.11). It is assumed that similar avoidance measures would be included, as necessary, within any demolition plan to ensure no adverse effect on the Ramsar.
c.	It is considered there is a limited potential for disturbance to waterbirds to be caused by activity associated with the Proposal when account is taken of the fact that, given the distance to The Swale from the proposal site and existing, intervening buildings. To ensure no visual disturbance On this basis, a conclusion of no adverse effect on integrity can be reached (ref HRAR – 6.19 - 6.20).
d.	The potential for disturbance to Ramsar Citation species from recreational activities by either construction or subsequent operational/demolition staff is considered low. Whilst there is access to the Saxon Shore Way from the wider Kemsley Paper Mill, currently very little or no use is made of this by Kemsley Mill staff. It is possible that there will be increased recreational usage made of the Saxon Shore Way during both construction/demolition of the site, as Sittingbourne is within potential travel distance over lunch break. However, it should be borne in mind that Milton Creek is outside the Ramsar and that dogs will not be permitted on site. It is anticipated that few if any construction, operational or demolition staff will access the Swale Ramsar. On this basis, no adverse effect on integrity is predicted (ref HRAR – 6.12 – 6.15).
e.	An assessment of the potential for each of the interest feature/intertidal assemblage bird species to be susceptible to noise disturbance, based on survey data undertaken across the intertidal area between 2009 and 2018 has been undertaken (ref HRAR - 6.22 – 6.132). This has concluded that, subject to the implementation of suitable avoidance measures (ref HRAR – 6.147-148), no adverse effect on integrity with respect to the interest feature/intertidal assemblage is predicted. It is assumed that similar avoidance measures would be included, as necessary, within any demolition plan to ensure no adverse effect on the Ramsar.

f.	Under normal operating conditions, the Proposed Development will produce a low hum, rather than any loud, sudden noises that might elicit a disturbance response from nearby interest-feature birds using the intertidal areas of The Swale. It will furthermore not result in noise levels of greater than 55 dBL_{Amax} within the Ramsar. On this basis, no adverse effect on integrity is predicted (ref HRAR – para 6.21).
g.	Given the distance of the proposed development to the Ramsar, and that there is further development between the Proposal Site and designated site, light from the proposed development does not have the potential to illuminate either the terrestrial or inter-tidal habitats above that which it is currently. All lighting will be designed as per best practice standards to ensure that no additional light spill above the current situation would occur. On this basis, no adverse effect on integrity is predicted (ref HRAR – 6.16 – 6.18, DCO Requirement 22). It is assumed that similar avoidance measures would be included, as necessary, within any demolition plan to ensure no adverse effect on the Ramsar.
h.	The in-combination assessment has concluded that there are no adverse effects on the integrity of designated sites, either because there are no ecological pathways via which to do this, or because the in-combination modelling (for noise, air, etc) do not exceed the maximum thresholds. Therefore, no adverse effect on integrity is predicted (ref HRAR Section 7). At this stage, in-combination effects with demolition of WKN/K3 are impossible to predict, given the uncertainty over timing. However, assuming all necessary mitigation/avoidance measures are adopted during demolition, adverse effects on integrity are considered highly unlikely.

11 Ecology

11.1 Introduction

11.1.1 This Chapter assesses the likely significant ecological effects resulting from the K3 Proposed Development and WKN Proposed Development.

11.2 Regulatory and Policy Framework

Relevant Legislation

Wildlife and Countryside Act 1981 (as amended)

11.2.1 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

11.2.2 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.

11.2.3 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.

11.2.4 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

11.2.5 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.

11.2.6 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

11.2.7 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.

11.2.8 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'.

11.2.9 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.

11.2.10 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

11.2.11 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.

11.2.12 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)

11.2.1 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.

11.2.2 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)

11.2.3 The National Planning Policy Framework (NPPF) was first published on 27th March 2012 and subsequently revised in July 2018 to provide a simplified and streamlined single document to replace previous national planning policy [Ref 11.1].

11.2.4 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'.

11.2.5 Chapter 15 of the NPPF 'Conserving and enhancing the natural environment' contains provisions for ensuring that planning can be sustainable from an environmental perspective. Specifically, Chapter 15 states that: '…*the planning system should contribute to and enhance the natural and local environment by*:

- *protecting and enhancing valued landscapes, sites of biodiversity or geological value and soils (in a manner commensurate with their statutory status or identified quality in the development plan)*;
- *recognising the intrinsic character and beauty of the countryside, and the wider benefits from natural capital and ecosystem services – including the economic and other benefits of the best and most versatile agricultural land, and of trees and woodland*;
- *maintaining the character of the undeveloped coast, while improving public access to it where appropriate;*
- *minimising impacts on and providing net gains for biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures;*
- *preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions*

such as air and water quality, taking into account relevant information such as river basin management plans; and

- *Remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate.'*

11.2.6 Paragraph 175 goes on to state that: "*When determining planning applications, local planning authorities should apply the following principles*:

- *if significant harm to biodiversity resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts) adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused;*

- *development on land within or outside a Site of Special Scientific Interest, and which is likely to have an adverse effect on it (either individually or in combination with other developments), should not normally be permitted. The only exception is where the benefits of the development in the location proposed clearly outweigh both its likely impact on the features of the site that make it of special scientific interest, and any broader impacts on the national network of Sites of Special Scientific Interest;*

- *development resulting in the loss or deterioration of irreplaceable habitats (such as ancient woodland and ancient or veteran trees) should be refused, unless there are wholly exceptional reasons58 and a suitable compensation strategy exists; and*

- *development whose primary objective is to conserve or enhance biodiversity should be supported; while opportunities to incorporate biodiversity improvements in and around developments should be encouraged, especially where this can secure measurable net gains for biodiversity.*

11.2.7 Paragraph 176 provides that "*the following should be given the same protection as European sites:*

- *potential Special Protection Areas and possible Special Areas of Conservation;*

- *listed or proposed Ramsar sites; and*

- *sites identified, or required, as compensatory measures for adverse effects on habitats sites, potential Special Protection Areas, possible Special Areas of Conservation, and listed or proposed Ramsar sites.*

11.2.8 Finally, the NPPF states that (paragraph 177) "*The presumption in favour of sustainable development does not apply where development requiring appropriate assessment because of its potential impact on a habitats site is being planned or determined*".

11.2.9 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 11.2]. 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 11.3] which provides case studies and examples to help comply with the legal requirements set out in the circular.

11.2.10 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)

11.2.11 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).

11.2.12 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*

11.2.13 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?*

Kent Environmental Strategy 2016

11.2.14 The Kent Environmental Strategy has adopted an integrated approach where it is informed by, but does not duplicate, priorities and actions from other strategies in key areas of environment, growth, economy and health across partner organisations. The focus of this strategy is to draw together priorities which we need to address in partnership and not in isolation. Underpinning the strategy is the Kent Environment Strategy Implementation Plan, which provides the detailed actions for delivering on our priorities. These actions have been identified through stakeholder engagement, workshops and reviews. The strategy is split into three themes:

- Theme One: Building the foundations for delivery;

- Theme Two: Making best use of existing resources and minimising negative impacts; and

- Theme Three: Toward a sustainable future.

11.2.15 The overall outcomes are for Kent to make all sectors aware of their impact on the environment and how to avoid or reduce this through evidence-based decision making, reducing resource usage and wasting less. Whilst actively addressing the risks, impacts and opportunities from environmental and climate change, whilst delivering wider economic and health opportunities.

Kent Biodiversity Action Plan

11.2.16 The Kent BAP [Ref 11.4] was adopted in 2009 and lists species and habitats that are identified as priorities for action within Kent. The following species and habitats covered in this assessment are listed as priorities in the Kent BAP:

- *Slow worm; and*

- *Common lizard.*

Local Plan- Bearing Fruits 2031: The Swale Borough Local Plan

11.2.17 Swale Borough Council adopted the Swale Borough Local Plan in 2017 [Ref 11.5], 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:

11.2.18 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.*

11.2.19 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*

11.2.20 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*

11.2.21 Policy DM22- The Coast:

- *The protection, enhancement or management as appropriate of biodiversity, landscape, seascape, and coastal processes.*

11.2.22 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

11.2.23 The Swale Biodiversity Action Plan (BAP) [Ref 11.6] identifies habitats and species of conservation importance with the aim of enabling the conservation and enhancement of biodiversity within the Swale Borough contributing 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.

11.3 Methodology

Scoping and Consultation

11.3.1 The formal scoping exercise is summarised in Chapter 3.

11.3.2 All the issues raised within the consultee responses to the ES Scoping Opinion and S42 Consultation are addressed within this Chapter.

11.3.3 In addition to the formal consultation, the WKN Proposed Development was discussed with Natural England via their Discretionary Advice Service with a site meeting on the 4th September 2018. Natural England subsequently provided written advice (dated 8th October 2018 – Appendix 11.6), the contents of which have also been used to inform the scope of the assessment in this Chapter.

Establishing Baseline Conditions

11.3.4 A considerable body of survey data in relation to ecology has been gathered with respect to the K3 Site and surrounding area. Methods for such survey work are described in detail in Appendix 11.1 and 11.3 and briefly below, as required.

Data Search

11.3.5 A desk-based study was conducted in 2018 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.

11.3.6 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 10 km of the DCO boundary A plan showing the location of existing statutory designations relative to the DCO boundary is provided as Figure 11.1.

11.3.7 All information received on species in the search area was reviewed and is summarised in this report. All records of protected species within 2 km of the DCO boundary are shown on Figure 11.2.

Phase 1 Habitat Survey

11.3.8 A habitat survey of the K3 Site and WKN Site was conducted in accordance with The Handbook for Phase 1 Habitat Survey [Ref 11.7] in 2009, and included searches for signs of protected species, as described in the Guidelines for Preliminary Ecological Assessment [Ref 11.8]. A Phase I Habitat Survey Map is provided as Figure 11.3.

11.3.9 The intertidal area of The Swale where the surface water outfall is to be located (Works Areas 1E and 7) was surveyed in 2017 (Appendix 11.7).

11.3.10 A further survey of the K3 Site and WKN Site and surrounding area (including areas comprising Works No. 6-7 not originally surveyed in 2009) was undertaken on 11th October 2018 by an experienced ecologist, Nicholas Betson CEnv MCIEEM. Habitats within the Sites were classified, mapped and described, with respect to their structure and floristic composition.

11.3.11 During each survey, all 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.

11.3.12 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 Sites.

11.3.13 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).

11.3.14 The plant species nomenclature follows that of Stace [Ref 11.9]. Plant species observed within each habitat type were recorded using the DAFOR system which stands for Dominant, Abundant, Frequent, Occasional or Rare.

Reptile Surveys

11.3.15 Reptile surveys have been undertaken across the DCO boundary in suitable habitat in 2009 and 2018. These were carried out in accordance with the recommended methodology outlined in the Herpetofauna Workers' Manual [Ref 11.10] and Froglife's Advice Sheet 10 (1999) [Ref 11.11]. The surveys were undertaken, between April and October (an optimum time for such surveys), by experienced ecologists.

11.3.16 The survey was conducted using artificial refugia made from roofing felt measuring 50 cm x 50 cm. These provide shelter and basking opportunities for reptiles, which can be recorded on or under the refugia during suitable weather conditions, i.e. avoiding periods of strong wind, heavy rain or extreme temperatures; typically, surveys are undertaken when the air temperature is between 9 and 18°C.

The survey results will be used to estimate the population size classes for each of the reptile species recorded and to assess whether or not the site could be classified as a Key Reptile Site, as defined by Froglife (1999) [Ref 11.11].Bird surveys

11.3.17 Full details of the methodologies for bird surveys undertaken (both breeding and intertidal) can be found in Appendix 11.1.

Invertebrate surveys

11.3.18 Full details of the methodologies for the invertebrate surveys can be found in Appendix 11.3..

Water Vole surveys

11.3.19 Water Vole surveys were undertaken of ditches within the DCO boundary in both 2009 and 2018, as necessary. in accordance with the recommendations as detailed in the Water Vole Conservation Handbook.

11.3.20 Water vole surveys require both banks of the ditch to be walked with the surveyor recording any signs of water vole activity. Such signs include:

- visual sightings / sounds of voles entering the water;
- latrines, showing discrete piles of droppings;
- tunnel entrances;
- 'lawns' around tunnel entrances;
- feeding remains of chopped vegetation;
- paths and runs at water's edge or in vegetation; and
- footprints in mud.

Significance Criteria

Receptor Sensitivity – Identification of Ecological Receptors

11.3.21 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.

11.3.22 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 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.

11.3.23 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 11.16];
- National and County Red Data Book species.

11.3.24 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 [Ref 11.17] 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.

11.3.25 The use of a matrix with respect to the impact assessment 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 11.1.

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 11.1: Value of Ecological Receptors

Magnitude of Impact

11.3.26 The significance of important impacts is assessed in the context of the baseline.

11.3.27 Impacts may be described in terms of changes to the structure or function of a 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.

11.3.28 Table 11.2 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 substantial improvement of resource quality: extensive restoration or enhancement: substantial 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; slight loss of, or alteration to, one (maybe more) key characteristics, features or elements. Beneficial – Slight 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 slight loss or detrimental alteration to one or more characteristics, features or elements. Beneficial – Very slight 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 11.2: Magnitude of Impacts

Significance of Effects

11.3.29 A professional 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.).

11.3.30 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 11.3).

Value	Magnitude of impact				
	No Change	Negligible	Low	Medium	High
Negligible	No change	Negligible	Negligible or Slight	Negligible or Slight	Slight
Low	No change	Negligible or Slight	Negligible or Slight	Slight	Slight or Moderate
Medium	No change	Negligible or Slight	Slight	Moderate	Moderate or Substantial
High	No change	Slight	Slight or Moderate	Moderate or Substantial	Substantial or very Substantial
Very high	No change	Slight	Moderate or Substantial	Substantial or Very Substantial	Very substantial

Table 11.3: Assessment Matrix for the Significance of Ecological Effects

11.3.31 An effect that is moderate, Substantial, or Very Substantial, is generally considered significant.

11.3.32 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 (as relevant) based on the most significant effect identified for that feature.

11.3.33 For consistency between disciplines the overall significance of an effect is expressed as Negligible, Slight, Moderate, Substantial or Very Substantial based on the definitions below:

- Very 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 substantial change in a site or feature of local importance may also enter this category.

- 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 particular 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.

- 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

11.3.1 The Ecological Impact Assessment (EclA) in this chapter follows the most recent published guidance from the Chartered Institute of Ecology and Environmental Management [Ref 11.16]. 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

11.3.2 The ecology of the Kemsley Paper Mill site and surrounding area 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.

11.3.3 Impacts on ecology receptors from changes to noise and air quality rely on the models produced for those subjects. As such, the conclusions with respect to ecology also rely on the assumptions that underpin those models as set out in Chapters 5 Air Quality and 7 Noise and Vibration.

11.3.4 Therefore, the assessment is considered to be based on sound ecological data and, as such, suitably robust.

11.4 Baseline Conditions

11.4.1 At the time of scoping, the intention was to apply for an extension to K3 as consented to comprise a power upgrade from 49.9MW to 75MW and an increase in annual permissible waste throughput of 107,000tpa. Whilst this remains the practical effect of the DCO application, in order to accord with the Planning Act 2008 the DCO application seeks permission for the construction and operation of a 75MW generating station with a total annual throughput of 657,000 tpa (i.e. the development as a whole including K3 as already consented by the planning permission dated 6 March 2012 granted by Kent County Council, together with subsequent material and non-material variations thereto). Full details are provided in Chapter 2.

11.4.2 The effects of the construction and operation of K3 as consented was assessed in the EIA submitted in support of its consent, and is avaible in the 2010 Ecology and Nature Conservation Chapter of the Environmental Statement (RPS, 2010) that support the application (see Document 3.2).

11.4.3 The zone of influence of the K3 Proposed Development and WKN Proposed Development is assumed to be 10 km to ensure that all sites of international importance that could be subject to effects are included in the assessment, in line with EA guidance on the consideration of air quality effects on designated sites

[Ref 11.13]. The smaller 2 km radius used for the nationally-designated sites is in line with industry best-practice.

11.4.4 Prior to the construction of K3 as consented, the DCO boundary comprised a variety of habitats, including dense scrub, unimproved neutral grassland, tall ruderal, swamp, scattered scrub, hardstanding and ephemeral/ short perennial.

11.4.5 Currently, however, the K3 Site is advanced in terms of construction and anticipated to become fully operational in accordance with its extant planning permission by the end of 2019 and before the examination of the proposed Development Consent Order for the K3 Proposed Development and WKN Proposed Development.

11.4.6 The WKN Site is currently used as a laydown area for the construction of K3 as consented. Therefore, it was historically expected to be returned to its original state (scrub / grassland / rubble mosaic). The WKN Proposed Development baseline will therefore be the WKN Site, as existed prior to the use of the WKN Site as laydown, as informed by the surveys completed at the time, as described in Appendix 11.3. This is considered a worst-case scenario as it allows the WKN Proposed Development to account for the loss of habitat that occurred during the original site clearance.

Desk Study

Designated Sites

11.4.7 There are eight internationally-designated sites within 10 km of the assessment boundary (Figure 11.1):

- The Swale Special Protection Area (SPA) – 0.16 km east;
- The Swale Ramsar – 0.16 km south east;
- Medway Estuary and Marshes SPA – 2.1 km north;
- Medway Estuary and Marshes Ramsar – 2.1 km north;
- Thames Estuary and Marshes SPA – 8.7 km north west;
- Thames Estuary and Marshes Ramsar – 8.7 km north west;
- Queensdown Warren SAC – 9.3 km south west; and
- Outer Thames Estuary SPA – 8.0 km north-east.

