RiverOak Strategic Partners

Manston Airport Development Consent Order 2018 Consultation

Preliminary Environmental Information Report (PEIR) Volume V Appendices 2.1-7.5

For consultation
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Scheme Name	Manston Airport DCO
Promoter's Name	RiverOak Strategic Partners Limited
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Suite of Consultation Documents

1.1 As part of this second statutory consultation under section 47 of the Planning Act 2008 a suite of consultation documents relating to the proposal to reopen Manston Airport is available to the public. Together, these documents give an overview of the development proposals including information on the potential benefits and impacts of the Project. The documents also provide further information about environmental considerations following further progression of environmental assessments, as well as a draft Noise Mitigation Plan that has been developed as part of the response to the 2,200 consultation responses that were received in response to the first statutory consultation held between 12 June and 23 July 2017 (‘the 2017 consultation’). Further information is also provided on how the public can submit their feedback.

1.2 Similarly to the 2017 consultation, this consultation also forms part of RiverOak’s initial engagement on the design of airspace and procedures associated with the airport. As such it is a further opportunity for members of the community to highlight any factors which they believe RiverOak should take into account during that design phase. Having taken all such factors into account, the subsequent proposals for flightpaths and airspace will be subject to a separate round of consultation once the DCO application has been made.

1.3 The suite of consultation documents includes:

1.3.1 an introduction to the consultation;

1.3.2 an updated preliminary environmental information report (‘PEIR’);

1.3.3 a non-technical summary of the PEIR;

1.3.4 an updated masterplan;

1.3.5 a Noise Mitigation Plan;

1.3.6 a Statement of Community Consultation;

1.3.7 an updated analysis of air freight and need; and

1.3.8 a feedback form.

Appendix 2.1

Appendix 2.1

Technical note:
38199 – Manston Airport DCO EIA – Fuel Farm Requirements and Options Appraisal

1. Introduction

This technical note has been produced in order to provide a summary of the high-level requirements for an airport fuel farm as part of the redevelopment of Manston Airport, and to provide an appraisal of the options as part of the fuel farm site selection.

This work will be used as part of the consideration of alternatives for a fuel farm that will inform discussions with important statutory consultees and eventually the DCO application itself.

2. Needs Case

As part of the proposals to develop and re-open Manston Airport a fuel farm will be required that is capable of providing sufficient storage and operational capacity to meet the needs of the project including particularly the air traffic generated.

An air traffic forecast, which has been produced as part of the evolving DCO application, includes an assessment of the aviation fuel storage requirements for each year of operation. It is based on the forecast number of air traffic movements for both air freight and passenger aircraft.

The fuel storage requirements for airport year 20 (the maximum year of operation) are presented in **Table 2.1** below. This includes an assessment of the number of tanker deliveries needed per year and per day, assuming an average road tanker capacity of 38,000 litres to deliver the fuel required to support the airport operations.

Table 2.1 Manston Airport Fuel Storage Requirements

	Annual Volume (KLitres)	Total Storage (Litres)	Number Annual Road Deliveries	Road Daily Deliveries
Year 20	285,620	1,600,000	7,516	20.59

3. Manston Airport Fuel Farm Requirements

The following represents the requirements that have been defined by the developer and their supporting team to support the establishment of the fuel farm. These have been produced taking into consideration constructability, cost, operational, safety/risk and environmental factors.

3.1 Existing infrastructure

Where it exists the airport fuel farm should re-use, and/or adapt existing infrastructure. This will reduce the need for new infrastructure thereby likely having a cost benefit. This will also potentially be a more environmentally sustainable option.

In addition the re-use of existing infrastructure will also reduce the need for development elsewhere therefore reducing the 'land take' required as part of the proposed development and minimising Compulsory Purchase Order (CPO) requirements.

3.2 Sufficient space and capacity

As detailed in **Table 2.1** the fuel farm should have sufficient space and capacity to meet the fuel storage requirements at airport year 20. This includes sufficient capacity for the storage of the fuel, but also for the parking of fuel delivery tankers, for the unloading of fuel deliveries, and for the transfer of fuel to the fuel delivery bowsers (should such be used).

The site should also have sufficient space and capacity to allow for the design and operation of the fuel farm to adopt Best Available Techniques (BAT) and comply with all relevant standards, guidance and best practice.

The layout should comply with the requirements of industry good practice, for example HSG 176 and the EI Guidelines on environmental management for facilities storing bulk quantities of petroleum products and other fuels.

A sufficient buffer will be needed in tankage to meet operational availability targets.

3.3 Separate and/or segregated area and access

For both safety and operational reasons it is important that the fuel farm is located in a separate (or segregated) part of the airport site, and that it also has its own separate (or segregated) access to other airport related traffic. For safety reasons, the tank farm area should:

- minimise collision potential for tankers with pedestrians and other vehicles at the airport;
- have sufficient segregation distances between the fuel tanker stands and fuel tanks to the fuel farm and airport boundary;
- control of ignition sources in zoned areas (essential by regulation);
- ideally have a dedicated road for tanker use (or if not should be able to have temporary barrier during unloading/loading); and
- have easy access (no blockage/bottlenecks) for emergency vehicle access in case of fire.

3.4 Road access

The current proposals are for the fuel farm deliveries to be via road tankers, with the average capacity of 38,000 litres per tanker. There are forecast to be an average of 20.59 deliveries per day during the maximum year of operation (year 20), which therefore equates to an average of 41.18 fuel tankers movements per day on the local highway network.

In addition to the fuel tankers the airport will also generate other road traffic movements for the air freight operations, passenger operations and for staff associated with the operation of the airport. The current proposals are that these traffic movements will utilise new and/or improved site accesses from the highways network via the Spitfire Way (B2190) and Manston Road (B2050). The airfreight cargo forecast includes an average of 178 HGV movements per day during the maximum year of operation (year 20).

Therefore it seems reasonable to, where possible, have fuel farm tanker traffic avoid using the same route as other Airport traffic. Albeit not an absolute requirements this is therefore something which is desirable.

In addition, and another advantage, is that a separate and/or segregated access will also allow for quick and easy access to the fuel farm for the emergency services in the case of an accident or incident at the fuel farm.

3.5 Landside/airside access

Currently it is being investigated whether fuel will be transported from the fuel farm to the refuelling area itself, which is of course located in the airside portion of the Airfield, by a hydrant or bowser. The Developer currently wants to leave both options open. Therefore, and because fuel tanker bowsers are not 'public road legal', the fuel farm must be located immediately adjacent to the Airfield to allow for fuel tanker bowsers direct access to the fuel farm.

3.6 Outside of Groundwater Source Protection Zone 1 (SPZ1)

The Environment Agency (EA) have defined Source Protection Zones (SPZ) around groundwater sources such as wells, boreholes and springs used for public drinking water supply. These zones show the risk of contamination from any activities that might cause pollution in the area. The closer the activity, the greater the risk. The maps show three main zones, SPZ1, SPZ2 and SPZ3, with SPZ1 the closest to the groundwater source.

The latest guidance and position statements from the EA, The Environment Agency's approach to groundwater protect (March 2017), states that they '*will oppose any new development involving large-scale above or below ground storage of hazardous substances (as may occur at a chemical works or at a petrol filling station) within SPZ1*'.

Therefore the location for the fuel farm should be outside of groundwater source protection zone 1 in order to comply with the current Environment Agency guidance and best practice.

3.7 Cost/constructability

A requirement of the DCO is to show that the proposed development is both viable and sustainable, therefore the cost and constructability of the fuel farm will be key considerations. The cost of all of the required fuel farm infrastructure, as well as the ability of this infrastructure to be constructed and delivered as part of the proposed development will be a consideration in the selection of a site for the fuel farm.

3.8 Proximity to aircraft aprons/stands and other operational considerations

The location and operation of the fuel farm should also be compatible with the operation of the airport, and not present undue or onerous restrictions on the safe and efficient operation of the airport. There should be easy access and egress for the fuel deliveries from the fuel farm to the aircraft on the aprons and stands, with minimal restrictions on the movement and delivery of the fuel.

Fuel farm should be positioned such that risk of aircraft collision with the fuel tank is reduced to as low as reasonably practicable. The position of the tank farm should also not impair take-off and landing.

3.9 Conclusions

The following represents a summary of the requirements that have been defined by the developer and their supporting team to support the establishment of the fuel farm.

- existing fuel farm infrastructure;
- sufficient space and capacity;
- separate and/or segregated access;
- road access;
- landside/airside access;

- outside of groundwater source protection zone;
- costs and constructability; and
- proximity to aircraft aprons/stands and other operational considerations.

4. Fuel Farm Options

As part of the development of the project proposals a number of alternative locations and options for a fuel farm at Manston Airport have been considered, in all cases the requirements, as outlined in Section 3 above, have been considered in relation to each fuel farm location and option.

The following location and options have been identified and considered, these include options to re-use existing facilities, and three options for a new fuel farm on site and an option for a new fuel farm off-site:

1. expansion of Jentex site;
2. re-use of former airport fuel farm;
3. new fuel farm option 1 – northern edge of airfield;
4. new fuel farm option 2 – north-western edge of airfield;
5. new fuel farm option 3 – north-eastern edge of airfield; and
6. off-site fuel farm

An outline description of each of the fuel farm options is presented below. The three potential locations for a new fuel farm have been chosen as representative of the possible locations for a fuel farm within the airport site rather than as the final locations.

4.1 Expansion of Jentex site

The Jentex Fuel Oils Ltd site is a privately operated fuels provider that has operated from a location to the southeast of Manston Airport since 1966. Prior to 1966 the site was the main fuel farm for RAF Manston. The site has a separate direct access from Canterbury Road West. Currently the site is separated from the airport via a security fence, however when previously part of the airport it did have direct airside access via a security gate.

Upgrades and improvements would be required in order to meet the airport operational needs for increased storage capacity, and to ensure that the new facility was upgraded to comply with BAT.

4.2 Re-use of Former Airport Fuel Farm

Prior to the closure of the airport the fuel farm was located on the Northern Grass, the part of the airport on the north side of the B2050 (Manston Road); this option would see the new fuel farm located on the same site. Access to the fuel farm for deliveries was from a slip road off of the B2050, The Northern Grass was not airside, and had no direct airside access, therefore fuel deliveries were required to cross the public highway (B2050) in order to gain airside access.

Upgrades and improvements would be required in order to meet the airport operational needs for increased storage capacity, and to ensure that the new facility was upgraded to comply with BAT.

4.3 New Fuel Farm Option 1

The area identified for a new fuel farm is located on the northern edge of the main airport site, in an area bounded by the B2050 (Manston Road) the north, the air freight handling facilities to the south, and the passenger terminal and apron to the east. Access to the fuel farm would be via the new proposed airport cargo facility access from the B2190 (Spitfire Way) and then via the internal access road. The site would be located airside.

As a new facility all of the infrastructure required for the fuel farm would be new.

4.4 New Fuel Farm Option 2

This area identified for a new fuel farm is located in the northwest of the main airport site, the fuel farm could be located adjacent to the new proposed airport cargo facility access from the B2190. Access would be via this new airport cargo facility access, and the site would be located airside.

As a new facility all of the infrastructure required for the fuel farm would be new.

4.5 New Fuel Farm Option 3

This area identified for a new fuel farm is located in the northeast of the main airport site, the fuel farm could be located adjacent to the proposed location for the new fire training area. Access to the fuel farm would be via the new proposed airport cargo facility access from the B2190 (Spitfire Way). The site would be located airside.

As a new facility all of the infrastructure required for the fuel farm would be new.

4.6 Off-site Fuel Farm

During consultation with the EA over the requirements for an airport fuel farm they requested that consideration be given to locating the fuel farm off of the main airport site. For this option it will be assumed that a suitable location within 5km of the airport boundary can be found, and that the site will not be subject to any planning constraints that would prevent its use as a fuel farm.

5. Fuel Farm Options Appraisal

The following section provide an options appraisal for each of the proposed fuel farm options or locations against the requirements section on above in Section 3. The approach adopted is to review each of the options against the fuel farm requirements and identify how each options performs in relation to these requirements. A quantitative approach to assessment, e.g. a scoring matrix, has not been adopted as it is considered that a qualitative approach is more appropriate for the assessment of each option. Professional judgement has been used to assess each option.

5.1 Expansion of Jentex site

Fuel Farm Requirement	Proposal	Appraisal
Existing infrastructure	As much of the existing fuel farm infrastructure as possible will be reused; although the requirement to upgrade the facility to use BAT will limit the amount that can be reused. The buildings on the site, the car parks and the construction platform will be re-used, other infrastructure will be re-used depending on its suitability. The fuel farm will use an existing site that would otherwise not be suitable for any other airport related uses.	This option performs well as it will re-use and adapt existing infrastructure which will result in a cost saving for the project, and also reduce the need for some construction works. Using this site will free up other parts of the airport site development. This will help ensure that all of the development required as part of the proposal are located within the Manston Airport boundary, with no need for any off-site development or additional land-take.
Sufficient space and capacity	The existing fuel farm site covers approx. 1.75 hectares, and the Jentex site previously had storage and capacity beyond those needed for the current airport proposals.	This options perform well as the existing site has sufficient space to accommodate the infrastructure required for the fuel farm.

Fuel Farm Requirement	Proposal	Appraisal
Separate and/or segregated area and access	The fuel farm would be located in a separate part of the airfield segregated from all other airport operations. The site is south of the runway, and no other airport operations or activities are planned for south of the runway. The site is large enough to allow sufficient segregations between the fuel tanker stand, fuel tanks, airport boundary and other airport infrastructure. Access for deliveries from the road network would be via a separate dedicated fuel farm access from Canterbury Road West.	This option performs well and will be located away from other airport infrastructure and activities, with a segregated access.
Road access	There will be a separate dedicated access from Canterbury Road West, delivery tankers would use the same highways network as other airport traffic up to the junction between the A299/B2190 (Minster Roundabout). From here tankers would continue on the A299 and then Canterbury Road West.	This options performs very well as it segregates the fuel deliveries from other airport traffic at the Minster Roundabout. Traffic calming measures through Cliffsend also mean that the use of Canterbury Road West by other HGVs is also limited. The separate access will also allow for quick and easy access to the fuel farm in the case of an accident or incident.
Landside/airside access	The fuel farm will be on the main airport site and therefore have direct airside access for fuel bowsers.	This option performs well as fuel tanker bowsers will be able to gain direct access to the fuel farm from the airport site.
Outside of Groundwater Source Protection Zone 1 (SPZ1)	The far eastern part of the existing Jentex site is within SPZ1, but the proposed fuel farm would all be located entirely outside of SPZ1.	Provided that the fuel farm is located on the west of the existing Jentex site this options performs well and complies with the current EA guidance.
Cost/constructability	There would be a cost saving in relation to the earthworks and earthmoving operations as much of the existing building platforms for the facility could be re-used. Some of the existing infrastructure, such as buildings and car parking areas, could also be reused. There is an added cost associated with the decommissioning of the existing Jentex facility (see below) that would need to be considered as part of the costs for this option.	This option performs well as a there will be the option to re-use some existing infrastructure, including the building platforms which will reduce the amount of earth moving required.
Proximity to aircraft aprons/stand and other operation considerations	This option will not create any restrictions on other airport operations due to the segregations of the fuel farm from other airport operations. The fuel tanker bowsers will have to cross the runway to pass from the fuel farm to the re-fuelling areas, but this will be controlled by the airport air traffic control. From there access to the aprons and stands would be via the taxiway network. The location of the fuel farm to the south of runway will not impair take-off or landing.	This option performs moderately as the site will be segregated from other airport operations so will not impact other operational activities, but the fuel tanker bowsers will require access across the runway. This will be controlled and restricted by the air traffic control, but with the forecast level of air traffic movements it could be managed.
Other considerations	Any of the existing Jentex fuel farm equipment which cannot be reused will be decommissioned and removed. A full site investigation will be undertaken and a programme of remediation agreed with the relevant stakeholders and consultees.	This option will have the additional benefit of removing the potential source of contamination from the existing Jentex fuel farm.

Overall this option performs well for the re-use of existing fuel farm infrastructure, including limiting the need for any additional land take, sufficient space and capacity for a fuel farm that incorporates a BAT compliant design, separate and/or segregated access, road access from the public highway, landside/airside access, and cost and constructability, and meets all of the requirements for the airport fuel farm in these areas.

The operation of the fuel farm on this site would require the movement of the fuel tanker bowsers from the fuel farm to the aprons and stands to be managed and controlled, in particular as they cross the runway they will need approval and clearance from air traffic control. But this can be managed and accommodated within the operation of the airport.

This option is located outside of SPZ1, although part of the site is close to SPZ1, therefore the tanks and other sensitive infrastructure should be located as far from SPZ1 as possible on this site. The detailed design of fuel farm on this site should incorporate Best Available Techniques, but additional assessment and modelling of the groundwater, and risk and safety associated with a fuel farm on this site should be undertaken. Regular risk reviews should be carried out through the detailed design process, and any recommendations for further risk reduction measures to achieve an ‘as low are reasonably practicable’ (ALARP) risk level should be incorporated.

5.2 Re-use of former airport fuel farm

Fuel Farm Requirement	Proposal	Appraisal
Existing infrastructure	As much of the existing fuel farm infrastructure as possible will be reused; although the requirement to upgrade the facility to use BAT will limit the amount that can be reused. Locating the fuel farm on the Northern Grass will limit the amount land available on the site for aviation related development on the Northern Grass.	This option performs moderately in the re-use and adaption of existing infrastructure; there will be the opportunity to reuse some existing infrastructure which will result in a cost saving for the project, and also reduce the need for some construction works. However locating the fuel farm on the Northern Grass will limit the amount land available on the site for aviation related development and potentially constrain future development on the airport site resulting in development pressures off-site.
Sufficient space and capacity	The existing fuel farm site will be large enough to accommodate the infrastructure for the fuel farm, if required there is also sufficient space to expand the fuel farm on the Northern Grass.	This options perform well as the existing site has sufficient space to accommodate the infrastructure required for the fuel farm.
Separate and/or segregated area and access	The fuel farm would be located on the Northern Grass which has been identified within the masterplan for aviation related development, but will not be airside. There would need to be a suitable segregation between the fuel farm and the other aviation related development on the Northern Grass. Access for deliveries from the road network would be via a separate dedicated fuel farm access. Delivery tankers would be segregated from other airport traffic.	This option performs moderately and will be located away from other airside airport infrastructure and activities, with a segregated access. However there would need to be a suitable segregation between the fuel farm and other development on the Northern Grass which may limit the area available for development.
Road access	There will be a separate dedicated access from the B2050 (Manston Road), but in order to access the site the delivery tankers would use the same highways network as other airport traffic.	This options does not meet the requirements as road tankers will use the same road network as other airport traffic, including the passenger traffic which will use the B2050 (Manston Road). In addition in order to gain access from the fuel farm to the main airport site the fuel tanker bowsers will also have to cross the B2050.
Landside/airside access	The fuel farm will be on the Northern Grass which will not be airside. Therefore there will be no direct access	This option does not meet the requirements to provide direct airside access from the fuel farm.

Fuel Farm Requirement	Proposal	Appraisal
	to the main airport site or airside access for fuel bowsers.	
Outside of Groundwater Source Protection Zone 1 (SPZ1)	This site is outside of SPZ1.	This option perform well being located outside of SPZ1.
Cost/constructability	There would be a cost saving in relation to the earthworks and earthmoving operations as much of the existing building platforms for the facility could be re-used.	This option performs well as a there will be the option to re-use some existing infrastructure, including the building platforms which will reduce the amount of earth moving required.
Proximity to aircraft aprons/stand and other operation considerations	There will be no direct easy access from the fuel farm to the aprons and stands as the fuel farm will be located on the Northern Grass which is not airside. The fuel tanker bowsers will have to cross the B2050, as these vehicles are not road legal there, therefore there would need to be a suitable internal road or route to provide access to the aprons and stands from the fuel farm. The location of the fuel farm on the Northern Grass will not impair take-off or landing.	This option performs moderately as the fuel farm will be segregated from other airport operations and will provide the most reduced risk of aircraft collision being located the furthest from the runway. However it may limit the operation of any aviation related development on the Northern Grass in the proximity of the fuel farm. However there will be restrictions on the delivery of fuel from the fuel farm to the aprons and stands. A solution to allow the fuel delivery bowsers to cross the public road would be needed, and the interaction of these movements with other users of the B2050 would need to be managed.

Overall this option performs well for sufficient space and capacity for a fuel farm that incorporates a BAT compliant design, is located outside of groundwater source protection zone 1, and for cost and constructability, and meets all of the requirements for the airport fuel farm in these areas.

The options performs moderately against the requirements for reuse and adaption of existing infrastructure, separate and/or segregated area and access, and proximity to aircraft aprons/stand and other operation considerations. Whilst this option meets some of the requirements in these areas, it does not meet all of them.

The operation of the fuel farm on this site would require the movement of the fuel tanker bowsers from the fuel farm to the aprons and stands to be managed and controlled, in particular as they cross the runway they will need approval and clearance from air traffic control. But this can be managed and accommodated within the operation of the airport.

This option does not meet the requirements for road access, as the fuel deliveries will use the same road network as other airport traffic, or for landside/airside access, as it will not be located airside. Both of these requirements mean that there will be an increase in the interaction between the fuel deliveries and other traffic associated with the airport.

5.3 New fuel farm option 1 – northern edge of airfield

Fuel Farm Requirement	Proposal	Appraisal
Existing infrastructure	This option is for a new fuel farm, therefore there will be no re-use or adaption of existing infrastructure. The fuel farm will also be located on the main airport site alongside other airport infrastructure in the area currently planned for the air freight handling operations.	This option does not meet the requirement as all of the infrastructure for the fuel farm will be new. In addition the fuel farm may limit the land available for other development, either directly due to the land take of the fuel farm, or indirectly due to the

Fuel Farm Requirement	Proposal	Appraisal
		requirements to maintain safe working distances between the fuel farm and other operations.
Sufficient space and capacity	The site is new, and subject to detailed design there would be sufficient space to allow the construction of the required infrastructure.	This option performs well as the option is for a new fuel farm which can be sited to accommodate the needs.
Separate and/or segregated area and access	The fuel farm would be located on the main airport site adjacent to other airport operations. The location is also close to parking area for the air freight operation and also the passenger terminal and aprons. The access would be the same as the main airport access for the air freight operations, and	This option does not meet the requirement as the access for fuel deliveries will be the same as for the air freight operations, and the fuel farm will be located alongside other airport infrastructure and operations. The fuel delivery tankers will be required to use the same internal road network as the vehicles associated with the freight operations.
Road access	The fuel delivery tankers will use the same highways network as other airport traffic, the A299, Minster Roundabout and A2190 (Spitfire Way).	This options does not meet the requirements as road tankers will use the same road network as other airport traffic.
Landside/airside access	The fuel farm will be on the main airport site and will be located airside.	This option performs well as it will be located on the main airport site with direct airside access.
Outside of Groundwater Source Protection Zone 1 (SPZ1)	This site is outside of SPZ1.	This option perform well being located outside of SPZ1.
Cost/constructability	All of the infrastructure for this option would be new, although some of the earthworks required for this option would be required as part development of the airport taxiway, internal road and other developments in this part of the airport site.	This option performs moderately as all of the infrastructure required for this option is new.
Proximity to aircraft aprons/stand and other operation considerations	The area for this option is in close proximity to the passenger apron and stands, with a clear route from the fuel farm to the air freight apron and stands. The location of the fuel farm will not impair take-off or landing.	This option performs well as the fuel farm will have easy access to/from the apron and stands.
Other considerations	Dependant on the final location, layout and design this site may be in front of the museum quarter where the relocated RAF Manston and Spitfire & Hurricane Museums would be located.	Feedback from consultees on the plans for the museums indicates that there should still be a clear visual pathway from users of the museum to the runway. A fuel farm in this location may block any view

Overall this option performs well for sufficient space and capacity for a fuel farm that incorporates a BAT compliant design, for landside/airside access, is located outside of groundwater source protection zone 1, and for proximity to aircraft aprons/stand and other operation considerations, and meets all of the requirements for the airport fuel farm in these areas.

The options performs moderately against the requirements for cost/constructability as all of the fuel farm infrastructure required will be new. However some of the required works, such as the earthworks and construction of roads and parking areas, will be required as part of the other airport development in this part of the site.

This option does not meet the requirements for reuse and adaption of existing infrastructure, as all of the fuel farm infrastructure will be new, and it will potentially limit the space available for other airside development; for separate and/or segregated area and access, as the fuel farm will be located alongside other airport infrastructure and use the same access as other airport traffic; or for road access, as the fuel deliveries will use the same road network as other airport traffic.

5.4 New fuel farm option 2 – north-western edge of airfield

Fuel Farm Requirement	Proposal	Appraisal
Existing infrastructure	This option is for a new fuel farm, therefore there will be no re-use or adaption of existing infrastructure. The fuel farm will also be located on the main airport site alongside other airport infrastructure, and the fuel farm may limit the land available for other development, either directly due to the land take of the fuel farm, or indirectly due to the requirements to maintain safe working distances between the fuel farm and other operations.	This option does not meet the requirements as all of the infrastructure for the fuel farm will be new. In addition the fuel farm may limit the space available for other airport development.
Sufficient space and capacity	The site is new, and subject to detailed design there would be sufficient space to allow the construction of the required infrastructure.	This option performs well as the option is for a new fuel farm which can be sited to accommodate the needs.
Separate and/or segregated area and access	The fuel farm would be located on the main airport site adjacent to other airport operations. The location is also close to the main access to the airport for the air freight operations. The access would be the same as the main airport access for the air freight operations.	This option does not meet the requirements as the access will be the same as for the air freight operations. The fuel bowsers will be required to use the same internal road network as the vehicles associated with the freight operations.
Road access	The fuel delivery tankers will use the same highways network as other airport traffic.	This options does not meet the requirements as road tankers will use the same road network as other airport traffic.
Landside/airside access	The fuel farm will be on the main airport site and will be located airside.	This option performs well as it will be located on the main airport site with direct airside access.
Outside of Groundwater Source Protection Zone 1 (SPZ1)	This site is outside of SPZ1.	This option performs well being located outside of SPZ1.
Cost/constructability	All of the infrastructure for this option would be new, although some of the earthworks required for this option would be required as part development of the airport taxiway, internal road and other developments in this part of the airport site.	This option performs moderately as all of the infrastructure required for this option is new.
Proximity to aircraft aprons/stand and other operation considerations	This option will be located in an area bounded by the main air freight access and internal road to the north, the air freight apron and stands to the east, and the main taxiway Alpha to the south. The area for this option is in close proximity to the main taxiway (Alpha), and the route from the fuel farm to the apron and stands would be along the taxiway. This would affect the operation of either the fuel farm or airport as aircraft would not be able to wait on the taxiway at the same time as fuel bowsers were moving. The location of the fuel farm will not impair take-off or landing, but as noted may affect the use of the taxiway.	This option performs moderately as the fuel farm will have easy access to/from the apron and stands. But the close proximity to taxiway Alpha and need of the fuel bowser to use the taxiway to access the refuelling areas will result in some operational restrictions.

Overall this option performs well for sufficient space and capacity for a fuel farm that incorporates a BAT compliant design, for landside/airside access, is located outside of groundwater source protection zone 1, and meets all of the requirements for the airport fuel farm in these areas.

The options performs moderately against the requirements for cost/constructability as all of the fuel farm infrastructure required will be new, and for proximity to aircraft aprons/stand and other operation considerations. However some of the required works, such as the earthworks and construction of roads and parking areas, will be required as part of the other airport development in this part of the site. The fuel farm will have direct access to the aprons and stands, but the fuel farm is located adjacent to taxiway Alpha, which may place some operational restrictions on the fuel farm and other airport operations.

This option does not meet the requirements for reuse and adaption of existing infrastructure, as all of the fuel farm infrastructure will be new, and it will potentially limit the space available for other airside development; for separate and/or segregated area and access, as the fuel farm will be located alongside other airport infrastructure and use the same access as other airport traffic; or for road access, as the fuel deliveries will use the same road network as other airport traffic.

5.5 New fuel farm option 3 – north-eastern edge of airfield

Fuel Farm Requirement	Proposal	Appraisal
Existing infrastructure	This option is for a new fuel farm, therefore there will be no re-use or adaption of existing infrastructure. The fuel farm will also be located on the main airport site alongside other airport infrastructure in the area currently planned for fixed base of operations (FBO) facility, flight training school and the firefighting training area. The fuel farm may limit the land available for other development, either directly due to the land take of the fuel farm, or indirectly due to the requirements to maintain safe working distances between the fuel farm and other operations.	This option does not meet the requirements as all of the infrastructure for the fuel farm will be new. In addition the fuel farm may limit the space available for other airport development.
Sufficient space and capacity	The site is new, and subject to detailed design there would be sufficient space to allow the construction of the required infrastructure.	This option performs well as the option is for a new fuel farm which can be sited to accommodate the needs.
Separate and/or segregated area and access	The fuel farm would be located on the main airport site adjacent to other airport operations. The location is also close to parking area for the air freight operation and also the passenger terminal and aprons. The access would be the same as the airport for the FBO and flight training school	This option does not meet the requirements as the access for fuel deliveries will be the same as for the air freight operations. The fuel delivery tankers will be required to use the same internal road network as the vehicles associated with the freight operations.
Road access	The fuel delivery tankers will use the same highways network as other airport traffic and would enter the airport site from the same access as the passenger traffic from the B2050 (Manston Road).	This options does not meet the requirements as road tankers will use the same road network as other airport traffic, in particular the road tankers will be travelling on the same roads at the airport passengers.
Landside/airside access	The fuel farm will be on the main airport site and will be located airside.	This option performs well as it will be located on the main airport site with direct airside access.
Outside of Groundwater Source Protection Zone 1 (SPZ1)	This site is outside of SPZ1.	This option perform well being located outside of SPZ1.
Cost/constructability	All of the infrastructure for this option would be new.	This option performs poorly as all of the infrastructure required for this option is new.

Fuel Farm Requirement	Proposal	Appraisal
Proximity to aircraft aprons/stand and other operation considerations	This option will be located in an area bounded by the B2050 (Manston Road) the north, the air freight handling facilities to the south, and the passenger terminal and apron to the east. The area for this option is in close proximity to the passenger apron and stands, with a clear route from the fuel farm to the air freight apron and stands. The location of the fuel farm will not impair take-off or landing.	This option performs well as the fuel farm will have easy access to/from the apron and stands.
Other considerations	The area identified for this option is the planned location for the airport fire training area, having been used for this purpose when the airport previously operated.	It is unlikely that approval would be granted to site the fire training area and fuel farm on the same part of the site. Therefore a new area would need to be identified for the fire training area.

Overall this option performs well for sufficient space and capacity for a fuel farm that incorporates a BAT compliant design, for landside/airside access, is located outside of groundwater source protection zone 1, and for proximity to aircraft aprons/stand and other operation considerations, and meets all of the requirements for the airport fuel farm in these areas.

The options performs poorly against the requirements for cost/constructability as all of the fuel farm infrastructure required will be new.

This option does not meet the requirements for reuse and adaption of existing infrastructure, as all of the fuel farm infrastructure will be new, and it will potentially limit the space available for other airside development; for separate and/or segregated area and access, as the fuel farm will use the same access as other airport traffic; or for road access, as the fuel deliveries will use the same road network as other airport traffic.