11.4.8 There are four nationally-designated sites and one locally-designated site located within 2 km:

- The Swale Marine Conservation Zone (MCZ) – 0.02 km south;
- The Swale Site of Special Scientific Interest (SSSI) – 0.13 km south east;

- Medway Estuary and Marshes SSSI - 2.1 km north;
- Elmley National Nature Reserve (NNR) – 0.4 km north-east;
- Milton Creek Local Wildlife Site (LWS) – 0.13 km south-east.

11.4.9 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*.

11.4.10 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.

11.4.11 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.

11.4.12 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 interest 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.

11.4.13 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*.

11.4.14 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 recent 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.

11.4.15 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).

11.4.16 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.

11.4.17 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.

11.4.18 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.

Protected species

11.4.19 See Figure 11.2 for the locations of records of protected species.

Amphibians

11.4.20 There are 79 records of protected or notable amphibian species occurring within 2 km of the DCO boundary. Largely, these are associated with Milton Creek LWS.

Birds

11.4.21 There are 207 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

11.4.22 There are 4 records of protected and/or notable flora species occurring within 2 km. 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

11.4.23 There are no records of protected and/or notable invertebrate species occurring within 2 km over the last ten years.

Mammals

11.4.24 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.

11.4.25 There are 1,534 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.

11.4.26 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

11.4.27 There are three records of protected and/or notable reptile species occurring within 2 km over the last ten years. These are associated with Milton Creek LWS and The Swale SPA, Ramsar and SSSI.

Phase 1 Habitat Surveys

11.4.28 The majority of the DCO boundary was surveyed in 2009 to support the ES for the application relating to K3 as consented. Full details can be found in Appendix 11.3 and Figure 11.3, and updated, as necessary in 2018. Briefly, the following habitats were present:

Scrub

11.4.29 Areas of dense scrub containing frequent Bramble *Rubus fruticosus* agg, Hawthorn *Crataegus monogyna* and Dog Rose Rosa canina agg. were present across the Site.

11.4.30 On the western edge of the K3 Site was a small area of dense scrub with occasional Hawthorn, and single specimens of Hazel *Corylus avellana*, Sycamore *Acer pseudoplatanus* and a large Leylandii *Cupressus x leylandii*. A small stand of Poplar *Populus* species was also present to the south of this area.

11.4.31 In the south of the K3 Site was an area which contained a mosaic of dense scrub and unimproved neutral grassland. Abundant species included Hawthorn, Oxeye Daisy *Leucanthemum vulgare*, False Oat-grass *Arrhenatherum elatius*, Cocksfoot *Dactylis glomerata*, Creeping Bent *Agrostis stolonifera* and Common Couch *Elytrigia repens*. Frequent species included Common Bird's-foot-trefoil *Lotus corniculatus* and Creeping Cinquefoil *Potentilla reptans*.

11.4.32 Areas of scattered scrub were present within the northern half of the K3 Site consisting of frequent Bramble, Hawthorn and Silver Birch *Betulus pendula*. The scattered scrub to the north of the Site also had occasional Gorse *Ulex europaeus*.

Grassland

11.4.33 Areas of unimproved neutral grassland were present across the Site. G1 was relatively species-rich. Abundant species included Kidney Vetch *Anthyllis vulneraria*, Common Restharrow *Ononis repens*, False Oat-grass, Cock's-foot, Creeping Bent and Common Couch. Frequent species included Common Bird's-foot-trefoil and Creeping Cinquefoil. Occasional species included the following: Oxeye Daisy and Ribwort Plantain *Plantago lanceolata*.

11.4.34 G2 was relatively short and more species-rich than G1 and G3. Abundant species included Common Bird's-foot-trefoil, Creeping Bent, frequent Cock's-foot and occasional Common Ragwort *Senecio jacobaea*, Grass Vetchling *Lathyrus nissolia*, Wild Carrot *Daucus carota carota*, Dove's-foot Crane's-bill *Geranium molle*, Common Toadflax *Linaria vulgaris* and Yarrow *Achillea millefolium*.

11.4.35 Areas G3 contained abundant False Oat-grass, Cocksfoot, Creeping Bent, Common Couch. Frequent species included Common Bird's-foot-trefoil and Creeping Cinquefoil Occasional species included the following: Oxeye Daisy, and Ribwort Plantain.

Tall herb

11.4.36 Areas of tall ruderal vegetation were present across the Site with a large area present to the east of the Site. These areas contained abundant Greek Dock *Rumex cristatus*, White Mignonette *Reseda alba*, Bristly Oxtongue *Picris echioides,*

Hawkweed Oxtongue *Picris hieracioides* and Hedge Mustard *Sisymbrium officinale*. Frequent species included Yorkshire-fog, Creeping Bent, Oxeye Daisy and Canadian Fleabane *Conyza canadensis*.

Swamp

11.4.37 To the north of the Site was a large expanse (>3 ha) of swamp habitat, dominated by Common Reed with scattered scrub including Elder *Sambucus nigra* and Hawthorn.

11.4.38 The area south of the reedbed was dominated by bare ground that has recently been manually built up to level parts of the Site. This bare ground consists of a soil and stone aggregate.

11.4.39 A drainage ditch which runs approximately north-south on the western edge of the WKN Laydown Area (Works Area 6). This was heavily overgrown with Common Reed, Hawthorn and Bramble and was only wet in small patches.

11.4.40 A further ditch was located to the south of Works Area 5 which was similarly overgrown with Common Reed.

Waste tips

11.4.41 Spoil piles of soil and building material dominated the centre of the Site. These areas contained frequent Long-headed Poppy *Papaver dubium*, Oxford Ragwort *Senico squalidus*, Common Field Speedwell *Veronica persica* and Opium Poppy *Papaver somniferum.*

Cultivated/disturbed land

11.4.42 Areas of ephemeral/ short perennial vegetation were present around the area of spoil heaps. These areas were dominated by bare ground with frequent Hawkweed Oxtongue, Bristly Oxtongue, Perennial Ryegrass *Lolium perenne*, Annual Meadow-grass *Poa annua*, Colt's-foot *Tussilago farfara*, Spear Thistle *Cirsium vulgare*. Long-headed Poppy and Oxford Ragwort. Cornflower *Centaurea cyanus* (Target note 1, Figure 9.5) and Annual Beard-grass Polypogon monspeliensis. (Target note 2, Figure 9.5) were also recorded. The latter two species are a UKBAP and nationally scarce species respectively.

Intertidal areas

11.4.43 Full details of the intertidal habitats around the outfall (Works Areas 7 and 1E) can be found in Appendix 11.7. Briefly, these included saltmarsh, intertidal mudflats and various course sediments.

Further surveys - 2009

11.4.44 Following the Phase 1 Habitat Survey of the DCO boundary in 2009, several Phase 2 surveys were undertaken including: invertebrate surveys, reptile surveys, breeding bird surveys, and a water vole survey. Full details can be found in Appendix 11.3.

11.4.45 These identified the following receptors as present either on site or directly adjacent to it:

- a population of reptiles (Common Lizard, Slow-Worm & Grass Snake);
- the nationally-scarce Annual Beard-grass;
- populations of the Schedule 1 birds Cetti's Warbler, Bearded Tit and Marsh Harrier; and
- Open Mosaic Habitat of importance for invertebrates.

Further surveys - 2018

11.4.46 The following surveys were undertaken to ensure a complete baseline of ecological information was available with respect to areas within the DCO boundary that had no relevant survey data from 2009. Principally, this related to the proposed WKN laydown area (Work No. 6) and construction access road (Work No. 5).

Bird surveys

11.4.47 Following the Phase 1 Habitat Survey, suitable habitat was identified to support species of breeding birds, such as Cetti's Warbler and Bearded Tit; therefore, follow up breeding bird surveys were undertaken in 2018, updating those undertaken in 2009 (both reported in Appendix 11.1).

Reptile Survey

11.4.48 The habitats on site were identified as being suitable to support reptile populations, and so during 2018 a targeted reptile survey was carried out. This identified a low population of both common lizards and slow worms was observed during reptile surveys of the laydown area, with a peak count of five common lizards and six slow worms found on any one survey.

Off-site (Zone of influence) Survey Work

11.4.49 Extensive survey work of the off-site intertidal habitat surrounding the DCO boundary, including that at the closest point to the site 100 m to the south east, has been undertaken over the last 10 years to inform the K3 project (in 2009 and 2016) – Appendix 11.1 and 11.3. These surveys have highlighted that the stretch of The Swale adjacent to the wider Kemsley Paper Mill site is used extensively by intertidal species, including citation species for both the SPA and Ramsar, over winter and at both low and high tide, including Black-tailed Godwit, Curlew, Greenshank, Grey Plover, Red Shank and Teal. Updated surveys have been undertaken in winter of 2018-2019 and are also reported in Appendix 11.1.

11.4.50 A reedbed 50m of the north of the WKN Site has been found to support breeding Marsh Harrier every year that surveys have been undertaken (Appendix 11.1). Marsh Harrier is one of the species listed within the breeding bird assemblage for which The Swale is designed as an SPA. Additionally, both Cetti's Warbler and Bearded Tit, both listed on Schedule 1 of the Wildlife and Countryside Act (1981),

as amended, have been recorded in scrub habitat surrounding the reedbed. Surveys undertaken during 2018 found similar results.

Sensitive Receptors

11.4.51 The sensitive receptors listed in Table 11.4 below have the potential to be affected by effects arising from the DCO 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
The Swale MCZ	High
Milton Creek LWS	Medium
Breeding Schedule 1 birds (non-SPA), inc. Cetti's Warbler	Low
Reptile population	Low
Annual beard-grass	Low

Table 11.4: Sensitive ecology receptors

11.5 Future baseline

11.5.1 In the absence of the WKN Proposed Development & K3 Proposed Development, K3 would continue to operate under the previously consented scheme This includes all of the mitigation and habitat creation associated with that consent.

11.5.2 The DCO Boundary would otherwise be maintained as the habitats present predevelopment, as modified by natural succession/climate change. As such, it would be anticipated that most of the grassland/swamp habitat would eventually succeed to dense scrub habitats.

11.6 K3 Proposed Development Predicted Effects - Construction

11.6.1 The construction impacts of K3 as consented were assessed in detail as part of the 2010 Environmental Statement (Document 3.2). K3 as consented is at an advanced stage of construction and due to be fully operational by the end of 2019. All planning conditions of relevance to ecology have been discharged. No further external construction work is required by way of consequence of the practical effect of the K3 Proposed Development. The assessment undertaken as part of the 2010 ES therefore remains a robust assessment for the consideration of the construction of the K3 Proposed. For reference a brief summary is provided below.

11.6.2 Receptors which were assessed as part of this ES included:

- Swale Ramsar / SPA;

- Medway Estuary Marshes Ramsar, SPA;
- Swale SSSI;
- Medway Estuary and Marshes SSSI;
- Elmley Island NNR;
- Milton Creek LWS
- Brownfield habitat;
- Annual beard-grass;
- Invertebrate populations;
- Reptiles;
- Breeding birds;
- Non-breeding intertidal waterbirds; and
- Harvest Mouse

11.6.3 The previous ES concluded that there would be no significant effects on ecology arising from the construction phase of the development, subject to the mitigation outlined. This included best practice construction methodologies, as outlined in the EMMP (Appendix 11.4), along with restrictions on the timing of piling, a reptile translocation, and the creation of new habitat for reptiles, harvest mouse, annual beard-grass, invertebrates and breeding birds.

11.6.4 Additionally, while anecdotal evidence suggests that the effect of disturbing activity on breeding Marsh Harrier during the construction phase is unlikely to be significant, some doubt remained during the original 2009 assessment. The S106 Agreement for the consented generating station (referred to previously as a 'Sustainable Energy Plant' or 'SEP') therefore included the requirement to create a new reedbed at Hartey Fen on the Isle of Sheppey as part of the RSPB's habitat creation scheme to return farmland to grazing marsh and associated habitats (including reedbed). This was intended to provide alternative breeding habitat, should the Marsh Harrier choose to abandon the Kemsley reedbed, particularly during construction. Such a reedbed has been created and signed off by the RSPB.

The effect of the K3 Proposed Development - Operation

11.6.5 Operational activities may potentially cause:

- degradation and loss of habitats e.g. from pollution and lack of or inappropriate management;
- degradation to and loss of habitats that support species of conservation importance e.g. from pollution and lack of or inappropriate management;

- disturbance to wildlife e.g. from noise or light pollution, human activity and vehicular movement; and

- changes in air quality;

11.6.6 Of the above, the majority of the potential effects of the first two relate to the built form/final layout/management of the K3 Proposed Development.

11.6.7 The effects of K3 as consented were assessed in detail as part of the 2010 Environmental Statement (Document 3.2). K3 as consented is at an advanced stage of construction and due to be fully operational by the end of 2019. The practical effect of the K3 Proposed Development of the K3 Proposed Development will not result in any practical changes in this regard. Therefore, the effect of these impacts remains as assessed in the original ES and, as such, are not significant.

Noise

11.6.8 The HGV movements brining waste to K3 Proposed Development (416 HGV movements per day – as per Chapter 4) may generate noise levels sufficient to cause disturbance to birds using the nearby designated sites. The potential for such disturbance is considered very limited, however.

11.6.9 The closest point of the highway network used by the HGVs to the designated sites is at the roundabout at the junction of Barge Way with the North Gate of the Kemsley Paper Mill. This is some 400 m from intertidal habitats of The Swale SPA/Ramsar/SSSI and circa 70 m from the grazing marsh habitats of that site. Given these distances, it is very unlikely that the increases in HGV numbers compared to the baseline in this location would generate noise sufficient to result in disturbance of birds.

11.6.10 The HGV movements will access the K3 Site via the existing access road. This will take them within circa 100m of the reedbed to the north of the K3 Proposed Development that supports breeding Marsh Harrier. The potential for disturbance effects on the breeding Marsh Harrier in this area is considered low since the birds using the reedbed are already habituated to the movement of HGVs along the roads that surround the reedbed with no apparent effect (as demonstrated by their continued presence on site between 2009 and 2018). Further to this, modelling of HGV construction noise shows that the noise associated with this would be around 50 dBL_{Amax} (Figure 11.5a) across the areas of dense scrub surrounding the reedbed. This is below the impact threshold that Natural England suggest should be used for further investigation with respect to noise disturbance of birds.

Air quality

11.6.11 Appendix 5.4 of Chapter 5 (Air Quality) provides an analysis of the combined impacts of emissions to air of the K3 Proposed Development with the WKN Proposed Development, along with an assessment of cumulative impacts from other proposed / committed developments, on the features of interest of the surrounding designated sites along with their supporting habitats.

11.6.12 The operational effects of air quality arising from traffic and emissions to air (Appendix 5.4 of Chapter 5) have been modelled, at a selection of discrete

receptor points at the closest point of the designated sites adjacent to roads affected by the WKN Proposed Development and K3 Proposed Development.

11.6.13 Cumulative traffic data for the WKN Proposed Development and K3 Proposed Development in the opening year of WKN, 2024 was modelled. The PC from the WKN Proposed Development and the K3 Proposed Development stack emissions at each of the sensitive receptors was added to the road contribution to give a 'WKN + K3' PC that considers both stack and traffic emissions.

11.6.14 Only the Swale SPA/SSSI/Ramsar and the Medway Estuary and Marshes SPA/Ramsar are within 200 m of a road affected by the WKN Proposed Development and K3 Proposed Development. The A249 passes through the Medway Estuary and Marshes SPA/Ramsar so receptors were selected at the roadside.

11.6.15 For NO_x, the cumulative PC as a percentage of the CL is less than 1% for the Medway Estuary and Marshes SPA/Ramsar. At both the Swale SPA/SSSI/Ramsar and the Medway Estuary and Marshes SPA/Ramsar, the PEC is less than the CL. On that basis, the cumulative effects are considered insignificant.

11.6.16 For nitrogen deposition the cumulative PC as a percentage of the CL is less than 1% for both the Medway Estuary and Marshes SPA/Ramsar and the Swale SPA/SSSI/Ramsar and the cumulative impacts are considered insignificant.

11.6.17 The cumulative PECs presented in Appendix 5.4 can be considered highly conservative as the PCs from the other developments are the maximum impacts across a grid and are unlikely to occur at the same location as the maximum road contribution. On this basis, all impacts as a results of traffic emissions, and the stack emissions with traffic cumulatively are negligible, and as such, are not significant.

11.6.18 Based on current Environment Agency guidelines [Ref 11.13] and the Institute of Air Quality Management Position Statement [Ref 11.14], for all other pollutants (NO_x, NH_3, SO_2, 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 the majority of interest features and supporting habitats of the designated sites.

11.6.19 The only interest features where this was not the case was Eurasian reed warbler and reed bunting for The Swale SPA with respect to nutrient nitrogen deposition where the PC was greater than 1% of the minimum critical load and the relevant minimum critical load is already exceeded. Both species are associated with reedbed habitats within which they breed across The Swale. Neither species has been recorded breeding within the DCO boundary nor within the reedbed to the north of the WKN Site. However, they may be present in the wider area, Coldharbour Fleet to the north west, for example.

11.6.20 Notwithstanding this, reedbed habitats in north Kent are unlikely to be very sensitive to nutrient nitrogen deposition. The APIS website from which the information with respect to critical loads is derived incorporates reedbed with other wetland habitats such as marsh and fens. It notes that the minimum critical load for these habitats listed on APIS and used in Appendix 5.4 (15 $kgN.ha^{-1}.yr^{-1}$) represents more closely upland habitats that will be naturally more nutrient poor

and therefore more susceptible to species composition change due to atmospheric nitrogen input. Reedbeds are, by their nature, monospecific, dominated by common reed. As such, their susceptibility to competitive exclusion by other graminoid species is considered very low. The upper end of the critical load range is therefore considered more appropriate for these habitats, set within grazing marsh which are higher nutrient systems due to the underlying nutrient status of the soils within the flood plain on which they form. Using the upper critical load for this habitat of 30 $kgN.ha^{-1}.yr^{-1}$ is therefore more appropriate meaning that the PC becomes ≤1% of this critical load and, as such, is not significant.