5.6 Off-site fuel farm

Fuel Farm Requirement	Proposal	Appraisal
Existing infrastructure	This option is for a new fuel farm, therefore there will be no re-use or adaption of existing infrastructure. The fuel farm in this option will be located off-site, which will require additional land outside of the current project red-line boundary.	This option does not meet the requirements as all of the infrastructure for the fuel farm will be new, and it will require additional off-site land take.
Sufficient space and capacity	The site is new, and a site would be selected that would have sufficient space to allow the construction of the required infrastructure.	This option performs well as the option is for a new fuel farm which can be sited to accommodate the needs.
Separate and/or segregated area and access	As the fuel farm would be located off-site the location could be chosen to ensure sufficient separation from the other airport operation and infrastructure. A separated and dedicated access, with good access for emergency services, would be a key consideration in the site selection.	This option performs well as it would be located off-site away from other airport infrastructure with a separate access.
Road access	Dependant on the location the fuel delivery tankers may use the some of the same highways network as other airport traffic.	This performance of this option is dependent on the chosen location, but it is expected that a site will be chosen that limits the interactions on the public highway of fuel farm and other airport traffic.
Landside/airside access	The fuel farm will be located off-site and therefore will not be located airside. Dependant on the location the	This option does not meet the requirement as it will be located off-site with no direct airside access.

Fuel Farm Requirement	Proposal	Appraisal
	method for the transfer of fuel from the storage tanks to the fuel bowsers would need to be established.	
Outside of Groundwater Source Protection Zone 1 (SPZ1)	This site is outside of SPZ1.	This option perform well being located outside of SPZ1.
Cost/constructability	All of the infrastructure for this option would be new, in addition there may be unknown costs and construction issues associated with the chose site.	This option performs poorly as all of the infrastructure required for this option is new.
Proximity to aircraft aprons/stand and other operation considerations	This option will be located off-site so will not affect other airport operations or activities. As the fuel farm will be located off-site it is not certain how the delivery of fuel to the aprons and stands will be achieved. If the site is within close proximity to the main airport site then a pipeline system could be utilised, although this would have additional costs, construction, risk & safety and environmental considerations. The chose site may limit the option to use fuel delivery bowsers, as they will need to use the public roads. The location of the fuel farm will not impair take-off or landing.	This option does not meet the requirements as it is located off-site with no easy access to/from the fuel farm for the fuel delivery bowsers that does not use the public roads.

Overall this option performs well for sufficient space and capacity for a fuel farm that incorporates a BAT compliant design, for landside/airside access, for separate and/or segregated area and access, for road access, and is located outside of groundwater source protection zone 1, and meets all of the requirements for the airport fuel farm in these areas.

The options performs poorly against the requirements for cost/constructability as all of the fuel farm infrastructure required will be new, in addition there maybe additional unknown and/or unforeseen costs and construction issues associated with the chosen site.

This option does not meet the requirements for reuse and adaption of existing infrastructure, as all of the fuel farm infrastructure will be new, landside/airside access, as the fuel farm will be located off-site with no direct airside access, or for proximity to aircraft aprons/stand as the fuel farm will be situated off-site with no easy access to the aprons and stands.

6. Summary and Conclusions

Each of the six options for the Manston Airport fuel farm have been assessed against the fuel farm requirements identified in Section 3.

6.1 Conclusions

The appraisal of the six identified that the adaptation of the Jentex site (Option 1) as the site for the Manston Airport fuel farm performs best against all of the requirements. This options performs well against six of the eight fuel farm requirements.

For proximity to aircraft aprons/stand and other operation considerations this option performs moderately well, the fuel farm will have easy access to the aprons and stands via the internal airport road network, but the fuel bowsers would be required to cross the runway. Movements across the runway, as is standard, would need to be managed and controlled by the air traffic control, this would place some restriction on the operation of the fuel farm. But these could be managed, and would not affect the efficient of the fuel farm.

Part of the Jentex site is located within SPZ1, but the site is large enough to ensure that the fuel farm can be located outside of SPZ1, therefore this option performs well against this requirement. It is recognised that addition work to look at the risks to groundwater and the SPZ is required, this would include more detailed design to identify potential embedded mitigation, additional groundwater modelling and update to Hydrogeological Risk Assessment, safety & risk studies of fuel farm design and an update of the Drainage Strategy with specific measures for the fuel farm.

The final detailed design of the fuel farm, and of the embedded mitigation, will be completed to recognise that due to the risks associated with the location it needs to go beyond standard practice and incorporate special measures.

Author	Reviewer
……………………………………………………………..	……………………………………………………………..
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Appendix 3.1

Appendix 3.1
Glossary of Abbreviations and Airport Terms

Abbreviation	Description
AA	Appropriate Assessment
AAI	Area of Archaeological Importance
AAWT	Average Annual Weekly Traffic
AC	The Airports Commission
AERMIC	Regulatory Model Improvement Committee
AHLV	Area of High Landscape Value
ALC	Agricultural Land Classification
AMIE	Archives Monuments Information England
AMS	American Meteorological Society
AOD	Above Ordnance Datum
AONB	Area of Outstanding Natural Beauty
AOS	Area of Search
APF	Aviation Policy Framework
AQAL	Air Quality Assessment Levels
AQMA	Air Quality Management Area
AQMAU	Air Quality Modelling and Assessment Unit
AQO	Air Quality Objectives
ATC	Air traffic control
ATM	Air traffic movement
ATS	Air traffic services
ATZ	Aerodrome Traffic Zone
BAA	British Airports Authority (now known as Heathrow Airport Holdings Limited)

Abbreviation	Description
BAP	Biodiversity Action Plan: A strategy for conserving and enhancing wild species and wildlife habitats in the UK
BAT	Best Available Techniques
BBS	Breeding Birds Survey
BFI	Baseflow Index
BGS	British Geological Survey
BMS	Biodiversity Mitigation Strategy
BMV	Best and Most Versatile
bn	Billion
BOA	Biodiversity Opportunity Area
BoCC	Birds of Conservation Concern
BoR	Book of Reference
BRES	Business Registration and Employment Survey
BS	British Standard
CAA	Civil Aviation Authority
CAP 168	Civil Aviation Publication 168 on licensing of aerodromes
CAP 670	Civil Aviation Publication 670 on air traffic services safety requirements
CAP 725	Civil Aviation Publication 725 on airspace change
CAP 772	Wildlife Hazard Management at Aerodromes
CBA	Cost Benefit Analysis
CCC	Canterbury City Council
CCS	Considerate Contractor's Scheme
CCTV	Closed Circuit Television
CDM (Regulations)	Construction (Design and Management) Regulations 2007
CEMP	Construction Environmental Management Plan
CERC	Cambridge Environmental Research Consultants

Abbreviation	Description
CFMP	Catchment Flood Management Plan
CIEEM	Chartered Institute of Ecology and Environmental Management
CIfA	Chartered Institute for Archaeologists
CO	Conservation Objective
CoCP	Code of Construction Practice
COSHH	Control of Substances Hazardous to Health
CPD	Contractor Project Director
CPO	Compulsory Purchase Order
CTR	London Control Zone
DAS	Design and Access Statement
dB	decibel
DCLG	Department for Communities and Local Government
DCO	Development Consent Order
DDC	Dover District Council
DEFRA	Department for the Environment, Food and Rural Affairs
DfT	Department for Transport
DMP	Drainage Management Plan
DMRB	Design Manual for Roads and Bridges
EA	Environment Agency
EASA	European Aviation Safety Agency, who certify airports
EC	European Commission
EcIA	Ecological Impact Assessment
ECoW	Ecological Clerk of Works
EFT	Emission Factor Toolkit
EH	English Heritage

Abbreviation	Description
EHO	Environmental Health Officer
EIA	Environmental Impact Assessment
EIA Regulations	Infrastructure Planning (Environmental Impact Assessment) Regulations 2009
ELF	Extremely low frequency
EM	Explanatory Memorandum
EPUK	Environmental Protection United Kingdom
ES	Environmental Statement
ESA	Environmentally Sensitive Area
EU	European Union
EUROCONTROL	European Organisation for the Safety of Air Navigation
EWS	Emergency Water System
FAA	Federal Aviation Administration
FBO	Fixed Base Operations
FOI	Freedom of Information
FRA	Flood Risk Assessment
GCR	Geological Conservation Review Site
GCN	Great Crested Newt
GDP	Gross Domestic Product
GEP	Good Ecological Potential
GES	Good Ecological Status
GLVIA	Guidelines for Landscape and Visual Assessment
GPLC	Guideline Principals of Land Contamination
GPS	Global positioning system
GSE	Ground Support Equipment
GW	Gigawatt (1000 million Watts)

Abbreviation	Description
GWTDE	Ground water dependant terrestrial ecosystem
Ha	Hectare
HC	Hydrocarbons
HE	Historic England
HER	Historic Environment Record
HGV	Heavy Goods Vehicle
HIA	Health Impact Assessment
HghE	Highways England
HLC	Historic Landscape Characterisation
HMWB	Heavily Modified Waterbody
HRA	Habitat Regulations Assessment
Hz	Hertz
IAQM	Institute of Air Quality Management
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
ICNIRP	International Commission on Non-Ionising Radiation Protection
ICT	Information and communications technology
IDB	Internal Drainage Board
IEA	Institute of Environmental Assessment
IEMA	Institute of Environmental Management and Assessment
ILS	Instrument Landing System
IMD	Index of Multiple Deprivation
IPC	Infrastructure Planning Commission - now replaced by PINS
IPCC	Intergovernmental Panel on Climate Change
JNCC	Joint Nature Conservation Committee

Abbreviation	Description
KCC	Kent County Council
km	Kilometre
kV	Kilovolt (1000 Volts)
KWT	Kent Wildlife Trust
LA	Local Authority
LAeq	Equivalent Continuous Level
LAQM	Local Air Quality Management
LBAP	Local Biodiversity Action Plan
LCA	Landscape Character Assessment
LCC	Low cost carrier
LDF	Local Development Framework
LDV	Light Duty Vehicles
LGP	Long Grass Policy
Listed Building	A building of special architectural or historic interest which has been included on a list approved by the Secretary of State under the Planning (Listed Buildings and Conservation Areas) Act 1990 (known as the "Statutory List of Buildings of Special Architectural or Historic Interest")
LNR	Local Nature Reserve
LoD	Limits of Deviation
LPA	Local Planning Authority
LSOA	Lower Super Output Area
LVIA	Landscape and Visual Impact Assessment
LWS	Local Wildlife Site
m	Metre
MAG	Manchester Airport Group
MAGIC	Multi-Agency Geographic Information for the Countryside
MEDA	Master Emergency Diversion Airfield

Abbreviation	Description
MOD	Ministry of Defence
MRO	Maintenance, repair and overhaul
MSA	Mineral Safeguarding Area
MW	Megawatt (1 Million Watts)
NAQS	National Air Quality Strategy
NATS	National Air Traffic Service
NCA	National Character Area
NE	Natural England
NGR	National Grid Reference
NH_3	Ammonia
NLCA	National Landscape Character Area
NLSML	National Library of Scotland Map Library
NO	Nitrogen Monoxide
NO_x	Oxides of Nitrogen
NO_2	Nitrogen Dioxide
NNR	National Nature Reserve
NPPF	National Planning Policy Framework
NPPG	National Planning Policy Guidance
NPS	National Policy Statement
NPSE	Noise Policy Statement for England
NRMM	Non-road Mobile Machinery
NSIP	Nationally Significant Infrastructure Project
NT	National Trust
NVC	National Vegetation Classification
O_3	Ozone

Abbreviation	Description
OLS	Obstacle Limitation Surface
OS	Ordnance Survey
OuE	European Odour Unit
OWMP	Outline Waste Management Plan
Pb	Lead
PC	Process Contribution
PCH	potential collision height
PEC	Predicted Environmental Concentration
PEIR	Preliminary Environmental Information Report
PFRA	Preliminary Flood Risk Assessment
PHE	Public Health England
PICP	Pollution Incident Control Plan
PILs	Persons with an interest in land
PINS	Planning Inspectorate
Planning Act	Planning Act 2008
PM	Particulate Matter
PPA	Planning Performance Agreement
PPE	Personal Protective Equipment
PPG	Pollution Prevention Guidance
PPS	Planning Policy Statement
PQC	Pavement Quality Concrete
Project	Manston Airport Project
PRoW	Public Right of Way
Q	Quarter
RAF	Royal Air Force

Abbreviation	Description
Ramsar	Sites designated under the Ramsar Convention. Designation covers all aspects of wetland conservation and wise use, recognising wetlands as ecosystems that are extremely important for biodiversity conservation in general and for the well-being of human communities
RAF	Royal Air Force
RBMP	River basin Management Plan
RCP	Richborough Connection Project
RF	Radio Frequency
RFFS	Rescue and Fire Fighting Services
RIGS	Regionally Important Geological Site
RPG	Registered Park and Gardens
RSPB	Royal Society for the Protection of Birds
RSP	RiverOak Strategic Partners
SAC	Special Area of Conservation
SCI	Site of Community Importance
SERF	South-East Research Framework
SHE	Safety Health and Environment Plan
SFRA	Strategic Flood Risk Assessment
SLA	Special Landscape Area
SM	Scheduled Monument
SMP	Soil Management Plan
SO_2	Sulphur Dioxide
SoCC	Statement of Community Consultation
SoCG	Statement of Common Ground
SOR	Strategic Optioneering Report
SoS	Secretary of State
SPA	Special Protection Area

Abbreviation	Description
SPZ	Source Protection Zone
SRN	Strategic Road Network
SSSI	Site of Special Scientific Interest
SuDS	Sustainable Drainage Systems
SW	Southern Water
SWMP	Site Waste Management Plan
TA	Transport Assessment
TCF	Technical Construction File
TDC	Thanet District Council
TfL	Transport for London
TEP	The Environment Partnership
TG	Technical Guidance
TMZ	Transponder Mandatory Zone, where aircraft must use transponders at lower heights than usual
TP	Travel Plan
TPO	Tree Preservation Order
UG	Underground
IOD	Unique Identifier
UK	United Kingdom
UKBAP	UK Biodiversity Action Plan
USAF	United States Air Force
VOCs	Volatile Organic Compounds
WFD	Water Framework Directive
WHO	World Health Organisation
WHS	World Heritage Site
WMP	Waste Management Plan

Abbreviation	Description
WSI	Written Scheme of Investigation
WTO	World Trade Organisation
ZOI	Zone of Influence
ZTV	Zone of Theoretical Visibility
ZVI	Zone of Visual Influence

Aviation Term	Description
Aeroplane Design Code	Alphabetic code for defining aircraft size based on wingspan from A (smallest) to F (largest).
Aircraft Classification Number (ACN)	Number expressing the relative effect of an aircraft on the runway pavement for a specified standard subgrade category;
Aircraft Hangar	A building for housing aircraft.
Aircraft Stand	A designated area on an apron intended to be used for parking an aircraft.
Air freight	The carriage of goods by aircraft
Airside	The part of the airport accessible to aircraft, access to airside from landside controlled by one or all of security, passport and customs checks
Air Traffic Control (ATC)	Service provided by ground-based controllers who direct aircraft on the ground and through controlled airspace, can be used to refer to the building from where the ATC operate;
Apron	Area of the airport where aircraft are parked, loaded, unloaded, refuelled and boarded, typically constructed of concrete;
Backload	The transportation of cargo on a return trip to the originating airport
Belly freight	Cargo stowed under the main deck of a passenger aircraft
Cargo, Freight	The terms cargo and freight are used interchangeably and refer to goods carried by road, sea or air
Consolidator	A person or company who combines small volumes of commodities from different originators so they can be shipped together and who usually owns the aircraft used for transport
Dedicated carrier	An aircraft which transports only freight (not passengers)
European Aviation Safety Agency (EASA)	All UK aerodromes open to public use and which serve commercial air transport, where operations using instrument approach or departure procedures are provided, and which have a paved runway of 800 metres

Aviation Term	Description
	or above, or exclusively serve helicopters, are required to comply with EASA regulations.
Freight forwarder	A person or company that organises the shipment of commodities from an originator (manufacturer, producer etc.) to a destination (customer etc.) but who generally does not own the aircraft used in the transport
Fuel Farm	Dedicated area within the airport for the storage of aviation fuel (Jet A or 100LL) prior to being discharged into aircraft fuel tanks;
Landside	The part of the airport directly accessed from ‘outside’ the perimeter;
Long haul	No generally agreed definition as ‘long’ or ‘short’ is subjective. In Europe as a flight taking more than four hours to complete and/or originating/destined outside Europe is considered long haul
Navigation Aids	Variety of equipment such as such as automatic direction finder (ADF) and VHF omnidirectional radio range (VOR) that will be installed at an airport to aid pilots in navigation.
Obstacle Limitation Surface (OLS)	A series of surfaces that define the limits to which objects, for example buildings, aircraft, vehicles and trees, may project into the airspace. The OLS will comprise a number of different surfaces around the runway which together will combine to form the OLS. Construction of any objects that will impact on the OLS requires approval from the Civil Aviation Authority (CAA).
Pavement Classification Number (PCN)	Used in combination with the aircraft classification number (ACN) to indicate the strength of a runway, taxiway or airport apron;
Perimeter	The secure area around the airport which forms the barrier between landside and airside operations, access across and through the perimeter is tightly controlled;
Runway	Defined rectangular area prepared for the landing and take-off of aircraft, typically constructed of asphalt, concrete or a mixture of both.
Safeguarding	This includes ensuring there are no buildings or structures which may cause danger to aircraft, that radar and navigation aids are not distorted by proposed developments, or that visual aids are not obscured, this is implemented by establishing a safeguarding zone
Short haul	No generally agreed definition as ‘long’ or ‘short’ is subjective. In Europe, short haul generally indicates a flight within Europe so taking four hours or less to complete
Taxiway	A path for connecting runways with aprons, hangars, terminals and other facilities, typically constructed of concrete, for reference named alpha, bravo, charlie, echo etc.

Appendix 4.1

Appendix 4.1

Planning Policy Context

4.1 Introduction

4.1.1 This Appendix has been prepared by RPS and sets out the relevant national, regional and strategic local planning policies in order to establish the policy context against which the proposals for the reopening of Manston Airport need to be considered.

4.2 National Planning Policy

National Planning Practice Guidance (NPPG)

4.2.1 On 6th March 2014, the Department for Communities and Local Government (DCLG) launched the planning practice guidance web-based resource. This was accompanied by a Written Ministerial Statement which included a list of the previous planning practice guidance documents cancelled when the site was launched. The idea is that the planning practice guidance will be updated as needed. The web-based resource was developed following the recommendations of the External Review of Planning Practice Guidance which the Government previously consulted on. The purpose of publishing the web-based resource is to bring together planning practice guidance for England in an accessible and useable way as National Planning Practice Guidance (NPPG).

4.2.2 In terms of planning practice guidance as it relates to aviation and airport planning, the NPPG does not introduce any additional guidance beyond that which is already captured by the National Planning Policy Framework (NPPF) (see below).

National Planning Policy Framework (NPPF)

4.2.3 The NPPF was published in March 2012 and sets out the Government's planning policies for England and how these are expected to be applied (paragraph 1). It states that planning law requires that applications must be determined in accordance with the Development Plan, unless material considerations indicate otherwise, and that the NPPF must be taken into account in the preparation of local and neighbourhood plans, and is a material consideration in planning decisions (paragraph 2).

4.2.4 Paragraph 3 specifically states that the NPPF does not contain specific policies for nationally significant infrastructure projects for which particular considerations apply. These are determined in accordance with the decision-making framework set out in the Planning Act 2008 and relevant national policy statements (NPS) for major infrastructure, as well as any other matters that are considered both important and relevant (which may include the NPPF). It continues to state that NPS form part of the overall framework of national planning policy, and are a material consideration in decisions on planning applications (see following section on NPS on Airports).

4.2.5 At the heart of the NPPF is a presumption in favour of sustainable development which in terms of decision-taking, means approving development proposals that accord with the Development Plan without delay or where the Development Plan is absent, silent or relevant policies are out-of-date, granting planning permission unless any adverse impacts of doing so would significantly and demonstrably outweigh the benefits when assessed against the policies in the NPPF taken as a whole or if specific policies in the NPPF indicate that development should be restricted (paragraph 14).

4.2.6 Paragraph 17 specifically addresses the role that the planning system should play and sets out a core list of land use planning principles which should underpin the plan-making and decision-taking process. These include:

> **"…proactively drive and support sustainable economic development to deliver… infrastructure that the country needs, making every effort to objectively identify and then meet development needs of an area, and respond positively to wider opportunities for growth…**
> **... support the transition to a low carbon future in a changing climate…**
> **… actively manage patterns of growth to make the fullest use of public transport…"**

4.2.7 Paragraph 33 of the NPPF specifically relates to the planning of airports and airfields and states:

> **"When planning for ports, airports and airfields that are not subject to a separate national policy statement, plans should take account of their growth and role in serving business, leisure, training and emergency service needs. Plans should take account of this Framework as well as the principles set out in the relevant national policy statements and the Government Framework for UK Aviation."**

4.2.8 Part 11 of the NPPF relates to the need to conserve and enhance the natural environment and the need for the planning system to contribute to and enhance the natural and local environment by protecting and enhancing valued landscapes, geological conservation interests and soils; minimising impacts on biodiversity and providing net gains in biodiversity where possible and preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability.

4.2.9 Paragraph 118 states that when determining planning applications, local planning authorities should aim to conserve and enhance biodiversity by applying certain principles. These include refusing planning permission if significant harm 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; not normally permitting development on land within or outside a Site of Special Scientific Interest likely to have an adverse effect on a Site of Special Scientific Interest (either individually or in combination with other developments) unless the benefits of the development can clearly outweigh the impacts and refusing planning permission for development resulting in the loss or deterioration of irreplaceable habitats, including ancient woodland and the loss of aged or veteran trees found outside ancient woodland, unless the need for, and benefits of, the development in that location clearly outweigh the loss.

4.2.10 Part 12 of the NPPF deals with the need to conserve and enhance the historic environment. Paragraph 133 states that where a proposed development will lead to substantial harm to or total loss of significance of a designated heritage asset, local planning authorities should refuse consent, unless it can be demonstrated that the substantial harm or loss is necessary to achieve substantial public benefits that outweigh that harm or loss. Paragraph 134 states that where a development proposal will lead to less than substantial harm to the significance of a designated heritage asset, this harm should be weighed against the public benefits of the proposal.

4.2.11 Within the NPPF, there are various references to the need for local authorities to work with other authorities and providers to:

> **"identify and protect, where there is robust evidence, sites and routes which could be critical in developing infrastructure to widen transport choice; (Paragraph 41)**
>
> **to assess the quality and capacity of infrastructure for transport, water supply, wastewater and its treatment, energy**

(including heat), telecommunications, utilities, waste, health, social care, education, flood risk and coastal change management, and its ability to meet forecast demands; (Paragraph 162) and

to take account of the need for strategic infrastructure including nationally significant infrastructure within their areas." (Paragraph 162)

4.2.12 The NPPF Technical Guidance was archived on 7th March 2013 and replaced by the new planning practice guidance launched on 6th March 2014 (see preceding section).

4.3 National Aviation Policy

Aviation Strategy White Paper (expected 2018)

4.3.1 The Government has announced that the Department for Transport (DfT) is currently progressing work to develop a new strategy for UK aviation (Written Statement to Parliament on Airport Capacity and Airspace Policy – 2nd February 2017). The Government aim to publish the Aviation Strategy White Paper in 2018.

4.3.2 The Government has published a call for an evidence consultation document to establish views on the approach the Government is proposing to take on a number of aviation issues identified to inform the Aviation Strategy. The consultation document is entitled *'Beyond the Horizon: The Future of Aviation in the UK'*[1]. The new strategy is proposed to focus on aviation covering the whole country and for a long term strategy; with the consultation process examining the effect on all of the UK's regions.

4.3.3 It is recogissed within the consultation document that before a new runway is built, for the UK to grow its domestic and international capacity, there is a need for existing runways throughout the UK to be more intensively utilised. Of particular interest is part of paragraph 7.20 which states:

> *"The Government agrees with the Airports Commission's recommendation that there is a requirement for more intensive use of existing airport capacity and is minded to be supportive of all airports who wish to make best use of their existing runways including those in the South East."*

Draft Airports National Policy Statement (NPS) – October 2017

4.3.4 The Draft Airports NPS: *"New runway capacity and infrastructure at airports in the South East of England"* was published for consultation 24 October 2017, following an earlier version that was published on 2 February 2017, together with other supporting documents and analyses, including the draft Appraisal of Sustainability. This follows the outcome of the work by the Airports Commission which published its final report in July 2015 and the Government's announcement on 25 October 2016 that a new Northwest Runway at Heathrow Airport was its preferred scheme to deliver additional airport capacity in the South East of England.

4.3.5 The purpose of the NPS is to provide the primary basis of decision making on development consent applications for a Northwest Runway at Heathrow Airport[2]. It states in the clearest terms that '*the Airports NPS does not have effect in relation to an application for development consent for an airport development not comprised in an application relating to …'* the preferred scheme at Heathrow[3]. Thus, other than for the preferred scheme at Heathrow, the Airports NPS will not form the basis for determination of DCO applications as set out at Section 104(3) of the 2008 Planning Act.

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[1] The Department for Transport (July 2017) 'Beyond the Horizon: The Future of Aviation in the UK'.

[2] Paragraph 1.12.

[3] Paragraph 1.39.

4.3.6 The Airports NPS is still important and relevant for other applications for airports infrastructure in London and the South East of England[1,2]. Its policies will be important and relevant for the Examining Authority and Secretary of State[4] in examining and determining DCO applications such as that proposed that for Manston Airport but it is not the primary basis of determination in the same way as it is for the Heathrow Northwest Runway[5].

4.3.7 The Airports NPS also does not affect wider aviation issues *'for which the 2013 Aviation Policy Framework and any subsequent policy statements still apply'*[6]. Although service provided by Heathrow for freight is mentioned in the NPS, freight aviation would be considered a '*wider aviation issue'*.

4.3.8 The parts of the draft Airports NPS that are considered to be relevant to RiverOak's DCO application for Manston Airport are set out below.

4.3.9 The draft NPS reaffirms that international connectivity is important to the success of the UK economy. It facilitates trade in goods and services and is particularly important for many of the fastest growing sectors of the economy[7]. Our airports are the primary gateway for vital time-sensitive freight services[8]. The aviation sector benefits the UK economy through its direct contribution to GDP and employment, and by facilitating trade and investment, manufacturing supply chains, skills development, and tourism[9].

4.3.10 Paragraphs 2.7 and 3.23 refer to the importance of freight services specifically:

> **2.7 – Air freight is also important to the UK economy. Although only a small proportion of UK trade by weight is carried by air, it is particularly important for supporting export-led growth in sectors where goods are of high value or time critical. Heathrow Airport is the UK's biggest freight port by value. Over £155 billion of air freight was sent between UK and non-European Union countries in 2015, representing over 40% of the UK's extra-European Union trade by value. This is especially important in the advanced manufacturing sector, where air freight is a key element of the time-critical supply chain. By 2030, advanced manufacturing industries such as pharmaceuticals or chemicals, whose components and products are predominately moved by air, are expected to be among the top five UK export markets by their share of value. In the future, UK manufacturing competitiveness and a successful and diverse UK economy will drive the need for quicker air freight.**
>
> **3.23 - The aviation sector can also boost the wider economy by providing more opportunities for trade through air freight. The time-sensitive air freight industry, and those industries that use air freight, benefit from greater quantity and frequency of services, especially long haul. By providing more space for cargo, lowering costs, and by the greater frequency of services, this should in turn provide a boost to trade and GDP benefits.**

4.3.11 The benefits for freight delivered by the Heathrow Northwest Runway was one of four strategic considerations to which the Government afforded particular weight in selecting it as its preferred scheme[10]. It is considered, therefore, that these benefits should also be a strategic consideration of

[4] Paragraph 1.14.
[5] The need to have regard to other matters which are both important and relevant to the determination of DCO applications is confirmed at Section 104(2)(d) of the Act.
[6] Paragraph 1.36.
[7] Paragraph 2.1.
[8] Paragraph 2.2.
[9] Paragraph 2.4.
[10] Paragraph 3.71.

national importance when considering the merits of other airports schemes such as RiverOak's proposal at Manston which will also benefit freight services significantly.

Airports Commission Final Report (July 2015)

4.3.12 The independent Airports Commission was set up in late 2012 with a brief to find an effective and deliverable solution to increase aviation capacity in the South East as well as supporting the UK, and to make recommendations which will allow the UK to maintain its position as Europe's most important aviation hub.

4.3.13 The Airports Commission short-listed three options for this new capacity: one new northwest runway at Heathrow Airport; a westerly extension of the northern runway at Heathrow Airport; and one new runway at Gatwick Airport. It conducted a robust, integrated and transparent process to assess these options, considering a range of economic, social and environmental factors and engaging extensively with interested parties through formal consultation, public evidence sessions and a programme of meetings and visits.

4.3.14 Each of the three schemes shortlisted was considered a credible option for expansion, capable of delivering valuable enhancements to the UK's aviation capacity and connectivity. Each would also have environmental impacts, which would need to be carefully managed.

4.3.15 The Commission concluded that the proposal for a new Northwest Runway at Heathrow Airport, in combination with a significant package of measures to address its environmental and community impacts presented the strongest case.

4.3.16 Relevant to Manston Airport, the report outlines that the strong growth in regional airport traffic became less uniform towards the end of the 2000s and since 2007. The UK's larger regional airports continued to grow their passenger numbers and route networks, whilst the small and medium sized regional airports have seen them plateau or decline.

4.3.17 Specifically relevant to Manston, the Commission throughout their considerations recognised that the air freight sector plays an important role in the UK economy and particularly to trade with emerging markets and other non-EU countries, and to many airlines. The Commission identified that the key sectors for air freight include perishables such as food and flowers and pharmaceutical products and medicines that need to be delivered in controlled environments within short shelf lives, as well as fast evolving high-tech products where several weeks of sea transit from the Far East might represent a significant proportion of the product's sales life.

Airports Commission Discussion Paper 06: Utilisation of the UK's Existing Airport Capacity (June 2014)

4.3.18 The Airports Commission during its investigation looked at the potential to redistribute demand away from London and South East airports. The study suggested that there is relatively little scope for redistribution, but did recognise that regional airports and those serving London and the South East, other than Gatwick and Heathrow, play a crucial national role, especially at a time when the major London airports are operating very close to capacity.