11.6.21 Therefore, all impacts as a result of the operation of the K3 Proposed Development are negligible and, as such, the effects are not significant.

11.7 K3 Proposed Development Decommissioning

11.7.1 Although the exact nature of how decommissioning/demolition of the K3 Proposed Development is not currently known, impacts from such activities would be similar to those generated during construction. This would include potential impacts arising from dust, noise, and drainage; all of which would be addressed via the production of a Decommissioning and Demolition Environmental Management Plan, to be produced prior to such work secured via a requirement in the DCO.

The Practical Effect of the K3 Proposed Development

11.7.2 The ecological conditions in relation to construction of the K3 as consented were assessed as part of the EIA completed for the original planning application for the facility (a summary is provided above at 11.6.2).

11.7.3 All works pursuant to the construction of K3 as consented and planning conditions in relation to ecological matters have been completed and discharged.

11.7.4 No further external construction work is required by way of consequence of the practical effect of the K3 Proposed Development.

11.7.5 The practical effect of the consent for the K3 Proposed Development sought would not result in any additional external physical changes to K3 as consented and the layout and appearance of the facility will remain as per its consented design. No ecological impacts during operation above those already considered during the permitting process from activity, recreational, changes to habitat management, light or invasive species are expected.

11.7.6 The DCO being sought would allow K3 as consented to operate to an upgraded power generation level of 75MW (an additional 25.1MW) and to process 657,000 tonnes of waste per annum (an additional 107,000 tonnes) above and beyond that permitted under its existing planning permission. The practical effect therefore has the potential to give rise to changes in air quality through emissions to air from the stack and changes in vehicle-related emissions associated with additional traffic movements.

11.7.7 As requested in the Scoping Opinion issued by PINS, consideration is also given to the potential for increased traffic to result in noise disturbance of birds using the surrounding designated sites.

Air Quality

11.7.8 Appendix 5.4 of Chapter 5 (Air Quality) provides an analysis of the combined impacts of emissions to air of the K3 Proposed Development with the WKN Proposed Development, along with an assessment of cumulative impacts from other proposed / committed developments, on the features of interest of the surrounding designated sites along with their supporting habitats.

11.7.9 The operational effects of air quality arising from traffic (Appendix 5.4 of Chapter 5) have been modelled , at a selection of discrete receptor points at the closest point of the designated sites adjacent to roads affected by the WKN Proposed Development and K3 Proposed Development.

11.7.10 Cumulative traffic data for the WKN Proposed Development and K3 Proposed Development in the opening year of WKN, 2024 was modelled. The PC from the WKN Proposed Development and the increase in K3 stack emissions at each of the sensitive receptors was added to the road contribution to give a 'WKN + Increase in K3' PC that considers both stack and traffic emissions.

11.7.11 Only the Swale SPA/SSSI/Ramsar and the Medway Estuary and Marshes SPA/Ramsar are within 200 m of a road affected by the WKN Proposed Development and K3 Proposed Development. The A249 passes through the Medway Estuary and Marshes SPA/Ramsar so receptors were selected at the roadside.

11.7.12 For NO_x, the cumulative PC as a percentage of the CL is less than 1% for the Medway Estuary and Marshes SPA/Ramsar. At both the Swale SPA/SSSI/Ramsar and the Medway Estuary and Marshes SPA/Ramsar, the PEC is less than the CL. On that basis, the cumulative effects are considered insignificant.

11.7.13 For nitrogen deposition the cumulative PC as a percentage of the CL is less than 1% for both the Medway Estuary and Marshes SPA/Ramsar and the Swale SPA/SSSI/Ramsar and the cumulative impacts are considered insignificant.

11.7.14 The cumulative PECs presented in Appendix 5.4 can be considered highly conservative as the PCs from the other developments are the maximum impacts across a grid and are unlikely to occur at the same location as the maximum road contribution. On this basis, all impacts as a results of traffic emissions, and the stack emissions with traffic cumulatively are negligible, and as such, are not significant.

11.7.15 Based on current Environment Agency guidelines [Ref 11.13] and the Institute of Air Quality Management Position Statement [Ref 11.14], for all other pollutants (NO_x, NH_3, SO_2, 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 the majority of interest features and supporting habitats of the designated sites.

11.7.16 The only interest features where this was not the case was Eurasian reed warbler and reed bunting for The Swale SPA with respect to nutrient nitrogen deposition where the PC was greater than 1% of the minimum critical load and the relevant minimum critical load is already exceeded. Both species are associated with reedbed habitats within which they breed across The Swale. Neither species has

been recorded breeding within the DCO boundary nor within the reedbed to the north of the WKN Site. However, they may be present in the wider area, Coldharbour Fleet to the north west, for example.

11.7.17 Notwithstanding this, reedbed habitats in north Kent are unlikely to be very sensitive to nutrient nitrogen deposition. The APIS website from which the information with respect to critical loads is derived incorporates reedbed with other wetland habitats such as marsh and fens. It notes that the minimum critical load for these habitats listed on APIS and used in Appendix 5.4 (15 $kgN.ha^{-1}.yr^{-1}$) represents more closely upland habitats that will be naturally more nutrient poor and therefore more susceptible to species composition change due to atmospheric nitrogen input. Reedbeds are, by their nature, monospecific, dominated by common reed. As such, their susceptibility to competitive exclusion by other graminoid species is considered very low. The upper end of the critical load range is therefore considered more appropriate for these habitats, set within grazing marsh which are higher nutrient systems due to the underlying nutrient status of the soils within the flood plain on which they form. Using the upper critical load for this habitat of 30 $kgN.ha^{-1}.yr^{-1}$ is therefore more appropriate meaning that the PC becomes $\leq$1% of this critical load and, as such, is not significant.

11.7.18 Therefore, all impacts as a result of the operation of the K3 Proposed Development are negligible and, as such, the practical effects of the K3 Proposed Development are not significant.

Noise

11.7.19 Although the operational noise will not change as a result of the K3 Proposed Development, the additional HGV movements (68 HGV movements per day) above K3 as consented to may generate noise levels sufficient to cause disturbance to birds using the nearby designated sites. The potential for such disturbance is considered very limited, however.

11.7.20 The closest point of the highway network used by the HGVs to the designated sites is at the roundabout at the junction of Barge Way with the North Gate of the Kemsley Paper Mill. This is some 400 m from intertidal habitats of The Swale SPA/Ramsar/SSSI and circa 70 m from the grazing marsh habitats of that site. Given these distances, it is very unlikely that the small increases in HGV numbers compared to the baseline in this location would generate noise sufficient to result in disturbance of birds.

11.7.21 The additional HGV movements above K3 as consented will access the K3 Site via the existing access road. This will take them within circa 100m of the reedbed to the north of the K3 Proposed Development that supports breeding Marsh Harrier. The potential for disturbance effects on the breeding Marsh Harrier in this area is considered low since the birds using the reedbed are already habituated to the movement of HGVs along the roads that surround the reedbed with no apparent effect (as demonstrated by their continued presence on site). Further to this, modelling of HGV construction noise shows that the noise associated with this would be around 50 - 55 dBLAmax (Figure 11.5a) across the areas of dense scrub surrounding the reedbed. This is below the impact threshold that Natural England suggest should be used for further investigation with respect to noise disturbance of birds.

Decommissioning

11.7.22 Although the exact nature of how decommissioning/demolition of the K3 Proposed Development is not currently known, impacts from such activities would be similar to those generated during construction. This would include potential impacts arising from dust, noise, and drainage; all of which would be addressed via the production of a Decommissioning and Demolition Environmental Management Plan, to be produced prior to such work secured via a requirement in the DCO.

11.7.23 This remains applicable to the K3 Proposed Development and its practical effect.

11.8 Summary

11.8.1 Table 11.5 summarises the effects of the K3 Proposed Development.

Effect Identified	Receptor Sensitivity	Impact Magnitude	Nature	Duration	Degree of Effect
Construction Effects					
As assessed in the 2010 ES – all effects Not Significant once mitigation taken into account					
Completed Development Effects					
The Swale Ramsar and SPA - Air Quality	Very High	Negligible	Slight	Long-term	**Not significant**
Medway Estuary and Marshes Ramsar and SPA - Air Quality	Very High	Negligible	Slight	Long-term	**Not significant**
Thames Estuary and Marshes SPA - Air Quality	Very High	Negligible	Slight	Long-term	**Not significant**
Queensdown Warren SAC - Air Quality	Very High	Negligible	Slight	Long-term	**Not significant**
The Swale MCZ - Air Quality	High	Negligible	Slight	Long-term	**Not significant**
The Swale SSSI - Air Quality	High	Negligible	Slight	Long-term	**Not significant**
Medway Estuary SSSI - Air Quality	High	Negligible	Slight	Long-term	**Not significant**
Elmley Island NNR - Air Quality	High	Negligible	Slight	Long-term	**Not significant**
Milton Creek LWS - Air Quality	Medium	Negligible	Negligible	Long-term	**Not significant**
The Swale Ramsar and SPA – Noise from traffic movement	Very High	No change	No change	Long-term	**Not significant**

The Swale SSSI – Noise from traffic movement	High	No change	No change	Long-term	**Not significant**

Table 11.5: Summary of Effects

11.9 WKN Proposed Development Predicted Effects

11.9.1 This section identifies and assesses the potential effects that are predicted to occur during construction and on completion of the WKN Proposed Development. The baseline against which the WKN Proposed Development is assessed is K3 as consented. K3 as consented is due to become fully operational by the end of 2019.

11.9.2 This assessment has assumed that all standard mitigation would be included within both the construction and operational phases of the development, which will comply with all good practise guidelines. Detailed principles will follow those outlined in the Ecology Mitigation and Enhancement Strategy (Appendix 11.4), the Construction and Environmental Management Plan (CEMP) (Appendix 2.1), and the Lighting Strategy, (Appendix 11.8).

11.9.3 Construction activities are detailed in Chapter 2. In terms of ecological impacts, the development may potentially cause:

- Permanent loss of natural or semi-natural habitats;
- Temporary loss of natural or semi-natural habitats;
- Permanent loss of habitat that supports species of conservation importance;
- Temporary loss of habitat that supports species of conservation importance;
- Temporary disturbance to wildlife, e.g. from noise, vibration or light pollution, human activity and vehicular movements, and overshadowing of bird habitats;
- Soil compaction, resulting in changes to flora and fauna;
- Discharge of site drainage water to the marine environment during the operational phase;
- Accidental release of pollution from the proposed development site; and
- Spread of invasive species.

WKN Proposed Development Construction Effects

The Swale SPA and Ramsar (Very High Value)

11.9.4 The impact of the construction phase of the development on The Swale SPA and Ramsar is described in detail below.

11.9.5 The construction of the proposed second outfall for the WKN Proposed Development into The Swale (Work No.7) will follow the same methodology/timing restrictions set out in the approved Marine Licence for the first outfall constructed to serve K3. This approach is codified in the amended Marine Licence granted by the MMO in May 2019 (licence ref. L/2017/00482/2 – Appendix 11.7). The application for the amended Marine Licence included an ecological appraisal of the potential effects on the marine component of the SPA/Ramsar as well as the Marine Conservation Zone along with a Water Framework Directive (WFD) assessment (Appendix 11.7).

11.9.6 This concluded that, assuming all the methodological/timing restrictions set out in the Marine Licence were adhered to, there would be no impacts on The Swale from the construction of the outfall. As such, all impacts due to the outfall are not significant and are not discussed further in this assessment.

Habitat Loss

11.9.7 The development will cause no direct impact to The Swale SPA and Ramsar via habitat loss, given no part of either designated site falls within the site boundary.

Drainage

11.9.8 As described in Chapter 10 Water, once construction of the WKN Proposed Development commences, the hardstanding areas will drain eastwards into the storage pond that will be the first element of the scheme constructed. It will ensure that settling pond capabilities are available from the start of the works, and to provide tidal inundation protection to the construction site. Works on site will follow the best practice guidelines with respect to the management of surface water. Temporary foul drainage to serve the contractors welfare facilities was put in place at the start of works on site and linked to the existing Kemsley Paper Mill foul system. The following activities/items will be located more than 20 m from the site boundary perimeter: refuelling and maintenance of machines, oil storage tanks, chemical or fuel storage and on-site concrete batching plants (if utilised). A strict waste management system will be incorporated to prevent the disposal of construction or domestic rubbish entering the adjacent reedbed areas used by breeding marsh harrier.

11.9.9 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.

11.9.10 Full implementation of the above would ensure no adverse impacts on the SPA (including the adjacent reedbed) in relation to drainage and surface hydrology.

11.9.11 It is considered likely that the magnitude of the impacts of changes to drainage during construction on a feature of very high value would be negligible. This would result in a slight effect and is therefore not significant.

Light Spill

11.9.12 There is potential for light spill from the construction site to impact the birds using the SPA/Ramsar. The light scheme will follow best practice to minimise light impacts. The construction lighting design includes:

- Having no direct lighting of any designated areas;
- Position lighting to screen designated areas by flood defences;
- Making use of relatively low directional lighting that limits spillage, glare or additional sky glow; and
- Locating construction compounds to ensure lighting effects are prevented for the surrounding designated sites.

11.9.1 The lighting from the WKN Proposed Development during construction will be similar to that which currently exists on the adjacent K3 and the surrounding Kemsley Paper Mill. All lighting will be installed in accordance with best practice and will be directed inward, toward the development. Details of the lighting during construction will be secured within the CEMP.

11.9.2 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 slight effect and is therefore not significant.

Disturbance from people and plant movements

11.9.3 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. It is considered there is a limited potential for disturbance of birds using the intertidal areas caused by people when account is taken of the fact that:

- The SPA/Ramsar cited bird species feeding on the adjacent intertidal area are already habituated to people using the Knauf Jetty (immediately to the north of the laydown area), industrial areas behind the seawall and public footpath along the seawall itself.
- 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 and the concentrations occurring on the opposite bank of the River Swale are over 500 m from the proposed area of construction and separated by the river channel and seawall.

11.9.4 Therefore, it is not anticipated that SPA/Ramsar cited birds using the intertidal areas of The Swale will be disturbed by plant or people movement during the construction phase of the development.

11.9.5 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 immediately to the north, for example, is subject to regular disturbance from activity on the Knauf gypsum jetty immediately to the north of the reedbed.

11.9.6 This can involve up to 30 20-ton tipper lorry movements an hour with vehicles travelling at speed up the private road. 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 in 2016. Further, the reedbed has continued to be used by this species through the construction of both K3 and the DS Smith AD Plant, which is located directly to the north of the reedbed.

11.9.7 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 11.18]. 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 Kemsley Paper Mill.

11.9.8 Therefore, while anecdotal evidence suggests that the effect of disturbing activity on breeding Marsh Harrier during the construction phase is unlikely to be significant, some doubt remained during the original 2009 assessment.

11.9.9 The S106 Agreement for the original K3 application included the requirement to create a new reedbed at Hartey Fen on the Isle of Sheppey; as part of the RSPB's habitat creation scheme to return farmland to grazing marsh and associated habitats (including reedbed). This was intended to provide alternative breeding habitat, should the Marsh Harrier choose to abandon the Kemsley reedbed, particularly during construction of K3.

11.9.10 Such a reedbed has been created and signed off as complete by the RSPB. Recent discussions (October 2018) confirm that the reedbed is successfully developing, and that Marsh Harrier are using adjacent areas. Therefore, the overall expectation is that once the reedbed has developed further, Marsh Harrier will use it for nesting.

11.9.11 To further avoid any activity disturbance related to human activity during construction, a 2.4 m closed-board wooden fence has been erected along the northern site boundary (as part of the previous clearance works for the K3 laydown), following the Ecological Mitigation and Enhancement Strategy which was prepared for the site (Appendix 11.4). Such a fence will also be erected around the proposed laydown area.

11.9.12 Consequently, when account is taken of the impact-avoidance mechanisms already implemented, it is also concluded that disturbance of breeding Marsh Harrier in the form of plant (machinery) or people during the construction of the

WKN Proposed Development can be screened out as not likely to have a significant effect.

11.9.13 It is therefore 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 slight effect and is therefore not significant.

Recreational disturbance

11.9.14 The potential for disturbance to SPA/Ramsar cited bird species from recreational use of the construction staff is considered low. Whilst there is an access route via the path at the southern end of the WKN Site, there is no current use of this access route by Kemsley Paper Mill staff. The operational nature and characteristics of the wider Kemsley Paper Mill Site mean access is restricted and measures are already in place to prevent incursion outside of defined areas. Therefore, it is not anticipated that any of the construction staff will access The Swale SPA/Ramsar.

11.9.15 There will be no impact from recreational disturbance from members of the public, as there is no public access via the site.

11.9.16 It is considered likely that the magnitude of the impacts of recreational disturbance during construction on a feature of very high value would be no change. This would result in no change and is therefore not significant.

Noise and vibration

11.9.17 Noise created during the construction phase from piling works, HGV movements 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 80dBL_{Amax} with a screening threshold around 55 dBL_{Amax}. The main intertidal areas of The Swale Ramsar/SPA used by wintering citation birds recorded by the foreshore monitoring are over 200 m from the construction area of the WKN Proposed Development, where significant noise events may occur.

11.9.18 Modelling of the noise generated by the loudest events during construction (impact piling) has been undertaken (see Chapter 7 – Noise & Vibration for details of the modelling), assuming that the nearest building to The Swale (the stores building) requires impact piling. The resulting noise contours have been plotted with the nearby designated sites shown (Figure 11.4); the highest noise that would be received by birds using the SPA/Ramsar has been modelled at 61.5 dBL_{Amax}, covering an area of some 9.6 ha within the 6,514-ha designated site, which equates to 0.147% of the designated site.

11.9.19 As set out in the Habitats Regulations Assessment Report (HRAR – Appendix 11.2), this area of intertidal habitat is used by citation and assemblage species of The Swale SPA and Ramsar.