Airports Commission Interim Report (December 2013)

4.3.19 Further in relation to Manston Airport, the Airports Commission Interim Report (December 2013) in Appendix 2: *Assessment of Long-Term Options*, is supportive of Manston Airport recognising that it:

> **".....presents some potential as a reliever airport, but does not address the larger question of London & South East capacity. The concept of reliever airports is considered in short and medium term work. Please see Appendix 1 for further information."**

4.3.20 Appendix 1: *Assessment of Short- and Medium-Term Options* of the Interim Report - Section 3 '*Proposals received and Commission conclusion'* – table entry number 82 sets out the Commission's view of reliever airports. It defines the reliever airports concept as providing:

> **"support and/or financial incentives to encourage the growth of airports providing dedicated support for the business and general aviation markets with the potential additional benefit of reducing the use of congested airports for this traffic."**

4.3.21 It goes on to state that:

> **"The Commission is supportive of the reliever airports concept. The Commission recognises that this may be the best way to cater for the needs of business users without disrupting the wider airport system..."**

Aviation Policy Framework (March 2013)

4.3.22 This Aviation Policy Framework (APF) has fully replaced the 2003 Air Transport White Paper (see below) as Government's policy on aviation, alongside any decision the Government makes following the recommendation of the independent Airports Commission, and is therefore silent on specific policies either in support of or against further airport expansion in the South East. The Airports Commission was established in September 2012 with the remit of recommending how the UK can maintain its status as a global aviation hub and maintain our excellent international connectivity for generations to come, as well as making best use of our existing capacity in the shorter term.

4.3.23 In the absence of any specific commentary on regional airport expansion in the South East or Manston Airport itself, the APF does state that the Government recognises the very important role airports across the UK play in providing domestic and international connections and the vital contribution they can make to the growth of regional economies. It is acknowledged that for more remote parts of the UK, aviation is not a luxury, but provides vital connectivity. It states that many airports act as focal points for business development and employment by providing rapid delivery of products by air and convenient access to international markets and cites the success of East Midlands Airport which acts as a hub for freight.

4.3.24 In terms of air freight, the APF recognises its importance for supporting export-led growth in sectors where the goods are of high value or time critical. It goes on to state that air freight is a key element of the supply chain in the advanced manufacturing sector in which the UK is looking to build competitive strength. Goods worth £116 billion are shipped by air between the UK and non-EU countries, representing 35% of the UK's extra-EU trade by value. The express air freight sector alone contributed £2.3 billion to UK GDP in 2010, and facilitates £11 billion of UK exports a year. Over 38,000 people are directly employed in the express industry, which supports more than 43,000 jobs in other sectors of the economy. The APF further states that a successful and diverse economy will drive a need for quicker air freight. Key components to keep factories working are often brought in from specialist companies in North America and the Far East. To keep production lines rolling this often has to be done at short notice. Access to such services is crucial to keeping UK manufacturing competitive in the global marketplace.

4.3.25 The Government is in the process of replacing the APF with a more comprehensive 'Aviation Strategy.' This is expected in 2018 (see section above).

4.4 Regional Policy

4.4.1 This section looks to summarise the regional policy that is relevant in the consideration of any future development at Manston Airport.

4.4.2 It should be noted that the strategic planning functions of County Councils that were prominent historically are now much reduced following the Planning and Compulsory Purchase Act 2004. As the County Planning Authority, Kent County Council only has responsibility now for mineral and waste development. It is also the planning authority for the County Council's own development such as new roads and transportation schemes.

Local Transport Plan for Kent 4: Delivering Growth without Gridlock 2016-2031

4.4.3 The plan sets out the County Council's position on aviation which is to maximizse use of existing regional airport capacity, along with some expansion of existing airports and improved rail connections. In respect of Manston Airport, the plan recognises that it ceased to operate on 15th May 2014 and that the County Council's position as set out in the meeting of the County Council on 16th July 2015 is:

> "That we the elected members of KCC wish it to be known that we fully support the continued regeneration of Manston and East Kent and will keep an open mind on whether that should be a business park or an airport, depending upon the viability of such plans and their ability to deliver significant economic growth and job opportunity." [11]

4.4.4 The County Council is also seeking to deliver a new railway station to significantly improve rail connectivity to the area (Thanet Parkway Rail Station). The station will provide access to greater employment opportunities for local residents, and increase the attractiveness for investment in Discovery Park Enterprise Zone and numerous surrounding business parks in Thanet. It will also support local housing and any reopened airport at Manston. The estimated journey time from Thanet Parkway to London St Pancras will be just over 20 minutes shorter than that from Deal to London St Pancras; therefore the new station enhances the accessibility of the wider area of East Kent (Page 19).

The London Plan, 2016 (Consolidated with Alterations since 2011)

4.4.5 Under legislation establishing the Greater London Authority (GLA), the London Mayor has to produce a 'Spatial Development Strategy', which is known as 'The London Plan'. The London Plan was first adopted in July 2011, and has since been updated in 2013 and most recently in 2016. It covers the strategic planning policies (economic, social, environmental and transport) for all 32 London Boroughs.

4.4.6 The London Plan does not set out to 'micro-manage' aspects that are better addressed by local boroughs, but it does contain numerous cross-cutting policies in achieving sustainable development, social inclusion and regeneration.

4.4.7 The London Plan recognises that despite being located outside of Greater London, regional airports provide a key contribution to supporting both the economy and connectivity of London.

4.4.8 With regards to Manston Airport, there are no specific policies contained in the London Plan, primarily because Manston Airport is not in London. However, paragraph 2.16 states that the Mayor will help coordinate the development and implementation of policies for corridors that have been identified as being of importance to London and the wider city region. The Thames Gateway is identified as the nearest development corridor (extending to within 35km of Manston Airport), covering a large area of Kent, though it does not quite extend to Manston Airport itself.

4.4.9 Within Chapter 6 of the London Plan (London's Transport) Policy 6.4 relates to improving London's transport connectivity. At a strategic level, the Mayor will support seeking improved access by public transport to airports.

4.4.10 With regard to aviation, there is a specific policy in the London Plan (Policy 6.6). It states that adequate airport capacity serving a wide range of destinations is critical to the competitive position of London in a global economy. Airport capacity serving the capital and wider south-east of England must be sufficient to sustain London's competitive position.

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[11] Scrutiny Committee: 9 June 2016 Minutes (2016) Kent County Council. Available online at https://democracy.kent.gov.uk/documents/s72979/Minutes%20of%20Previous%20Meeting.pdf [Checked 14/11/17].

The Draft London Plan (2017)

4.4.11 A draft London Plan was published for consultation on the 29 November 2017.

4.4.12 With regards to Manston Airport, there are no specific policies contained in the Draft London Plan, primarily because Manston Airport is not in London.

4.4.13 Policy SD2 (Collaboration in the Wider South East) looks for strategic understanding of the transport issues facing the wider south east. It outlines that the the Mayor will work with wider south east partners to find solutions to shared strategic concerns including the wider needs for freight.

4.4.14 Policy T8 concerns aviation and states that the Mayor supports the case for additional aviation capacity in the South East of England provided it would meet London's passenger and freight needs recognising that this is crucial to London's continuing prosperity and to maintaining its international competitiveness and world-city status. Policy T8 sets out the Mayor's opposition to expansion of Heathrow Airport unless it can be shown that no additional noise or air quality harm would result, and that the benefits of future regulatory and technology improvements would be fairly shared with affected communities. Policy T8 further states that any changes to London's airspace must treat London's major airports equitably when airspace is allocated.

4.4.15 Policy T8 (Aviation) states that better use should be made of existing airport capacity, underpinned by upgraded passenger and freight facilities and improved surface access links, in particular rail.

4.4.16 Paragraph 10.8.4 states that the Mayor recognises the need for additional runway capacity in the south east of England, but this should not be at the expense of London's environment or the health of its residents.

4.4.17 In paragraph 10.8.10, the Mayor recognises that air freight plays an important role in supporting industry in London and the UK, and the provision of both bellyhold and dedicated freighter capacity should be an important consideration when plans for airport development in the south east of England are taken forward.

4.5 Local Planning Policy

4.5.1 In this section, summaries of the relevant planning policies contained within the statutory Development Plans of the following Local Planning Authorities are provided:

- Thanet District Council;
- Dover District Council; and
- Canterbury City Council.

4.5.2 Reforms to the production of local planning policy were set out in the Planning and Compulsory Purchase Act (2004) with detailed guidance contained in Planning Policy Statement 12 (PPS12) – Local Spatial Planning. The Planning and Compulsory Purchase Act (2004) Schedule 8 sets out a period of three years for the transition of old policy to a new policy that replaces it (when it is published, adopted or approved). Where local authorities had not produced the required new policy, the Secretary of State for Communities and Local Government provided direction that the transition period as set out in the Planning and Compulsory Purchase Act (2004) would not apply, and in effect adopted planning policies would be in effect 'saved' until replacement planning policy was adopted.

4.5.3 For the purposes of decision-taking, saved Local Plan policies should not be considered out-of-date simply because they were adopted prior to the publication of the NPPF. However, from March 2013, due weight should be given to saved policies in existing plans according to their degree of consistency with the NPPF (the closer the policies in the plan to the policies in the NPPF, the greater the weight that may be given).

Thanet District Council

4.5.4 The Manston Airport site is located entirely within the administrative area of Thanet District Council.

4.5.5 The statutory Development Plan for Thanet District Council comprises:

- Thanet Local Plan (2006) (Saved Policies);
- Cliftonville Development Plan Document (February 2010);
- Local Plan Proposals Map; and
- Kent Waste and Minerals Local Plan (Saved Policies).

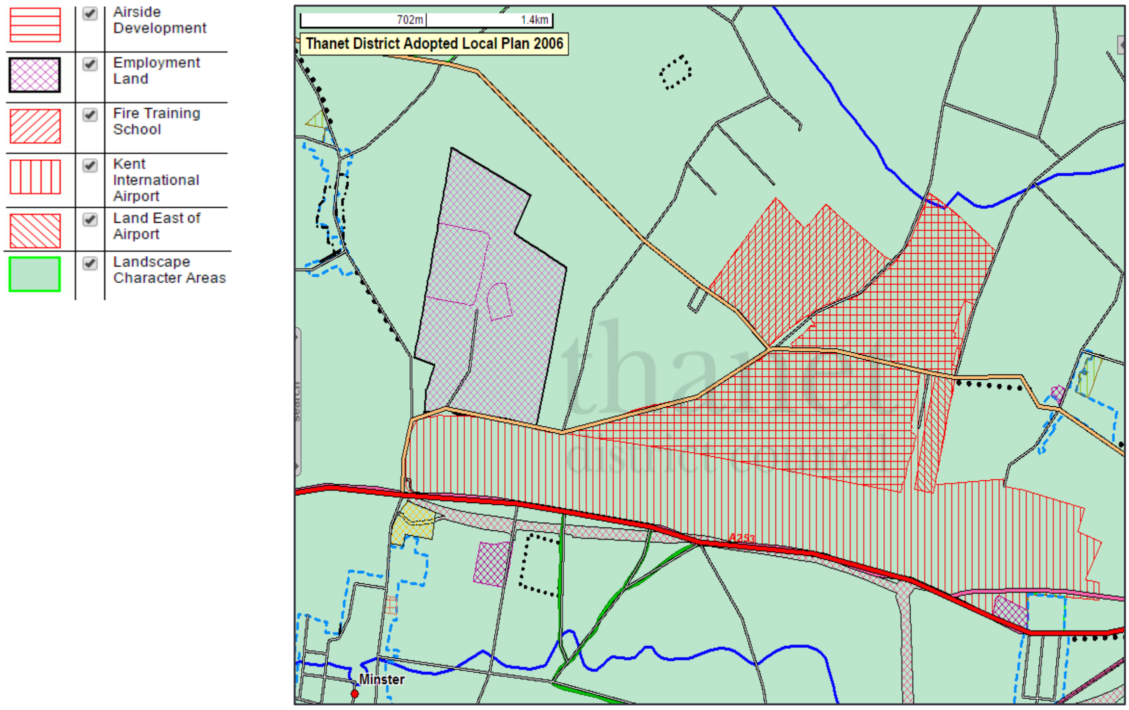
Thanet Local Plan Saved Policies and Proposals Map

4.5.6 An extract from the Local Plan Proposals Map showing the Manston Airport site is provided below in **Figure 4.1.1**.

4.5.7 The key planning policy designations that affect the Manston Airport site and the area adjoining it as shown on the Local Plan Proposals Map are as follows:

- The airport boundary is defined on the Proposals Map (Policy EC2 – Kent International Airport);
- Policy EC4 – Airside Development Area;
- Policy EP13 – Groundwater Protection Zone;
- Policy CC1 – Development in the Countryside;
- Policy CC2 – Central Chalk Plateau;
- The land to the east is designated for terminal related purposes (Policy EC5 – Land at, and east of the Airport Terminal); and
- The land to the west is designated for economic development (Policy EC1 – Manston Park, Manston).

Figure 4.1.1 Extract from Thanet District Council Local Plan (2006) Proposal Maps showing Manston Airport and relevant extract from the key



Land Designations

4.5.8 Saved **Policy EC2 (Kent International Airport)** refers to the boundary for the airport site as shown on the Proposals Map. Policy EC2 states that:

> **“Proposals that would support the development, expansion and diversification of Kent international airport will only be permitted subject to the following requirements:**
>
> 1. **Demonstrable compliance with the terms of the current agreement under section 106 of the town and country planning act 1990 or subsequent equivalent legislation;**
> 2. **New built development is to be designed to minimise visual impact on the open landscape of the central island. particular attention must be given to roofscape and to minimising the mass of the buildings at the skyline when viewed from the south;**
> 3. **Appropriate landscaping schemes, to be designed and implemented as an integral part of the development:**
> 4. **Any application for development for the purpose of increasing aircraft movements in the air or on the ground, auxiliary power or engine testing, must be supported by an assessment of the cumulative noise impact and the effectiveness of mitigation measures to be implemented in order to minimise pollution and disturbance. the acceptability of proposals will be judged in relation to any identified and cumulative noise impact, the effectiveness of mitigation and the social and economic benefits of the proposals;**
> 5. **An air quality assessment in compliance with policy ep5, to demonstrate that the development will not lead to a harmful deterioration in air quality. permission will**

not be given for development that would result in national air quality objectives being exceeded;

6. **Development will not be permitted within the airport complex to the south of the airside development site identified in policy ec4, unless it has been demonstrated that the development is necessary for the purpose of air traffic management;**
7. **Any new development which would generate significant surface traffic must meet requirements for surface travel demand in compliance with policy ec3.**
8. **It must be demonstrated that new development cannot contaminate groundwater sources or that appropriate mitigation measures will be incorporated in the development to prevent contamination."**

4.5.9 Saved **Policy EC4 (Airside Development Area)** refers to land within the boundary of the airport site excluding the runway as shown on the Proposals Map. Policy EC4 states that:

> **""Land at the airport, as identified on the proposals map, is reserved for airside development. Development proposals will require specific justification to demonstrate that an airside location is essential to the development proposed. Development will be required to retain sufficient land to permit access by aircraft of up to 65m (217ft) wingspan to all parts of the site."**

4.5.10 The land north of the runway and including the land north of the B2050 is safeguarded for airside development purposes. This is defined as uses with an operational requirement for direct access to aircraft and therefore dependent on a location immediately adjacent to the runway or capable of direct access to it via taxiways. This includes uses based on:

- Operation of passenger handling services
- Air cargo operations related to the site
- Operation of aircraft maintenance and manufacturing
- Services ancillary to the maintenance and operation of the airport

4.5.11 Saved **Policy EP13 (Ground Water Protection Zones)** covers all land within and adjacent to the boundary of the airport site as shown on the Proposals Map. Policy EP13 states that:

> **"If a proposed development in the groundwater protection zones identified on the proposals map would have the potential to result in a risk of contamination of groundwater sources, it will not be permitted unless adequate mitigation measures can be incorporated to prevent such contamination taking place."**

4.5.12 The airport is entirely located in the countryside. Saved **Policy CC1** (Development in the Countryside) states that the Thanet Countryside is defined as those areas of the District outside the identified urban and village confines. Within the countryside, Policy CC1 states that new development will not be permitted unless there is a need for the development that overrides the need to protect the countryside.

4.5.13 Saved **Policy CC2 (Landscape Character Areas)** covers all land within and adjacent to the boundary of the airport site as shown on the Proposals Map. Policy CC2 states that:

> **"Within the landscape character areas identified on the proposals map, the following policy principles will be applied:**
>
> **4 On the central chalk plateau, a number of sites are identified for various development purposes. where development is permitted by other policies in this plan,**

particular care should be taken to avoid skyline intrusion and the loss or interruption of long views of the coast and the sea;

Development proposals that conflict with the above principles will only be permitted where it can be demonstrated that they are essential for the economic or social well-being of the area.

In the event of a real and specific threat to the landscape character of these areas from permitted development, the use of article 4 directions will be considered, and secretary of state approval for the direction sought."

4.5.14 Saved **Policy EC5 (Land at, and East of, the Airport Terminal)** covers a relatively small parcel of land to the east of the terminal and north of the runway which is safeguarded for terminal operational requirements, as shown on the Proposals Map. Policy EC5 states that:

"Until such time as a new airport terminal is built, land at, and east of, the existing airport terminal is identified on the proposals map for airport terminal-related purposes. Uses will be restricted to those which directly support or complement the operational requirements of the existing airport terminal. Should a new terminal be built, other airport-related development will be permitted on this allocated site. Planning conditions or planning agreements will be applied to limit any development granted planning consent to uses conforming to this policy."

4.5.15 The Local Plan (Saved Policies) recognises that some airport terminal-related activities need to be located adjacent to the existing terminal building. This could include, for example, car parking or the physical expansion of the terminal. In order to cater for such uses, this site is identified on the Proposals Map including the existing airport terminal facilities and land immediately to the east of the terminal. This site is also acknowledged to provide a reasonable gap between the terminal area and Manston Village.

4.5.16 Saved **Policy EC1 (Land Allocated for Economic Development)** covers the employment area west of the airport and north of the western extent of the runway, as shown on the Proposals Map. Policy EC1 states that:

"At the following sites, as shown on the proposals map, land is allocated for business purposes:

5 Manston Park, Manston

Use will be restricted to classes B1 (business), B2 (general industry) and B8 (storage and distribution). on all sites a landscaping scheme appropriate to the scale, location and character of the site will be required to provide an attractive environment.

On these sites planning applications should be accompanied by traffic impact studies and green travel plans, unless the development is considered too small to have a significant travel impact."

Economic Development and Regeneration

4.5.17 In terms of economic development and regeneration, Chapter 2 of the Local Plan (Saved Policies) states that:

"The development of Kent International Airport as an important regional hub and business location, and its proximity to the business parks ensures a key role for the airport in the economic regeneration of the area."

4.5.18 The Local Plan (Saved Policies) recognises the political decisions that need to be made regarding the major London airports and the subsequent effects this will have on regional airports such as Kent International Airport.

4.5.19 It is outlined that where there is higher investment by the owners of Manston Airport in improving handling facilities, better passenger facilities and new or improved terminals, it is more likely the airport will attract substantial growth by attracting aircraft operators.

4.5.20 Chapter 2 of the Local Plan (Saved Policies) highlights the operational importance of Kent International Airport due to the length of runway, together with the substantial areas of surrounding land available for employment purposes. The Council are clear in their support for the future development of Kent International Airport.

Housing

4.5.21 The expansion of activity at Kent International Airport is quoted as one of four main sources of employment growth that will result in additional housing requirements in the district.

Transport

4.5.22 The Local Plan (Saved Policies) outlines that Thanet Council and adjoining District Councils wish to see Kent International Airport develop as a regional airport. It is acknowledged that the airport offers very significant economic and employment benefits for Thanet and East Kent. Its development will also have significant transport implications arising from passengers, freight and employees.

4.5.23 In addition to the airport itself, additional transport infrastructure works are also set out:

- Bus priority and cycle facilities on the A256 and from urban Thanet to Kent International Airport and the Central Island Business Parks; and
- Medium and long term proposals for rail access to Kent International Airport

Environmental Protection

4.5.24 Policy EP5 (Local Air Quality Monitoring) states that:

> **“Proposals for new development that would result in the national air-quality objectives being exceeded will not be permitted.**
> **Development proposals that might lead to such an exceedance, or to a significant deterioration in local air quality resulting in unacceptable effects on human health, local amenity or the natural environment, will require the submission of an air quality assessment, which should address:**
> **9. the existing background levels of air quality;**
> **10. the cumulative effect of further emissions;**
> **11. the feasibility of any measures of mitigation that would prevent the national air quality objectives being exceeded, or would reduce the extent of air quality deterioration.”**

4.5.25 Whilst the Council supports the development of Kent International Airport as a regional airport, Policy EP7 seeks to limit the effect of aircraft noise on sensitive development such as housing, schools and hospitals, by restricting locations where such development may be sited.

4.5.26 In 1995, the District Council commissioned production of aircraft noise contours by Arup showing predicted noise levels and based on a study of Kent International Airport Traffic Forecasts by Alan Stratford Associates. The forecasts considered a range of high, medium and low traffic scenarios, including the possibility of increased aviation associated with the prospective major economic regeneration role of Central Thanet, and possible runway extension.

4.5.27 At the time of preparing the Local Plan (Saved Policies) there was uncertainty regarding future aircraft noise levels at Kent International Airport. The Council was therefore adopting a precautionary approach in relation to aircraft noise, and for the purposes of Policy EP7, will continue to apply the 1996 (dBLAeq 16 hour) contour predictions, which formed the basis for the Policy in the adopted Local Plan, assuming the presence of military jets. The District Council advised they will review the need to consider adoption of alternative contour scenarios as circumstances develop, with quieter commercial aircraft entering service and civilian air activity increasing. Accordingly, because the contours may be subject to change within the Plan period, they are not featured on the Proposals Map.

4.5.28 Policy EP7 (Aircraft Noise) states that:

> **"Applications for noise sensitive development or redevelopment on sites likely to be affected by aircraft noise will be determined in relation to the latest accepted prediction of existing and foreseeable ground noise measurement of aircraft noise.**
> **Applications for residential development will be determined in accordance with the following noise exposure categories:**

NEC	PREDICTED AIRCRAFT NOISE LEVELS (Dbl Aeq.0700-23.00)	
A	<57	NOISE WILL NOT BE A DETERMINING FACTOR
B	57-63	NOISE WILL BE TAKEN INTO ACCOUNT IN DETERMINING APPLICATIONS, AND WHERE APPROPRIATE, CONDITIONS WILL BE IMPOSED TO ENSURE AN ADEQUATE LEVEL OF PROTECTION AGAINST NOISE (POLICY EP8 REFERS).
C	63-72	PLANNING PERMISSION WILL NOT BE GRANTED EXCEPT WHERE THE SITE LIES WITHIN THE CONFINES OF EXISTING SUBSTANTIALLY BUILT-UP AREA. WHERE RESIDENTIAL DEVELOPMENT IS EXCEPTIONALLY GRANTED, CONDITIONS WILL BE IMPOSED TO ENSURE AN ADEQUATE LEVEL OF PROTECTION AGAINST NOISE (POLICY EP8 REFERS).
D	>72	RESIDENTIAL DEVELOPMENT WILL NOT BE PERMITTED.

> **Applications for non-residential development including schools, hospitals and other uses considered sensitive to noise will not be permitted in areas expected to be subject to aircraft noise levels exceeding 60 db(a) unless the applicant is able to demonstrate that no alternative site is available. Proposals will be expected to demonstrate adequate levels of sound insulation where appropriate in relation to the particular use."**

Draft Thanet Local Plan to 2031 Preferred Options (January 2015)

4.5.29 Within the Draft Local Plan, Strategic Priority 1 looks to create additional employment and training opportunities, to strengthen and diversify the local economy and improve local earning power and employability. With regards to Manston Airport it states that:

> **"Support the sustainable development and regeneration of Manston Airport to enable it to function as a local regional airport, providing for significant new employment opportunities, other supporting development and improved**

surface access subject to environmental safeguards or as an opportunity site promoting mixed-use development that will deliver high quality employment and a quality environment."

4.5.30 The Council recognises that various options are available with regards to the future use of the Manston Airport site, as an airport operation and for aviation activities, as well as for other developments. It is acknowledged that these need to be explored and assessed for the wider area of the airport and its environ through the development plan making process. The Council are therefore seeking to designate the area as an "opportunity area" for which the District Council will prepare Area Action Plan (AAP) Development Plan Document. The AAP for Manston Airport will set out the development framework for the development and regeneration of the area.

4.5.31 Policy SP05 (Manston Airport) states that:

"The site of Manston Airport and the adjoining area will be designated as an "Opportunity Area" for the purposes of preparing the Manston Airport Area Action Plan" Development Plan Document. The Manston Airport AAP will explore through the development plan process the future development options for the site of the airport and the adjoining area. A consideration of the AAP should be the retention, development and expansion of the airport and aviation operations where supported by a feasibility study and a viable Business Plan, while exploring alternative options for the future development of the area for mixed-use development.

While the Manston Airport Area Action Plan is being prepared and until adopted by the Council as a development plan for the Manston Airport area, the following policy for the Manston Airport will apply.

Proposals at the airport, that would support the development, expansion and diversification of Manston Airport, will be permitted subject to all of the following requirements.

1) That there be demonstrable compliance by the applicants with the terms of the current agreement under section 106 of the Town and Country Planning Act 1990 as amended or subsequent equivalent legislation.

2) That new built development is to be designed to minimise visual impact on the open landscape of the central island. Particular attention must be given to roofscape for the purposes of minimising the mass of the buildings at the skyline when viewed from the south.

3) The provision of an appropriate landscaping scheme, to be designed and implemented as an integral part of the development.

4) That any application for development for the purpose of increasing aircraft movements in the air or on the ground, auxiliary power or engine testing, be supported by an assessment of cumulative noise impact and the effectiveness of mitigation measures to be implemented in order to minimise pollution and disturbance. The acceptability of proposals will be judged in relation to any identified and cumulative noise impact, the effectiveness of mitigation and the social and economic benefits of the proposals.

5) The provision of an air quality assessment in compliance with the Air Quality Management Plan to demonstrate that the development will not lead to a harmful deterioration in air quality. Permission will not be given for development that would result in national air quality objectives being exceeded.

6) That any new development which would generate significant surface traffic must meet requirements for surface travel demand.

7) That it must be demonstrated both that new development cannot contaminate groundwater sources and that appropriate mitigation measures will be incorporated in the development to prevent contamination.

8) There will be no significant harm to Thanet's SSSI/SAC/SPA/Ramsar sites. A Habitats Regulations Assessment will be required."

4.5.32 **Policy SE04 (Ground Water Protection Zones)** covers all land within and adjacent to the boundary of the airport site. Policy SE04 states that:

"Proposals for development within the Groundwater Source Protection Zones identified on Map 19 will only be permitted if there is no risk of contamination to groundwater sources. If a risk is identified, development will only be permitted if adequate mitigation measures can be implemented. Proposals for Sustainable Drainage systems involving infiltration must be assessed and discussed with the Environment Agency to determine their suitability in terms of the impact of any drainage into the groundwater aquifer."

4.5.33 **Policy SE05 (Air Quality)** states that:

"All major development schemes should promote a shift to the use of sustainable low emission transport to minimise the impact of vehicle emissions on air quality, particularly within the designated Urban Air Quality Management Area. Development will be located where it is accessible to support the use of public transport, walking and cycling. Development proposals that might lead to a significant deterioration in air quality or an exceedance of air quality national objectives or to a worsening of air quality within the urban Air Quality Management Area will require the submission of an Air Quality Assessment, which should address:

1) The cumulative effect of further emissions;
2) The proposed measures of mitigation through good design and offsetting measures that would prevent the National Air Quality Objectives being exceeded or reduce the extent of the air quality deterioration. These will be of particular importance within the urban AQMA, associated areas and areas of lower air quality.

Proposals that fail to demonstrate these will not be permitted."

4.5.34 **Policy SE08 (Aircraft Noise)** states that:

"Applications for noise sensitive development or redevelopment on sites likely to be affected by aircraft noise will be determined in relation to the latest accepted prediction of existing and foreseeable ground noise measurement of aircraft noise. Applications for residential development will be determined in accordance with the following noise exposure categories:

NEC	PREDICTED AIRCRAFT NOISE LEVELS (Dbl Aeq.0700-23.00)	
A	<57	NOISE WILL NOT BE A DETERMINING FACTOR
B	57-63	NOISE WILL BE TAKEN INTO ACCOUNT IN DETERMINING APPLICATIONS, AND WHERE APPROPRIATE, CONDITIONS WILL BE IMPOSED TO ENSURE AN ADEQUATE LEVEL OF PROTECTION AGAINST NOISE.
C	63-72	PLANNING PERMISSION WILL NOT BE GRANTED EXCEPT WHERE THE SITE LIES WITHIN THE CONFINES OF EXISTING SUBSTANTIALLY BUILT-UP AREA. EXCEPTIONALLY, WHERE RESIDENTIAL DEVELOPMENT IS GRANTED, CONDITIONS WILL BE IMPOSED TO ENSURE AN ADEQUATE LEVEL OF PROTECTION AGAINST NOISE.
D	>72	RESIDENTIAL DEVELOPMENT WILL NOT BE PERMITTED.

Proposed Revisions to Draft Local Plan (Preferred Options) (January 2017)

4.5.35 Following the publication of the draft Thanet Local Plan to 2031 Preferred Options (January 2015), the local planning authority has suggested some focused changes to key policies, some of which are relevant to Manston Airport. These changes have been set out in the Proposed Revisions to Draft Local Plan (Preferred Options) (January 2017) and were the subject of a public consultation exercise, running from the 19th January 2017 to the 17th March 2017.

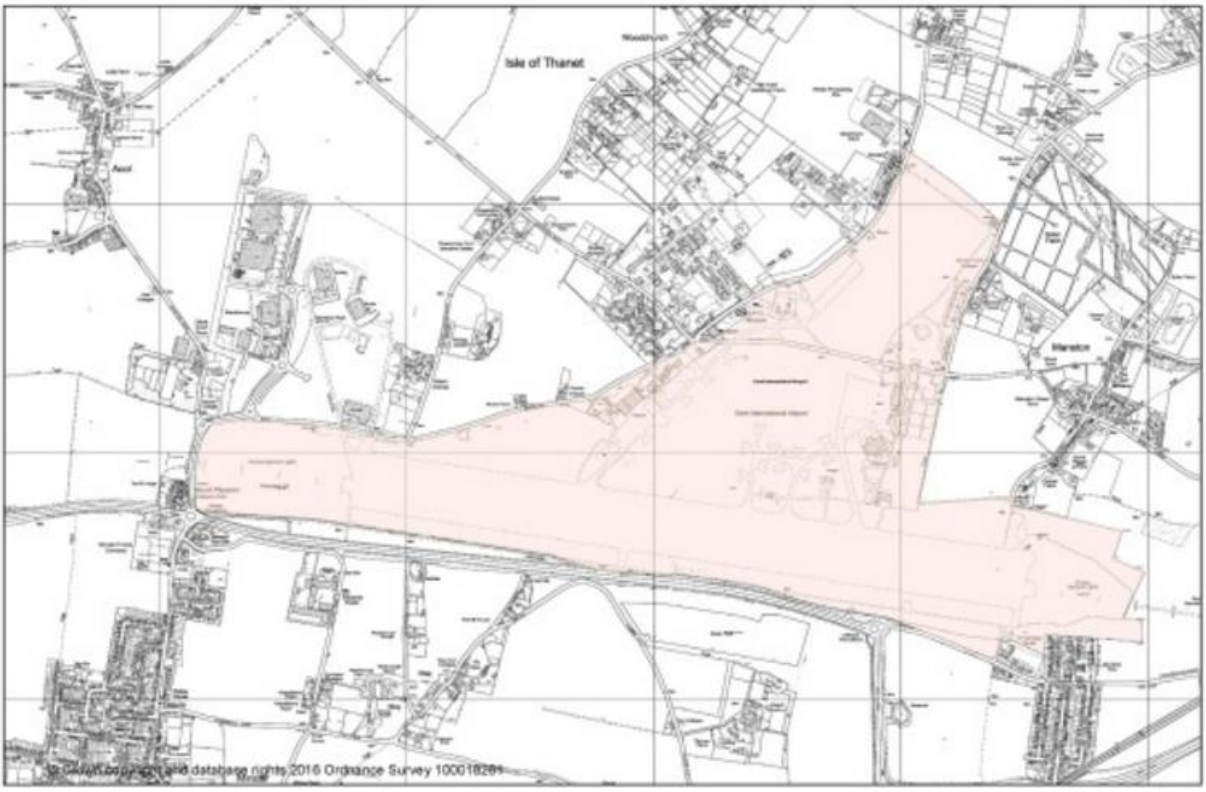
4.5.36 The local planning authority has significantly amended site specific draft Policy SP05 (Manston Airport) following the commission of an airport viability study by Avia Solutions. This was to look at whether an airport was a viable option for the site within the plan period to 2031. This report took into account national and international air travel and transport and the way in which it is likely to develop over the next 15 to 20 years and looked at previous reports and developments in national aviation. The report (September 2016) concluded that airport operations at Manston are very unlikely to be financially viable in the longer term, and almost certainly not possible in the period to 2031.

4.5.37 Taking on board the conclusions of the airport viability report and given the level of objectively assessed housing need, the Council considers that the best use for the 320ha brownfield airport site is for a mixed-use settlement with the capacity for up to 2,500 new dwellings and up to 85,000sqm of employment and leisure floorspace use, a new district centre and featuring all the amenities needed for a town. The development will also deliver important links across Thanet and improved access to and from the site and provide open space and community facilities that the whole of Thanet can access.

4.5.38 Policy SP05 relates to the site identified in the Map below:

Figure 4.1.2 Extract from Thanet District Council Proposed Revisions to Local Plan (2017) Proposal Maps showing Former Airport Site

Former Airport Site



4.5.39 Revised draft Policy SP05 (Former Airport Site) states that:

> **Land is allocated for a mixed use settlement at the site of the former Manston Airport as defined on the policies map. The site has the capacity to deliver at least 2,500 new dwellings, and up to 85,000sqm employment and leisure floorspace.**
>
> **The overarching principle of development of this settlement is the creation of a single sustainable settlement that can be easily served by public transport and with good, easily walkable access to central community services and other facilities.**
>
> **Contributions will be required to meet the following provisions and proposals will be judged and permitted only in accordance with a development brief and comprehensive masterplan for the whole site detailing:**
>
> - **How the requirements of the Transport Strategy will be met including the upgrade of Manston Court Road and improvements to Spitfire junction.**
> - **The relationship to the Parkway Station and Ramsgate Port including a southern bypass of Manston village and a direct link from the site to the A299 roundabout linking with the southbound dual carriageway.**
> - **A travel plan to include a public transport strategy linking the site to existing services, demonstration of**

how the site links with and relates to neighbouring settlements;

- **Key routes for traffic-calming measures**
- **Coherent phasing and evidence of deliverability**
- **A business plan to demonstrate how the employment will be delivered, and how it will relate and link to Manston Business Park**
- **The provision of a District Centre to meet the retail need of the development, fit within the retail hierarchy and serve the appropriate catchment, as well as provision of complementary uses such as community business space and leisure uses/recreational facilities.**
- **Provision of community facilities as outlined in the Infrastructure delivery plan (IDP) including a primary school facility at 4 forms of entry, and a Doctors Surgery**

A Landscape and Visual Impact Assessment to address:

- **the visual sensitivity of the site focussing on retention of open space and protecting wide open landscape and strategic views;**
- **how new built development will be designed to minimise visual impact on the open landscape of the central island. Particular attention must be given to roofscape for the purposes of minimising the mass of the buildings at the skyline when viewed from the south.**

Design and Heritage statements to include:

- **An appropriate landscaping scheme, to be designed and implemented as an integral part of the development.**
- **Provision of 31.77 Ha open space in accordance with Table 7 as required by Policy GI04, and integrated green infrastructure to include walking, cycling and equestrian routes and facilities**
- **A buffer between the development and Manston Village. Settlement separation between the villages of Manston, Minster, Cliffsend and Acol and Thanet Urban Area**
- **Pre-design archaeological assessment**
- **Links to the sites heritage to support tourism in Thanet, including consideration of proposals that would permit a limited element of aviation use**
- **Detail as to how the runway will be incorporated into the development scheme and what functions it will**

serve.

- **Provision of surface water management/sustainable drainage schemes that will not contaminate groundwater sources, and any proposed initiatives that will improve the condition of the groundwater**

Development proposals must:

- **Provide an appropriate mix of dwellings to meet the requirements of Policy SP18**
- **Provide affordable housing to meet the requirements of Policy SP19 (**NB SP19 is being amended to request affordable housing for more than 10 units)**
- **Provide one electric car charging point for every 10 parking spaces provided**
- **Consider accommodating any self-build requirements included in the self-build register**
- **Contribute towards the Strategic Access Management and Monitoring scheme to meet the requirements of SP25**
- **Include an assessment of the sites functionality as a roosting or feeding resource for the interest features of the Thanet Coast and Sandwich Bay SPA Protection Area, including areas within 400m of the development sites boundary, and provide mitigation where necessary**
- **Retain existing boundary features where possible**
- **Provide a connection to the sewerage system at the nearest point of adequate capacity, in collaboration with the service provider**
- **Allow future access to the existing water supply infrastructure for maintenance and upsizing purposes**
- **Provide for the installation of digital infrastructure**
- **Provide a Statement of Social Impacts addressing any needs for community facilities identified in the Infrastructure Delivery Plan**

4.5.40 Based on the amendment to draft Policy SP05 to provide a mixed-use settlement with residential provision, draft Policy SP11 (Housing Provision) has been revised to propose 2,500 residential dwellings at the Former Airport Site. RiverOak has submitted representations strongly objecting to the proposals to allocate the former airport site as a new settlement.

4.5.41 The expectation is that publication of the Pre-Submission Version of the full Local Plan will take place in January 2018 followed by submission of the Local Plan for Examination in Summer 2018; The Examination in Public in expected in late 2018/early 2019 with adoption due by end 2019. There are still unresolved objections including towards the approach taken on Manston Airport and whether the new Local Plan is based on adequate, up-to-date and relevant evidence about the economic, social and environmental characteristics and prospects of the area.

Dover District Council

4.5.42 The statutory Development Plan for Dover District Council comprises:

- Dover District Core Strategy (adopted September 2010);
- Dover District Land Allocations Local Plan (adopted January 2015);
- Dover District Proposals Map; and
- Dover District Local Plan (Saved Policies) (2002).

4.5.43 A review of Dover Districts planning policy has not identified any planning policy of relevance to the reopening of Manston Airport. The Core Strategy only contains a reference to the location of Manston Airport.

4.5.44 Dover District Council are about to commence a review of their Local Plan and have identified Manston Airport as a cross-boundary strategic priority for planning.

Canterbury City Council

4.5.45 The statutory Development Plan for Canterbury City Council comprises:

- Canterbury District Local Plan (July 2017) and Proposals Map[12]; and
- Herne Bay Area Action Plan [13] (adopted April 2010)

4.5.46 A review of CCC Development Plan documents has not identified any planning policy of relevance to the reopening of Manston Airport. However, the Local Plan does recognise that the NPPF encourages Local Authorities to plan proactively for the transport infrastructure necessary to support the growth of airports.

4.6 Other relevant plans and policies

Kent and Medway Growth and Infrastructure Framework (September 2015)

4.6.1 Kent’s leaders agreed it would be important to produce a pan-Kent and Medway Growth and Infrastructure Framework to bring together a clear picture over the Local Plan period to 2031 on:

- housing and economic growth planned to 2031 across Kent and Medway;
- the fundamental infrastructure needed to support this growth;
- the cost of this infrastructure;
- the potential funding sources across the public and private sector funding during this period: and
- the likely public-sector funding gap and work towards solutions.

4.6.2 The Kent and Medway Economic Partnership (KMEP) has been, and will continue to shape and be appraised of the Framework work and its findings.

4.6.3 Within the Framework, and with specific reference to Manston Airport and its surroundings, the following are identified:

- Manston Airport is identified as a Key Employment Site (14,000m^2);

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[12] Canterbury District Local Plan (2017) Canterbury City Council. Available online at https://www2.canterbury.gov.uk/media/1507001/Canterbury-District-Local-Plan-Adopted-July-2017.pdf [Checked 14/11/17].
[13] Here Bay Area Action Plan (2010) Canterbury City Council. Available online at https://www2.canterbury.gov.uk/media/512291/HerneBayAreaActionPlanlowres.pdf [Checked 14/11/17].

- Manston Business Park is identified as a Key Employment Site (207,000m²); and
- Manston Green (to the east of the airport) is identified for a major housing development (700 units).

Kent and Medway Economic Partnership (KMEP)

4.6.4 The Kent and Medway Economic Partnership (KMEP) is the economic partnership for Kent and Medway which aims to drive forward economic growth and prosperity throughout the region. It was set up in 2013 and is one of the four federated partnerships which comprise the South East Local Enterprise Partnership.

4.6.5 The Kent and Medway Economic Partnership is responsible for the delivery of the objectives set out in Kent and Medway's Growth Plan *'Unlocking the Potential: Going for Growth.'* The Growth Deal sets out the actions that businesses and local authorities in Kent and Medway, together with the South East LEP and central Government will take to drive forward delivery. The Growth Plan, as part of the Strategic Economic Plan, was submitted to the Government at the end of March 2014.

4.6.6 The Discovery Park and Manston Growth Deal states that a coordinated approach to the development of Discovery Park and Manston needs to be taken forward and that the KMEP will:

- consider extending Enterprise Zone designation to Manston Business Park, Manston Airport and the Richborough Corridor. KMEP will ask Government to permit Thanet District Council to retain 100% of business rate receipts within the Zone with no impact on their baseline, in order that discounts can be fully funded by receipts above the discount level;
- allocate £3.5 million in Local Growth Fund finance to support commercial development at Manston and Discovery Park; and
- support SEFUND investment in commercial and residential development. Alongside this, KMEP will seek Local Growth Fund transport investment in Thanet Parkway station as a priority to reinforce the success of Discovery Park and support investment at Manston as well as in the Westwood Relief Strategy, eliminating a major bottleneck impacting on employment and commercial growth in Thanet Central Island.

Kent County Council - Manston Airport under private ownership: The story to date and the future prospects (March 2015)

4.6.7 This document sets out the story of Manston Airport over the last 16 years, from its sale by the Ministry of Defence (MOD) to March 2015. Kent County Council also considers the future for the airport which it is confident will be bright. The Council has always supported Manston and they have invested substantial sums of public money to the cause. They have also made substantial investments in both road and rail infrastructure to improve access to Manston and East Kent.

4.6.8 The County Council remain committed to seizing the best opportunity for Manston Airport by creating a significant number of new jobs and bringing prosperity into East Kent.

Appendix 6.1 – 6.5

Appendix 6.1

List of Receptors

6.1.1 This appendix provides tables listing details of the specific receptors at which concentrations were modelled (in addition to the gridded receptors). Details of how these receptors were chosen are given in **Section 6.4**. **Table 6.1** provides details of the human receptors, **Table 6.2** provides details of the ecological receptors, and **Table 6.3** provides details of the monitoring locations used as receptors.

Table 6.1 Human receptor locations

ID	Description	Easting	Northing	Height	Notes
H01	Garden Cottage	631215	166224	1.6	Long- and short-term
H02	Cleve Court	631165	166314	1.6	Long- and short-term
H03	Cleve Court Farm	631186	166424	1.6	Long- and short-term
H04	Oast Cottages	631003	166651	1.6	Long- and short-term
H05	Acol	630864	166832	1.6	Long- and short-term
H06	Alland Grange	632086	166298	1.6	Long- and short-term
H07	Alland Grange Lane	632159	166430	1.6	Long- and short-term
H08	Rose Farm	632489	166193	1.6	Long- and short-term
H09	Pouces Cottages	632629	166210	1.6	Long- and short-term
H10	Bell Davies Drive 1	633019	166385	1.6	Long- and short-term
H11	Bell Davies Drive 2	633039	166403	1.6	Long- and short-term
H12	Manston Road 1	633126	166502	1.6	Long- and short-term
H13	Defence Centre	633285	166619	1.6	Long- and short-term
H14	Coach House	633912	166981	1.6	Long- and short-term
H15	Manston Court Road	634183	166374	1.6	Long- and short-term
H16	Wood Farm	634509	166374	1.6	Long- and short-term
H17	Manston Road 2	634621	166241	1.6	Long- and short-term
H18	Manston Road 3	634640	166153	1.6	Long- and short-term
H19	High Street 1	634680	166079	1.6	Long- and short-term
H20	High Street 2	634651	165954	1.6	Long- and short-term
H21	High Street 3	634584	165938	1.6	Long- and short-term
H22	High Street 4	634694	165880	1.6	Long- and short-term
H23	High Street 5	634455	165807	1.6	Long- and short-term

ID	Description	Easting	Northing	Height	Notes
H24	Highlands Glade	635028	166030	1.6	Long- and short-term
H25	Spratling Court Farm	635479	166321	1.6	Long- and short-term
H26	Spratling Lane	635757	166282	1.6	Long- and short-term
H27	Auckland Avenue	636106	166044	1.6	Long- and short-term
H28	Manston Road 4	636063	165787	1.6	Long- and short-term
H29	Ozengell Grange 1	635661	165661	1.6	Long- and short-term
H30	Ozengell Grange 2	635606	165627	1.6	Long- and short-term
H31	Kentmere Avenue	635903	165323	1.6	Long- and short-term
H32	Canterbury Road East	635777	165134	1.6	Long- and short-term
H33	Sea View Road	634774	165056	1.6	Long- and short-term
H34	Windsor Road	634770	165249	1.6	Long- and short-term
H35	Arundel Road 1	634726	165251	1.6	Long- and short-term
H36	Arundel Road 2	634682	165251	1.6	Long- and short-term
H37	King Arthur Road 1	634646	165253	1.6	Long- and short-term
H38	King Arthur Road 2	634602	165260	1.6	Long- and short-term
H39	King Arthur Road 3	634603	165217	1.6	Long- and short-term
H40	King Arthur Road 4	634601	165182	1.6	Long- and short-term
H41	King Arthur Road 5	634599	165138	1.6	Long- and short-term
H42	King Arthur Road 6	634596	165101	1.6	Long- and short-term
H43	Canterbury Road West 1	634450	165100	1.6	Long- and short-term
H44	Canterbury Road West 2	634382	165134	1.6	Long- and short-term
H45	Clive Road	634518	164793	1.6	Long- and short-term
H46	Thorne Farm 1	633418	164980	1.6	Long- and short-term
H47	Thorne Farm 2	633287	164842	1.6	Long- and short-term
H48	Red Cottages	633076	164912	1.6	Long- and short-term
H49	Ivy Cottage Hill 1	632465	165443	1.6	Long- and short-term
H50	Ivy Cottage Hill 2	632426	165384	1.6	Long- and short-term
H51	Ivy Cottage Hill 3	632378	165324	1.6	Long- and short-term
H52	Way Hill 1	632242	165162	1.6	Long- and short-term
H53	Way Hill 2	632166	165091	1.6	Long- and short-term
H54	Dellside	632064	165515	1.6	Long- and short-term
H55	Wayborough House	632023	165273	1.6	Long- and short-term

ID	Description	Easting	Northing	Height	Notes
H56	Tothill Street 1	631079	165231	1.6	Long- and short-term
H57	Fairfield Road	630849	165341	1.6	Long- and short-term
H58	Burgess Close	631238	165328	1.6	Long- and short-term
H59	Hill House Drive	631258	165433	1.6	Long- and short-term
H60	Southall Close	631203	165516	1.6	Long- and short-term
H61	Premier Inn	631139	165561	1.6	Long- and short-term
H62	Holiday Inn	631045	165700	1.6	Long- and short-term
H63	Mount Pleasant 1	631091	165778	1.6	Long- and short-term
H64	Mount Pleasant 2	631111	165805	1.6	Long- and short-term
H65	Mount Pleasant 3	631115	165852	1.6	Long- and short-term
H66	Tothill Street 2	631061	165470	1.6	Long- and short-term
H67	Proposed Manston Road 4	634597	166287	1.6	Long- and short-term
H68	Proposed Manston Green	635335	165657	1.6	Long- and short-term
H69	Proposed at Jentex site	634417	165213	1.6	Long- and short-term
H70	Proposed off Southall Close	631268	165516	1.6	Long- and short-term
S01	Air Cadets	633172	166482	1.6	Short-term only
S02	RAF Museum	633258	166471	1.6	Short-term only
S03	Memorial Museum	633351	166555	1.6	Short-term only
S04	Church	634633	165956	1.6	Short-term only
S05	St Stephens	635743	166131	1.6	Short-term only
S06	Tesco	636110	165647	1.6	Short-term only
S07	Smugglers Retreat	631121	165603	1.6	Short-term only
S08	Coop	631189	165670	1.6	Short-term only
A01	AQMA 1	628199	169135	1.6	AQMA
A02	AQMA 2	629810	168213	1.6	AQMA
A03	AQMA 3	630337	168165	1.6	AQMA
A04	AQMA 4	631554	168915	1.6	AQMA
A05	AQMA 5	632410	169167	1.6	AQMA
A06	AQMA 6	633542	169294	1.6	AQMA
A07	AQMA 7	635052	169313	1.6	AQMA
A08	AQMA 8	635998	168591	1.6	AQMA
A09	AQMA 9	635909	167560	1.6	AQMA

ID	Description	Easting	Northing	Height	Notes
A10	AQMA 10	635754	166743	1.6	AQMA
A11	AQMA 11	635574	165975	1.6	AQMA
A12	AQMA 12	635125	165203	1.6	AQMA
A13	AQMA 13	634752	165243	1.6	AQMA
A14	AQMA 14	634369	165285	1.6	AQMA
A15	AQMA 15	634356	165091	1.6	AQMA
A16	AQMA 16	634362	164473	1.6	AQMA
A17	AQMA 17	634276	164112	1.6	AQMA
A18	AQMA 18	634556	163810	1.6	AQMA
A19	AQMA 19	634834	164066	1.6	AQMA
A20	AQMA 20	635064	163939	1.6	AQMA
A21	AQMA 21	635416	164358	1.6	AQMA
A22	The Square Birchington 1	630226	169070	1.6	AQMA
A23	The Square Birchington 2	630235	169089	1.6	AQMA
A24	The Square Birchington 3	630253	169081	1.6	AQMA
A25	The Square Birchington 4	630270	169076	1.6	AQMA
A26	The Square Birchington 5	630288	169071	1.6	AQMA
A27	The Square Birchington 6	630308	169071	1.6	AQMA
A28	The Square Birchington 7	630308	169058	1.6	AQMA
A29	The Square Birchington 8	630290	169050	1.6	AQMA
A30	The Square Birchington 9	630276	169045	1.6	AQMA
A31	The Square Birchington 10	630254	169033	1.6	AQMA
A32	St Lawrence 1	637052	165324	1.6	AQMA
A33	St Lawrence 2	637046	165372	1.6	AQMA
A34	St Lawrence 3	637074	165376	1.6	AQMA
A35	St Lawrence 4	637065	165340	1.6	AQMA
A36	St Lawrence 5	637075	165331	1.6	AQMA
A37	St Lawrence 6	637104	165345	1.6	AQMA
A38	St Lawrence 7	637140	165328	1.6	AQMA
A39	St Lawrence 8	637119	165323	1.6	AQMA
A40	St Lawrence 9	637099	165327	1.6	AQMA
A41	St Lawrence 10	637082	165319	1.6	AQMA

ID	Description	Easting	Northing	Height	Notes
A42	St Lawrence 11	637085	165289	1.6	AQMA
A43	St Lawrence 12	637063	165280	1.6	AQMA

Table 6.2 Ecological receptor locations

ID	Description	Easting	Northing	Height	Notes
E01	Ramsar, SPA, SSSI	621048	168683	0	UK9012071
E02	Ramsar, SPA, SSSI	625191	169137	0	UK9012071
E03	Ramsar, SPA, SAC, SSSI	628533	169560	0	UK0013107, UK9012071
E04	Ramsar, SPA, SAC, SSSI	629867	169917	0	UK0013107, UK9012071
E05	Ramsar, SPA, SAC, SSSI	630740	169804	0	UK0013107, UK9012071
E06	Ramsar, SPA, SAC, SSSI	631813	170059	0	UK0013107, UK9012071
E07	Ramsar, SPA, SAC, SSSI	632683	170381	0	UK0013107, UK9012071
E08	Ramsar, SPA, SAC, SSSI	633993	170521	0	UK0013107, UK9012071
E09	Ramsar, SPA, SAC, SSSI	635116	170740	0	UK0013107, UK9012071
E10	Ramsar, SPA, SAC, SSSI	636457	171381	0	UK0013107, UK9012071
E11	Ramsar, SPA, SAC, SSSI	637964	171321	0	UK0013107, UK9012071
E12	Ramsar, SPA, SAC, SSSI	639028	171113	0	UK0013107, UK9012071
E13	Ramsar, SPA, SAC, SSSI	639841	170161	0	UK0013107, UK9012071
E14	Ramsar, SPA, SAC, SSSI	639882	168631	0	UK0013107, UK9012071
E15	Ramsar, SPA, SAC, SSSI	639810	167452	0	UK0013107, UK9012071
E16	Ramsar, SPA, SAC, SSSI	639527	166684	0	UK0013107, UK9012071
E17	Ramsar, SPA, SAC, SSSI	639241	165688	0	UK0013107, UK9012071
E18	SAC	638891	165003	0	UK0013107
E19	SAC	638595	164294	0	UK0013107
E20	Ramsar (30 m distant), SPA (30 m distant), SAC, SSSI, NNR	637303	164087	0	UK0013077, UK9012071
E21	Ramsar (70 m distant), SPA (70 m distant), SAC, SSSI, NNR (70 m distant)	636318	164194	0	UK0013077, UK9012071
E22	Ramsar, SPA, SAC, SSSI, NNR	635298	164386	0	UK0013077, UK9012071
E23	Ramsar, SPA, SAC, SSSI, NNR	634800	164047	0	UK0013077, UK9012071
E24	Ramsar, SPA, SAC, SSSI, NNR	634346	163650	0	UK0013077, UK9012071

ID	Description	Easting	Northing	Height	Notes
E25	Ramsar, SPA, SSSI, NNR	633796	162733	0	UK9012071
E26	Ramsar, SPA, SSSI, NNR	633703	162425	0	UK9012071
E27	Ramsar, SPA, SAC, SSSI, NNR	634513	161455	0	UK0013077, UK9012071
E28	Ramsar, SPA, SAC, SSSI	633502	161188	0	UK0013077, UK9012071
E29	Ramsar, SPA, SAC, SSSI, NNR	635337	160698	0	UK0013077, UK9012071
E30	Ramsar, SPA, SAC, SSSI	633692	159746	0	UK0013077, UK9012071
E31	SAC, SSSI	634794	159415	0	UK0013077
E32	Ramsar, SPA, SAC, SSSI, NNR	635708	159117	0	UK0013077, UK9012071
E33	SAC, SSSI	633607	158133	0	UK0013077
E34	SAC, SSSI	635539	157577	0	UK0013077
E35	Ramsar, SSSI	633584	156906	0	1001128
E36	Ramsar, SPA, SSSI	635214	156105	0	UK9012071
E37	Ramsar, SSSI	632347	155607	0	1001128
E38	SSSI	632033	163044	0	1001128
E39	SSSI	632554	162933	0	1001128
E40	SSSI	633412	162328	0	1001128
E41	SSSI	633527	162189	0	1001128
E42	SSSI	632364	162425	0	1001128
E43	Ramsar, SPA, SAC, SSSI	622112	162206	0	UK0030283, UK9012121
E44	Ramsar, SPA, SAC, SSSI, NNR	623126	162989	0	UK0030283, UK9012121
E45	SAC, SSSI, NNR	624052	162872	0	UK0030283
E46	SAC, SSSI, NNR	624096	162621	0	UK0030283
E47	SAC, SSSI, NNR	623938	162268	0	UK0030283
E48	Ramsar, SPA, SAC, SSSI	623648	161865	0	UK0030283, UK9012121
E49	Ramsar, SPA, SAC, SSSI	622879	161358	0	UK0030283, UK9012121
E50	LWS	631694	164088	0	
E51	LWS	631458	164099	0	
E52	LWS	631039	164107	0	
E53	LWS	632436	162421	0	
E54	LWS	631908	162848	0	
E55	LWS	631008	162944	0	

ID	Description	Easting	Northing	Height	Notes
E56	LWS	630479	164211	0	
E57	LWS	630389	164405	0	
E58	LWS	630172	164540	0	
E59	Habitat	633116	169430	0	
E60	Habitat	633976	168913	0	
E61	Habitat	635881	166552	0	
E62	Habitat	635634	165614	0	
E63	Habitat	635696	165271	0	
E64	Habitat	635212	165108	0	
E65	Habitat	635302	164394	0	
E66	Habitat	634825	164063	0	
E67	Habitat	634369	163647	0	
E68	Habitat	634218	163399	0	
E69	Habitat	633122	163264	0	
E70	Habitat	633581	165056	0	
E71	Habitat	633420	165112	0	
E72	Habitat	633441	164876	0	
E73	Habitat	633330	164922	0	
E74	Habitat	632062	164071	0	
E75	Habitat	631267	164655	0	
E76	Habitat	631135	164551	0	
E77	Habitat	631149	166159	0	
E78	Habitat	632034	166274	0	
E79	Habitat	632106	166329	0	
E80	Habitat	632102	166377	0	
E81	Habitat	633049	166413	0	
E82	Habitat	633119	166478	0	
E83	Habitat	632891	166706	0	
E84	Habitat	632763	166769	0	
E85	Habitat	631105	168000	0	
E86	Habitat	631260	168095	0	
E87	Habitat	631603	168434	0	

ID	Description	Easting	Northing	Height	Notes
E88	Habitat	632016	168303	0	

Table 6.3 Monitor receptor locations

ID	Description	Easting	Northing	Height	Notes
M01	ZH3 Thanet Airport	635931	165331	1.6	Monitor
M02	ZH4 Thanet Ramsgate	638483	165430	1.6	Monitor
M03	ZH5 Thanet Birchington	630284	169052	1.6	Monitor
M04	TH05	639019	167981	1.6	Monitor
M05	TH10	635539	169840	1.6	Monitor
M06	TH13/46/47	630254	169037	1.6	Monitor
M07	TH16	634445	164416	1.6	Monitor
M08	TH26	638492	165410	1.6	Monitor
M09	TH27	639097	165971	1.6	Monitor
M10	TH31	634662	166026	1.6	Monitor
M11	TH32	632984	166419	1.6	Monitor
M12	TH33	631161	165486	1.6	Monitor
M13	TH34	636570	167891	1.6	Monitor
M14	TH36	636405	168227	1.6	Monitor
M15	TH37/38/45	635932	165333	1.6	Monitor
M16	TH48	630438	169111	1.6	Monitor
M17	TH49	630186	168983	1.6	Monitor
M18	TH50/61/62	638616	165564	1.6	Monitor
M19	TH51/52/53	638472	165432	1.6	Monitor
M20	TH54/64/65	637135	165354	1.6	Monitor
M21	TH55	636815	167297	1.6	Monitor
M22	TH59	638220	168614	1.6	Monitor
M23	TH66	637112	165331	1.6	Monitor
M24	TH67/68/69	638536	165465	1.6	Monitor
M25	TH70/71/72	637092	165340	1.6	Monitor
M26	TH73/74/75	638528	165426	1.6	Monitor
M27	TH76	634752	170679	1.6	Monitor

Appendix 6.2

Baseline Air Quality Data

Current baseline

TDC monitoring

6.1.2 Details of the continuous monitors operated by Thanet District Council are summarised in **Table 6.4**, and details of the diffusion tubes operated by Thanet District Council are summarised in **Table 6.5**. Their locations are shown in **Figure 6.1**.

Table 6.4 Continuous monitor details

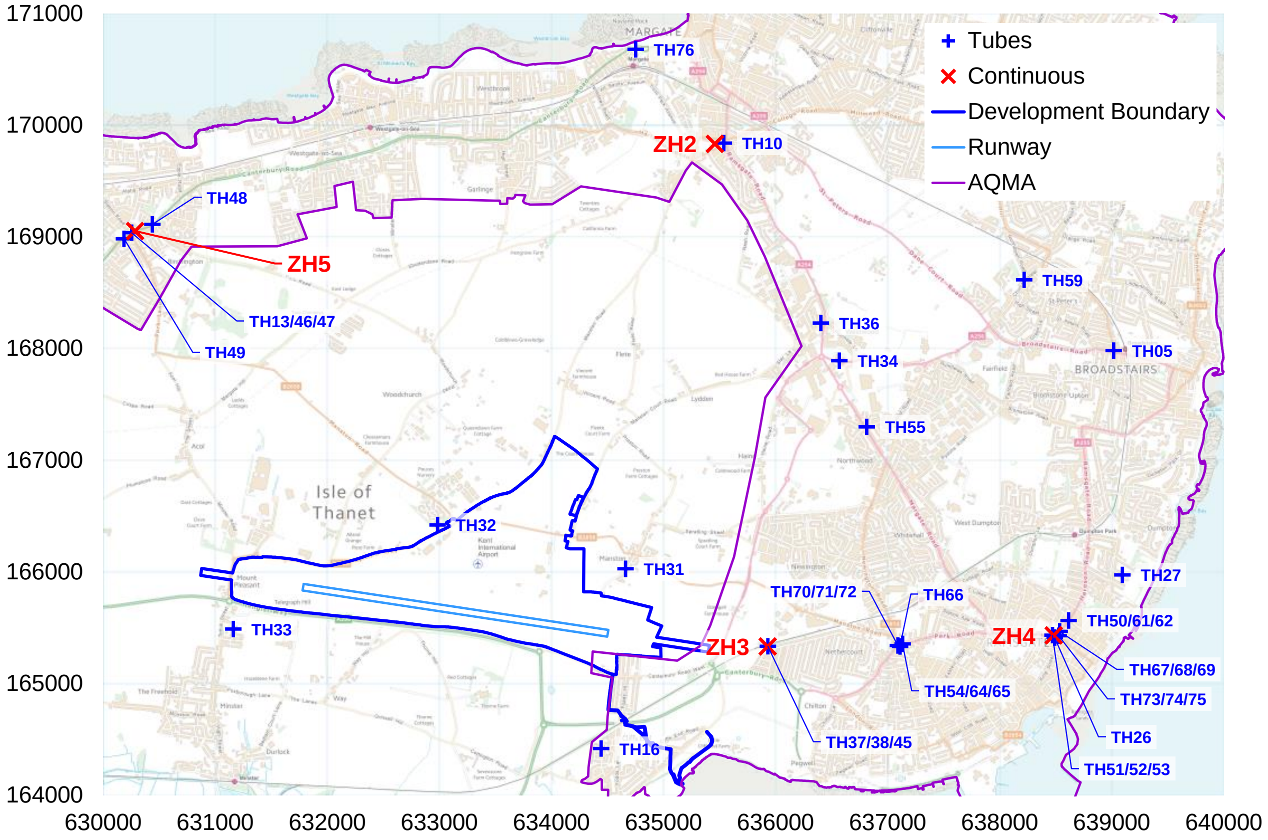
Name	National grid coordinates	Classification	Pollutants monitored	Notes
ZH2 Thanet Margate Background	635460, 169833	Urban background	NO_x (i.e. NO, NO_2)	Closed March 2013.
ZH3 Thanet Airport	635931, 165331	Suburban	NO_x (i.e. NO, NO_2)	Closed March 2016.
ZH4 Thanet Ramsgate Roadside	638483, 165430	Roadside	NO_x (i.e. NO, NO_2), PM_{10}	
ZH5 Thanet Birchington Roadside	630284, 169052	Roadside	NO_x (i.e. NO, NO_2), PM_{10}	

Table 6.5 Diffusion tube details

Name	National grid coordinates	Classification	Notes
TH05	639019, 167981	Kerbside	
TH10	635539, 169840	Kerbside	
TH13/46/47	630254, 169037	Kerbside	
TH16	634445, 164416	Background	
TH26	638492, 165410	Kerbside	
TH27	639097, 165971	Urban background	
TH31	634662, 166026	Urban background	
TH32	632984, 166419	Urban background	
TH33	631161, 165486	Urban background	
TH34	636570, 167891	Roadside	
TH36	636405, 168227	Kerbside	
TH37/38/45	635932, 165333	Kerbside	
TH48	630438, 169111	Kerbside	

Name	National grid coordinates	Classification	Notes
TH49	630186, 168983	Roadside	
TH50/61/62	638616, 165564	Roadside	
TH51/52/53	638472, 165432	Roadside	
TH54/64/65	637135, 165354	Roadside	
TH55	636815, 167297	Roadside	
TH59	638220, 168614	Kerbside	From 2015 only.
TH66	637112, 165331	Roadside	
TH67/68/69	638536, 165465	Roadside	
TH70/71/72	637092, 165340	Roadside	
TH73/74/75	638528, 165426	Roadside	
TH76	634752, 170679	Roadside	From 2015 only.