11.9.20 Marsh harrier using the reedbed to the north of the proposal site are closer to potentially disturbing noises, the loudest of which is likely to be from impact piling.

11.9.21 Therefore, in order to avoid impacts to the birds using the intertidal area and marsh harrier, impact piling would be undertaken during the following periods:

- No impact piling between April and August, inclusive;
- No impact piling between the months January and February inclusive.
- Limited impact piling is permissible between the months of November and December provided that any impact piling activity does not accrue to more than a total of 10 days consecutively or otherwise.

11.9.22 Impact piling is permissible unrestricted outside of these time periods. All other methods of piling using non-impact methods can be used without restriction.

11.9.23 Details of this avoidance strategy with respect to piling noise will be set out within the CEMP.

11.9.24 In order to avoid disturbance impacts, the creation of the new outfall into The Swale (Works Area 7) will be undertaken following the same methodological and timing restrictions placed on the original Marine Licence (i.e. use of track mats and works restricted to outside wintering period).

11.9.25 Construction of the facility will also necessitate construction vehicles accessing the Site, a 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 WKN Site. From Chapter 4 (Traffic and Transport) this will result in a maximum of 409 two-way movements, and up to 45 two way HGV movements.

11.9.26 These additional HGV movements will access the Site via the existing access road to the north. This will take them within circa 50 m of the reedbed to the north of the WKN Proposed Development that supports breeding Marsh Harrier. The potential for disturbance effects on the breeding Marsh Harrier in this area is considered low since the birds using the reedbed are already habituated to the movement of HGVs along the roads that surround the reedbed with no apparent effect (as demonstrated by their continued presence on site). Further to this, modelling of HGV reversing signals (as the most disturbing aspect of vehicle noise) shows that the noise associated with this would be around 50 - 55 dBL_{Amax} (Figure 11.5) across the areas of dense scrub surrounding the reedbed. This is below the impact threshold that Natural England suggest should be used for further investigation with respect to noise disturbance of birds.

11.9.27 Therefore, it is considered likely that the magnitude of the impacts of noise during construction on a feature of very high value would be negligible. This would result is a slight effect and is therefore not significant.

Overshadowing/line of sight

11.9.28 During the construction phase of the development there will be piling rigs and cranes on site. However, these will be set over 200 m back from the SPA/Ramsar.

Therefore, there is no potential for overshadowing/blocking of line of sight on the foreshore during construction and all such effects would be not significant.

Flight lines

11.9.29 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 WKN Site are offshore, with no waterbirds being noted to fly over the WKN Site in any of the surveys completed to date.

11.9.30 The WKN Site, at present, is used as the laydown area for K3, although before that was bare ground and ephemeral habitats. The surrounding area is already heavily industrialised to the south and north, and areas of conurbation exist to the west. Immediately to the south, K3 is currently under construction.

11.9.31 These factors, combined with the fact that the site is not enroute to any other nearby wetland areas, make it unlikely that water birds would pass through the the DCO boundary. 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.

Therefore, the magnitude of the impact of changes to flight lines during construction on a feature of very high value, would be no change. This would result is a no effect and is therefore not significant.Air quality

11.9.32 The IAQM Guidance [Ref 11.4] on the assessment of dust from demolition and construction sets out 50 m as the distance from the site boundary and 50 m from the site traffic route(s), within which, there could be potential dust effects on ecological receptors. In this application, there are no ecological receptors within 50 m, and so, ecological effects have been scoped out. These distances have been set to be deliberately conservative.

11.9.33 Further to this, the number of HGV movements during the construction period will increase by a maximum of 90 per day (Appendix 4.1, Chapter 4 – Traffic and Transport). 90 is below the value of 200, which is the threshold of significant change [Ref 11.15]. The construction timelines of K3 and WKN will not overlap, and therefore, there is not going to be any cumulative impacts which would take the vehicle movements above 200.

11.9.34 As such, the magnitude of the impact of change upon this feature of very high value, would be no change. This would result in no effect, and is therefore, not significant.

Medway Estuary and Marshes Ramsar and SPA, Thames Estuary & Marshes Ramsar and SPA, Outer Thames Estuary SPA, Queendown Warren SAC (Very High Value)

11.9.35 The impact of the development during construction on these designated sites is described in Appendix 11.2: Information to Inform a Habitats Regulations Assessment.

11.9.36 Given the distance involved between these sites and the WKN Site no construction impacts are anticipated from air quality, lighting, construction noise, traffic, or recreation.

11.9.37 Therefore, the magnitude of the impacts of construction on a feature of very high value, would be no change. This would result in no change and is therefore not significant.

Swale Estuary MCZ (High Value)

11.9.38 The Swale MCZ is located (at its closest) 15 m east of the WKN Site, with the laydown area being at the closest point. However, it is a sub-tidal designated site and therefore there is no potential for disturbance of interest features.

11.9.39 All impacts due to changes to surface water will be the same as for The Swale SPA/Ramsar which coincide geographically with the MCZ, including with respect to the proposed second outfall (see Appendix 11.7).

11.9.40 It is considered likely that the magnitude of the impacts of the development on this feature of high value, would therefore be negligible. This would result in a slight effect which is not significant.

The Swale SSSI and Medway Estuary and Marshes SSSI, Elmley Island NNR (High Value)

11.9.41 Both SSSIs and the NNR cover the same geographical area as the corresponding SPA/Ramsar and are designated for similar interest features. As such, all construction impacts to these sites are the same as for the SPA/Ramsars described above.

11.9.42 As such, it is considered that the magnitude of the impacts of the development on this feature of high value, would be negligible. This would result in a slight effect which is not significant.

Milton Creek Local Wildlife Site (Medium Value)

11.9.43 Milton Creek Local Wildlife Site (LWS), located over 400 m south east of the WKN Site, 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. Therefore, given the distance between the WKN Site and Milton Creek, all impacts on the LWS during construction of WKN would be similar in nature to The Swale but of a lower magnitude. As such, all impacts to this receptor of medium value would be of negligible magnitude and significance and, as such, not significant.

Breeding Schedule 1 birds (non-SPA) (Low Value)

Habitat loss

11.9.44 Prior to its use as the laydown area for construction of K3, the WKN Site comprised a mosaic of bare ground, ephemeral habitats with rubble piles and small areas of grassland. These were not found to support breeding birds (Appendix 11.1 & 11.3). As such, the loss of these habitats as a result of the construction of WKN would have no impact on the breeding bird population in the area.

11.9.45 The construction of WKN Proposed Development would require the permanent loss of some areas of landscaping associated with the completed K3, that would include areas of dense scrub to be planted as mitigation for the loss of the breeding bird habitat present on the original K3 Site. Further loss of breeding bird habitat would occur during the clearance of vegetation in advance of the creation of the laydown area and parts of the construction access road albeit this would be temporary for the duration of construction.

11.9.46 Overall, therefore, there will be a net loss of breeding bird habitat (mainly dense scrub) for the duration of the construction phase of the WKN Proposed Development. The resulting impact would therefore be medium adverse magnitude on a receptor of low value, and therefore resulting in a slight adverse effect that is not significant.

Drainage

11.9.47 There is potential for the construction phase of the development to accidentally release pollution into the reedbed habitat to the north of the proposal site which supports the majority of the birds of conservation concern found during the survey work (see Appendix 11.1), especially from the proposed laydown area.

11.9.48 Contractor compliance with the Construction Environmental Management Plan (CEMP), similar to that produced to comply with conditions of the original K3 planning permission will ensure that works on site follow the best practice guidelines. Temporary foul drainage to serve the contractors welfare facilities was provided at the start of works on site to tie into the existing Kemsley Paper Mill drainage.

11.9.49 The following activities/items will be located more than 20m from the site perimeter: refuelling and maintenance of machines, oil storage tanks, chemical or fuel storage and on site concrete batching plants. A strict waste management system will be established to prevent the disposal of construction or domestic rubbish entering the adjacent marshland areas.

11.9.50 This affords protection to the reedbed area 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. The resulting effect would therefore be 'no change'.

Light spill

11.9.51 There is potential for light spill from the construction site to impact the breeding birds using the adjacent reedbed habitat. The light scheme for the construction phase will follow best practice to minimise light impacts as described above. Task specific lighting may also be required, however through careful positioning and

planning this should have minimal effect on the areas outside the site. Specific details of construction lighting will be secured through the CEMP.

11.9.52 Given the key reedbed area is at its closest point 50 m from the WKN Proposed Development boundary, the magnitude of the impact on this feature of low value is negligible. This would lead to a negligible effect which is not significant.

Disturbance from people and plant movements

11.9.53 The movement of people and plant during the construction phase has potential to cause visual disturbance to nesting birds. Identifying the impact on different species and individuals is difficult as their tolerance to visual disturbance and their ability to habituate will vary. Again, these impacts are only likely to be significant at the very edge of the reedbed, not within the reedbed/dense scrub where the Schedule 1 species nest. Further, these species have been consistently recorded on site, including during the construction of K3 and the nearby AD Plant.

11.9.54 Therefore, the magnitude of the impact of disturbance from people and plant movement on this feature of low value is negligible. The effect would be assessed negligible and is therefore not significant.

Noise

11.9.55 Noise created during the construction phase has the potential to disturb breeding birds causing them to cease feeding or fly away from the area of influence. It is recognised that short, sharp 'percussive' noises have the greatest potential to cause disturbance.

11.9.56 Noise created during the construction phase from impact piling and other construction activities has the potential to disturb birds breeding in the area to cause them to fail to establish a breeding territory or abandon their attendance at a nest.

11.9.57 The nearest significant area of habitat for nesting birds is immediately to the reedbed to the north of the development site. Noise modelling for this area (Figure 11.4) demonstrates that the maximum noise during the construction period for this area (during impact piling) would be 72.6dBL_{Amax}, with the majority of noise occurring between 65<70dBL_{Amax}.

11.9.58 Given that there is some potential for noise of this level to disturb breeding Schedule 1 species, as described above and as to be described in the CEMP, impact piling will avoid the nesting bird season (April to August inclusive).

11.9.59 Other construction activities are unlikely to generate noise as 'loud' as piling but may still disturb birds. Modelling of HGV reversing signals shows that the noise associated with this would be around 50 - 55 dBL_{Amax} (Figure 11.5) across the areas of dense scrub surrounding the reedbed. This is below the impact threshold that Natural England suggest should be used for further investigation with respect to noise disturbance of birds.

11.9.60 As such, the impact of construction noise on the Schedule 1 breeding bird assemblage of low value, would be would be negligible. The effect would be assessed negligible and therefore is not significant.

Reptiles (Low value)

Habitat Loss

11.9.61 Assuming it is restored to its pre-development state, the WKN Site would comprise a matrix of spoil piles, ephemeral habitats and small areas of grassland which may support reptiles. The areas of habitat created within the K3 Site that would fall within the WKN Site would be grassland and scrub, both of which provide suitable habitat for reptiles. All of the onsite habitat will be lost to facilitate WKN Proposed Development, albeit some will only be lost, temporarily during construction, as it will be re-instated on completion of the development(the laydown area and areas of habitat creation in the final WKN Site).

11.9.62 In order to mitigate the habitat loss, additional new habitat will be created post development at the eastern end of the WKN Site, with enhanced habitat creation within the area of what is currently made ground on the laydown area.

11.9.63 The WKN Site was temporarily cleared of reptiles and other ecological constraints as part of the construction of K3, prior to the commencement of construction, following the Ecological Mitigation and Enhancement Strategy (EcoIMES) produced for the original K3 application (Appendix 11.4). Therefore, there is no requirement to move animals from this area prior to the construction of the WKN Proposed Development. Common lizards and slow worms were also found during the autumn 2018 surveys, within the area to the east of the application boundary, and along the Knauf jetty track, which is to be used as the laydown / laydown access. In order to avoid killing/injuring reptiles during site clearance temporarily during construction, the population of reptiles will be moved out of the construction zone, via a two-stage, sensitive strim, prior to construction works beginning on site. A final destructive search of potential shelter locations (such as rubble piles) will also be undertaken.

11.9.64 The site will then be protected from accidental movement of plant into retained habitats by reptile-proof fencing, which will remain *in-situ* for the entire construction phase of the development.

11.9.65 On completion of the construction phase of the development, the reptile exclusion fencing will be removed, and the reptile population will be allowed to colonise the newly-created habitat on site.

11.9.66 Therefore, while there will be an overall like-for-like habitat creation/lost, much of the creation will take place at the end of the construction phase. Therefore, for the duration of construction, there will be a medium negative impact on this low value receptor. This would result in a slight effect which is not significant.

Annual beard-grass (Low value)

11.9.67 A large area of habitat was created in association with the original K3 development, to address impacts to annual beard-grass when the WKN Site was cleared. This involved selected areas of the pond margins/banks being maintained as bare ground on an annual basis, by regular scraping of the bank surface to remove regenerating vegetation particularly any competitive species.

11.9.68 In the first year of the creation of the attenuation ponds, seeds were collected from annual beard-grass plants growing on the wider site. Annual beard-grass flowers from June to August and it is anticipated that seed could be collected from July to September. Seed which has been collected was directly sown in the newly-created bare areas along the banks of the attenuation ponds.

11.9.69 It is anticipated that attenuation ponds created on site as part of the WKN Proposed Development will follow similar principles, to be described in an updated Ecology Mitigation and Management Plan(Appendix X)..

11.9.70 Therefore, it is considered that, at a baseline of prior to the K3 construction (i.e. – ephemeral/ rubble / open ground), construction impacts to this population of low value would be negligible. This would result in a negligible effect which is not significant.

WKN Proposed Development Operational Effects

11.9.71 The operational phase of the WKN Proposed Development is assumed once the facility has been commissioned (circa 2023/24).

11.9.72 Operational activities may potentially cause:

- changes in air quality;
- degradation and loss of habitats, e.g. from pollution and lack of or inappropriate management;
- degradation to and loss of habitats that support species of conservation importance, e.g. from pollution and lack of or inappropriate management;
- changes in hydrology/water quality; and
- disturbance to wildlife, e.g. from noise or light pollution, human activity and vehicular movement.

The Swale SPA / Ramsar (Very High Value)

11.9.73 The operation of the proposed second outfall into The Swale will follow the same restrictions set out in the approved Marine Licence for the first outfall constructed to serve K3. The ecological effects of the operation of the second outfall on this receptor are described in Appendix 11.7. The operation of the second outfall was approved by the MMO following a licence amendment May 2019 (licence ref. L/2017/00482/2 - Appendix 11.7). The conclusion of the assessment is that the operation of the outfall would have no effect on The Swale and, as such, all effects are not significant.

Drainage

11.9.74 As outlined in Chapter 10 Water Environment, the WKN Proposed Development will be split into two separate drainage systems. The first drainage system will collect clean surface water runoff (for example from building roof areas) and store it in the lagoon. The second drainage system will collect 'dirty' runoff (for example

from the FGT area) and store it in the 'dirty' water tank. This 'dirty' water will then be used in the process as required (for example for ash quenching). The clean water will be stored in the lagoon and used to top up the 'dirty' water tank. If the lagoon has reached the maximum acceptable capacity it will be discharged at a controlled rate into The Swale, as for K3.

11.9.75 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 slight effect and is therefore not significant.

Light spill

11.9.76 Light spill from the operational development has the potential to impact nearby wildlife. To avoid such impacts, the light scheme for the operational phase will follow best practice to minimise light impacts. Appendix 11.8 provides a draft lighting design, based on the indicative layout for the WKN Proposed Development. This demonstrates that lighting would be down to 0 lux at the boundary for the majority of the site and within 20 m of the boundary at the north western end of the site. The final design of such a scheme will be secured through an appropriate requirement within the DCO. However, the Kemsley Paper 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.

11.9.77 This would result in a slight effect and is therefore not significant.

Disturbance from people and plant movements

11.9.78 The movement of people during the operational phase of the development may be visible to a small proportion of the SPA/Ramsar 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/Ramsar cited bird species feeding on the intertidal area adjacent to the WKN Site are already habituated to people using the Knauf Jetty, industrial areas behind the seawall and public footpath along the seawall itself.

- 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 and the concentrations occurring on the opposite bank of The Swale are over 500 m from the WKN Proposed Development and separated by the river channel and seawall.

11.9.79 Therefore, it is not anticipated that SPA/Ramsar cited birds will be disturbed by plant or people movement during the operational phase. 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 slight effect and is therefore not significant.

Recreational disturbance

11.9.80 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 Paper 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 50 permanent 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 and significance of the impacts/effects of recreational disturbance during operation on a feature of very high value would be no change and is therefore not significant.

Operational noise

11.9.81 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/Ramsar cited birds.

11.9.82 Sudden noise created during the operational phase including 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.

11.9.83 Operational noise modelling presented in Figure 7.3 and 7.5 of Chapter 7 show that no operational noise levels (including that of HGV movements upon the nearby marsh harrier) are not expected to exceed 40 dB.

11.9.84 On this basis, the magnitude and significance of the impacts/effects of operational noise during operation on a feature of very high value would be no change and is therefore not significant.

Air quality

11.9.85 Appendix 5.4 provides an analysis of the combined impacts of emissions to air of the K3 Proposed Development with the WKN Proposed Development on the features of interest of the surrounding designated sites along with the supporting habitats.

11.9.86 The operational effects of air quality arising from traffic (circa 250 movements per day, Chapter 4 – Transport) have been modelled in Appendix 5.4 of Chapter 5, which were modelled at a selection of discrete receptor points at the closest point of the habitat site to a road adjacent to roads affected by the WKN Proposed Development and K3 Proposed Development.

11.9.87 Cumulative traffic data for the WKN Proposed Development and K3 Proposed Development in the opening year of WKN, 2024 was modelled. The PC from the WKN and K3 stack emissions at each of the sensitive receptors was added to the road contribution to give a 'WKN + K3' PC that considers both stack and traffic emissions.