Figure 6.1 Monitoring locations



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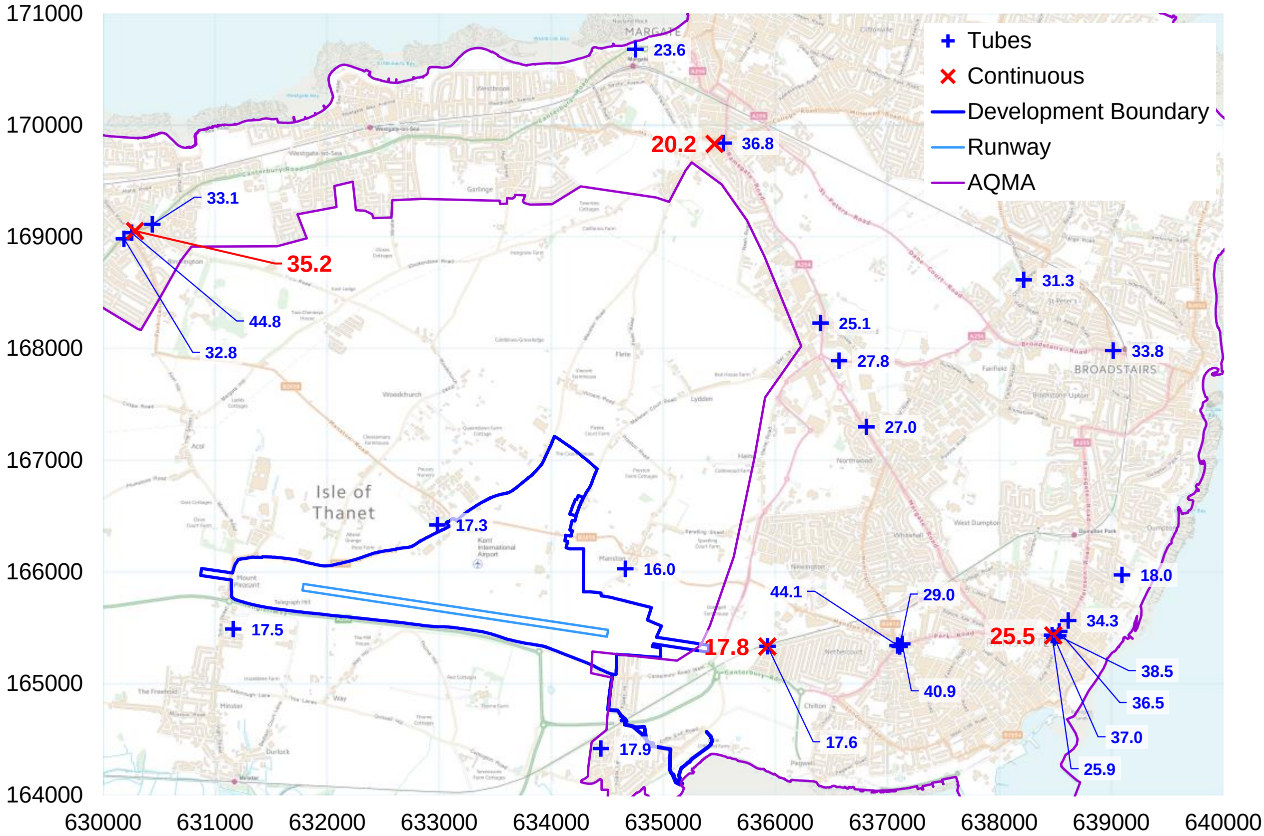
6.1.3 Measured annual mean NO_2 concentrations from Thanet's monitoring programme between 2007 and 2016 are summarised in **Table 6.6. Figure 6.2** shows the locations of the monitors labelled with the annual mean NO_2 concentration averaged over the available measurement years.

Table 6.6 Annual mean NO_2 concentrations (µg m^{-3}) from monitors

Name	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Average
ZH2	21	21	21	20	19.5	19.5*	19.3*	N/A	N/A	N/A	**20.2**
ZH3	18	19	21	18	18.7	18.1	16.0	16.5	14.7	N/A	**17.8**
ZH4	25	26	30	26	26.8	25.1	25.2	25.6	22.9	22.6	**25.5**
ZH5	37	39	40	35	35.9	40.8	34.8	30.8	24.6	33.6	**35.2**
TH05	N/A	N/A	40	31	34.4	34.7	31.2	34.8	30.3	33.6	**33.8**
TH10	N/A	N/A	43	37	40.4	35.4	33.7	35.3	34.9	35.0	**36.8**
TH13/46/47	N/A	N/A	49	41	46.6	45.1	43.0*	47.4	42.4	44.1	**44.8**
TH16	N/A	N/A	21	18	17.2	18.9	16.6	20.0	14.7	16.7	**17.9**
TH26	N/A	N/A	42	36	38.5	36.1	34.9	37.1	35.3	36.0	**37.0**
TH27	N/A	N/A	22	19	19.0	18.4	17.9	17.1	14.1	16.3	**18.0**
TH31	N/A	N/A	19	17	17.4	15.0	15.6	16.4	12.9	14.7	**16.0**
TH32	N/A	N/A	22	19	19.2	16.6	15.9	15.7	14.4	15.4	**17.3**
TH33	N/A	N/A	22	18	19.1	16.1	18.3	15.2	14.9	16.5	**17.5**
TH34	N/A	N/A	33	26	32.2	27.9	25.5	27.7	24.1	25.8	**27.8**
TH36	N/A	N/A	26	24	26.1	24.0	23.8	25.7	22.5	28.6	**25.1**
TH37/38/45	N/A	N/A	21	19	19.4	17.2	16.7	16.4	14.8	16.0	**17.6**
TH48	N/A	N/A	37	31	32.8	34.2	33.3	33.7	31.9	31.2	**33.1**
TH49	N/A	N/A	43	36	38.8	37.1	32.8	33.7	20.3	20.7	**32.8**
TH50/61/62	N/A	N/A	38	35	34.7	33.7	33.1	34.4	32.3	33.0	**34.3**
TH51/52/53	N/A	N/A	30	26	25.5	26.4	23.6	28.1	23.7	23.7	**25.9**
TH54/64/65	N/A	N/A	45	40	42.3	41.7	38.0	41.2	38.2	40.9	**40.9**
TH55	N/A	N/A	30	28	28.3	26.6	25.9	26.6	21.9	29.0	**27.0**
TH59	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	29.3	33.3	**31.3**
TH66	N/A	N/A	31	29	29.0	28.1	28.3	28.5	31.1	27.2	**29.0**
TH67/68/69	N/A	N/A	42	38	37.7	36.5	34.4	34.4	33.7	35.6	**36.5**
TH70/71/72	N/A	N/A	47	42	43.4	44.3	43.7	44.4	42.8	44.9	**44.1**
TH73/74/75	N/A	N/A	N/A	37	39.5	36.0	43.7*	42.1	35.7	35.7	**38.5**
TH76	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	21.6	25.5	**23.6**

*Low data capture. Data capture information is not available for 2007–2011.

Figure 6.2 Monitored annual mean NO_2 (µg m^{-3}), averaged 2007–2016



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6.1.4 Measured annual mean NO_x concentrations from Thanet's monitoring programme between 2007 and 2016 are summarised in **Table 6.7**.

Table 6.7 Annual mean NO_x concentrations (µg m^{-3}) from monitors

Name	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Average
ZH2	32	32	29	28	26	N/A	N/A	N/A	N/A	N/A	**29.4**
ZH3	24	24	26	24	23	22	20	20	18	N/A	**22.3**
ZH4	42	42	47	41	41	41	40	41	36	38	**40.9**
ZH5	83	84	88	78	81	93	79	71	54	70	**78.1**

6.1.5 Measured annual mean PM_{10} concentrations from Thanet's monitoring programme between 2007 and 2016 are summarised in **Table 6.8**.

Table 6.8 Annual mean PM_{10} concentrations (µg m^{-3}) from monitors

Name	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Average
ZH4	N/A	N/A	29	28	34.0	27.6	30.7*	24.7	24.3	25.9	**28.0**
ZH5	N/A	N/A	23	24	28.8	25.4	25.6*	20.8	22.3	25.0	**24.4**

*Low data capture. Data capture information is not available for 2007–2011.

Defra's background mapped concentrations

6.1.6 Concentrations of NO_2, NO_x, PM_{10} and $PM_{2.5}$ from the Defra data for 2018 are given in **Table 6.9** to **Table 6.12** for a selection of 1 km Ordnance Survey grid squares in the vicinity of the airport (grid square from 629500 to 639500 eastings by 163500 to 169500 northings). Concentrations of NO_2 are shown graphically in **Figure 6.3**.

Table 6.9 Annual mean NO_2 concentrations ($\mu g\ m^{-3}$) by 1 km grid square from Defra data

	629500	630500	631500	632500	633500	634500	635500	636500	637500	638500	639500
169500	8.9	9.5	9.5	9.9	10.0	9.4	10.6	10.1	9.9	10.4	9.1
168500	8.8	9.0	8.4	8.7	8.6	8.7	9.3	10.9	10.5	11.1	10.2
167500	8.7	8.5	9.0	9.6	8.6	8.9	9.4	11.4	13.3	11.0	11.3
166500	8.3	8.5	11.5	9.8	9.8	9.5	10.9	11.2	11.2	10.9	10.2
165500	8.9	9.3	10.3	10.0	10.1	10.0	11.7	11.8	12.5	12.3	10.1
164500	8.0	8.5	8.5	8.4	8.9	9.4	10.2	12.0	12.1	11.2	N/A
163500	7.7	7.8	7.9	8.0	8.6	9.3	10.0	10.8	11.0	10.9	N/A

Table 6.10 Annual mean NO_x concentrations ($\mu g\ m^{-3}$) by 1 km grid square from Defra data

	629500	630500	631500	632500	633500	634500	635500	636500	637500	638500	639500
169500	11.9	12.8	12.8	13.4	13.6	12.7	14.4	13.7	13.4	14.1	12.3
168500	11.7	12.1	11.2	11.6	11.5	11.6	12.5	14.8	14.3	15.2	13.8
167500	11.6	11.4	12.1	13.1	11.6	11.9	12.7	15.6	18.6	15.0	15.5
166500	11.1	11.4	15.9	13.3	13.3	12.8	14.9	15.3	15.3	14.9	13.8
165500	12.0	12.5	14.0	13.5	13.7	13.6	16.0	16.2	17.3	17.0	13.7
164500	10.6	11.4	11.4	11.2	12.0	12.6	13.8	16.5	16.7	15.4	N/A
163500	10.3	10.4	10.5	10.7	11.5	12.5	13.6	14.8	15.1	15.0	N/A

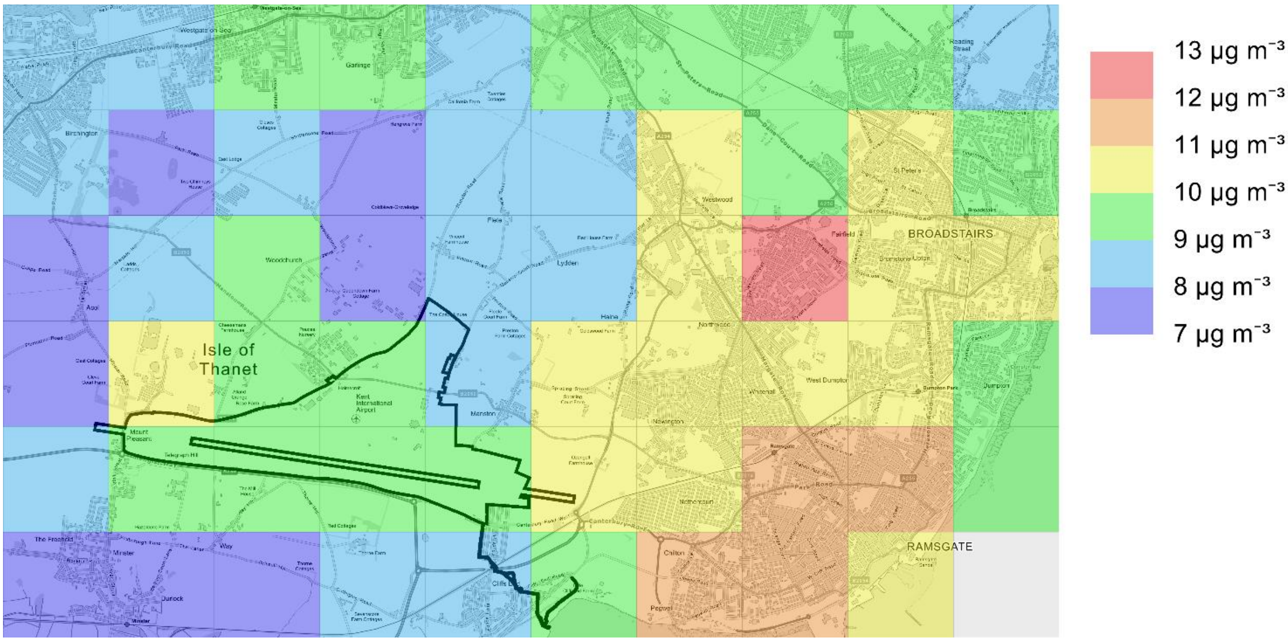
Table 6.11 Annual mean PM_{10} concentrations (µg m^{-3}) by 1 km grid square from Defra data

	629500	630500	631500	632500	633500	634500	635500	636500	637500	638500	639500
169500	14.8	14.9	15.3	15.7	15.9	15.5	15.0	15.6	15.7	15.6	14.9
168500	16.2	15.8	16.6	16.1	16.5	15.4	16.3	16.8	16.6	15.2	14.5
167500	16.9	16.5	16.8	16.7	16.0	16.4	16.8	16.4	17.0	15.2	14.9
166500	16.6	17.1	18.6	16.2	14.9	16.0	16.8	15.5	15.8	15.1	14.7
165500	17.0	16.7	17.1	16.6	16.8	15.9	17.2	15.5	15.4	15.1	13.9
164500	16.3	16.1	15.9	16.9	16.7	16.0	16.1	15.7	15.2	14.1	N/A
163500	16.1	16.4	16.8	16.5	16.3	14.7	14.1	14.0	13.9	13.7	N/A

Table 6.12 Annual mean $PM_{2.5}$ concentrations (µg m^{-3}) by 1 km grid square from Defra data

	629500	630500	631500	632500	633500	634500	635500	636500	637500	638500	639500
169500	10.6	10.6	10.8	11.1	11.2	10.9	10.8	11.0	11.1	11.1	10.6
168500	11.2	11.1	11.4	11.2	11.4	10.8	11.3	11.7	11.6	11.0	10.6
167500	11.6	11.4	11.6	11.5	11.2	11.4	11.6	11.5	11.8	10.9	10.8
166500	11.4	11.7	12.8	11.3	10.7	11.2	11.7	11.1	11.3	10.9	10.6
165500	11.6	11.5	11.8	11.5	11.6	11.2	11.8	11.1	11.1	11.0	10.2
164500	11.3	11.2	11.1	11.6	11.5	11.1	11.2	11.1	10.9	10.3	N/A
163500	11.1	11.3	11.5	11.4	11.3	10.5	10.2	10.1	10.1	10.0	N/A

Figure 6.3 Annual mean NO_2 concentrations (µg m^{-3}) from Defra data



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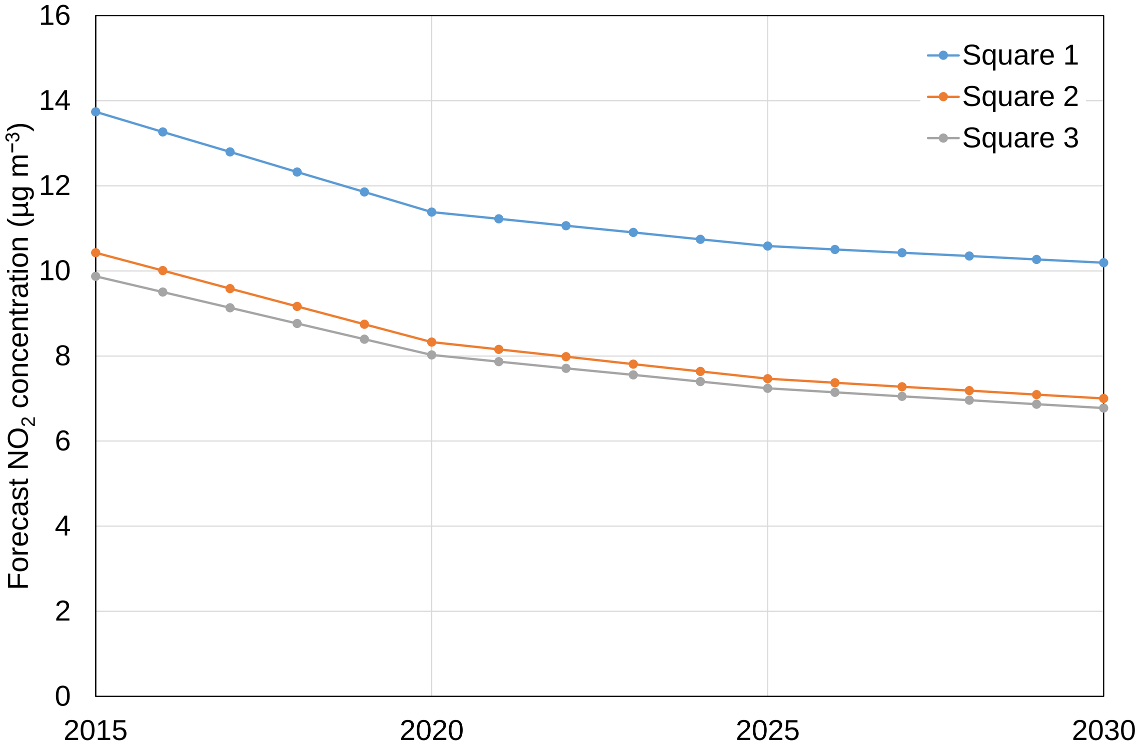
6.1.7 **Figure 6.4** shows the forecast trend in NO_2 emissions between 2013 and 2030, for three grid squares. Grid square 1 represents the square with the highest urban background concentration in 2018 (the red square in **Figure 6.12**). Grid squares 2 and 3 represent the square containing the eastern end of the runway and the square immediately north of it; these squares contain some of the closest residential properties to the airport. It can be seen that between 2015 and 2030, annual mean background NO_2 concentrations are forecast to fall by over 3 µg m^{-3}, or between 25% and 30%. This does not take into account additional actions from Defra's new national action plan.

Figure 6.4 Trends in annual mean NO_2 concentrations (µg m^{-3}) from Defra data



Baseline data selection

6.1.8 The background concentrations in air at each of the specific receptors, as assumed in the modelling for this assessment, are given in **Table 6.13**. The background deposition rates at each of the specific ecological receptors, as assumed in the modelling for this assessment, are given in **Table 6.14**.

Table 6.13 Background air concentrations assumed for this assessment (µg m^{-3})

Receptor	NO_x	NO_2	PM_{10}	$PM_{2.5}$	Receptor	NO_x	NO_2	PM_{10}	$PM_{2.5}$
H01	26.0	19.3	18.5	12.7	**E43**	26.0	19.3	14.8	10.5
H02	26.0	19.3	18.5	12.7	**E44**	26.0	19.3	14.1	10.0
H03	26.0	19.3	18.5	12.7	**E45**	26.0	19.3	15.8	10.9
H04	26.0	19.3	18.5	12.7	**E46**	26.0	19.3	15.8	10.9
H05	26.0	19.3	16.9	11.5	**E47**	26.0	19.3	14.1	10.0
H06	26.0	19.3	16.0	11.1	**E48**	26.0	19.3	14.7	10.3
H07	26.0	19.3	16.0	11.1	**E49**	26.0	19.3	14.3	10.2
H08	26.0	19.3	16.0	11.1	**E50**	26.0	19.3	15.7	10.9
H09	26.0	19.3	16.0	11.1	**E51**	26.0	19.3	15.7	10.9
H10	26.0	19.3	14.7	10.5	**E52**	26.0	19.3	15.7	10.9
H11	26.0	19.3	14.7	10.5	**E53**	26.0	19.3	14.8	10.4
H12	26.0	19.3	14.7	10.5	**E54**	26.0	19.3	15.2	10.6
H13	26.0	19.3	14.7	10.5	**E55**	26.0	19.3	15.2	10.6
H14	26.0	19.3	14.7	10.5	**E56**	26.0	19.3	15.8	11.0
H15	26.0	19.3	15.7	11.0	**E57**	26.0	19.3	15.8	11.0
H16	26.0	19.3	15.7	11.0	**E58**	26.0	19.3	15.8	11.0
H17	26.0	19.3	15.7	11.0	**E59**	26.0	19.3	15.7	11.0
H18	26.0	19.3	15.7	11.0	**E60**	26.0	19.3	16.3	11.2
H19	26.0	19.3	15.7	11.0	**E61**	26.0	19.3	16.6	11.5
H20	26.0	19.3	15.7	11.0	**E62**	26.0	19.3	16.9	11.6
H21	26.0	19.3	15.7	11.0	**E63**	26.0	19.3	16.9	11.6
H22	26.0	19.3	15.7	11.0	**E64**	26.0	19.3	16.9	11.6
H23	26.0	19.3	15.7	11.0	**E65**	26.0	19.3	15.9	11.0
H24	26.0	19.3	16.6	11.5	**E66**	26.0	19.3	15.7	10.9
H25	26.0	19.3	16.6	11.5	**E67**	26.0	19.3	14.5	10.3
H26	26.0	19.3	16.6	11.5	**E68**	26.0	19.3	14.5	10.3
H27	26.0	19.3	15.2	10.8	**E69**	26.0	19.3	16.1	11.1

Receptor	NO_x	NO_2	PM_{10}	$PM_{2.5}$	Receptor	NO_x	NO_2	PM_{10}	$PM_{2.5}$
H28	26.0	19.3	15.2	10.8	E70	26.0	19.3	16.5	11.4
H29	26.0	19.3	16.9	11.6	E71	26.0	19.3	16.5	11.4
H30	26.0	19.3	16.9	11.6	E72	26.0	19.3	16.5	11.3
H31	26.0	19.3	16.9	11.6	E73	26.0	19.3	16.5	11.3
H32	26.0	19.3	16.9	11.6	E74	26.0	19.3	16.7	11.4
H33	26.0	19.3	15.7	11.0	E75	26.0	19.3	15.7	10.9
H34	26.0	19.3	15.7	11.0	E76	26.0	19.3	15.7	10.9
H35	26.0	19.3	15.7	11.0	E77	26.0	19.3	18.5	12.7
H36	26.0	19.3	15.7	11.0	E78	26.0	19.3	16.0	11.1
H37	26.0	19.3	15.7	11.0	E79	26.0	19.3	16.0	11.1
H38	26.0	19.3	15.7	11.0	E80	26.0	19.3	16.0	11.1
H39	26.0	19.3	15.7	11.0	E81	26.0	19.3	14.7	10.5
H40	26.0	19.3	15.7	11.0	E82	26.0	19.3	14.7	10.5
H41	26.0	19.3	15.7	11.0	E83	26.0	19.3	16.0	11.1
H42	26.0	19.3	15.7	11.0	E84	26.0	19.3	16.0	11.1
H43	26.0	19.3	15.7	11.0	E85	26.0	19.3	16.4	11.2
H44	26.0	19.3	15.7	11.0	E86	26.0	19.3	16.4	11.2
H45	26.0	19.3	15.7	10.9	E87	26.0	19.3	16.4	11.2
H46	26.0	19.3	16.5	11.3	E88	26.0	19.3	15.9	11.0
H47	26.0	19.3	16.5	11.3	A01	26.0	19.3	14.3	10.1
H48	26.0	19.3	16.5	11.3	A02	26.0	19.3	16.0	11.0
H49	26.0	19.3	16.4	11.3	A03	26.0	19.3	15.5	10.9
H50	26.0	19.3	16.4	11.3	A04	26.0	19.3	16.4	11.2
H51	26.0	19.3	16.4	11.3	A05	26.0	19.3	15.4	10.9
H52	26.0	19.3	16.4	11.3	A06	26.0	19.3	15.7	11.0
H53	26.0	19.3	16.4	11.3	A07	26.0	19.3	14.7	10.6
H54	26.0	19.3	16.4	11.3	A08	26.0	19.3	16.0	11.1
H55	26.0	19.3	16.4	11.3	A09	26.0	19.3	16.5	11.4
H56	26.0	19.3	16.9	11.6	A10	26.0	19.3	16.6	11.5
H57	26.0	19.3	16.4	11.3	A11	26.0	19.3	16.9	11.6
H58	26.0	19.3	16.9	11.6	A12	26.0	19.3	16.9	11.6
H59	26.0	19.3	16.9	11.6	A13	26.0	19.3	15.7	11.0

Receptor	NO_x	NO_2	PM_{10}	$PM_{2.5}$	Receptor	NO_x	NO_2	PM_{10}	$PM_{2.5}$
H60	26.0	19.3	16.9	11.6	A14	26.0	19.3	15.7	11.0
H61	26.0	19.3	16.9	11.6	A15	26.0	19.3	15.7	11.0
H62	26.0	19.3	16.9	11.6	A16	26.0	19.3	15.7	10.9
H63	26.0	19.3	16.9	11.6	A17	26.0	19.3	15.7	10.9
H64	26.0	19.3	16.9	11.6	A18	26.0	19.3	14.5	10.3
H65	26.0	19.3	16.9	11.6	A19	26.0	19.3	15.7	10.9
H66	26.0	19.3	16.9	11.6	A20	26.0	19.3	13.9	10.0
S01	26.0	19.3	14.7	10.5	A21	26.0	19.3	15.9	11.0
S02	26.0	19.3	14.7	10.5	A22	26.0	35.3	14.6	10.4
S03	26.0	19.3	14.7	10.5	A23	26.0	35.3	14.6	10.4
S04	26.0	19.3	15.7	11.0	A24	26.0	35.3	14.6	10.4
S05	26.0	19.3	16.6	11.5	A25	26.0	35.3	14.6	10.4
S06	26.0	19.3	15.2	10.8	A26	26.0	35.3	14.6	10.4
S07	26.0	19.3	16.9	11.6	A27	26.0	35.3	14.6	10.4
S08	26.0	19.3	16.9	11.6	A28	26.0	35.3	14.6	10.4
E01	26.0	19.3	15.1	10.5	A29	26.0	35.3	14.6	10.4
E02	26.0	19.3	14.5	10.2	A30	26.0	35.3	14.6	10.4
E03	26.0	19.3	14.3	10.1	A31	26.0	35.3	14.6	10.4
E04	26.0	19.3	14.6	10.4	A32	26.0	38.0	15.1	10.9
E05	26.0	19.3	14.6	10.4	A33	26.0	38.0	15.1	10.9
E06	26.0	19.3	13.6	9.8	A34	26.0	38.0	15.1	10.9
E07	26.0	19.3	14.0	10.1	A35	26.0	38.0	15.1	10.9
E08	26.0	19.3	14.3	10.3	A36	26.0	38.0	15.1	10.9
E09	26.0	19.3	15.1	10.7	A37	26.0	38.0	15.1	10.9
E10	26.0	19.3	14.0	10.1	A38	26.0	38.0	15.1	10.9
E11	26.0	19.3	13.7	9.9	A39	26.0	38.0	15.1	10.9
E12	26.0	19.3	13.3	9.6	A40	26.0	38.0	15.1	10.9
E13	26.0	19.3	13.7	9.9	A41	26.0	38.0	15.1	10.9
E14	26.0	19.3	14.3	10.4	A42	26.0	38.0	15.1	10.9
E15	26.0	19.3	14.7	10.6	A43	26.0	38.0	15.1	10.9
E16	26.0	19.3	14.5	10.4	M01	26.0	19.3	16.9	11.6
E17	26.0	19.3	13.7	9.9	M02	26.0	19.3	14.9	10.7

Receptor	NO_x	NO_2	PM_{10}	$PM_{2.5}$	Receptor	NO_x	NO_2	PM_{10}	$PM_{2.5}$
E18	26.0	19.3	14.9	10.7	**M03**	26.0	19.3	14.6	10.4
E19	26.0	19.3	13.9	10.0	**M04**	26.0	19.3	14.7	10.6
E20	26.0	19.3	14.9	10.7	**M05**	26.0	19.3	14.7	10.6
E21	26.0	19.3	15.4	10.9	**M06**	26.0	19.3	14.6	10.4
E22	26.0	19.3	15.9	11.0	**M07**	26.0	19.3	15.7	10.9
E23	26.0	19.3	15.7	10.9	**M08**	26.0	19.3	14.9	10.7
E24	26.0	19.3	14.5	10.3	**M09**	26.0	19.3	13.7	9.9
E25	26.0	19.3	15.2	10.6	**M10**	26.0	19.3	15.7	11.0
E26	26.0	19.3	15.2	10.6	**M11**	26.0	19.3	16.0	11.1
E27	26.0	19.3	14.3	10.1	**M12**	26.0	19.3	16.9	11.6
E28	26.0	19.3	15.4	10.7	**M13**	26.0	19.3	16.2	11.3
E29	26.0	19.3	13.6	9.8	**M14**	26.0	19.3	16.6	11.5
E30	26.0	19.3	15.7	10.9	**M15**	26.0	19.3	16.9	11.6
E31	26.0	19.3	15.1	10.6	**M16**	26.0	19.3	14.6	10.4
E32	26.0	19.3	13.7	9.8	**M17**	26.0	19.3	15.5	10.9
E33	26.0	19.3	15.2	10.8	**M18**	26.0	19.3	14.9	10.7
E34	26.0	19.3	14.3	10.1	**M19**	26.0	19.3	14.9	10.7
E35	26.0	19.3	15.3	10.7	**M20**	26.0	19.3	15.1	10.9
E36	26.0	19.3	15.2	10.6	**M21**	26.0	19.3	16.2	11.3
E37	26.0	19.3	15.6	10.9	**M22**	26.0	19.3	15.0	10.8
E38	26.0	19.3	16.3	11.2	**M23**	26.0	19.3	15.1	10.9
E39	26.0	19.3	14.8	10.4	**M24**	26.0	19.3	14.9	10.7
E40	26.0	19.3	15.2	10.6	**M25**	26.0	19.3	15.1	10.9
E41	26.0	19.3	15.2	10.6	**M26**	26.0	19.3	14.9	10.7
E42	26.0	19.3	14.8	10.4	**M27**	26.0	19.3	14.5	10.4

Table 6.14 Background deposition rates assumed for this assessment (µg m^{-3})

Receptor	N deposition (kg N ha^{-1} y^{-1})	N component of acid deposition (keq ha^{-1} y^{-1})	S component of acid deposition (keq ha^{-1} y^{-1})	Feature	Broad habitat
E01	12.60	0.90	0.20	Pluvialis apricaria [North-western Europe - breeding] - European golden plover	Montane habitats
E02	12.74	0.91	0.19	Pluvialis apricaria [North-western Europe - breeding] - European golden plover	Montane habitats
E03	12.74	0.91	0.19	Reefs	Inshore sublittoral rock
E04	12.74	0.91	0.19	Reefs	Inshore sublittoral rock
E05	13.02	0.93	0.20	Reefs	Inshore sublittoral rock
E06	10.36	0.74	0.19	Reefs	Inshore sublittoral rock
E07	10.36	0.74	0.19	Reefs	Inshore sublittoral rock
E08	10.36	0.74	0.19	Reefs	Inshore sublittoral rock
E09	10.78	0.77	0.20	Reefs	Inshore sublittoral rock
E10	10.78	0.77	0.20	Reefs	Inshore sublittoral rock
E11	10.78	0.77	0.20	Reefs	Inshore sublittoral rock
E12	10.78	0.77	0.20	Reefs	Inshore sublittoral rock
E13	10.78	0.77	0.20	Reefs	Inshore sublittoral rock
E14	13.16	0.94	0.23	Reefs	Inshore sublittoral rock
E15	13.16	0.94	0.23	Reefs	Inshore sublittoral rock
E16	13.16	0.94	0.23	Reefs	Inshore sublittoral rock
E17	13.16	0.94	0.23	Reefs	Inshore sublittoral rock
E18	13.16	0.94	0.23	Reefs	Inshore sublittoral rock
E19	10.78	0.77	0.21	Reefs	Inshore sublittoral rock
E20	10.78	0.77	0.21	Fixed coastal dunes with herbaceous vegetation ("grey dunes")	Supralittoral sediment (acidic type)

Receptor	N deposition (kg N ha^{-1} y^{-1})	N component of acid deposition (keq ha^{-1} y^{-1})	S component of acid deposition (keq ha^{-1} y^{-1})	Feature	Broad habitat
E21	10.78	0.77	0.21	Fixed coastal dunes with herbaceous vegetation ("grey dunes")	Supralittoral sediment (acidic type)
E22	10.78	0.77	0.21	Fixed coastal dunes with herbaceous vegetation ("grey dunes")	Supralittoral sediment (acidic type)
E23	13.44	0.96	0.20	Fixed coastal dunes with herbaceous vegetation ("grey dunes")	Supralittoral sediment (acidic type)
E24	13.44	0.96	0.20	Fixed coastal dunes with herbaceous vegetation ("grey dunes")	Supralittoral sediment (acidic type)
E25	13.44	0.96	0.20	Pluvialis apricaria [North-western Europe - breeding] - European golden plover	Montane habitats
E26	13.44	0.96	0.20	Pluvialis apricaria [North-western Europe - breeding] - European golden plover	Montane habitats
E27	13.44	0.96	0.20	Fixed coastal dunes with herbaceous vegetation ("grey dunes")	Supralittoral sediment (acidic type)
E28	13.44	0.96	0.20	Fixed coastal dunes with herbaceous vegetation ("grey dunes")	Supralittoral sediment (acidic type)
E29	10.78	0.77	0.21	Fixed coastal dunes with herbaceous vegetation ("grey dunes")	Supralittoral sediment (acidic type)
E30	15.68	1.12	0.25	Fixed coastal dunes with herbaceous vegetation ("grey dunes")	Supralittoral sediment (acidic type)
E31	15.68	1.12	0.25	Fixed coastal dunes with herbaceous vegetation ("grey dunes")	Supralittoral sediment (acidic type)
E32	12.04	0.86	0.23	Fixed coastal dunes with herbaceous vegetation ("grey dunes")	Supralittoral sediment (acidic type)
E33	15.68	1.12	0.25	Fixed coastal dunes with herbaceous vegetation ("grey dunes")	Supralittoral sediment (acidic type)
E34	12.04	0.86	0.23	Fixed coastal dunes with herbaceous vegetation ("grey dunes")	Supralittoral sediment (acidic type)
E35	15.68	1.12	0.25	Feature: Pluvialis apricaria - Golden Plover	Broad Habitat: Neutral grassland
E36	12.04	0.86	0.23	Pluvialis apricaria [North-western Europe - breeding] - European golden plover	Montane habitats
E37	15.68	1.12	0.25	Feature: Pluvialis apricaria - Golden Plover	Broad Habitat: Neutral grassland

Receptor	N deposition (kg N ha^{-1} y^{-1})	N component of acid deposition (keq ha^{-1} y^{-1})	S component of acid deposition (keq ha^{-1} y^{-1})	Feature	Broad habitat
E38	13.44	0.96	0.20	Feature: Pluvialis apricaria - Golden Plover	Broad Habitat: Neutral grassland
E39	13.44	0.96	0.20	Feature: Pluvialis apricaria - Golden Plover	Broad Habitat: Neutral grassland
E40	13.44	0.96	0.20	Feature: Pluvialis apricaria - Golden Plover	Broad Habitat: Neutral grassland
E41	13.44	0.96	0.20	Feature: Pluvialis apricaria - Golden Plover	Broad Habitat: Neutral grassland
E42	13.44	0.96	0.20	Feature: Pluvialis apricaria - Golden Plover	Broad Habitat: Neutral grassland
E43	14.28	1.02	0.22	Vertigo moulinsiana - Desmoulin`s whorl snail	Rivers and streams
E44	14.28	1.02	0.22	Vertigo moulinsiana - Desmoulin`s whorl snail	Rivers and streams
E45	14.28	1.02	0.22	Vertigo moulinsiana - Desmoulin`s whorl snail	Rivers and streams
E46	14.28	1.02	0.22	Vertigo moulinsiana - Desmoulin`s whorl snail	Rivers and streams
E47	14.28	1.02	0.22	Vertigo moulinsiana - Desmoulin`s whorl snail	Rivers and streams
E48	14.28	1.02	0.22	Vertigo moulinsiana - Desmoulin`s whorl snail	Rivers and streams
E49	14.28	1.02	0.22	Vertigo moulinsiana - Desmoulin`s whorl snail	Rivers and streams
E50	12.60	0.90	0.20	Neutral Grassland	N/A
E51	12.74	0.91	0.19	Neutral Grassland	N/A
E52	12.74	0.91	0.19	Neutral Grassland	N/A
E53	12.74	0.91	0.19	Neutral Grassland	N/A
E54	13.02	0.93	0.20	Neutral Grassland	N/A
E55	10.36	0.74	0.19	Neutral Grassland	N/A
E56	17.64	1.26	0.23	Broadleaved. Mixed and Yew Woodland	N/A
E57	17.64	1.26	0.23	Broadleaved. Mixed and Yew Woodland	N/A
E58	18.62	1.33	0.24	Broadleaved. Mixed and Yew Woodland	N/A
E59	18.62	1.33	0.24	Broadleaved. Mixed and Yew Woodland	N/A
E60	18.62	1.33	0.24	Broadleaved. Mixed and Yew Woodland	N/A

Receptor	N deposition (kg N ha^{-1} y^{-1})	N component of acid deposition (keq ha^{-1} y^{-1})	S component of acid deposition (keq ha^{-1} y^{-1})	Feature	Broad habitat
E61	18.62	1.33	0.24	Broadleaved. Mixed and Yew Woodland	N/A
E62	18.62	1.33	0.24	Broadleaved. Mixed and Yew Woodland	N/A
E63	22.68	1.62	0.28	Broadleaved. Mixed and Yew Woodland	N/A
E64	22.68	1.62	0.28	Broadleaved. Mixed and Yew Woodland	N/A
E65	22.68	1.62	0.28	Broadleaved. Mixed and Yew Woodland	N/A
E66	22.68	1.62	0.28	Broadleaved. Mixed and Yew Woodland	N/A
E67	13.16	0.94	0.23	Neutral Grassland	N/A
E68	10.78	0.77	0.21	Neutral Grassland	N/A
E69	18.48	1.32	0.26	Broadleaved. Mixed and Yew Woodland	N/A
E70	18.48	1.32	0.26	Broadleaved. Mixed and Yew Woodland	N/A
E71	18.48	1.32	0.26	Broadleaved. Mixed and Yew Woodland	N/A
E72	22.96	1.64	0.24	Broadleaved. Mixed and Yew Woodland	N/A
E73	22.96	1.64	0.24	Broadleaved. Mixed and Yew Woodland	N/A
E74	22.96	1.64	0.24	Broadleaved. Mixed and Yew Woodland	N/A
E75	22.96	1.64	0.24	Wood-Pasture & Parkland	N/A
E76	22.96	1.64	0.24	Wood-Pasture & Parkland	N/A
E77	22.96	1.64	0.24	Wood-Pasture & Parkland	N/A
E78	18.48	1.32	0.26	Wood-Pasture & Parkland	N/A
E79	25.90	1.85	0.29	Broadleaved. Mixed and Yew Woodland	N/A
E80	25.90	1.85	0.29	Broadleaved. Mixed and Yew Woodland	N/A
E81	19.32	1.38	0.27	Broadleaved. Mixed and Yew Woodland	N/A
E82	25.90	1.85	0.29	Broadleaved. Mixed and Yew Woodland	N/A
E83	19.32	1.38	0.27	Broadleaved. Mixed and Yew Woodland	N/A
E84	25.90	1.85	0.29	Wood-Pasture & Parkland	N/A

Receptor	N deposition (kg N ha^{-1} y^{-1})	N component of acid deposition (keq ha^{-1} y^{-1})	S component of acid deposition (keq ha^{-1} y^{-1})	Feature	Broad habitat
E85	19.32	1.38	0.27	Wood-Pasture & Parkland	N/A
E86	25.90	1.85	0.29	Broadleaved. Mixed and Yew Woodland	N/A
E87	22.96	1.64	0.24	Broadleaved. Mixed and Yew Woodland	N/A
E88	22.96	1.64	0.24	Wood-Pasture & Parkland	N/A

Appendix 6.3

Detailed Methodology

Methodology for predicted effects from airport-related activity

6.1.9 There are two principal sets of recommendations for carrying out an airport air quality study. The first arises from the Project for the Sustainable Development of Heathrow (PSDH), a programme run by the DfT in about 2005–07, the objective of which was to develop the best practical methodology for assessing the air quality impacts of a third runway at Heathrow. This came up with a number of specific recommendations, but contains significant omissions where the best approach depends on data availability. For example, PSDH does not make any recommendations about how to determine how long aircraft spend operating in various modes as there are various potential data sources, and it is left to the analyst to use their judgement as to the best way of extracting suitable operating durations. Few of the PSDH recommendations are specific to Heathrow and the methodology can be used for other airports of comparable size with similar aircraft types.

6.1.10 The PSDH methodology was implemented by Heathrow Airport for its 2008/9 emissions inventory[1], modelling study[2] and model evaluation study[3]. The reports give a detailed description of the methodology used and form a useful reference. The model evaluation found that it gave a generally good agreement with the extensive monitoring data around Heathrow, and formed a suitable basis for evaluating the impacts of future airport developments there. Subsequent Heathrow inventories have used essentially the same methodology, with some updates where new airport-specific data has become available (e.g. for taxiing times).

6.1.11 The second methodology was published by ICAO in 2011[4]. This document deals with producing emission inventories for historic years, with very little attention paid to how inventories for future years might be produced. As such it is less directly relevant to the present work for the Proposed Development.

6.1.12 The ICAO methodology offers different levels of assessment, described as ‘simple’, ‘advanced’ and ‘sophisticated’, each requiring increasingly detailed data. The sophisticated approach generally requires detailed data on times, engine settings and so forth for each individual aircraft movement, so it is unsuitable for modelling future cases. The advanced approach is similar to the PSDH recommendations in terms of data requirements, and can generally be adapted to future cases given suitable forecast data.

6.1.13 Much of the detail of the methodology is the same or similar between PSDH and ICAO.

6.1.14 A third “standard” is the Aviation Environmental Design Tool (AEDT), promulgated by the FAA for airport air quality inventories and noise studies. Detailed documentation of the methodology used by the tool is not readily available.

6.1.15 While various research groups have suggested ways in which parts of the inventory calculation can be improved, few of these have been generally incorporated into received methodologies. One notable exception is the FOA 3a method for calculating PM_{10} emissions from smoke number emissions.

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[1] B Y Underwood, C T Walker and M J Peirce, Heathrow Airport Emission Inventory 2008/9. AEAT/ENV/R/2906 Issue 1, July 2010.
[2] B Y Underwood, C T Walker and M J Peirce, Air Quality Modelling for Heathrow Airport 2008/9: Methodology. AEAT/ENV/R/2915 Issue 1, July 2010.
[3] B Y Underwood, C T Walker and M J Peirce, Air Quality Modelling for Heathrow Airport 2008/9: Results and Model Evaluation. AEAT/ENV/R/2948 Issue 1, July 2010.
[4] ICAO, Airport Air Quality Manual. Doc 9889. 2011

6.1.16 Defra issues technical guidance on air quality management[5], which is an important source of guidance on approaching common sources of air pollution. However other than providing a screening threshold of 10 million passengers per annum or 1 million tonnes of freight, it does not provide recommendations on the technical issues of modelling air quality around large airports.

6.1.17 The methodology used in this assessment is generally consistent with the ICAO advanced and PSDH recommendations, with decisions about the best approach being led by the availability of data.

The dispersion model

6.1.18 The PSDH carried out a model intercomparison study to compare the use of various dispersion modelling tools for airport air quality modelling. As a result, the PSDH endorsed the use of ADMS-Airport, a version of the long-established dispersion modelling tool ADMS adapted to account for the momentum and buoyancy fluxes from jet engines. However, the use of the regular version of ADMS with suitable initial dispersion characteristics was also found to be acceptable.

6.1.19 AEDT uses AERMOD for the dispersion modelling. AERMOD was developed in the United States by the American Meteorological Society (AMS)/United States Environmental Protection Agency (USEPA) Regulatory Model Improvement Committee (AERMIC). ADMS was developed in the UK by Cambridge Environmental Research Consultants (CERC) in collaboration with the Meteorological Office, National Power and the University of Surrey. Both AERMOD and ADMS are termed ‘new generation’ models, parameterising stability and turbulence in the planetary boundary layer by the Monin-Obukhov length and the boundary layer depth. This approach allows the vertical structure of the planetary boundary layer to be more accurately defined than by the stability classification methods of earlier dispersion models such as R91 or ISC.

6.1.20 Numerous model inter-comparison studies have demonstrated little difference between the output of ADMS and AERMOD, except in certain complex terrain scenarios. The principal difference between ADMS and ADMS-Airport is the jet engine module, which tends to reduce modelled ground-level concentrations from aircraft engines, especially at high thrust settings, as a result of the heat of the plume.

6.1.21 Taking the above into consideration, ADMS (Version 5.2) has been selected as the most appropriate model to use for the purposes of this particular study.

Emissions sources: Aircraft emissions

Aircraft activity

6.1.22 The number of aircraft movements each year is taken from the fleet forecast provided by RSP. This gives the number of movements for each cargo and passenger aircraft type over the course of a year, for each year up to Year 20. These movements are summarised in **Table 6.15**.

6.1.23 In addition, estimates of light aircraft movements associated with the proposed flying school and other light aircraft operations have been provided. These make a very small contribution to air quality impacts, despite the relatively large number of movements, so it has been possible to make some simplifying assumptions without materially affecting the conclusions of the assessment. It is assumed that the training flights will be Piper PA28 aircraft, with each flight having 6 touch-and-goes — treated as seven arrivals and seven departures per training flight. There are assumed to be 3000 such flights per year. It is assumed that other light aircraft operations will amount to 1000 flights (2000 movements) per year of the Piper PA34 as a representative aircraft type.

[5] Defra et al, Local Air Quality Management Technical Guidance (TG16), April 2016.

Table 6.15 Number of movements for Years 2, 6 and 20

Aircraft type	Aircraft description	Type	Year 2	Year 6	Year 20
320	A320	Cargo	10	10	15
332	A330-200	Cargo	156	390	2925
73H	B737-800 pax	Cargo	312	520	770
73Y	B737-300 freighter	Cargo	104	416	2309
744	B747-400	Cargo	220	220	0
748	B747-800	Cargo	208	312	787
752	B757-200	Cargo	624	1352	2001
76V	B767	Cargo	520	0	0
76Y	B767-300 freighter	Cargo	624	1352	0
77X	B777-200 freighter	Cargo	936	2500	3700
A4F	Antonov An-124 Ruslan	Cargo	52	130	308
AT7	ATR 72	Cargo	1456	2912	4310
C17	C-17 Globemaster	Cargo	15	15	22
LOH	Lockheed L-182 / 282 / 382 (L-100) Hercules	Cargo	15	15	22
320	A320	Pax	0	120	178
73H	B737-800 pax	Pax	0	5074	7511
753	B757-300	Pax	0	52	154
F70	Fokker 70	Pax	0	1456	1456
PA28	Piper PA28	Pax	36000	36000	36000
PA34	Piper PA34	Pax	2000	2000	2000

Main engine emissions: Engine assignments

6.1.24 For each aircraft type in the fleet data, a single engine was assigned, and a single entry (identified by UID or unique identifier) in the ICAO databank or FOI database (see below) was chosen. Engine models were based on the most commonly fitted engines in the current worldwide fleet, with operator-specific information used where available. Where an engine model has more than one entry in the ICAO databank with significantly different emission factors, an entry was chosen with a test date in the mid-1990s where available; this reflects the typical age of aircraft in the cargo fleet and is conservative.

6.1.25 For the A320, the global fleet is divided approximately equally between the CFM CFM56-5B4 and the IAE V2527-A5, with the former having a slightly greater market share. However, the CFM56-5B4 has evolved significantly over the years, making it hard to choose a suitable ICAO entry. Instead, the V2527-A5 has been assumed, since this engine represents a substantial minority of the fleet and has NO_x emissions at the higher end of the CFM56-5B4 range, and is therefore conservative.

6.1.26 The aircraft engine assignments are summarised in **Table 6.16**. The UID is the engine identifier used in the ICAO emissions databank. MTOW is maximum take-off weight, used in the calculation of brake and tyre wear.

Table 6.16 Aircraft data

Aircraft type	Aircraft description	MTOW (kg)	Number of engines	UID	Engine description
320	A320	77,000	2	1IA003	V2527-A5
332	A330-200	233,000	2	3RR030	Trent 772
73H	B737-800 pax	70,533	2	8CM064	CFM56-7B24/3
73Y	B737-300 freighter	63,276	2	1CM005	CFM56-3B-2
744	B747-400	396,893	4	2GE045	CF6-80C2B1F
748	B747-800	442,252	4	11GE139	GEnx-2B67
752	B757-200	113,400	2	1RR012	RB211-535C
753	B757-300	122,470	2	1RR012	RB211-535C
76V	B767	185,065	2	2GE044	CF6-80C2B6
76Y	B767-300 freighter	185,065	2	2GE044	CF6-80C2B6
77X	B777-200 freighter	347,451	2	7GE097	GE90-110B1
A4F	Antonov An-124 Ruslan	391,994	4	1GE006	CF6-50C
AT7	ATR 72	22,000	2	PW127	PW127
C17	C-17 Globemaster	265,350	4	4PW073	PW2040
F70	Fokker 70	38,100	2	1RR020	TAY Mk620-15
LOH	Lockheed L-182 / 282 / 382 (L-100) Hercules	70,306	4	T56-A-15	T56-A-15
PA28	Piper PA28	975	1	IO-320-DIAD	IO-320-DIAD
PA34	Piper PA34	2,155	2	IO-360-B	IO-360-B

Main engine emissions: Emission factors

6.1.27 Emission factors for jet engines are taken from the ICAO databank, version 23[6]. The databank provides emission indices for NO_x, CO and HC, fuel flow rates and smoke numbers; each of these is given at four power settings (100%, 85%, 30% and 7% of rated thrust). Emission indices are multiplied by fuel flow rates to obtain an emission factor in g s^{-1}.

6.1.28 The ICAO databank gives smoke numbers which need to be converted to emission indices. This is done using the FOA3a method[7], with the amendment that the factor of (1 − bypass ratio) in

[6] ICAO Aircraft Engine Emissions Databank, version 23. https://www.easa.europa.eu/document-library/icao-aircraft-engine-emissions-databank

[7] J Kinsey and R L Wayson, Appendix C PM methodology discussion paper. In: G Ratliff *et al.*, Aircraft Impacts on Local and Regional Air Quality in the United States. PARTNER Project 15 final report. PARTNER-COE-2009-002, October 2009.

equation 7a is only applied to mixed turbofan engines[8]. For some engines, smoke number data points at certain thrust settings are missing, so an approach originally developed by Qinetiq has been used in which factors are applied to the maximum smoke number[8].

6.1.29 For turboprop engines, emission factors are taken from the Swedish FOI database[9].

Main engine emissions: Times in mode

6.1.30 In the absence of airport-specific data or detailed modelling on times in mode, the following assumptions have been made. It is assumed that times in mode are independent of aircraft type. It is also assumed that any dependence on time of day or time of year (e.g. congestion during busy periods resulting in increased taxi or hold times) is negligible. These times are considered to be realistic best estimates, rather than being intentionally conservative.

6.1.31 Taxiing speeds are assumed to be 4.1 m s^{-1} (8 knots) on average. This is based on a maximum airfield speed limit of 20 knots, with allowance for slowing down at bends and taxi hold points. Taxiing times have been calculated by dividing taxi route distances by this average speed. An additional 30 seconds has been added to taxi-in times to account for time spent attaching ground power on arrival at the stand. Other times are given in **Table 6.17**, based on Heathrow data[8]. By design, aircraft of the types proposed for Manston have very similar times for take-off, climb, approach and landing. These are tightly constrained to be uniform in order to manage and optimise separation distances, so there is very little variation in these times between airports or between (large) aircraft.

6.1.32 These times are not necessarily accurate for light aircraft such as the Piper PA28 and PA34, but in view of the very small contribution these aircraft make to total air quality emissions, the same times have been used for simplicity.

Table 6.17 Times in mode

Mode	Time in mode (s)	Notes
Pushback	600	Estimate from RSP.
Taxi-out	See text	
Hold	60	Estimate based on 20% of departing aircraft holding for 5 minutes, with the remaining aircraft being able to join the runway immediately.
Take-off roll	35	Based on Heathrow data[8].
Initial climb	30	Based on Heathrow data[8].
Climb-out	70	Based on Heathrow data[8].
Approach	230	Based on Heathrow data[8].
Landing roll — idle thrust	60	Based on Heathrow data[8]. At 7% engine thrust.
Landing roll — reverse thrust	30	Based on Heathrow data[8]. At 30% engine thrust. Used by 20% of arriving aircraft.
Taxi-in	See text	

[8] B Underwood, C Walker and M Peirce, Heathrow Airport Emission Inventory 2008/9. AEAT/ENV/R/2906/Issue 1, July 2010.
[9] Aircraft Engine Emissions Database. Available on request from http://www.foi.se/en/Our-Knowledge/Aeronautics/FOIs-Confidential-database-for-Turboprop-Engine-Emissions/.

Main engine emissions: Thrust settings

6.1.33 In the absence of airport-specific data, the ICAO standard thrust settings have been used for each mode: take-off roll and initial climb at 100%, climb-out at 85%, approach at 30% and other modes at 7%.

6.1.34 It is common for aircraft to take off at less than 100% thrust, sometimes as low as 75%, primarily to reduce wear on the engines. This can reduce total NO_x emissions by as much as 25% relative to full thrust take-offs. However, in the absence of airport-specific information, especially regarding issues such as load factors which can affect the take-off thrust setting chosen, a conservative assumption has been adopted that all aircraft take off at 100% thrust.

6.1.35 Aircraft sometimes use reverse thrust on landing, usually where the runway is short and/or when weather conditions are poor (e.g. wet or icy). For this assessment, it is assumed that 20% of arriving aircraft use reverse thrust on landing, for 30 seconds per landing, at an engine thrust setting of 30%.

Auxiliary Power Units (APU) emissions

6.1.36 As well as their main engines, many aircraft have APUs which are small engines used to generate electrical power for purposes such as starting the main engines, powering air conditioning and other services. However, it is proposed that at Manston Airport the preferred source of power for these purposes is Fixed Electrical Ground Power (FEGP), which is zero-emission at point of use. It is estimated that all cargo aircraft and 50% of passenger aircraft will use FEGP and not use APUs at all. APU emissions from the remaining passenger aircraft are calculated as follows.

6.1.37 The ICAO advanced methodology provides emission factors for different aircraft size and age groups and three APU operating modes, along with typical operating times for each operating mode. These have been used to calculate emissions per arrival and per departure. For PM, ICAO does not provide emission factors as g s^{-1} but recommend their simple methodology, which consists of a simple factor of 25 g per movement for narrow-bodied aircraft and 40 g per movement for wide-bodied aircraft.

6.1.38 The ICAO methodology suggests a total APU running time of 25 minutes per arrival–departure cycle. This agrees well with independent estimates provided by RSP, so this time has been used in the assessment.

Brake and tyre wear emissions

6.1.39 Emissions of PM from brake and tyre wear are calculated using the PSDH methodology (ICAO omits this source). Brake wear emissions, in g PM_{10} per arrival, are calculated as $2.53 \times 10^{-4} \times$ MTOW, where MTOW is the maximum take-off weight in kg. Tyre wear emissions, in g PM_{10} per arrival, are calculated as $2.23 \times 10^{-3} \times$ MTOW − 87.4 for aircraft with an MTOW > 50,000 kg, and 24.1 × MTOW / 50000 for smaller aircraft.

6.1.40 $PM_{2.5}$ emissions are calculated by multiplying the PM_{10} emission by 0.4 for brake wear and 0.7 for tyre wear.

Aircraft emissions: Spatial disaggregation

6.1.41 Aircraft emissions are treated as volume sources with an initial vertical extent of 20 m. Stand-based emissions (pushback and APUs) are assigned to polygons covering the cargo and passenger apron areas. Taxiway- and runway-based emissions are treated as long boxes with a width of 50 m and a length dependent on the mode.

6.1.42 Large aircraft typically require about 1500–2000 m of runway for their landing roll. It is therefore assumed that cargo aircraft, which are typically Code E (e.g. Boeing 747 or 777), use the full length of the runway from the touchdown point (approximately 2300 m) for their landing roll. Passenger aircraft, which at the Proposed Development will mainly be Code C (e.g. Boeing 737 or Airbus 320), can manage shorter rolls, so it is assumed that when landing on Runway 10, passenger aircraft exit the runway at the intersection taxiway approximately three-quarters of the way along the runway (approximately 1630 m from the touchdown point). There is no equivalent taxiway at the other end of the runway, so it is assumed that passenger aircraft landing on Runway 28 use the full length of the runway and exit at the end.

6.1.43 Taxi routes are assumed to be the most direct route between the apron and the runway. The cargo and passenger aprons are each small and simple enough that it is reasonable to assume a single point in the centre of the respective aprons as the end point of all taxiing activity. Taxi-in routes are the reverse of taxi-out routes. Each taxi route is divided into straight-line sections, and a volume source has been built around each straight-line section, of vertical extent 20 m, width 50 m, and length equal to the straight-line length.

6.1.44 It is assumed that there is at most one aircraft in the hold area at any time, so the hold queues have been assumed to be 70 m long. The hold emissions are assumed to occur in a rectangular box of this length, and 50 m wide.

6.1.45 It is assumed that cargo aircraft require 2000 m for the take-off roll and passenger aircraft require 1500 m. When departing on Runway 10, all aircraft start 50 m from the end of the runway (to allow for aircraft straightening up when joining the runway). When departing on Runway 28, cargo aircraft start 50 m from the end of the runway, while passenger aircraft are assumed to start just after the intersection taxiway about a quarter of the way along the runway. The roll is divided into ten volume sources, each 200 m (cargo) or 150 m (passenger) long, 50 m wide and 20 m in vertical extent. The departing aircraft is assumed to accelerate at a constant rate, and the emissions are partitioned between the ten volume sources accordingly (so about 32% of the emissions are assigned to the first volume source).

6.1.46 The PSDH recommended a more elaborate methodology for take-off roll, accounting for non-uniform acceleration, effects of the forward speed on the engine thrust, etc. It found that these made a difference of a few percent at most to emissions. Unfortunately, the data that underlie these methodologies were not published and remain proprietary. In view of the small difference that these effects make to emissions, they have been omitted from this assessment.

6.1.47 Initial climb is assumed to start where the take-off roll ends. Aircraft are assumed to climb at an angle of 10° to a height of 457 m (1500 feet) at constant speed. The constant speed assumption is conservative, since in reality, the continuing acceleration of the aircraft means a greater proportion of the emissions will occur at a greater height. ADMS is unable to model inclined sources, so the initial climb phase is again divided into ten volume sources, each of length 259 m (= 457 / tan(10°) / 10). The bottom of the first volume source is assumed to be at ground level, with successive volume sources 45.7 m higher. This tends to put the emissions closer to the ground than in reality, so is a conservative assumption.

6.1.48 The climb-out phase is treated similarly, and is assumed to start where the initial climb ends. Aircraft are assumed to climb at the same angle from a height of 457 m to 914 m (3000 feet) at constant speed. Again, the climb-out is divided into ten volume sources, each of length 259 m.

6.1.49 The approach phase is treated similarly. Approach is assumed to start at a height of 914 m above the runway and to finish at the runway touchdown point, with aircraft descending at a constant speed and a constant angle of 3°. The approach is divided into a number of volume sources; to reduce the number of these, the approach length is divided into ten equal sections of 150 m horizontal (7.86 vertical) plus ten equal sections of 1594 m horizontal (83.5 m vertical). It should be noted that emissions from approaching aircraft more than a few tens of metres above the ground make very little contribution to ground-level concentrations.