11.9.88 Only the Swale SPA/SSSI/Ramsar and the Medway Estuary and Marshes SPA/Ramsar are within 200 m of a road affected by the WKN Proposed Development and K3 Proposed Development. The A249 passes through the

Medway Estuary and Marshes SPA/Ramsar so receptors were selected at the roadside.

11.9.89 For NO_x, the cumulative PC as a percentage of the CL is less than 1% for the Medway Estuary and Marshes SPA/Ramsar. At both the Swale SPA/SSSI/Ramsar and the Medway Estuary and Marshes SPA/Ramsar, the PEC is less than the CL. On that basis, the cumulative effects are considered insignificant.

11.9.90 For N deposition the cumulative PC as a percentage of the CL is less than 1% for both the Medway Estuary and Marshes SPA/Ramsar and the Swale SPA/SSSI/Ramsar and the cumulative impacts are considered insignificant.

11.9.91 The cumulative PECs presented in Appendix 5.4 can be considered highly conservative as the PCs from the other developments are the maximum impacts across a grid and are unlikely to occur at the same location as the maximum road contribution. On this basis, all impacts as a results of traffic emissions are negligible, and as such, are not significant.

11.9.92 Based on current Environment Agency guidelines [Ref 11.13] and the Institute of Air Quality Management Position Statement [Ref 11.14], for all pollutants (NO_x, NH_3, SO_2, 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 the majority of interest features and supporting habitats of the designated sites. Therefore, all impacts as a result of the operation of the K3 Proposed Development are negligible and, as such, are not significant.

11.9.93 One interest feature where this was not the case was Eurasian reed warbler and reed bunting for The Swale SPA with respect to nutrient nitrogen deposition where the PC>1% of the minimum critical load and the relevant minimum critical load is already exceeded. Both species are associated with reedbed habitats within which they breed across The Swale. Neither species has been recorded breeding within the DCO boundary nor within the reedbed to the north of the WKN Site. However, they may be present in the wider area, Coldharbour Fleet to the north west, for example.

11.9.94 Notwithstanding this, reedbed habitats in north Kent are unlikely to be very sensitive to nutrient nitrogen deposition. The APIS website from which the information with respect to critical loads is derived incorporates reedbed with other wetland habitats such as marsh and fens. It notes that the minimum critical load for these habitats listed on APIS and used in Appendix 5.4 (15 $kgN.ha^{-1}.yr^{-1}$) represents more closely upland habitats that will be naturally more nutrient poor and therefore more susceptible to species composition change due to atmospheric nitrogen input. Reedbeds are, by their nature, monospecific, dominated by common reed. As such, their susceptibility to competitive exclusion by other graminoid species is considered very low. The upper end of the critical load range is therefore considered more appropriate for these habitats, set within grazing marsh which are higher nutrient systems due to the underlying nutrient status of the soils within the flood plain on which they form. Using the upper critical load for this habitat of 30 $kgN.ha^{-1}.yr^{-1}$ is therefore more appropriate meaning that the PC becomes ≤1% of this critical load and, as such, is not significant.

Overshadowing/line of sight

11.9.95 During the operational phase of the development there is no potential for the WKN Proposed Development 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. As a single-line facility, the main buildings are likely to be somewhat smaller than those of K3 which do not overshadow the intertidal areas.

11.9.96 As such, no impacts are anticipated with both magnitude and significance being no change and therefore not significant.

Flight lines

11.9.97 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.

11.9.98 Given that the area surrounding the WKN Site is already heavily industrialised, and that there are no wetland waterbodies within the vicinity of the SPA/Ramsar where the flight path would be across the development site, it is considered that the WKN Proposed Development will not impact the flight lines of SPA/Ramsar bird using the Swale.

11.9.99 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 no change and is therefore not significant.

Medway Estuary and Marshes SPA and Ramsar, Thames Estuary and Marshes Ramsar and SPA, Outer Thames Estuary SPA and Queendown Warren SAC (Very High Value)

11.9.100 The impact of the operational phase of the development on these designated sites is described in detail in Appendix 11.2: Information to Inform a Habitats Regulations Assessment.

11.9.101 At a distance of >2 km between the WKN Proposed Development and these designated sites any hydrology/water quality overshadowing, flight lines, operational noise, lighting and disturbance from human activity from the operational phase of the development are unlikely to have significant impacts.

11.9.102 Appendix 5.4 provides an analysis of the impacts of emissions to air of the WKN Proposed Development on the features of interest of the SPAs and SAC. For all pollutants (NO_x, NH_3, SO_2, 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 SPAs and SAC. Therefore, no impacts on the SPA interest features as a result of the operation of the Proposed Development are predicted.

Swale Estuary MCZ (High Value)

11.9.103 The Swale MCZ is located (at its closest) 25 m 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 WKN Proposed Development.

Drainage

11.9.104 The WKN Proposed Development will be split into two separate drainage systems. The first drainage system will collect clean surface water runoff (for example from building roof areas) and store it in the lagoon. The second drainage system will collect 'dirty' runoff (for example from the FGT area) and store it in the 'dirty' water tank. This 'dirty' water will then be used in the process as required (for example for ash quenching). The clean water will be stored in the lagoon and used to top up the 'dirty' water tank. If the lagoon has reached the maximum acceptable capacity it will be discharged at a controlled rate into The Swale. The effects of this discharge are considered within the attached marine impact assessment (Appendix 11.7) which led to the granting of an amended Marine Licence by the MMO in May 2019 (licence ref. L/2017/00482/2 - Appendix 11.7).

11.9.105 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 slight effect and is therefore not significant.

Water quality

11.9.106 As described in Chapter 10 Water Environment, any clean surface water overflow from the WKN Proposed Development will be discharged to The Swale via a new outfall pipe installed in the sea defence alongside the existing K3 outfall, at a controlled rate.

11.9.107 The drainage water outfall has the potential to discharge at any time when the attenuation pond is full, although the presence of a high tide valve in the outfall will stop any discharge during high tide events.

11.9.108 Discharge of water from the WKN Proposed Development storage areas (i.e. water containing waterborne contaminants) to The Swale MCZ will not occur during the commissioning phase or during the lifetime of the project.

11.9.109 Therefore, it is considered that the magnitude of the impact on the features of The Swale MCZ (a high value receptor) would be negligible. This would result in an effect of slight significance which is not significant.

The Swale SSSI and Medway Estuary & Marshes SSSI Elmley NNR (High value)

11.9.110 All operational impacts to these sites are the same as for the corresponding SPA/Ramsars described above. As such, it is considered that the magnitude of the impacts of the development on these features of high value, would be negligible. This would result in a slight effect which is not significant.

Milton Creek Local Wildlife Site (Medium Value)

11.9.111 Given the distance between the WKN Site and Milton Creek, all impacts on the LWS during operation of WKN Proposed Development would be similar in nature to The Swale but of a lower magnitude. As such, all impacts to this receptor of medium value would be of negligible magnitude and significance and, as such, not significant.

Annual beard-grass (low value)

11.9.112 The main impacts to annual beard-grass from the operational phase of the development will be the gradual loss of open bare ground habitat from a lack of appropriate management. This has the potential, if unmitigated, to cause the loss of annual beard-grass from the proposal site when taken in combination with the habitat loss which would have occurred in the construction phase.

11.9.113 However, an updated Management Plan for the WKN Site has been produced (Appendix 11.4) that will ensure that the species is maintained on site. It is considered likely that all operational impacts on this population of low value, has the potential to be of negligible magnitude resulting in a negligible significance of effect which is therefore not significant.

Reptiles (low value)

11.9.114 As the development will be in operation 24hrs a day, there is potential for traffic to cause fatalities to reptiles whilst they are moving across the proposal site foraging and basking. However, the likelihood of this occurring is small, given the proposal site speed limit is likely to be restricted to a low speed and that reptiles readily feel vibrations and oncoming traffic would be detected by individuals which would move out of roadways.

11.9.115 Within the proposal site there is potential for a lack of management, allowing scrub encroachment within open habitats such as the grassland. However, the Ecology Management and Mitigation Strategy (Appendix 11.4) will set out a regime of habitat management, including ensuring that dense structured vegetation does not overtake the grassland habitats on site, whilst still providing enough cover and foraging habitat for reptile species and there is no predicted adverse impact in the medium term.

11.9.116 As such, the magnitude of the impacts of changes to habitat management during operation on a feature of low value would be negligible. This would result is a negligible effect and is therefore not significant.

Breeding Schedule 1 birds – non-SPA (low value)

11.9.117 The main impacts to breeding birds from the operational phase of the development are likely to be increased disturbance from operational noise, pedestrians and traffic, potential for 24-hour lighting to spill onto the habitats used for breeding and habitat loss.

Light spill

11.9.118 Given the development will be active 24hrs a day, there is potential for light spill from the operational phase to impact the birds nesting both within the proposal site and within the reedbed to the north. Therefore, to mitigate such an impact, as described above, the light scheme for the operational phase will follow best practice to minimise light impacts. It will include street lighting located on the site buildings to provide illumination to roads, car parks and hard standing areas.

11.9.119 The street lighting will be fitted with a flat glass profile to minimize light spill. The lighting levels for the final operational plant will be designed to drop to a level of 1lux (bright moonlight) at the site boundary. Appendix 11.8 provides a draft lighting design, based on the indicative layout for the WKN Proposed Development. This demonstrates that lighting would be down to 0 lux at the boundary for the majority of the site and within 20 m of the boundary at the north western end of the site. There will therefore be no impact from the operational lighting on this low value feature.

Disturbance from people and plant movements

11.9.120 The movement of people and plant during the operational phase has potential to cause visual disturbance to nesting birds. Identifying the impact on different species and individuals is difficult as their tolerance to visual disturbance and their ability to habituate will vary. However, this is likely to be a significant impact only immediately adjacent to the main works areas, for example birds within the centre of the reedbed habitat to the north of the site are unlikely to be disturbed and are already adapted to a high-noise environment from the operational Kemsley Paper Mill.

11.9.121 As such, the magnitude of the impacts of disturbance during operation on a feature of low value would be negligible. This would result is a negligible effect and is therefore not significant.

Operational noise

There are two potential impacts on breeding birds from the operational noise:

- Masking noise
- Sudden operational noises causing disturbance

11.9.122 A possible effect of the operational background humming noise caused by the plant is the 'masking' of bird songs or calls by similar noise frequencies, thereby reducing the distance over which the song or call can be heard. Two of the most important functions of avian acoustic signals are territory defence and mate attraction [Ref 11.19]. Interference with acoustic communication and especially territorial song, presents a substantial problem to breeding birds. For a song, alarm call or another sound to give rise to a response from a bird, the sound must be detectable against the background noise. The detectability of a sound is determined by the signal-to-noise ratio (SNR) and the detection ability of the bird. Within a given frequency band, signals with an SNR below the detection threshold of the listening bird are 'masked'. As a result, background noise is important in determining which birds can hear a sound and the quality of the message contained within that sound [Ref 11.19]. Continuous noise may also mask the arrival of predators or the associated alarm calls given by neighbouring birds.

11.9.123 Of the Wildlife and Countryside Act Schedule 1 bird species breeding in close proximity to the WKN Site, only Cetti's Warbler has a defined territorial song which could be used for modeling of masking noise.

11.9.124 An audio sample of Cetti's Warbler song (recorded by Andrew Carter, Salisbury, Wilts) was processed using Matlab software (specifically the 'Signal Processing Toolbox') to calculate the power spectral density (psd) of the file. The psd describes how the power of a signal or time series is distributed with frequency. The psd of the song sample indicated that the dominant frequencies of the song were within the range of the 4,000Hz octave band, which extends from approximately 2,840Hz to 5,680Hz.

11.9.125 Noise emission levels from the facility at various features have been predicted in terms of octave-band LAeq spectra using a detailed computer noise model. Baseline background noise levels (in terms of octave-band LA90, which is the level that is occurring for 90% of the time and therefore an appropriate parameter for the assessment of masking effects to communication of the continuous operational noise from the facility) for the reedbed area were determined by a survey over five days during 2009 to inform the original K3 application (i.e. pre K3 operational).

11.9.126 The results of the noise prediction indicate that the majority of acoustic energy emitted from the facility is at low-frequencies (< 500 Hz) and that the emissions in the 4,000 Hz octave band, representing the frequency range within which the Cetti's Warbler song transmission is expected to be most significant, are relatively low. The measured baseline background noise levels in the 4,000Hz band for a nominal three-hour period between 03.00 and 07.00 hours that is representative of the dawn chorus were between 19 and 28dB LA90, 15-min (the mean level was 24dB). The greatest predicted operational noise emission level from the facility was 10dB LAeq in the 4,00 Hz band at the reedbed, 50m from the facility. Noise emission levels decrease with increasing distance from the facility.

11.9.127 The intelligibility of an acoustic signal, in this case the song of the warbler, will be affected by the difference between this signal and the prevailing noise level. The predicted noise emission level at the reedbed (50m) would not be expected to increase the mean background noise level between 03.00 and 07.00 hours in the 4,000 Hz octave-band (for example, 19dB + 10dB = 19.5dB and 24dB + 10dB = 24dB). On this basis, no effect is predicted on Cetti's Warbler due to masking by operational noise.

11.9.128 Operational noise modelling presented in Figure 7.3 and 7.5 of Chapter 7 show that no operational noise levels are expected to exceed 55 dB. On this basis, the magnitude and significance of the impacts/effects of sudden operational noise during operation on a feature of low value would be no change and is therefore not significant.

Lack of management

11.9.129 Within the proposal site there is potential for habitat loss caused by a lack of management allowing scrub encroachment within open habitats such as the grassland and within the reedbed within the attenuation ponds.

11.9.130 To mitigate this, however, a detailed management regime will be put in place to ensure that this lack of management does not occur. Once mitigation is therefore accounted for, the magnitude of the impacts of changes to habitat due to lack of management during operation on a feature of low value would be negligible. This would result is a negligible effect and is therefore not significant.

WKN Proposed Development Decommissioning

11.9.131 Although the exact nature of how decommissioning/demolition of the WKN Proposed Development is not currently know, impacts from such activities would be similar to those generated during construction. All effects arising from such impacts would be addressed via the production of a Decommissioning and Demolition Environmental Management Plan, to be produced prior to such work as per a requirement in the DCO.

Table 11.**6**: Residual effects arising from the development

Mitigation summary – K3 Proposed Development

11.9.132 Mitigation for the K3 Proposed Development was set out in the approved Ecology Mitigation and Management Plan (EMMP – Appendix 11.4). No further mitigation is considered necessary as the practical effects on ecology of the K3 Proposed Development (i.e. those above the effects already consented and mitigated by the existing permission) are all not significant.

Mitigation summary – WKN Proposed Development

11.9.133 Mitigation for the WKN Proposed Development to be secured via the CEMP (draft included at Appendix 2.1) will include:

General mitigation - Dust

11.9.134 Standard, best practice dust-suppression methods (see Chapter 5 Air Quality) will be used throughout construction of the development, thereby avoiding any impacts as a result of dust settlement on habitats and species.

General mitigation - lighting

11.9.135 Lighting strategies for both construction and operation will be developed to follow all good-practice to minimise lighting impacts such that lighting levels at the site boundary will be no more than 1 lux (bright moonlight). Appendix 11.8 provides a draft lighting design, based on the indicative layout for the WKN Proposed Development. This demonstrates that lighting would be down to 0 lux at the boundary for the majority of the site and within 20 m of the boundary at the north western end of the site. The final design will be secured via an appropriate Requirement within the DCO.

General mitigation - piling

11.9.136 in order to avoid impacts to the birds using the intertidal area and marsh harrier, impact piling would be undertaken during the following periods:

- No impact piling between April and August, inclusive;
- No impact piling between the months January and February inclusive.
- Limited impact piling is permissible between the months of November and December provided that any impact piling activity does not accrue to more than a total of 10 days consecutively or otherwise.

11.9.137 Impact piling is permissible unrestricted outside of these time periods. All other methods of piling using non-impact methods can be used without restriction.

General mitigation – Visual disturbance:

11.9.138 A 2.4 m closed-board wooden fence has been erected along the northern site boundary (as part of the previous clearance works for the K3 laydown), following the Ecological Mitigation and Enhancement Strategy which was prepared for the site (Appendix 11.4). Such a fence will also be erected around the proposed laydown area.

General mitigation – drainage/water quality

11.9.139 Full details of the mitigation with respect to drainage/water quality during both construction and operation are provided in Tables 10.14 and 10.15 in Chapter 10 Water Environment. These details will also be provided in the CEMP (Appendix 2.1).

Habitats and species

11.9.140 The following mitigation will be secured via an updated Ecology Mitigation and Enhancement Plan (Appendix 11.4):

Annual bearded-grass

11.9.141 Annual beard-grass is an annual species which grows on bare muddy patches. Areas along the banks of the attenuation pond will be suitable to establish and maintain these conditions.

11.9.142 Selected areas of the pond margins/banks should be maintained as bare ground on an annual basis, by regular scraping of the bank surface to remove regenerating vegetation particularly any competitive species.

11.9.143 Annual beard-grass flowers from June to August and seed should be collected from July to September. Annual beard grass seed shall be directly sown in the newly-created bare areas along the banks of the attenuation ponds.

11.9.144 Monitoring of the success of the habitat creation will be undertaken for the following year after construction works.

Reptiles

11.9.145 The areas of reptile habitat on site are to be lost to facilitate the laydown area for WKN. Therefore, the Ecology Mitigation and Enhancement Strategy and CEMP will ensure that the population of reptiles are moved via the appropriate methods, to

ensure that none are harmed during the works. Therefore, the following will be implemented during such works:

- Clearance will be undertaken at a time of the year when amphibians and reptiles are active (March to October) and during suitable weather conditions for them to be mobile (reasonably warm, no rain).