6.1.50 The landing roll is assumed to extend from the touchdown point to the end of the runway, and is divided into ten volume sources of length 232 m each. Uniform deceleration is assumed, and emissions are assigned to the volume sources accordingly, in the same way as for the take-off roll.

6.1.51 Brake wear emissions are assigned to the length of the runway from touchdown to runway end, and uniform along that length (it is assumed that a higher brake wear emission rate at the start of the landing roll will cancel out the reduced dwell time). Tyre wear emissions are assigned to a single volume source of length 200 m centred on the touchdown point.

6.1.52 Schematics of the disaggregation are given in **Figure 6.5** to **Figure 6.8**.

Figure 6.5 Schematic of emission disaggregation for approach

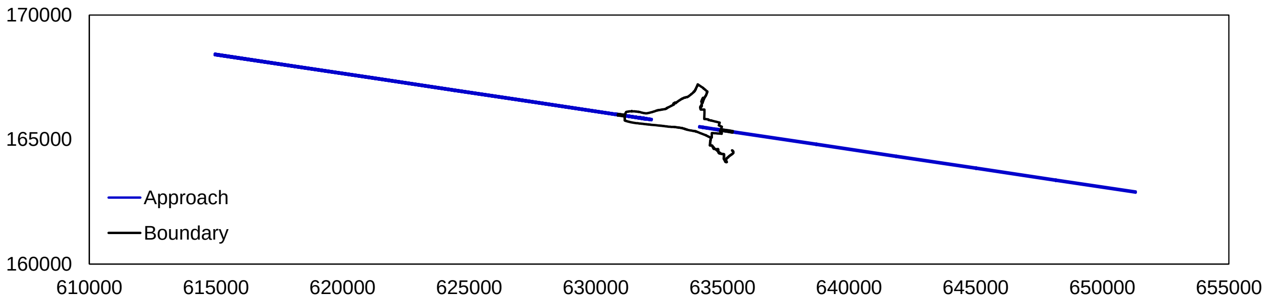


Figure 6.8 Schematic of emission disaggregation for initial climb and climb-out

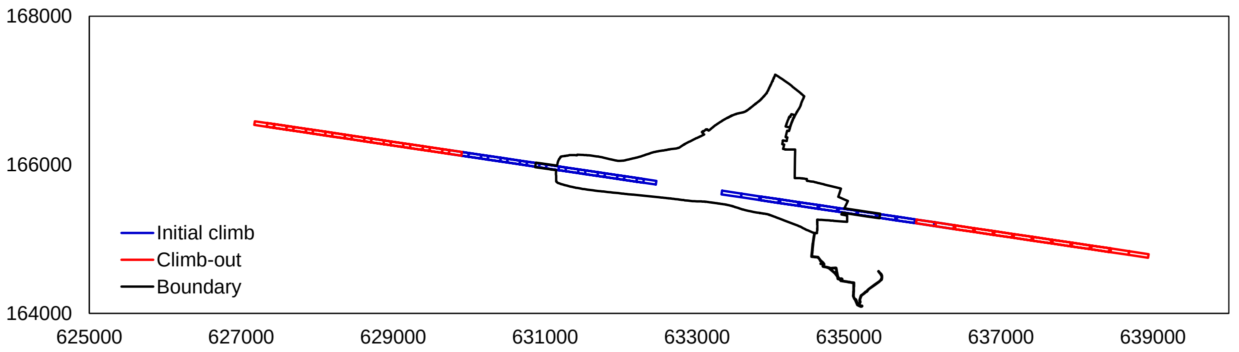


Figure 6.7 Schematic of emission disaggregation for taxiing, hold, take-off roll, pushback and APU

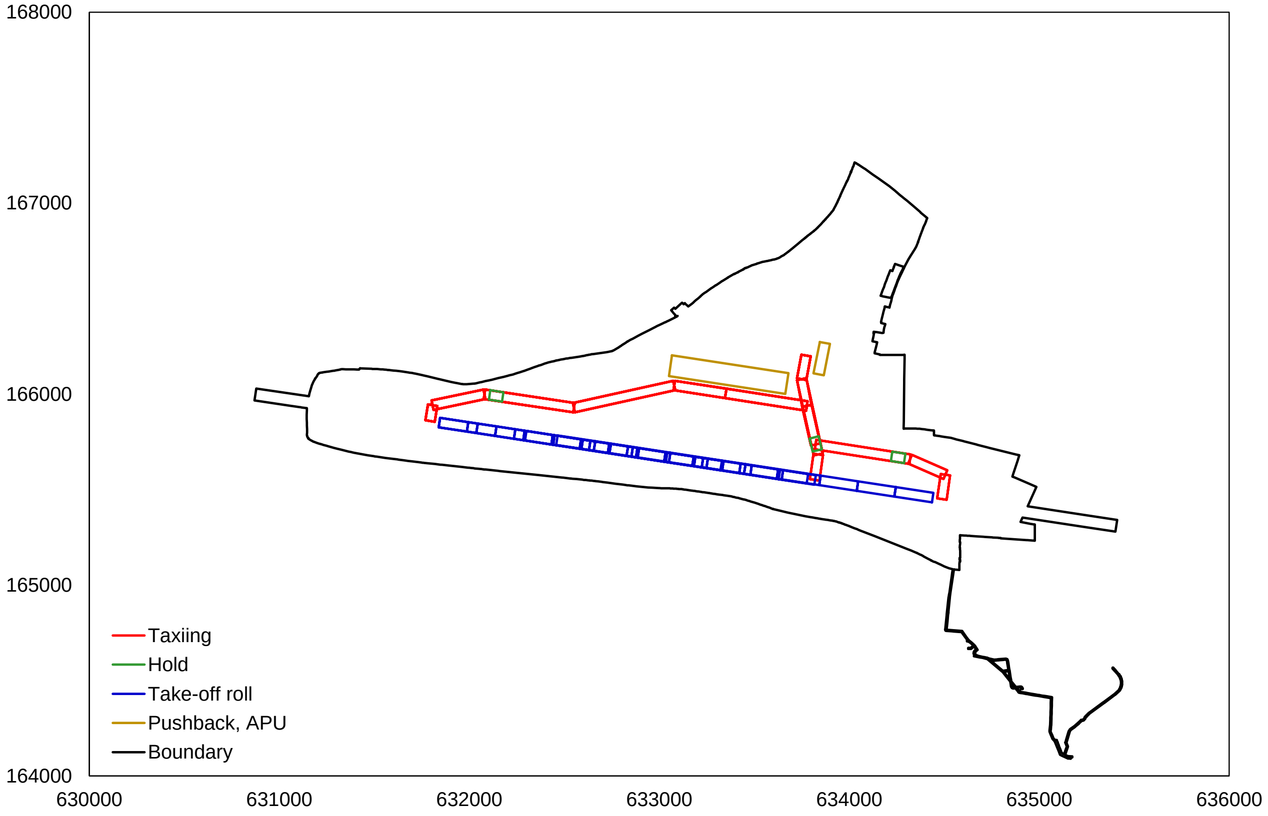
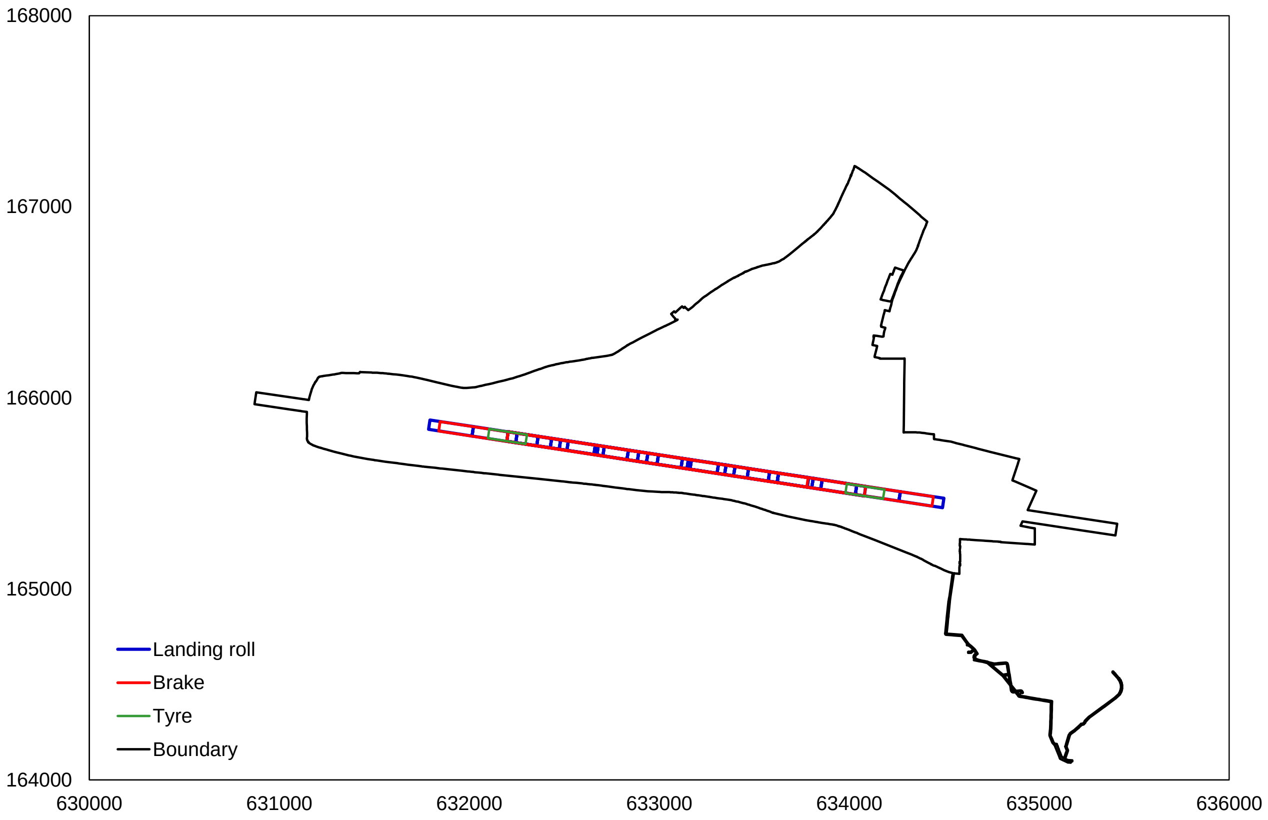


Figure 6.8 Schematic of emission disaggregation for landing roll, brake wear and tyre wear



Aircraft emissions: Runway assignments

6.1.53 Manston Airport has a single runway but it can be used in two directions, with aircraft moving along it either roughly eastwards (referred to as Runway 10) or westwards (Runway 28). In general, the choice of runway direction is determined by the weather, with both arriving and departing aircraft heading into the wind.

6.1.54 For the present modelling, therefore, ADMS was configured so that emissions sources for Runway 10 operations (including associated taxiing, but not apron-based sources such as pushback and APUs) are only modelled when the wind is in the direction range 9–188°, and sources for Runway 28 operations are only modelled when the wind is in the direction range 189–8° (angles are clockwise from north, directions the wind is blowing from).

6.1.55 This is an approximation, since aircraft can typically operate with a small tailwind, and may be requested to do so to avoid the operational difficulties associated with changing runway direction too frequently. No information is available on how frequent such operations are likely to be at the Proposed Development. Since tailwinds tend to blow emissions onto the airfield rather than towards sensitive receptors, this approximation is generally conservative.

Aircraft emissions: Temporal variation

6.1.56 Without actual operational experience of the Proposed Development, it is difficult to assign movements to particular times of day, except for noise-related constraints on night activity. Therefore, no temporal variation has been included in the modelling.

6.1.57 This assumption will overestimate the emissions occurring during the night, since while there will be some night flights, they will be less frequent than during the daytime. This assumption is generally conservative, since concentrations tend to be higher during the night due to the greater frequency of stable weather conditions which tends to reduce dispersion.

6.1.58 Similarly, it is assumed that there will be no variation in activity over the course of the year. In reality, it is likely that passenger movements may be somewhat higher in the summer than the winter, but it is doubtful that there will be any significant seasonal difference in cargo movements. Heathrow Airport shows a small increase in movements over the summer months compared to the winter. Modelling work as part of its submission to the Airports Commission[10] found that assuming a flat seasonal profile slightly overestimates modelled concentrations. This assumption is therefore considered to be conservative.

Aircraft testing ground runs

6.1.59 A small number of aircraft engine ground runs will be needed as part of routine maintenance. It is estimated that there may be up to 50 of these per year, lasting about 10 minutes each at 25% engine thrust. The runs will be carried out at the western end of the runway.

6.1.60 For modelling, it has been assumed that the whole aircraft fleet are equally likely to require testing runs, and the emissions calculated accordingly. Emissions are modelled as a 50 m × 50 m × 20 m volume source.

Aircraft maintenance operations

6.1.61 Other than emissions from engine ground testing runs (described above), no significant source of air quality emissions from maintenance emissions have been identified.

Emissions sources: On-airport, non-aircraft emissions

Ground support equipment (GSE)

6.1.62 Ground support equipment (GSE) is the term for the various vehicles and items of plant and equipment used airside, such as tugs and loading platforms. GSE is normally a mix of road vehicles and non-road mobile machinery. It is intended that the GSE at Manston Airport be bought new, with an increasing proportion of the GSE fleet moving to electric units over time.

6.1.63 By Year 20, it is intended that the whole GSE fleet will be electric, apart from a small number of plant items (fire trucks, ground power units). Emissions from these units have therefore been calculated based on expected power ratings and operational hours for the diesel-powered plant items, and emission factors corresponding to Stage IV limits for non-road mobile machinery[11].

6.1.64 For Years 2 and 6, it is assumed that only a small proportion of the GSE fleet is electric. In view of the wide variety of GSE types, a bottom-up calculation of emissions would be very uncertain. Instead, emissions have been calculated by taking emissions from GSE at Heathrow in 2013[12] and scaling by aircraft activity at the two airports. Here, the measure of aircraft activity is total maximum take-off weight (MTOW) of all movements over the course of the year.

6.1.65 For dispersion modelling, GSE emissions have been spread over polygons representing the cargo and passenger aprons, in the same way as pushback and APU emissions (see **Figure 6.7**).

Emergency diesel generators

6.1.66 The airport will need emergency diesel generators to cover the event of a loss of offsite electrical power. It is expected that six generators averaging 180 kW electrical output each will be required.

[10] B Y Underwood, C T Walker and M J Peirce, Air Quality Modelling for Heathrow Airport 2008/9: Methodology. AEAT/ENV/R/2915 Issue 1, July 2010.
[11] Directive 2004/26/EC of the European Parliament and of the Council of 21 April 2004 amending Directive 97/68/EC on the approximation of the laws of the Member States relating to measures against the emission of gaseous and particulate pollutants from internal combustion engines to be installed in non-road mobile machinery.
[12] H Peace, C Walker, M Peirce (2015) Heathrow Airport 2013 Air Quality Assessment. Ricardo-AEA/R/3438 Issue Number 1.

To ensure the availability of the generators on demand, it is normal to conduct monthly runs of about 1 hour each.

6.1.67 These test runs have been included in the model. The exact specifications of the generators have not yet been defined, so emission rates for typical diesel generators have been used. The locations and stack details are also undefined at this stage, so for dispersion modelling they have been located around the airport buildings and, for conservatism, treated as ground-level volume sources. The contribution of these is small so these approximations will not materially affect the results of the assessment.

Fire training

6.1.68 There will be no fire training activities involving combustion on the airport. The Defence Fire Training and Development Centre is a separate facility and not part of this application; any emissions from this source are included as part of the background concentrations.

Emissions sources: Construction activities

6.1.69 Forecasts of the number of construction vehicles and plant required for four phases of construction activity have been provided. The four phases partly overlap with the operational period of the airport, and are summarised as follows:

- Phase 1. Construction of runway, taxiways, initial cargo stands etc. Runs from Q3 2019 to Q4 2020, ending before opening of the airport in Year 2.
- Phase 2: Construction of further cargo stands and infrastructure. Runs from Q4 2020 to 2023, coinciding with operational activity in Year 2 to Year 5.
- Phase 3: Construction of further cargo stands and infrastructure. Runs from 2023 to 2030, coinciding with operational activity in Year 5 to Year 12.
- Phase 4: Construction of further cargo stands and infrastructure. Runs from 2030 to 2036, coinciding with operational activity in Year 12 to Year 18.

6.1.70 As indicated above, phases 2–4 are expected to be spread over several years each. However, for the purposes of modelling, it has been assumed that all construction activity for a phase is compressed into a single year.

6.1.71 At this stage in project development, it is not possible to define the exact power ratings required for each plant type, so standard power ratings were obtained from BS 5228-1:2009[13], to be consistent with noise modelling. These power ratings are generally consistent with those expected for construction projects of this kind.

6.1.72 Emission rates were then calculated by multiplying the power rating for each plant item by an emission factor taken from the European directive on non-road mobile machinery[14]. This directive imposes maximum emission factors for non-road mobile machinery (including construction plant of the kind used here) depending on their power rating and date of production. For Phase 1 and Phase 2, it is assumed that all plant is manufactured after 2013 and therefore meets Stage IIIB standards; the use of Stage IV plant In Phases 1–2 has also been assessed as a possible mitigation measure. For Phase 3 and Phase 4, it is assumed that all plant is manufactured after 2014 (i.e. is no more than 10 years old) and therefore meets Stage IV standards.

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[13] BSI (2009) Code of practice for noise and vibration control on construction and open sites. BS 5228-1:2009+A1:2014

[14] Directive 2004/26/EC of the European Parliament and of the Council of 21 April 2004 amending Directive 97/68/EC on the approximation of the laws of the Member States relating to measures against the emission of gaseous and particulate pollutants from internal combustion engines to be installed in non-road mobile machinery.

6.1.73 It is conservatively assumed that all plant operates at full power for the full duration of their shift, from 07:00–17:00 weekdays and 07:00–12:00 Saturdays.

6.1.74 Emissions were assigned to polygonal regions of the airport according to the activity of each plant item. For example, asphalt-laying plant were assigned to a rectangular region covering the runway.

Emissions sources: Road traffic emissions

Calculation of emissions

6.1.75 As part of the traffic and transport modelling, forecasts of road traffic were generated. These forecasts provide the number of traffic movements on selected road links near the airport for future years, both with and without the Proposed Development. Movements are provided as two-way 24-hour annual average weekday traffic (AAWT), for light duty vehicles (LDV; cars and light vans) and heavy duty vehicles (HDVs).

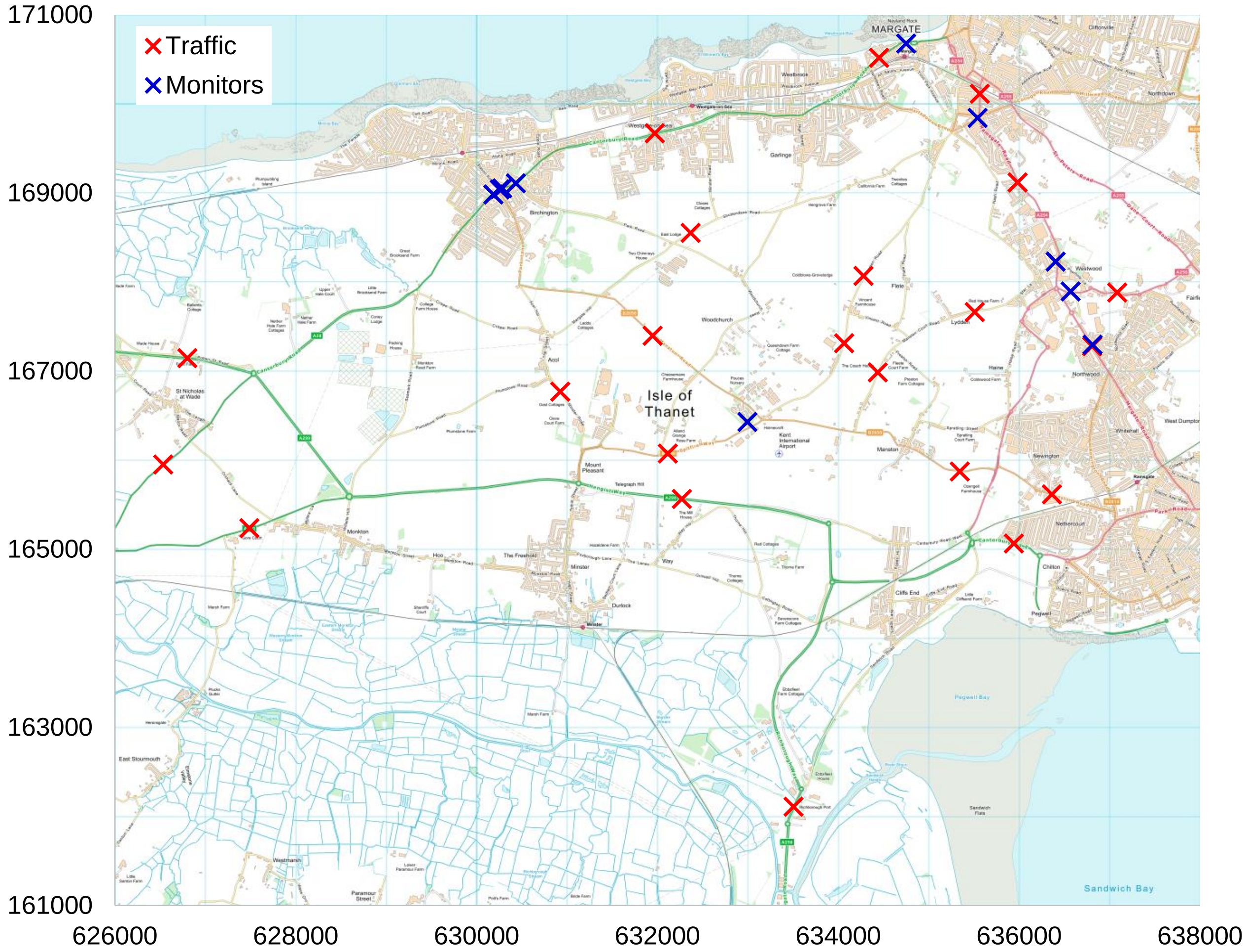
6.1.76 Emissions and concentrations are calculated using the recommended Defra methodology, but with emission factors uplifted using CURED. Emissions of PM_{10} and $PM_{2.5}$ were calculated using emission factors from the Emission Factor Toolkit (EFT) v7.0 for two vehicle categories, using the emissions calculator built into ADMS-Roads (a version of ADMS adapted for use in road traffic modelling). Emissions of NO_x were calculated using the Calculator Using Realistic Emissions For Diesels (CURED) v2A, created by Air Quality Consultants[15]; this includes an uplift to the Defra emission factors for diesel cars based on real-world measurements.

6.1.77 Emission factors are based on the relevant future year, or 2030 if earlier since projections are not available beyond 2030. Thus Year 2 uses 2020 emission factors, Year 6 uses 2024 emission factors, and Year 20 uses 2030 emission factors. This is a contrast to the approach taken for aircraft (where current emission factors are used for future years, despite expectations that they will fall), and reflects the fact that projections for road traffic are much better established than for aircraft.

6.1.78 Locations of modelled links are shown in **Figure 6.9**.

[15] Air Quality Consultants (2016) http://www.aqconsultants.co.uk/News/August-2016/Updated-CURED-to-V2A.aspx

Figure 6.9 Locations of modelled traffic links and monitoring stations used in road model verification



Verification

6.1.79 Verification of the model was undertaken using the method recommended by Defra[16]. A selection of road links were modelled where both traffic data and roadside monitoring data were available, using 2016 emission factors and meteorology. Locations of the monitors used for the verification are shown in **Figure 6.9**. The roads contribution was combined with the background concentrations from the Defra maps for 2016, and the resulting annual mean NO_2 concentrations at the monitoring locations were compared against 2016 monitoring results. An adjustment factor was derived from the comparison using the Defra method; this factor was calculated to be 2.86. This factor was applied to NO_2 concentrations and also to PM concentrations.

Dispersion modelling and calculation of NO_2 concentrations

6.1.80 Dispersion modelling was carried out in ADMS-Roads. Sources were modelled as road sources, which allows ADMS-Roads to include appropriate initial dispersion, including the effects of traffic-induced turbulence which depends on traffic flows and HDV fraction. For consistency with the verification, a single meteorological year, 2016, was used, as recommended by Defra's TG16 methodology.

[16] Defra (2016) Local Air Quality Management Technical Guidance (TG16), April 2016.

6.1.81 Rather than modelling the whole road network and identifying all near-road receptors, the DMRB approach of modelling transects was adopted. In this, each road link with traffic data was modelled as a straight-line source 1 km long, with a transect of receptors extending out from its mid-point to a distance of 200 m. This procedure takes account of the overall orientation of the link with respect to wind direction, and provides an indication of concentrations at different distances from the kerb of the road. This can then be used to identify receptors within particular concentration bands of the road.

6.1.82 Concentrations of NO_2 were calculated from NO_x concentrations using Defra's tool for this purpose[17]. Background concentrations were taken from Defra's background maps. This is different from the use of monitoring data for background concentrations used for on-airport sources, but is necessary to ensure that the conversion in the Defra spreadsheet works correctly.

Emission factors and background maps

6.1.83 The assessment was based on version 7 of the Emission Factor Toolkit (EFT), the Defra maps and tools issued in 2016, and Calculator Using Realistic Emissions For Diesels (CURED) v2A. These form a coherent, consistent set of tools. In November 2017, Defra issued updates to the EFT, its background maps and its associated tools. However, the assessment was largely complete by this time, so it was not practical to repeat the assessment with the new data. In addition, CURED is based on the old tools and a new version consistent with the new tools is not yet available, and it is unclear at the time of writing whether the new EFT generates more realistic emissions than the old EFT with CURED. For these reasons, it was decided not to repeat the assessment with the new version of the tools.

Operation and emission scenarios

6.1.84 Three operational years have been assessed:

- Year 2, representing the first year of aircraft operation;
- Year 6, representing the point at which the aircraft exceeds 10,000 movements per year; and
- Year 20, representing the worst case year in terms of likely emissions from aircraft and vehicular movements.

Calculation of short-period average concentrations

6.1.85 As described previously, the emissions are assigned to about 200 sources, each of which is represented in the model as a polyhedral volume within which the emissions occur and undergo initial mixing with the air. ADMS is unable to handle this many volume sources in a single run, so runs have been split into phase-specific runs with concentrations being combined externally. This makes it possible to obtain the total annual mean concentration of each pollutant at each receptor (and assists checking and source apportionment). However, it means ADMS cannot calculate concentrations over short-term averaging periods, e.g. for comparison with the hourly mean NO_2 limit value.

6.1.86 Therefore, the empirical relationships suggested in Defra's TG(16) guidance is used to estimate short-period concentrations, as follows:

- *"Exceedances of the NO_2 1-hour mean are unlikely to occur where the annual mean is below 60μg/m^3."*

6.1.87 and:

[17] Defra (2016) NOx to NO2 conversion spreadsheet, Version 5.1. June 2016. https://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html#NOxNO2calc

- *"To estimate potential exceedances of the PM_{10} 24-hour mean objective, local authorities should use the following relationship, provided in previous Technical Guidance, but still considered adequate:*
- *No. 24-hour mean exceedances = -18.5 + 0.00145 × annual mean3 + (206/annual mean)"*

Meteorology

6.1.88 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. The year of meteorological data that is used for a modelling assessment can also have a significant effect on ground level concentrations.

6.1.89 This assessment has used meteorological data recorded at the Manston Airport meteorological station for the five calendar years between 2012 and 2016 inclusive. The meteorological station is located on the airfield and is the nearest synoptic station to the site offering data in a suitable format for the model. A full set of wind roses for each year modelled is presented in **Figure 6.10** to **Figure 6.14** Most large meteorological datasets contain rows which cannot be used by the dispersion model, because of instrument faults or because of very low wind speeds. **Table 6.18** shows the number of hours that could be used for each of the five years. The number of hours with inadequate met data was very low in each year.

Table 6.18 Meteorological data adequacy

Year	Number of hours in year	Number of hours used by ADMS	Percentage of hours used
2012	8784	8719	99.26
2013	8760	8658	98.84
2014	8760	8683	99.12
2015	8760	8662	98.88
2016	8784	8662	98.61

Figure 6.10 2012 wind rose

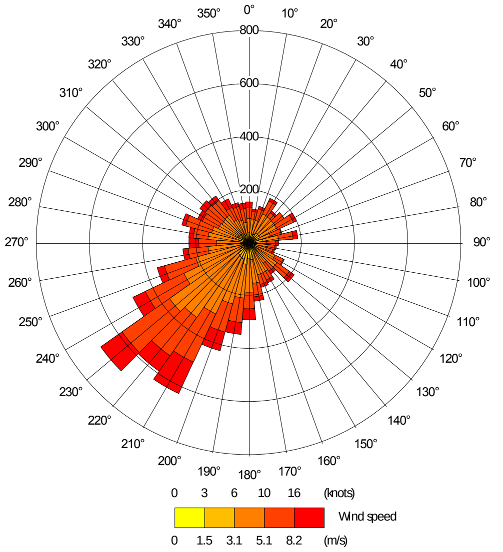


Figure 6.11 2013 wind rose

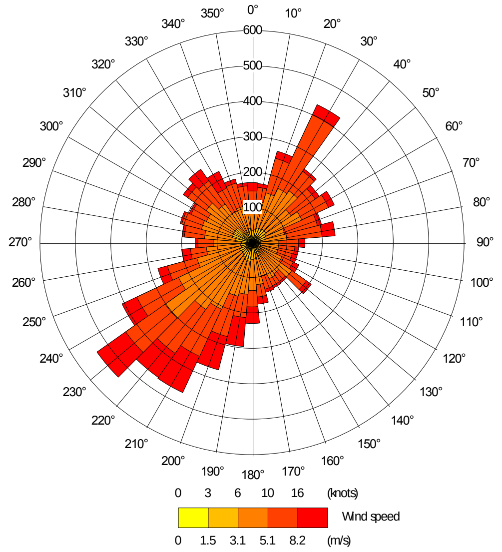


Figure 6.12 2014 wind rose

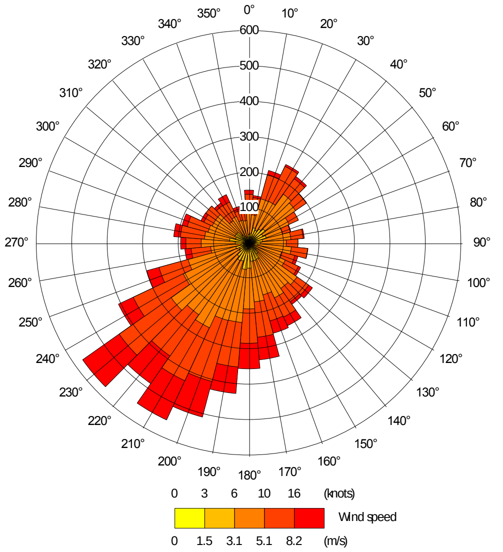


Figure 6.13 2015 wind rose

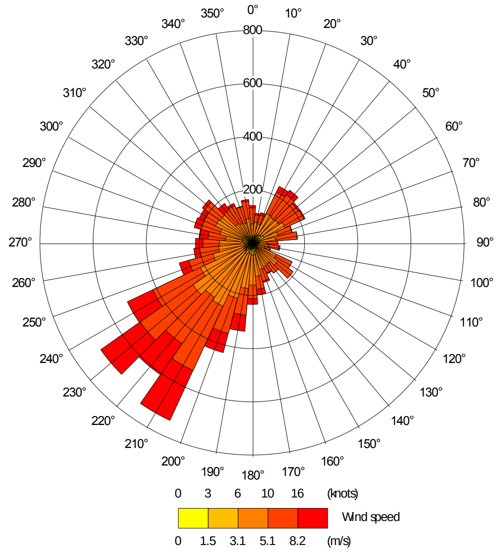
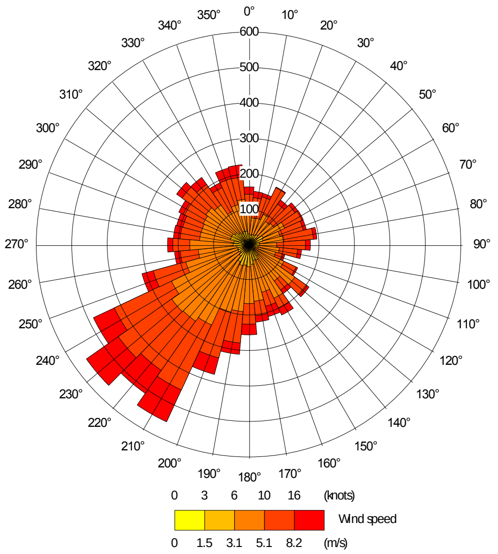


Figure 6.14 2016 wind rose



6.1.90 The wind roses show that winds are very predominantly from the southwest, with relatively few low wind speeds. There is little variation between years.