- Vegetation will be hand strimmed under the supervision of an ecological clerk of works (ECOW) to an initial height of 15 cm. It will be strimmed directionally, towards retained habitat. A second cut will be made to ground level at least 24 hours later to enable animals time to move away from the works area.

- Following the strimming, a destructive search will take place; this will be performed under the guidance and watching brief of an experienced ecologist, who will be present to capture any amphibians disturbed by the process, as mentioned above.

- The development site will be surrounded with suitable reptile fencing to discourage re-entry of any reptiles once they have moved out of the area. The location may need to be tweaked during installation to avoid retained vegetation.

11.9.146 On completion of the construction phase of the development, the laydown area will be re-instated, post-development, to the grassland / scrub mosaic which was present pre-construction. The reptile fence will then be removed (under the supervision of an ecologist) and any reptiles allowed to re-colonise the area.

11.9.147 As areas of suitable reptile habitat were previously lost during the construction of the K3 laydown, appropriate methods were used to remove/deter reptiles from using these areas to prevent accidental injury or death during construction works.

11.9.148 Reptiles were caught by installing an exclusion barrier fence around the reptile habitats that were lost, followed by placing artificial refugia within the area. Selective strimming of vegetation removed the extent of potential cover encouraging reptiles to use the artificial refugia. Animals using the refugia were caught and moved to a prepared receptor area.

11.9.149 The receptor site approximately matches the area of habitat from which the reptiles are being translocated, and habitats of high value for reptile species were established.

11.9.150 The receptor site is located towards the eastern end of the K3 Site. This area was previously sub-optimal habitat (ruderal) which was seeded and continues to be managed for reptiles as a grassland/scrub mosaic, with two hibernacula created (constructed from pieces of wood and rubble and part buried and capped with top soil) into which the reptiles were placed when first released on to the site.

11.9.151 The shading of the banks of the attenuation ponds by planted trees has been limited, especially on the south sides of any banks thereby creating an increase in basking areas available to reptiles.

11.9.152 Tussock-forming grassland such as cock's-foot *Dactylis glomerata* and tufted hair-grass *Descampsia cespitosa* has been planted on the banks of the attenuation ponds, to provide ideal basking, foraging and hibernation sites for reptiles.

11.9.153 Piles of dead vegetation, grass clippings etc will be heaped up in discrete piles along the bank of the attenuation pond to provide nesting sites for grass snakes. These will be positioned where they are unlikely to be disturbed during the summer months.

11.9.154 In addition, the bare ground currently present within the laydown area will be seeded with a similar tussock-forming grassland mix and planted with areas of scrub to further increase the area of reptile habitat post-development. Also, although off-site, the construction of the reedbed described below has led to the creation of 0.6 ha of additional tussocky grassland with associated benefits for reptiles and other wildlife.

Breeding birds (non-SPA)

11.9.155 The creation and retention of the attenuation pond with associated marginal vegetation on the WKN Site for other protected species will directly benefit a wide variety of breeding birds and the grassland / scrub habitat creation will provide a mosaic of vegetated areas to encourage breeding birds. Whilst tree and scrub screening landscaping once mature will provide enhanced nesting habitat.

Monitoring

11.9.156 Post-development monitoring surveys to assess the success of the mitigation outlined above will be carried out over the first five years after completion and any issues, such as the loss or reduction in any of the populations of species of conservation concern rectified through the implementation of appropriate strategies to be drawn up as necessary.

Reedbed

11.9.157 In addition to the on-site mitigation to be secured via the EMMP described above, a 1 ha reedbed along with circa 0.6 ha of tussocky grassland and 250 m of new ditch has already been established at Hartey Fen on the Isle of Sheppey to provide alternative breeding habitat for Marsh Harrier during construction as well as enhanced water vole and reptile habitat.

11.9.158 Given that, to date, Marsh Harrier has carried on nesting at the Kemsley reedbed, this new habitat on the Isle of Sheppey represents a significant enhancement for ecology.

11.10 Residual Effects of the K3 and WKN Proposed Developments

11.10.1 Residual effects are those that are predicted to remain after implementation of the mitigation measures described above. The residual effects are summarised in Table 11.7.

Significant residual effect	Receptor sensitivity	Impact magnitude	Nature	Duration	Degree of effect	Level of certainty
Construction						
The Swale SPA / Ramsar – Habitat Loss	Very High	No change	No impact	Long-term	**Not significant**	Certain
The Swale SPA / Ramsar - Drainage	Very high	Negligible	Slight	Short-term	**Not significant**	Reasonable
The Swale SPA / Ramsar – Light spill	Very high	Negligible	Slight	Short-term	**Not significant**	Reasonable
The Swale SPA / Ramsar – disturbance from people / plant	Very high	Negligible	Slight	Short-term	**Not significant**	Reasonable
The Swale SPA / Ramsar – Recreational disturbance	Very high	Negligible	No impact	Short-term	**Not significant**	Reasonable
The Swale SPA / Ramsar – Noise / vibration	Very high	Negligible	Slight	Short-term	**Not significant**	Reasonable
The Swale SPA / Ramsar - Overshadowing / line of sight	Very high	No change	No impact	Short-term	**Not significant**	Certain
The Swale SPA / Ramsar – Flight lines	Very high	No change	No impact	Short-term	**Not significant**	Certain
Medway Estuary and Marshes SPA / Ramsar – all effects	Very high	No change	No impact	Long-term	**Not significant**	Reasonable
Thames Estuary and Marshes SPA / Ramsar – all effects	Very high	No change	No impact	Long-term	**Not significant**	Reasonable
Outer Thames Estuary SPA / Ramsar – all effects	High	No change	No impact	Short-term	**Not significant**	Certain

Queensdown Warren SAC – all effects	High	No change	No impact	Short-term	**Not-significant**	Certain
Swale Estuary MCZ – drainage	High	Negligible	Slight	Short-term	**Not-significant**	Reasonable
Swale SSSI – all effects as for SPA/Ramsar	High	Negligible	Slight	Short-term	**Not-significant**	Reasonable
Medway Estuary and Marshes SSSI – all effects as per SPA/Ramsar	High	No change	No impact	Short-term	**Not-significant**	Reasonable
Elmley Island NNR – all effects as per SPA/Ramsar	High	Negligible	Slight	Short-term	**Not-significant**	Reasonable
Milton Creek LWS – all effects as per SPA/Ramsar	Medium	Negligible	Negligible	Short-term	**Not-significant**	Reasonable
Breeding bird (non-SPA) – habitat loss	Low	Negligible	Negligible	Long term	**Not-significant**	Reasonable
Breeding bird (non-SPA) – drainage	Low	Negligible	Negligible	Short term	**Not-significant**	Reasonable
Breeding bird (non-SPA) – lighting	Low	Negligible	Negligible	Short-term	**Not-significant**	Reasonable
Breeding bird (non-SPA) – movement of people / plant	Low	Negligible	Negligible	Short-term	**Not-significant**	Reasonable
Breeding bird (non-SPA) – noise	Low	Negligible	Negligible	Short-term	**Not-significant**	Reasonable
Reptiles – habitat loss	Low	Negligible	Negligible	Long-term	**Not-significant**	Reasonable

Annual beard grass – habitat loss	Low	Negligible	Negligible	Long-term	**Not-significant**	Reasonable
Operational Phase						
The Swale SPA / Ramsar – Drainage	Very high	Negligible	Slight	Long-term	**Not-significant**	Reasonable
The Swale SPA / Ramsar – light spill	Very high	Negligible	Slight	Long-term	**Not-significant**	Reasonable
The Swale SPA / Ramsar – disturbance of people and plant	Very high	Negligible	Slight	Long-term	**Not-significant**	Reasonable
The Swale SPA / Ramsar – recreational disturbance	Very high	No change	No impact	Long-term	**Not-significant**	Reasonable
The Swale SPA / Ramsar – Operational noise	Very high	No change	No impact	Long-term	**Not-significant**	Reasonable
The Swale SPA / Ramsar – Air quality	Very high	Negligible	Slight	Long-term	**Not-significant**	Reasonable
The Swale SPA / Ramsar – Overshadowing / line of sight	Very high	No change	No impact	Long-term	**Not-significant**	Reasonable
The Swale SPA / Ramsar – Flight lines	Very high	No change	No impact	Long-term	**Not-significant**	Reasonable
Medway Estuary and Marshes SPA / Ramsar – Air quality	Very high	Negligible	Slight	Long-term	**Not-significant**	Reasonable
Thames Estuary and Marshes SPA – Air quality	Very high	Negligible	Slight	Long-term	**Not-significant**	Reasonable
Queendown Warren SAC – Air quality	Very high	Negligible	Slight	Long-term	**Not-significant**	Reasonable

Swale Estuary MCZ – Drainage	High	Negligible	Slight	Long-term	**Not-significant**	Reasonable
Swale SSSI – Air quality	High	Negligible	Slight	Long-term	**Not-significant**	Reasonable
Medway Estuary and Marshes SSSI – Air quality	High	Negligible	Slight	Long-term	**Not-significant**	Reasonable
Elmley Island NNR – Air quality	High	Negligible	Slight	Long-term	**Not-significant**	Reasonable
Milton Creek LWS – all effects same as SPA/Ramsar	Medium	Negligible	Negligible	Long-term	**Not-significant**	Reasonable
Annual beard grass – lack of management	Low	Negligible	Negligible	Long-term	**Not-significant**	Reasonable
Reptiles – traffic	Low	Negligible	Negligible	Long-term	**Not-significant**	Reasonable
Reptiles – lack of management	Low	Negligible	Negligible	Long-term	**Not-significant**	Reasonable
Breeding birds (non-SPA) – light spill	Low	No change	No effect	Long-term	**Not-significant**	Reasonable
Breeding birds (non-SPA) – movement of people / plant	Low	Negligible	Negligible	Long-term	**Not-significant**	Reasonable
Breeding birds (non-SPA) – noise	Low	No change	No effect	Long-term	**Not-significant**	Reasonable
Breeding birds (non-SPA) – lack of management	Low	Negligible	Slight	Long-term	**Not-significant**	Reasonable

Table 11.7: Residual effects arising from the development

11.11 Cumulative Effects

11.11.1 The purpose of this section is to assess the cumulative effects of the WKN Proposed Development and K3 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. In order to ensure that all of the cumulative impacts from the K3 Proposed Development, WKN Proposed Development and the two combined are assessed both individually and cumulatively, the following methodology has been proposed:

- K3 Proposed Development + other cumulative developments;
- Practical effect of the K3 Proposed Development + other cumulative developments;
- WKN Proposed Development + other cumulative developments;
- WKN Proposed Development + K3 Proposed Development + other cumulative developments;
- WKN Proposed Development + practical effect of the K3 Proposed Development + other cumulative developments.
-

11.11.2 All of the relevant developments set out in Chapter 3 have been reviewed for relevance to ecology. A number are not considered any further as there are either no overlapping pathways by which cumulative effects on ecological receptors could occur (for example, residential developments), or distance (i.e. are too far away). Those that have been included are generally those that result in emissions to air.

11.11.3 The following planning applications have been considered further (planning references have been given for each project):

- 28. 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 Paper Mill Ridham Avenue Sittingbourne Kent ME10 2TD. Permitted February 2017.
- 8. 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.

- 1. 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.

- 18. 16/506935/COUNTY County Matters application for steam pipeline connecting the Ridham Dock Biomass Facility to the Kemsley 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.

- 5. SW/15/500348 – Construction of advanced thermal conversion and energy facility (4Evergreen Technologies Ltd.)

- 17. 17/505073/FULL Erection of a tile factory including service yard, storage yard and car parking area.

- 2. 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.

- 14. SW/13/1495 Variation of condition 9 of planning permission SW/11/548 (use of building 15B to install and operate materials recycling facility (MRF) and a refuse derived fuel (RDF) facility and to use existing weighbridge, weighbridge office, site office and washroom/toilets to the south of building 15a) to allow an increase of HGV movements from 58 to 98 (49 in and 49 out) for a temporary period of 12 months;

- 16. EN010090 (18/501923/ADJ) Application for an Order Granting Development Consent to decommission the existing K1 CHP on the site and build, commission and operate a new CHP plant;

11.11.4 The potential for cumulative effects between the K3 and WKN Proposed Developments 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.

11.11.5 Given the distance of the majority of these developments from the site (see Figure 3.2, Chapter 3), potential impacts from the various cumulative scenarios 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

11.11.6 Cumulative impacts from emissions to air are addressed separately below, followed by an assessment of other potential impacts not related to such emissions.

Cumulative emissions to air

11.11.7 Appendix 5.4 sets out an assessment of the cumulative impacts of emissions to air from all of the developments above for which data are available. here are four developments where there was sufficient detail to allow a PC to be added to give a cumulative PEC for ecological receptors:

- Kemsley K4 CHP PC (EN010090 (18/501923/ADJ))
- Kemsley AD (SW/11/1291)
- Reserve Power Plant PC (18/500393/FULL)
- Garden of England Energy Facility (15/500348/COUNTY)

11.11.8 The PCs for each of these four developments were added to the maximum PEC from the WKN and K3 Proposed developments to give a Cumulative PEC.

11.11.9 This shows that for the majority of receptors, there is no effect (i.e. either the cumulative PC<1% of the EQS and/or the cumulative PEC<EQS) of the other developments operating with the K3 Proposed Development and WKN Proposed Development.

11.11.10 As set out in Appendix 5.4, those features where an effect cannot immediately be excluded are shown in Table 5.4.11. This included Eurasian reed warbler and reed bunting for The Swale SPA and hen harrier/Merlin for the Medway Estuary & Marshes SPA with respect to nutrient nitrogen deposition where the cumulative PC>1% of the minimum critical load and the relevant minimum critical load is already exceeded. All species are associated with reedbed and grazing marsh habitats within which they breed or hunt across the two SPAs.

11.11.11 Both habitats in north Kent are unlikely to be very sensitive to nutrient nitrogen deposition. The APIS website from which the information with respect to critical loads is derived incorporates reedbed with other wetland habitats such as marsh and fens. It notes that the minimum critical load for these habitats listed on APIS and used in Appendix 5.4 (15 $kgN.ha^{-1}.yr^{-1}$ for reed warbler and reed bunting and 10 $kgN.ha^{-1}.yr^{-1}$ for hen harrier and merlin) represents more closely upland habitats (including, heathland) that these species are also associated with elsewhere in the country and that will be naturally more nutrient poor and therefore more susceptible to species composition change due to atmospheric nitrogen input than those in Kent. Reedbeds are, by their nature, monospecific, dominated by common reed. As such, their susceptibility to competitive exclusion by other graminoid species is considered very low. The upper end of the critical load range is therefore considered more appropriate for these habitats, set within grazing marsh which are higher nutrient systems due to the underlying nutrient status of the soils within the flood plain on which they form. Using the upper critical load for this habitat of 30 $kgN.ha^{-1}.yr^{-1}$ is therefore more appropriate meaning that the cumulative PEC does not exceed the critical load and, as such, cumulative effects in combination with the K3 and WKN Proposed Developments are not significant.

11.11.12 With respect to hen harrier and merlin, the 10 $kgN.ha^{-1}.yr^{-1}$ critical load used represents upland habitats (including, heathland) that these species are also associated with elsewhere in the country and that will be naturally more nutrient poor and therefore more susceptible to species composition change due to atmospheric nitrogen input than the grazing marsh habitats over which they forage

during winter in Kent. The majority of such habitats within the Medway system are agriculturally-improved to a greater or lesser extent and therefore the upper end of the critical load range is considered more appropriate for these habitats of 30 $kgN.ha^{-1}.yr^{-1}$. On this basis, any cumulative PEC will not exceed the critical load and, as such, cumulative effects in combination with the WKN and K3 Proposed Developments would not be significant

11.11.13 Table 5.4.11 also shows an exceedance from the cumulative PEC of the minimum critical load for nutrient nitrogen for both species of breeding tern at the Medway Estuary & Marshes SPA. The minimum critical load used is 8 $kgN.ha^{-1}.yr^{-1}$ listed on APIS as representing acid stable dune grasslands. As for hen harrier and merlin, while the tern species will both use such habitats elsewhere in the country, within the Medway Estuary system, both species breed mainly on the many salt marsh islands (Burntwick Island, for example) that occur in the river channel. As such, a more appropriate critical load would be that for early-pioneer salt marsh of 30 $kgN.ha^{-1}.yr^{-1}$. Using this figure, the cumulative PEC is only 45% of the critical load meaning that the cumulative PEC does not exceed the critical load and, as such, cumulative effects in combination with the K3 and WKN Proposed Developments are not significant.

11.11.14 Table 5.4.11 also shows two supporting habitats as having exceedances for nutrient nitrogen (shingle & sea cliff on The Swale Ramsar/SSSI and Medway Estuary & Marshes Ramsar/SSSI). However, the closest area of this habitat type within The Swale is on the eastern end of the Isle of Sheppey some 12 km from any of the developments considered. While modelling has not been undertaken in this location, given the distance, cumulative effects are considered very unlikely. The modelling presented in Appendix 5.4 combines the maximum PCs from each development to give a summed PC. This is highly conservative as there would be very little overlap between where these maximum rates of deposition occurred; none of them will occur 12 km from the K3 and WKN Proposed Developments. The nearest shingle habitats to the K3 and WKN Proposed Developments within the Medway Estuary & Marshes Ramsar/SSSI are to the north west, on the north of Deadman's Island and the southern edge of the Isle of Grain where the Medway meets the Thames Estuary & Marshes Ramsar/SSSI. While some shingle beaches may be potentially very susceptible to atmospheric nitrogen inputs, in particular where the shingle is stable and becoming vegetated, the shingle that occurs in these locations within the Medway is mostly tidal, being inundated by sea water on a twice-daily basis. This means that, in this location, they are considered to be insensitive to atmospheric nutrient nitrogen deposition with their nutrient status controlled by that of the inundating tide. On this basis, no in-combination effects are predicted.

K3 Proposed Development + other cumulative developments

16/507687/COUNTY IBA Recycling Facility

11.11.15 A detailed consideration of these impacts is provided in the Ecology Statement that accompanied this planning application. The potential for cumulative effects with the K3 as consented was considered in the planning submission for the IBA. No such effects were identified. The combination of the IBA and K3 was considered acceptable with respect to the quantum of habitat to be created in the

combined development. Given that this will not change when the K3 Proposed Development is considered, no cumulative effects are considered likely.

16/501484/COUNTY Gypsum Recycling Building

11.11.16 Various developments have been proposed or are being constructed at the Countrystyle Recycling Ltd. site 350 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 11.20] 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.

11.11.17 Given this, the lack of impacts associated with either of these pathways identified above from the K3 Proposed Development, no in-combination effects are considered likely.

SW/11/1291 - Kemsley AD Plant (DS Smith Paper)

11.11.18 The proposed Kemsley AD Plant is located on the far side of the reedbed immediately to the north of the DCO boundary. It is currently being commissioned, having been constructed during 2017/2018. In-combination impacts to the Swale SPA/Ramsar could occur via cumulative changes to air quality; such effects are considered above. No other in-combination effects are considered likely.

14/500327/OUT New Offices

11.11.19 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 495 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 with the K3 Proposed Development; therefore, there are no in-combination effects.

14/502737/EIASCO and 16/506935/COUNTY – Works at Ridham Docks

11.11.20 Ridham Docks is 1.6 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 K3 Proposed Development.

SW/15/500348 – Construction of advanced thermal conversion and energy facility (4Evergreen Technologies Ltd.)

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. The potential for in-combination effects as a result of such emissions is considered above. No other in-combination effects are considered likely.

17/505073/FULL Erection of a tile factory including service yard, storage yard and car parking area.

11.11.21 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.

11.11.22 Therefore, no residual impacts remain that could result in in-combination impacts with the K3 Proposed Development.

18/500393/FULL Erection of a natural gas fuelled reserve power plant with a maximum export capacity of up to 12MW.

11.11.23 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.

11.11.24 There are therefore potential impacts through cumulative changes to air quality. consideration of such effects is presented above. No other in-combination effects are considered likely.

SW/14/0224 – Application for a solar farm;

11.11.25 An application for a solar farm, on 38 hectares of arable farmland on the Tonge Corner Farm, near Sittingbourne, Kent.

11.11.26 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. 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.

11.11.27 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.

11.11.28 Given this, the lack of impacts associated with any of these pathways identified above from the K3 Proposed Development and that all other developments on the site are slight and not considered to have any effect on The Swale.

SW/13/1495

11.11.29 Variation of condition 9 of planning permission SW/11/548, to increase the number of HGV movements from 58 to 98 (49 in and 49 out) for a period of 12 months. The application does not provide any additional details on whether this increase in vehicular movement will impact any of the nearby designated sites. However, the 12 months sought will not overlap with the construction period of the K3 Proposed Development. Therefore, no cumulative impacts are anticipated.

EN010090 (18/501923/ADJ) K4

11.11.30 There will be no overlap between the construction activity of the K3 Proposed Development and that of K4.

There are potential impacts through cumulative changes to air quality from K4 operating with the K3 Proposed Development which are considered above. No further in-combination effects are considered likely.

Practical effect of the Proposed Development + other cumulative developments

16/507687/COUNTY IBA Recycling Facility

11.11.31 A detailed consideration of these impacts is provided in the Ecology Statement that accompanied this planning application. The potential for cumulative effects with the original K3 permission was considered in the planning submission for the IBA. No such effects were identified. The combination of the IBA and K3 was considered acceptable with respect to the quantum of habitat to be created in the combined development. Given that this will not change when the practical effect of the K3 Proposed Development is considered, no cumulative effects are considered likely.

16/501484/COUNTY Gypsum Recycling Building

11.11.32 Various developments have been proposed or are being constructed at the Countrystyle Recycling Ltd. site 350 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 11.20] 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.

11.11.33 Given this, the lack of impacts associated with either of these pathways identified above from the K3 Proposed Development, no in-combination effects are considered likely.

SW/11/1291 - Kemsley AD Plant (DS Smith Paper)

11.11.34 The proposed Kemsley AD Plant is located on the far side of the reedbed immediately to the north of the DCO boundary. It is currently being commissioned, having been constructed during 2017/2018. In-combination impacts to the Swale SPA/Ramsar could occur via cumulative changes to air quality which are considered above. No other in-combination impacts are considered likely.

14/500327/OUT New Offices

11.11.35 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 495 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 with the K3 Proposed Development; therefore, there are no in-combination effects.

14/502737/EIASCO and 16/506935/COUNTY – Works at Ridham Docks

11.11.36 Ridham Docks is 1.6 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 K3 Proposed Development.

SW/15/500348 – Construction of advanced thermal conversion and energy facility (4Evergreen Technologies Ltd.)

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, the in-combination effect of which is described above. 17/505073/FULL Erection of a tile factory including service yard, storage yard and car parking area.

11.11.37 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.

11.11.38 Therefore, no residual impacts remain that could result in in-combination impacts with the K3 Proposed Development.

18/500393/FULL Erection of a natural gas fuelled reserve power plant with a maximum export capacity of up to 12MW.

11.11.39 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.

11.11.40 There are therefore potential impacts through cumulative changes to air quality which are considered above. No other in-combination effects are considered likely.

11.11.41

SW/14/0224 – Application for a solar farm;

11.11.42 An application for a solar farm, on 38 hectares of arable farmland on the Tonge Corner Farm, near Sittingbourne, Kent.

11.11.43 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. 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.

11.11.44 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.

11.11.45 Given this, the lack of impacts associated with any of these pathways identified above from the K3 Proposed Development and that all other developments on the site are slight and not considered to have any effect on The Swale.

SW/13/1495

11.11.46 Variation of condition 9 of planning permission SW/11/548, to increase the number of HGV movements from 58 to 98 (49 in and 49 out) for a period of 12 months. The application does not provide any additional details on whether this increase in vehicular movement will impact any of the nearby designated sites. However, the 12 months sought will not overlap with the construction period of the K3 Proposed Development. Therefore, no cumulative impacts are anticipated.

EN010090 (18/501923/ADJ) K4

11.11.47 There will be no overlap between the construction activity of the K3 Proposed Development and that of K4.

There are potential impacts through cumulative changes to air quality from K4 operating with the K3 Proposed Development. These are described above. No other in-combination impacts are considered likely.

WKN Proposed Development + other relevant cumulative developments within the zone of influence of the development

16/507687/COUNTY IBA Recycling Facility

11.11.48 Given that the WKN Proposed Development is located on the same site as the permitted IBA facility, they are mutually exclusive; therefore, there can be no in combination effects between the IBA facility and the WKN Proposed Development.

16/501484/COUNTY Gypsum Recycling Building

11.11.49 Various developments have been proposed or are being constructed at the Countrystyle Recycling Ltd. site 350 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 11.19] 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.

11.11.50 WKN Proposed Development is not anticipated to have any impact upon water quality, and the embedded mitigation measures to be included are eliminating the impacts upon wintering birds. Therefore, no in-combination effects are likely with the WKN Proposed Development.

SW/11/1291 - Kemsley AD Plant (DS Smith Paper)

11.11.51 The proposed Kemsley AD Plant is located on the far side of the reedbed immediately to the north of the WKN Site. It is currently being commissioned, having been constructed during 2017/2018. In-combination impacts to the Swale SPA/Ramsar could occur via cumulative changes to air quality. An assessment of these effects is provided above. No other in-combination effects are considered likely.

14/500327/OUT New Offices

11.11.52 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 495 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 with the WKN Proposed Development; therefore, there are no in-combination effects.

14/502737/EIASCO and 16/506935/COUNTY – Works at Ridham Docks

11.11.53 Ridham Docks is 1.6 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 WKN Proposed Development.

SW/15/500348 – Construction of advanced thermal conversion and energy facility (4Evergreen Technologies Ltd.)

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. The in-combination effect of these is considered above. No other in-combination effects are considered likely.
17/505073/FULL Erection of a tile factory including service yard, storage yard and car parking area.

11.11.54 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.

11.11.55 Therefore, no residual impacts remain that could result in in-combination impacts with the WKN Proposed Development.

18/500393/FULL Erection of a natural gas fuelled reserve power plant with a maximum export capacity of up to 12MW.

11.11.56 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.

11.11.57 There are therefore potential impacts through cumulative changes to air quality. An assessment of such effects is provided above. No other in-combination effects are considered likely.

SW/14/0224 – Application for a solar farm

11.11.58 An application for a solar farm, on 38 hectares of arable farmland on the Tonge Corner Farm, near Sittingbourne, Kent.

11.11.59 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. 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.

11.11.60 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.

11.11.61 Given this, the lack of impacts associated with any of these pathways identified above from the WKN Proposed Development and that all other developments on the site are slight and not considered to have any effect on The Swale.

SW/13/1495

11.11.62 Variation of condition 9 of planning permission SW/11/548, to increase the number of HGV movements from 58 to 98 (49 in and 49 out) for a period of 12 months. The application does not provide any additional details on whether this increase in vehicular movement will impact any of the nearby designated sites. However, the 12 months sought will not overlap with the construction period of WKN Proposed Development. Therefore, no cumulative impacts are anticipated.

EN010090 (18/501923/ADJ) K4

11.11.63 It is possible that the general construction activity within the WKN Proposed Development (in combination with K4) could further make the reedbed unattractive to Marsh Harrier. However, the existing 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 WKN Proposed Development in combination with K4.

11.11.64 There are also potential impacts through cumulative changes to air quality. Such effects are considered above. No other in-combination effects are considered likely.

WKN Proposed Development + K3 Proposed Development + other relevant cumulative developments within the zone of influence of the development

16/507687/COUNTY IBA Recycling Facility

11.11.65 Given that the IBA Facility and WKN Proposed Development are mutually exclusive (since they are located on the same site), there can be no cumulative effects when considering both the WKN Proposed Development and the K3 Proposed Development.

16/501484/COUNTY Gypsum Recycling Building

11.11.66 Various developments have been proposed or are being constructed at the Countrystyle Recycling Ltd. site 350 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 11.19] 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.

11.11.67 Given this, the lack of impacts associated with either of these pathways identified above from the K3 Proposed Development, no in-combination effects are considered likely.

11.11.68 WKN Proposed Development is not anticipated to have any impact upon water quality, and the embedded mitigation measures to be included are eliminating the impacts upon wintering birds. Therefore, no in-combination effects are likely with the WKN Proposed Development.

SW/11/1291 - Kemsley AD Plant (DS Smith Paper)

11.11.69 The proposed Kemsley AD Plant is located on the far side of the reedbed immediately to the north of the DCO boundary. It is currently being commissioned, having been constructed during 2017/2018. In-combination impacts to the Swale SPA/Ramsar could occur via cumulative changes to air quality. Such effects are considered above. No other in-combination effects are considered likely.

14/500327/OUT New Offices

11.11.70 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 495 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 cumulatively, with both WKN and K3 Proposed Developments; therefore, there are no in-combination effects.

14/502737/EIASCO and 16/506935/COUNTY – Works at Ridham Docks

11.11.71 Ridham Docks is 1.6 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 K3 and WKN Proposed Developments when considering both in-combination.

17/505073/FULL Erection of a tile factory including service yard, storage yard and car parking area.

11.11.72 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.

11.11.73 Therefore, no residual impacts remain that could result in in-combination impacts with both K3 / WKN Proposed Developments together.

15/500348/COUNTY | Install advance thermal conversion and energy facility at Kemsley Fields Business Park

11.11.74 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).

11.11.75 An air quality assessment was undertaken for the site (Environmental Compliance 2014), which found that the proposed development would not negatively impact The Swale SPA / Ramsar, as the nitrogen, sulphur dioxide and ammonia levels were not modelled to be above the critical loads.

11.11.76 In-combination impacts to the Swale SPA/Ramsar could occur via cumulative changes to air quality. Such effects are considered above. No other in-combination effects are considered likely.

18/500393/FULL Erection of a natural gas fuelled reserve power plant with a maximum export capacity of up to 12MW.

11.11.77 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.

There are therefore potential impacts through cumulative changes to air quality. Such effects are considered above. No other in-combination effects are considered likely.

SW/14/0224 – Application for a solar farm;

11.11.78 An application for a solar farm, on 38 hectares of arable farmland on the Tonge Corner Farm, near Sittingbourne, Kent.

11.11.79 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. 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.

11.11.80 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.

11.11.81 Given this, the lack of impacts associated with any of these pathways identified above from the K3 Proposed Development and WKN Proposed Development in-combination and that all other developments on the site are slight and not considered to have any effect on The Swale.

SW/13/1495

11.11.82 Variation of condition 9 of planning permission SW/11/548, to increase the number of HGV movements from 58 to 98 (49 in and 49 out) for a period of 12 months. The application does not provide any additional details on whether this increase in vehicular movement will impact any of the nearby designated sites. However, the 12 months sought will not overlap with the construction period of either WKN or K3 Proposed Developments. Therefore, no cumulative impacts are anticipated.

EN010090 (18/501923/ADJ) K4

11.11.83 It is possible that the general construction activity within the WKN Proposed Development (in combination with K4) could further make the reedbed unattractive to Marsh Harrier. However, the existing 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 WKN Proposed Development in combination with K4.

11.11.84 There are potential impacts through cumulative changes to air quality. Such effects are considered above. No other in-combination effects are considered likely.

WKN Proposed Development + Practical effect of the K3 Proposed Development + other relevant cumulative developments within the zone of influence of the development

16/507687/COUNTY IBA Recycling Facility

11.11.85 Given that the IBA Facility and WKN Proposed Development are mutually exclusive (since they are located on the same site), there can be no cumulative effects when considering both the WKN Proposed Development and the K3 Proposed Development.

16/501484/COUNTY Gypsum Recycling Building

11.11.86 Various developments have been proposed or are being constructed at the Countrystyle Recycling Ltd. site 350 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 11.19] 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.

11.11.87 Given this, the lack of impacts associated with either of these pathways identified above from the K3 Proposed Development, no in-combination effects are considered likely.

11.11.88 WKN Proposed Development is not anticipated to have any impact upon water quality, and the embedded mitigation measures to be included are eliminating the impacts upon wintering birds. Therefore, no in-combination effects are likely with the WKN Proposed Development.

SW/11/1291 - Kemsley AD Plant (DS Smith Paper)

11.11.89 The proposed Kemsley AD Plant is located on the far side of the reedbed immediately to the north of the DCO boundary. It is currently being commissioned, having been constructed during 2017/2018. In-combination impacts to the Swale SPA/Ramsar could occur via cumulative changes to air quality. Such effects are considered above. No other in-combination effects are considered likely.

14/500327/OUT New Offices

11.11.90 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 495 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 cumulatively, with both WKN and K3 Proposed Developments; therefore, there are no in-combination effects.

14/502737/EIASCO and 16/506935/COUNTY – Works at Ridham Docks

11.11.91 Ridham Docks is 1.6 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 K3 and WKN Proposed Developments when considering both in-combination.

17/505073/FULL Erection of a tile factory including service yard, storage yard and car parking area.

11.11.92 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.

11.11.93 Therefore, no residual impacts remain that could result in in-combination impacts with both K3 / WKN Proposed Developments together.

15/500348/COUNTY | Install advance thermal conversion and energy facility at Kemsley Fields Business Park

11.11.94 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).

11.11.95 An air quality assessment was undertaken for the site (Environmental Compliance 2014), which found that the proposed development would not negatively impact The Swale SPA / Ramsar, as the nitrogen, sulphur dioxide and ammonia levels were not modelled to be above the critical loads.

11.11.96 In-combination impacts to the Swale SPA/Ramsar could occur via cumulative changes to air quality. Such effects are considered above. No other in-combination effects are considered likely.

18/500393/FULL Erection of a natural gas fuelled reserve power plant with a maximum export capacity of up to 12MW.

11.11.97 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.

11.11.98 There are therefore potential impacts through cumulative changes to air quality. Such effects are considered above. No other in-combination effects are considered likely.

SW/14/0224 – Application for a solar farm;

11.11.99 An application for a solar farm, on 38 hectares of arable farmland on the Tonge Corner Farm, near Sittingbourne, Kent.

11.11.100 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. 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.

11.11.101 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.

11.11.102 Given this, the lack of impacts associated with any of these pathways identified above from the K3 Proposed Development and WKN Proposed

Development in-combination and that all other developments on the site are slight and not considered to have any effect on The Swale.

SW/13/1495

11.11.103 Variation of condition 9 of planning permission SW/11/548, to increase the number of HGV movements from 58 to 98 (49 in and 49 out) for a period of 12 months. The application does not provide any additional details on whether this increase in vehicular movement will impact any of the nearby designated sites. However, the 12 months sought will not overlap with the construction period of either WKN or K3 Proposed Developments. Therefore, no cumulative impacts are anticipated.

EN010090 (18/501923/ADJ) K4

11.11.104 It is possible that the general construction activity within the WKN Proposed Development (in combination with K4) could further make the reedbed unattractive to Marsh Harrier. 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 WKN Proposed Development in combination with K4.

11.11.105 There are potential impacts through cumulative changes to air quality. Such effects are considered above. No other in-combination effects are considered likely.

References

11.1 Department for Communities and Local Government (DCLG) (2018): *National Planning Policy Framework*, London: DCLG.

11.2 Office of the Deputy Prime Minister and Department for Environment, Food and Rural Affairs (2005) *Government Circular: Biodiversity and Geological Conservation – Statutory Obligations And Their Effect Within The Planning System,* London: ODPM & DEFRA.

11.3 Office of the Deputy Prime Minister (2005) P*lanning for Biodoversity and Geological Conservation: A guide to Good Practice,* London: ODPM.

11.4 Kent Biodiversity Partnership: Kent BAP

11.5 Swale Borough Council (2015) *Bearing Fruits 2031: The Swale Borough Local Plan*. Sittingbourne: SBC.

11.6 Kent Wildlife Trusts (2008) *Swale Biodiversity Action Plan*. Available online http://www.swale.gov.uk/dso/download/1B52CE5FB1BE4BE395803E3BF4FC1084.pdf

11.7 JNCC (2010). *The Handbook for Phase 1 habitat survey – a technique for environmental audit.* Peterborough: Joint Nature Conservation Committee.

11.8 CIEEM (2013). *Guidelines for Preliminary Ecological Assessment.* Institute of Ecology and Environmental Management. Winchester: CIEEM.

11.9 Stace C. (1997). *New Flora of the British Isles 2nd Edition*. Cambridge: Cambridge University Press.

11.10 Gent,T., Gibson S. (2003). Herpetofauna Workers Manual.

11.11 Froglife (1999). Advice Sheet 10: Reptile Survey. Froglife.

11.12 Hill, D., Hockin, D., Price, D., Tucker, G., Morris, R. and Treweek, J. (1997) *Bird disturbance: improving the quality and utility of disturbance research*. Journal of Applied Ecology, 34, 275-288.

11.13 https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit#screening-for-protected-conservation-areas

11.14 IAQM (2016) Use of a Criterion for the Determination of an Insignificant Effect of Air Quality Impacts on Sensitive Habitats.

11.15 DMRB (2007) Design Manual for Roads and Bridges. Highways Agency

11.16 RSPB (2015) Birds of Conservation Concern.

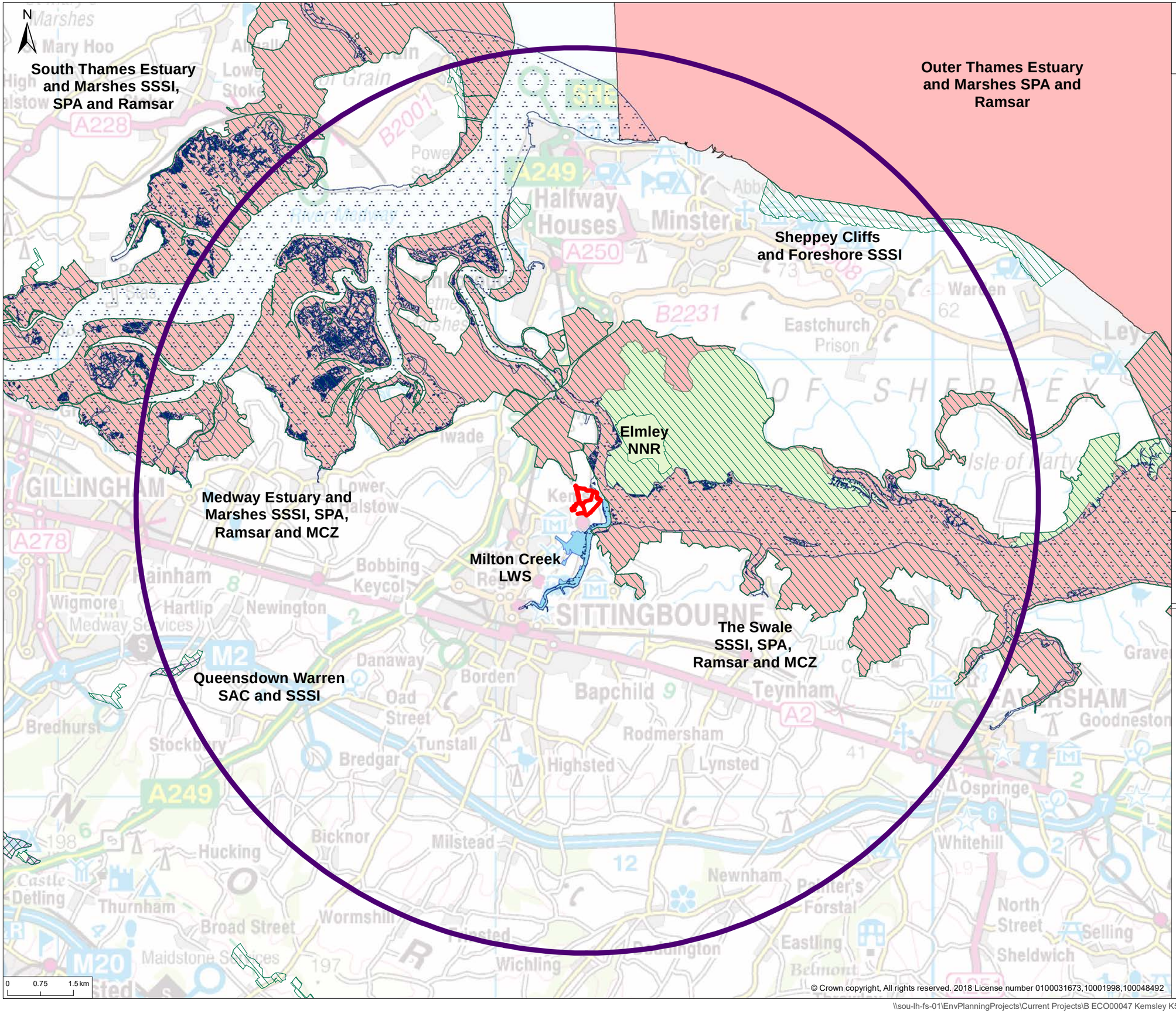
11.17 CIEEM (2018). *Guideline for Ecological Impact Assessment in the United Kingdom 3rd Edition*. Chartered Institute of Ecology and Environmental Management, Winchester.

11.18 Fernandez and Azkona (1993) H*uman disturbance affects parental care of Marsh Harriers and Nutritional Status of Nestlings* Journal of Raptor Research, 26, 257-. 259

11.19 Patricelli, G.L & Blickley, J.L (2006). Avian commuication in urban noise: causes and consequences of vocal adjustment. Auk, 123, 639-649.

11.20 SLR (2016) *Proposed Gypsum Recycling Building and Reconfiguration of Existing Lorry Park, Ridham Docks, Kent Ecological Impact Assessment*. SLR Unpublished report.

11.21 Argus Ecology (2015). *Garden of England Energy Centre Ecological assessment of air quality impacts.* Argus Ecology, Unpublished report.



Legend

- Application boundary
- 10km radius
- SPA & Ramsar
- SAC
- SSSI
- MCZ
- LWS
- NNR

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Client	Wheelabrator Technologies Inc.
Project	K3 and WKN DCO
Title	Designated Sites Location Plan

Status	Drawn By:	PM/Checked By
FINAL	HK	NB
Job Ref	**Scale @ A3**	**Date Created**
ECO00047	1:82,131	AUG 2019

Figure Number
11.1

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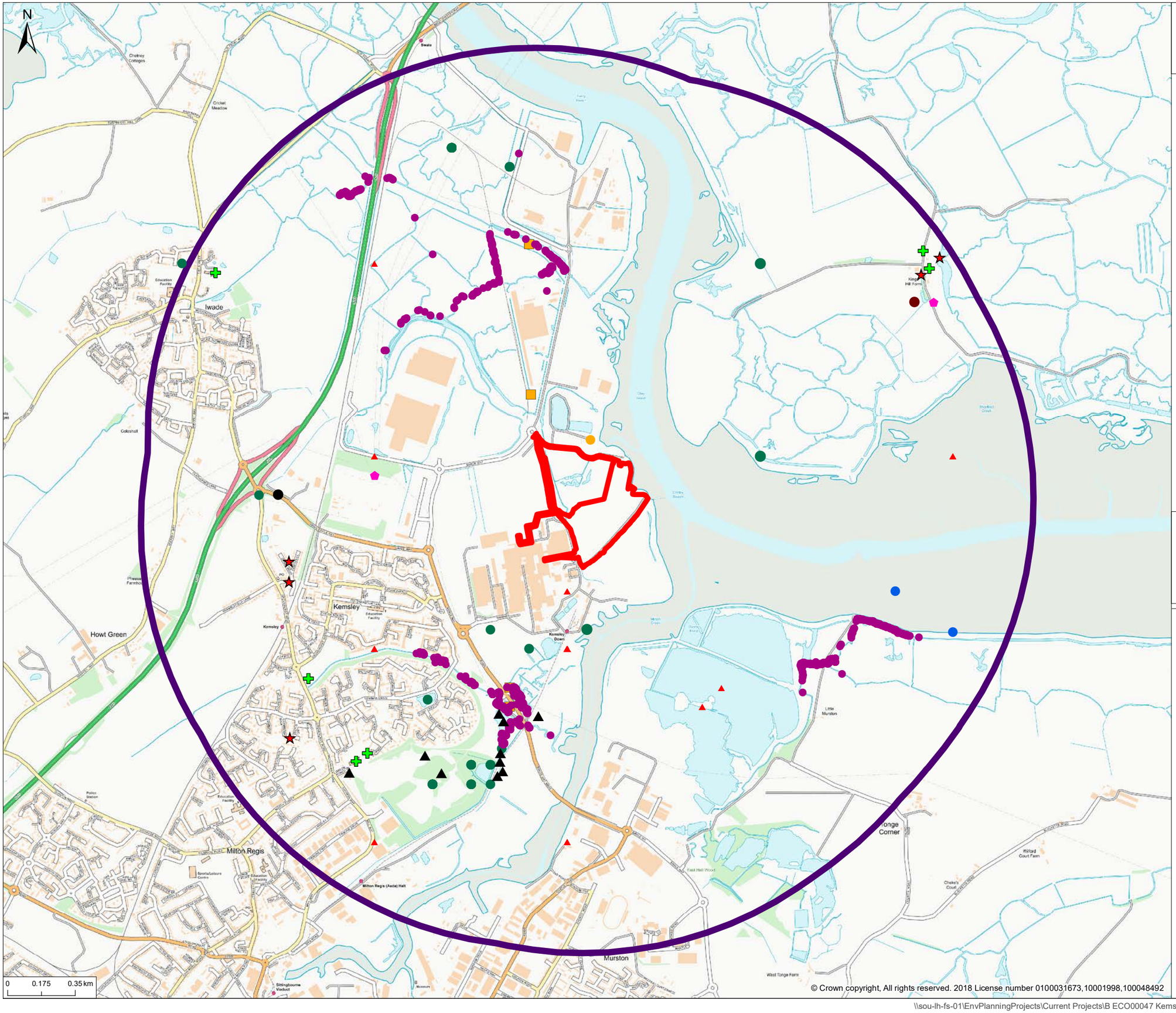

Legend

- Application boundary
- 2 km radius from site

Species

- Amphibian
- Bird
- Flora
- Mammal (common seal)
- Mammal (hedgehog)
- Mammal (stoat)
- Mammal (water shrew)
- Mammal (weasel)
- Reptile
- Water vole
- Maternity roost
- Bat roost
- Bat

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Client	Wheelabrator Technologies Inc.
Project	K3 and WKN DCO
Title	Protected Species Distributions

Status	Drawn By:	PM/Checked By
FINAL	HK	NB
Job Ref	**Scale @ A3**	**Date Created**
ECO00047	1:18,648	AUG 2019

Figure Number
11.2

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Legend

- DCO Boundary
- Dense scrub
- Short perennial
- Hardstanding
- Neutral grassland
- Swamp
- Spoil pile
- Scattered scrub
- Tall Ruderal
- Not surveyed

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Client: Wheelabrator Technologies Inc.

Project: K3 and WKN DCO

Title: K3 Phase 1 Habitat Survey

Status	Drawn By:	PM/Checked By
SUBMISSION	CR	NB
Job Ref	**Scale @ A3**	**Date Created**
OXF9812	1:3,000	SEPT 2019

Figure Number
11.3

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\\eur-mpfs-02\projects\9812 Kemsley Construction Phase\Tech\Drawings\9812-0062-004.mxd

Legend

Application boundary

dB LAmax

- <=30
- 30<=35
- 40<=45
- 35<=40
- 45<=50
- 50<=55
- 55<=60
- 60<=65
- 65<=70
- 70<=75
- 75<=80
- 85<

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Client: Wheelabrator Technologies Inc.

Project: K3 and WKN DCO

Title: Noise modelling - WKN Impact piling

Status	Drawn By:	PM/Checked By
FINAL	HK	NB
Job Ref	**Scale @ A3**	**Date Created**
ECO00047	1:3,000	AUG 2019

Figure Number
11.4

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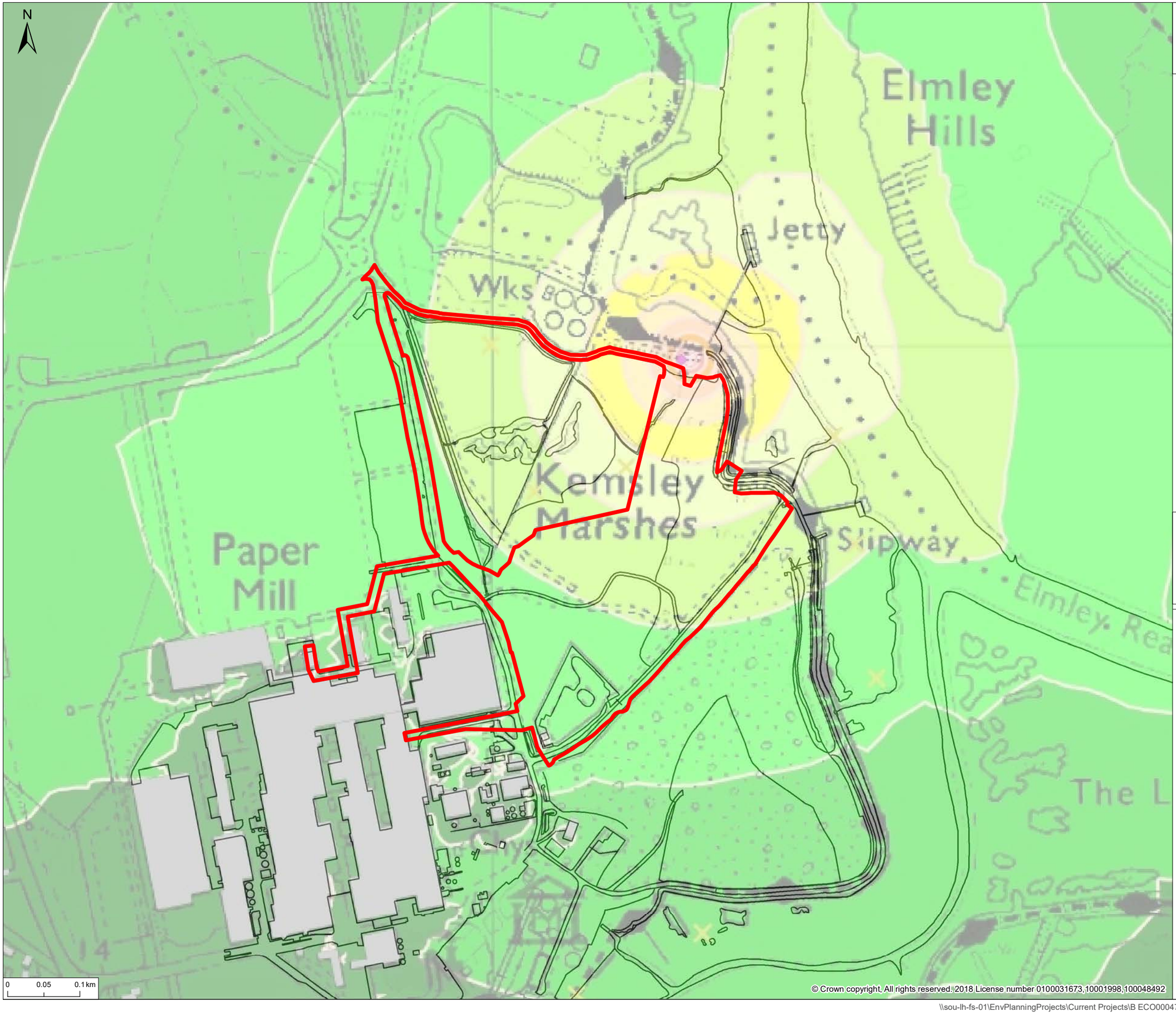

REPORT TITLE

Legend

- Application boundary
- 85dB<
- 80<=85 dB
- 75<=80 dB
- 70<=75 dB
- 65<=70 dB
- 60<=65 dB
- 55<=60 dB
- 50<=55 dB
- 45<=50 dB
- 40<=45 dB
- 30<=35 dB
- 35<=40 dB
- <=30 dB

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Client: Wheelabrator Technologies Inc.

Project: K3 and WKN DCO

Title: WKN HGV - Noise modelling

Status	Drawn By:	PM/Checked By
FINAL	HK	NB
Job Ref	**Scale @ A3**	**Date Created**
ECO00047	1:5,000	AUG 2019

Figure Number
11.5

\\sou-lh-fs-01\EnvPlanningProjects\Current Projects\B ECO00047 Kemsley K5\Tech\GIS\ECO00047_Fig11.5 (HGV Noise modelling).mxd

\\sou-lh-fs-01\EnvPlanningProjects\Current Projects\B ECO00047 Kemsley K5\Tech\GIS\ECO00047_Fig11.5 (HGV Noise modelling).mxd

REPORT TITLE

N

Legend

- Application boundary
- Permanent habitat loss
- Loss of K3 landscaping
- Temporary habitat loss (re-instated post development)
- Re-instated habitat

Habitat	Area (ha)
Permanent loss	1.56
Temporary loss (re-instated)	0.9
Bare ground to be re-instated	0.52
Loss of K3 landscaping	0.59

0 0.0275 0.055 km

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Client: Wheelabrator Technologies Inc.

Project: K3 and WKN DCO

Title: Habitat Loss / Gain

Status	Drawn By:	PM/Checked By
FINAL	HK	NB
Job Ref	**Scale @ A3**	**Date Created**
ECO00047	1:3,000	AUG 2019

Figure Number
11.6

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