Complex terrain

6.1.91 The predominant surface characteristics and land use in a model domain have an important influence in determining turbulent fluxes and, hence, the stability of the boundary layer and atmospheric dispersion. The most important of these are surface roughness length and topography/landform. These are discussed in the following section.

Terrain

6.1.92 The concentrations of an emitted pollutant found in elevated, complex terrain differ from those found in simple level terrain. There have been numerous studies on the effects of topography on atmospheric flows. The UK ADMLC provides a summary of the main effects of terrain on atmospheric flow and dispersion of pollutants[18]:

"Plume interactions with windward facing terrain features:

> *Plume interactions with terrain features whereby receptors on hills at a similar elevation to the plume experience elevated concentrations;*
>
> *Direct impaction of the plume on hill slopes in stable conditions;*
>
> *Flow over hills in neutral conditions can experience deceleration forces on the upwind slope, reducing the rate of dispersion and increasing concentrations; and*
>
> *Recirculation regions on the upwind side of a hill can cause partial or complete entrainment of the plume, resulting in elevated ground level concentrations.*

Plume interactions with lee sides of terrain features:

> *Regions of recirculation behind steep terrain features can rapidly advect pollutants towards the ground culminating in elevated concentrations; and*

[18] Hill et al., 2005

As per the upwind case, releases into the lee of a hill in stable conditions can also be recirculated, resulting in increased ground level concentrations.

Plume interactions within valleys:

Releases within steep valleys experience restricted lateral dispersion due to the valley sidewalls. During stable overnight conditions, inversion layers develop within the valley essentially trapping all emitted pollutants. Following sunrise and the erosion of the inversion, elevated ground level concentrations can result during fumigation events; and

Convective circulations in complex terrain due to differential heating of the valley side walls can lead to the impingement of plumes due to crossflow onto the valley sidewalls and the subsidence of plume centrelines, both having the impact of increasing ground level concentrations."

6.1.93 These effects are most pronounced when the terrain gradients exceed 1 in 10, i.e. a 100 m change in elevation per 1 km step in the horizontal plane.

6.1.94 Gradients in the region around the Proposed Development are at most 1 in 25, so no terrain modelling is necessary.

Surface roughness length

6.1.95 Roughness length, z_0, represents the aerodynamic effects of surface friction and is defined as the height at which the extrapolated surface layer wind profile tends to zero. This value is an important parameter used by meteorological pre-processors to interpret the vertical profile of wind speed and estimate friction velocities which are, in turn, used to define heat and momentum fluxes and, consequently, the degree of turbulent mixing.

6.1.96 The surface roughness length is related to the height of surface elements; typically, the surface roughness length is approximately 10% of the height of the main surface features. Thus, it follows that surface roughness is higher in urban and congested areas than in rural and open areas. Oke[19] and CERC[20] suggest typical roughness lengths for various land use categories **(Table 6.19)**.

Table 6.19 Typical surface roughness lengths for various land use categories

Type of Surface	z_0 (m)
Ice	0.00001
Smooth snow	0.00005
Smooth sea	0.0002
Lawn grass	0.01
Pasture	0.2
Isolated settlement (farms, trees, hedges)	0.4
Parkland, woodlands, villages, open suburbia	0.5–1.0
Forests/cities/industrialised areas	1.0–1.5
Heavily industrialised areas	1.5–2.0

[19] Oke, T.R., (1987) 'Boundary Layer Climates'. 2nd Edition, Methuen.
[20] CERC (2003) 'The Met Input Module'. ADMS Technical Specification.

6.1.97 Increasing surface roughness increases turbulent mixing in the lower boundary layer. With respect to elevated sources under neutral and stable conditions, increasing the roughness length can have complex and conflicting effects on ground level concentrations:

- The increased mixing can bring portions of an elevated plume down towards ground level, resulting in increased ground level concentrations close to the emission source; and
- The increased mixing increases entrainment of ambient air into the plume and dilutes plume concentrations, resulting in reduced ground level concentrations further downwind from an emission source.

6.1.98 The overall impact on ground level concentration is, therefore, strongly correlated to the distance of a receptor from the emission source.

6.1.99 We have used a roughness length of 0.1 m to represent the airport and its vicinity. Most of the key receptors are close to the airfield and within the rural landscape, so using a low roughness length will be conservative. Receptors in urban locations are further away and will experience a lower level of influence from emissions on the airport; they will be less sensitive to roughness length as the plume will be generally well-mixed within the boundary layer by the time it reaches these receptors.

Surface energy budget

6.1.100 One of the key factors governing the generation of convective turbulence is the magnitude of the surface sensible heat flux. This, in turn, is a factor of the incoming solar radiation. However, not all solar radiation arriving at the Earth's surface is available to be emitted back to atmosphere in the form of sensible heat. By adopting a surface energy budget approach, it can be identified that, for fixed values of incoming short and long wave solar radiation, the surface sensible heat flux is inversely proportional to the surface albedo and latent heat flux.

6.1.101 The surface albedo is a measure of the fraction of incoming short-wave solar radiation reflected by the Earth's surface. This parameter is dependent upon surface characteristics and varies throughout the year. Oke[19] recommends average surface albedo values of 0.6 for snow covered ground and 0.23 for non-snow covered ground.

6.1.102 The latent heat flux is dependent upon the amount of moisture present at the surface. Areas where moisture availability is greater will experience a greater proportion of incoming solar radiation released back to atmosphere in the form of latent heat, leaving less available in the form of sensible heat and, thus, decreasing convective turbulence. The modified Priestly-Taylor parameter (α) can be used to represent the amount of moisture available for evaporation. Holstag and van Ulden[21] suggest values of 0.45 and 1.0 for dry grassland and moist grassland respectively.

6.1.103 A detailed analysis of the effects of surface characteristics on ground level concentrations by Auld et al.[22] led them to conclude that, with respect to uncertainty in model predictions:

"…*the energy budget calculations had relatively little impact on the overall uncertainty*".

6.1.104 In this regard, it is not considered necessary to vary the surface energy budget parameters spatially or temporally, and annual averaged values have been adopted throughout the model domain for this assessment.

6.1.105 As snow covered ground is only likely to be present for a small fraction of the year, the surface albedo of 0.23 for non-snow covered ground advocated by Oke[19] has been used whilst the model default α value of 1.0 has also been retained.

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[21] Holstag and van Ulden (1983) 'The Stability of the Atmospheric Surface Layer during Nighttime'. American Met. Soc., 6th Symposium on Turbulence and Diffusion.
[22] Auld, V., Hill, R. and Taylor, T.J. (2002) 'Uncertainty in Deriving Dispersion Parameters from Meteorological Data'. Atmospheric Dispersion Modelling Liaison Committee (ADMLC). Annual Report 2002-2003.

Buildings

6.1.106 Any large object has an impact on atmospheric flow and air turbulence within the locality of the object. This can result in maximum ground level concentrations that are significantly different (generally higher) from those encountered in the absence of buildings. The building 'zone of influence' is generally regarded as extending a distance of 5L (where L is the lesser of the building height or width) from the foot of the building in the horizontal plane and three times the height of the building in the vertical plane.

6.1.107 Gaussian plume models are generally unable to model flows around complex arrangements of buildings; typically this requires some form of computational fluid dynamics model, which presents other difficulties to the modeller. It is therefore common for air quality studies to model only simple arrangements of buildings close to the key emissions sources.

6.1.108 While numerous buildings will be present on site, in general they will be at a distance from the principal sources of emissions, especially from the runway. For this assessment, therefore, no attempt has been made to include buildings directly into the model. Instead, the effects of buildings are included by suitable choice of surface roughness length.

Conversion of NO to NO_2

6.1.109 Emissions of NO_x from combustion processes are predominantly in the form of nitric oxide (NO). Excess oxygen in the combustion gases and further atmospheric reactions cause the oxidation of NO to nitrogen dioxide (NO_2). NO_x chemistry in the lower troposphere is strongly interlinked in a complex chain of reactions involving Volatile Organic Compounds (VOCs) and Ozone (O_3). Two of the key reactions interlinking NO and NO_2 are detailed below:

$$NO_2 + O_2 \xrightarrow{h\nu} NO + O_3 \qquad (R1)$$
$$NO + O_3 \rightarrow NO_2 + O_2 \qquad (R2)$$

where *hv* is used to represent a photon of light energy (i.e. sunlight).

6.1.110 Taken together, reactions R1 and R2 produce no net change in O_3 concentrations, and NO and NO_2 adjust to establish a near steady state reaction (photo-equilibrium). However, the presence of VOCs and CO in the atmosphere offer an alternative production route of NO_2 for photolysis, allowing O_3 concentrations to increase during the day with a subsequent decrease in the NO_2:NO_x ratio.

6.1.111 However, at night, the photolysis of NO_2 ceases, allowing reaction R2 to promote the production of NO_2, at the expense of O_3, with a corresponding increase in the NO_2:NO_x ratio.

6.1.112 Near to an emission source of NO, the result is a net increase in the rate of reaction R2, suppressing O_3 concentrations immediately downwind of the source, and increasing further downwind as the concentrations of NO begin to stabilise to typical background levels[23].

6.1.113 Given the complex nature of NO_x chemistry, the EA Air Quality Modelling and Assessment Unit (AQMAU) have adopted a pragmatic, risk based approach in determining the conversion rate of NO to NO_2 which dispersion model practitioners can use in their detailed assessments[24]. AQMAU guidance advises that the source term should be modelled as NO_x (as NO_2) and then suggests a tiered approach when considering ambient NO_2:NO_x ratios:

- **Screening Scenario:** 50% and 100% of the modelled NO_x process contributions should be used for short-term and long-term average concentration, respectively. That is, 50% of the predicted NO_x concentrations should be assumed to be NO_2 for short-term assessments and

[23] Gillani, M V and Pliem, J E.(1996) Sub-grid scale features of anthropogenic emissions of NOx and VOC in the context of regional Eulerian models. Atmospheric Environment, 30, 2043–2059.
[24] Environment Agency (2005) 'Conversion ratios for NO_X and NO_2'. http://webarchive.nationalarchives.gov.uk/20140328084622/http://www.environment-agency.gov.uk/static/documents/Conversion_ratios_for__NOx_and_NO2_.pdf.

100% of the predicted NO_x concentrations should be assumed to be NO_2 for long-term assessments;

- **Worst Case Scenario:** 35% and 70% of the modelled NO_x process contributions should be used for short-term and long-term average concentration, respectively. That is, 35% of the predicted NO_x concentrations should be assumed to be NO_2 for short-term assessments and 70% of the predicted NO_x concentrations should be assumed to be NO_2 for long-term assessments; and
- **Case Specific Scenario:** Operators are asked to justify their use of percentages lower than 35% for short-term and 70% for long-term assessments in their application reports.

6.1.114 The current guidance from the EA[25] gives guidance on the screening stages of an assessment only, with very little guidance on how to carry out a detailed assessment. It therefore only gives the above "screening scenario" proportions. However, this is a detailed assessment, so the screening scenario factors are not relevant. In line with the AQMAU guidance, therefore, this assessment has used the 'Worst Case Scenario' approach in determining the conversion rate of NO to NO_2 as a robust assumption.

Deposition

6.1.115 The predominant route by which emissions to air will affect land is by deposition of atmospheric emissions. Ecological receptors can potentially be sensitive to the deposition of pollutants, particularly nitrogen and sulphur compounds, which can affect the character of the habitat through eutrophication and acidification.

6.1.116 Deposition processes in the form of dry and wet deposition remove material from a plume and alter the plume concentration. Dry deposition occurs when particles are brought to the surface by gravitational settling and turbulence. They are then removed from the atmosphere by deposition on the land surface. Wet deposition occurs due to rainout scavenging (within clouds) and washout scavenging (below clouds) of the material in the plume. These processes lead to a variation with downwind distance of the plume strength, and may alter the shape of the vertical concentration profile as dry deposition only occurs at the surface.

6.1.117 Near to sources of pollutants (<2 km), dry deposition is generally the predominant removal mechanism for pollutants such as NO_x, SO_2 and NH_3[26,27]. Dry deposition may be quantified from the near-surface plume concentration and the deposition velocity[28]:

$$F_d = v_d\, C(x,y,0)$$

where:

F_d = dry deposition flux ($\mu g\ m^{-2}\ s^{-1}$)

v_d = deposition velocity ($m\ s^{-1}$)

$C(x,y,0)$ = ground level concentration ($\mu g\ m^{-3}$)

6.1.118 EA guidance AQTAG06[27] recommends deposition velocities for various pollutants dependent upon the habitat type, reproduced as **Table 6.20**.

[25] Environment Agency (2016) 'Air emissions risk assessment for your environmental permit'. https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit, last updated 2 August 2016.

[26] Fangmeier, A. et al., (1994) '*Effects of atmospheric ammonia on vegetation – a review*', Environmental Pollution, 86, 43–82.

[27] Environment Agency (2014) 'Technical Guidance on Detailed Modelling Approach for an Appropriate Assessment for Emissions to Air', Approved March 2014.

[28] Chamberlin and Chadwick (1953). 'Deposition of Airborne Radioiodine Vapour.' Nucleonics, 2, 22-25.

Table 6.20 EA recommended deposition velocities

Pollutant	Deposition Velocity (m s^{-1})	
	Grassland	Forest
NO_2	0.0015	0.003
SO_2	0.012	0.024
HCl	0.025	0.06
NH_3	0.02	0.03
HNO_3	0.04	0.04
SO_4^{2-} (sulphate aerosol)	0.01	0.01

6.1.119 In order to assess the impacts of deposition, habitat-specific critical loads and critical levels have been created. These are generally defined similarly to:

> *"...a quantitative estimate of exposure to one or more pollutants below which significant harmful effects on specified sensitive elements of the environment do not occur according to present knowledge*."[29]

6.1.120 It is important to distinguish between a critical load and a critical level. The critical load relates to the quantity of a material deposited from air to the ground, whilst critical levels refer to the concentration of a material in air. The UK APIS provides critical load data for designated ecological sites (SPAs, SACs and SSSIs) in the UK.[30]

6.1.121 The critical loads used to assess the impact of compounds deposited to land which result in eutrophication and acidification are expressed in terms of kilograms of nitrogen deposited per hectare per year (kg N ha^{-1} y^{-1}) and kilo-equivalents deposited per hectare per year (keq ha^{-1} y^{-1}). The unit of 'equivalents' (eq) is used for the purposes of assessing acidification, rather than a unit of mass. The unit eq (1 keq ≡ 1,000 eq) refers to molar equivalent of potential acidity resulting from e.g. sulphur, oxidised and reduced nitrogen, as well as base cations. Essentially, it means 'moles of charge' and is a measure of how acidifying a particular chemical species can be.

6.1.122 To convert the predicted concentration in air of NO_2, SO_2, NH_3, or HNO_3, the following formula is used:

$DR_i = C_i v_{di} f_i$

where:

DR_i = annual deposition of N or S (kg N ha^{-1} y^{-1} or kg S ha^{-1} y^{-1})

C_i = annual mean concentration of the ith chemical species (µg m^{-3})

v_{di} = deposition velocity of ith species (**Table 6.20**)

f_i = factor to convert from µg m^{-2} s^{-1} to kg ha^{-1} y^{-1} for the ith species (**Table 6.21**).

6.1.123 **Table 6.21** provides the relevant conversion factors as extracted from AQTAG06[27].

[29] Nilsson J. and Grennfelt P. (Eds) 1988. 'Critical Loads for Sulphur and Nitrogen'. Miljorapport 1988:15. Nordic Council of Ministers, Copenhagen.

[30] APIS also has information on critical levels. Critical Levels for air pollutants are not habitat specific (as critical loads are), but have been set to cover broad vegetation types.

Table 6.21 EA factors for converting modelled deposition rates

Pollutant	Conversion factor ($\mu g\ m^{-2}\ s^{-1}$ to $kg\ ha^{-1}\ y^{-1}$)	
	Of	f_i
NO_2	N	96
SO_2	S	157.7
HNO_3	N	70.1
NH_3	N	259.7

Source: Environment Agency [27]

6.1.124 In order to convert deposition of N or S to acid equivalents, the following relationships can be used:

- 1 keq $ha^{-1}\ y^{-1}$ = 14 kg N $ha^{-1}\ y^{-1}$; and
- 1 keq $ha^{-1}\ y^{-1}$ = 16 kg S $ha^{-1}\ y^{-1}$.

6.1.125 With respect to wet deposition, EA[27] states:

"It is considered that wet deposition of SO_2, NO_2 and NH_3 is not significant within a short range."

6.1.126 Therefore, the assessment only considers dry deposition of nutrifying and acidifying N and S compounds.

6.1.127 **Table 6.22** lists the ecologically designated sites for which deposition is calculated, and says which of the deposition velocities from **Table 6.20** are used.

Table 6.22 Deposition velocity class for ecological sites

Receptor	Class	Receptor	Class	Receptor	Class	Receptor	Class
E01	Grassland	**E23**	Grassland	**E45**	Grassland	**E67**	Grassland
E02	Grassland	**E24**	Grassland	**E46**	Grassland	**E68**	Grassland
E03	Grassland	**E25**	Grassland	**E47**	Grassland	**E69**	Forest
E04	Grassland	**E26**	Grassland	**E48**	Grassland	**E70**	Forest
E05	Grassland	**E27**	Grassland	**E49**	Grassland	**E71**	Forest
E06	Grassland	**E28**	Grassland	**E50**	Grassland	**E72**	Forest
E07	Grassland	**E29**	Grassland	**E51**	Grassland	**E73**	Forest
E08	Grassland	**E30**	Grassland	**E52**	Grassland	**E74**	Forest
E09	Grassland	**E31**	Grassland	**E53**	Grassland	**E75**	Forest
E10	Grassland	**E32**	Grassland	**E54**	Grassland	**E76**	Forest
E11	Grassland	**E33**	Grassland	**E55**	Grassland	**E77**	Forest
E12	Grassland	**E34**	Grassland	**E56**	Forest	**E78**	Forest
E13	Grassland	**E35**	Grassland	**E57**	Forest	**E79**	Forest
E14	Grassland	**E36**	Grassland	**E58**	Forest	**E80**	Forest

Receptor	Class	Receptor	Class	Receptor	Class	Receptor	Class
E15	Grassland	E37	Grassland	E59	Forest	E81	Forest
E16	Grassland	E38	Grassland	E60	Forest	E82	Forest
E17	Grassland	E39	Grassland	E61	Forest	E83	Forest
E18	Grassland	E40	Grassland	E62	Forest	E84	Forest
E19	Grassland	E41	Grassland	E63	Forest	E85	Forest
E20	Grassland	E42	Grassland	E64	Forest	E86	Forest
E21	Grassland	E43	Grassland	E65	Forest	E87	Forest
E22	Grassland	E44	Grassland	E66	Forest	E88	Forest

Special treatments

Other treatments

6.1.128 Specialised model treatments, for short-term (puff) releases, coastal models, fluctuations or photochemistry were not used in this assessment.

Sensitivity analysis and uncertainty

Sensitivity analysis

6.1.129 Wherever possible, this assessment has used worst-case scenarios, which will exaggerate the impact of the emissions on the surrounding area, including emissions, operational profile, ambient concentrations, meteorology and surface roughness. This assessment has considered five years of meteorological data, with data reported from the year(s) predicting the highest ground-level concentrations at each receptor.

Model uncertainty

6.1.130 Process emissions have been modelled under expected operation using the standard steady state algorithms in ADMS to determine the impact on local receptors. In order to model atmospheric dispersion using standard Gaussian methods, the following assumptions and limitations have to be made:

- Conservation of mass: the entire mass of emitted pollutant remains in the atmosphere and no allowance is made for loss due to chemical reactions or deposition processes (although the standard Gaussian model can be modified to include such processes). Portions of the plume reaching the ground are assumed to be dispersed back away from the ground by turbulent eddies (eddy reflection);
- steady state emissions: emission rates are assumed to be constant and continuous over the time averaging period of interest; and
- steady state meteorology: no variations in wind speed, direction or turbulent profiles occur during transport from the source to the receptor. This assumption is reasonable within a few kilometres of a source but may not be valid for receptor distances in the order of tens of kilometres. For example, for a receptor 50 km from a source and with a wind speed of 5 m s^{-1} it will take nearly three hours for the plume to travel this distance during which time many different processes may change (e.g., the sun may rise or set and clouds may form or dissipate affecting

the turbulent profiles). For this reason, Gaussian models are practically limited to predicting concentrations within ~20 km of a source.

6.1.131 As a result of the above, and in combination with other factors, not least attempting to replicate stochastic processes (e.g., turbulence) by deterministic methods, dispersion modelling is inherently uncertain, but is nonetheless a useful tool in plume footprint visualisation and prediction of ground level concentrations. Dispersion models have been widely used in the UK for both regulatory and compliance purposes for a number of years and this is an accepted approach for this type of assessment.

6.1.132 This assessment has incorporated a number of worst-case assumptions, as described above, which will result in an overestimation of the predicted ground level concentrations from the process. As a result of these worst-case assumptions, the predicted results should be considered the upper limit of model uncertainty for a scenario where the actual site impact is determined. Therefore, the actual predicted ground level concentrations would be expected to be lower than those reported in this assessment and, in some cases, significantly lower.

Significance evaluation methodology: site-specific critical loads

6.1.133 As noted in the main text (**Section 6.7**), information held on the APIS website has been reviewed in order to identify the main habitat/species features and their site relevant critical loads. **Table 6.23** and **Table 6.24** summarise this information.

Table 6.23 Critical Load data for nutrient nitrogen deposition

Receptor	Minimum critical load (kg N ha^{-1} y^{-1})	Feature	Relevant Nitrogen Critical Load Class
E01–E17, E25, E26, E36	8	Sterna albifrons (Eastern Atlantic - breeding) - Little tern (A195)	Coastal stable dune grasslands - acid type
E18, E19	Not sensitive	Reefs (H1170)	N/A
E20–E24, E27–E34	8	Fixed coastal dunes with herbaceous vegetation ("grey dunes") (H2130)	Coastal stable dune grasslands - acid type
E35, E37–E42	Not assessed	Supralittoral sediment (Ammophila arenaria - arrhenatherum elatius dune grassland)	No critical load has been assigned for this feature
E43, E44, E48, E49	5	Gallinago gallinago (Europe - breeding) - Common snipe (A153)	Raised and blanket bogs
E45–E47	No critical load	Vertigo moulinsiana - Desmoulin`s whorl snail (S1016)	No comparable habitat with established critical load estimate available
E50–E55, E67, E68	20	Low and medium altitude hay meadows	N/A
E56–E66, E69–E88	10	Broadleaved deciduous woodland	N/A

Table 6.24 Critical Load data for acid deposition

Receptor	CLmaxS (kg N ha^{-1} y^{-1})	CLminN (kg N ha^{-1} y^{-1})	CLmaxN (kg N ha^{-1} y^{-1})	Feature	Acidity Class
E01–E17, E25, E26, E36	0.88	0.223	1.13	Pluvialis apricaria [North-western Europe - breeding] - European golden plover (A140)	Acid grassland
E18, E19	Not sensitive	Not sensitive	Not sensitive	Reefs (H1170)	N/A

Receptor	CLmaxS (kg N ha^{-1} y^{-1})	CLminN (kg N ha^{-1} y^{-1})	CLmaxN (kg N ha^{-1} y^{-1})	Feature	Acidity Class
E20–E24, E27–E34	0.9	0.223	1.123	Fixed coastal dunes with herbaceous vegetation ("grey dunes") (H2130)	Acid grassland
E35, E37–E42	0.321	0.248	0.526	Pluvialis apricaria - Golden Plover	Bogs
E43, E44, E48, E49	0.227	0.321	0.542	Gallinago gallinago (Europe - breeding) - Common snipe (A153)	Bogs
E45–E47	No critical load	No critical load	No critical load	Vertigo moulinsiana - Desmoulin`s whorl snail (S1016)	Freshwater
E50–E55, E67, E68	3.93	0.85	4.79	Calcareous grassland (using base cation)	N/A
E56–E58, E66, E75, E76	1.77	0.14	1.91	Broadleafed/Coniferous unmanaged woodland	N/A
E59, E85–E88	1.67	0.14	1.81	Broadleafed/Coniferous unmanaged woodland	N/A
E60	10.81	0.14	10.96	Broadleafed/Coniferous unmanaged woodland	N/A
E61, E77	1.68	0.14	1.82	Broadleafed/Coniferous unmanaged woodland	N/A
E62–E64, E70, E71	10.83	0.14	10.97	Broadleafed/Coniferous unmanaged woodland	N/A
E65	1.72	0.14	1.86	Broadleafed/Coniferous unmanaged woodland	N/A
E69, E72–E74	1.77	0.14	1.92	Broadleafed/Coniferous unmanaged woodland	N/A
E78–E84	10.82	0.14	10.97	Broadleafed/Coniferous unmanaged woodland	N/A

Sources of model conservatism

6.1.134 The model methodology aims to be realistic and accurate as far as possible. However there are areas where the information available is sufficiently uncertain (especially about the future) that it is necessary to ensure that assumptions err on the side of being conservative — that is, they will tend to overpredict environmental impacts to avoid the risk of underpredicting them.

6.1.135 These have been detailed above, but are summarised here to help provide a picture of the degree of conservatism in the model.

6.1.136 Key sources of conservatism include:

- Background concentrations are based on the higher of Defra's modelled forecasts and current monitoring data, where available and suitable.
- The assumed background non-roads NO_2 is taken as the upper range of monitoring results.
- Where monitoring data is used to obtain background concentrations, the average of the 2007–2015 data is used, disregarding a tendency of concentrations to fall over the years.
- Similarly, background data is assumed to be either recent monitoring data or 2016 Defra modelled data, with no account taken of expected reductions in future years.

- Where critical loads are given as a range, the lower end of the range is used as the assessment level.
- Aircraft engines are chosen conservatively, with a general assumption that engines will be those that entered into service in the mid-1990s. For the A320, the V2527-A5 engine has been assumed, which has emissions at the high end of the possible engines.
- For aircraft emissions of PM, the FOA3a method is used, which gives higher emission rates than the FOA3 method.
- Aircraft are assumed to take off using 100% thrust. Reduced thrust is ignored.
- Measures to reduce emissions on the ground such as reduced-engine taxiing are ignored.
- Climb and approach emissions are modelled within volume sources, the bottom of which is at the lower end of the height range represented (in other words, elevated emissions are modelled closer to the ground than in reality).
- Each construction phase is assumed to be focused into a single calendar year, with all activity and corresponding emissions for the phase occurring during the corresponding assessment year.
- Estimates of total NO_2 concentrations are based on the worst-case scenario NO_2:NO_x ratios.

Appendix 6.4

Odour Assessment

Introduction

6.1.137 This appendix sets out the results of an assessment of the effects of the Proposed Development on odour. Although an assessment of odour impacts is not required under the regulations, a number of stakeholders have requested information on the topic, so this chapter presents a brief assessment.

6.1.138 This appendix should be read in conjunction with the description of the Proposed Development (**Chapter 3**). Following a summary of the limitations of the ES, the chapter outlines the relevant policy, legislation and guidance that has informed the assessment, and the data gathering methodology that was adopted as part of the assessment. This leads on to a description of the overall baseline conditions, the scope of the assessment, and the assessment methodology. The chapter concludes with a summary of the results of the assessment at this point in time.

6.1.139 The principal sources of odour from the Proposed Development are:

- Fugitive emissions of volatile components of aircraft fuel; and
- Emissions of products of incomplete combustion from aircraft engines and other vehicles and plant.

6.1.140 The assessment estimates the effects of odours on receptors around the Proposed Development. These odour effects are then evaluated for significance in relation to the benchmarks set in guidance and custom and practice.

6.1.141 There are no generally accepted methodologies for estimating the effects of odours from airports. This is a rather common situation in odour assessments, so guidance from the Institute of Air Quality Management (IAQM)[31] suggests that a variety of qualitative and quantitative approaches be taken, depending on the particular circumstances of an assessment. A combination of more than one approach may be appropriate for an assessment.

Limitation of the PEIR

6.1.142 No technical difficulties have been encountered whilst preparing the Odour Chapter.

Policy, legislative and guidance context

6.1.143 A study of planning policy, legislation and guidance at the national, regional and local level has been undertaken for the site and its locality in order to highlight any requirements which the Proposed Development needs to consider. It is always important that policies, legislation and guidance are taken into consideration as they help to define the scope of assessment and can inform the identification of particular local issues. Full details of all national and local planning policies relevant to the Proposed Development can be found in **Appendix 4.1**.

International

6.1.144 No international policy with explicit reference to odour control has been identified.

[31] IAQM (2014) Guidance on the assessment of odour for planning.

UK legislation and policy

Draft National Policy Statement

6.1.145 The 2017 Draft Airports National Policy Statement[32] is mainly focused on policy regarding a third runway at Heathrow Airport. The Draft NPS has this to say on the subject of odour:

6.1.146 *"The construction and operation of airports infrastructure has the potential to create a range of emissions such as dust, odour, artificial light, smoke and steam. All have the potential to have a detrimental impact on amenity or cause a common law nuisance or statutory nuisance under Part III, Environmental Protection Act 1990.197 These may also be covered by pollution control or other environmental consenting regimes.*

6.1.147 *Because of the potential effects of these emissions and in view of the availability of the defence of statutory authority against nuisance claims described previously, it is important that the potential for these impacts is considered by the applicant in its application, by the Examining Authority in examining applications, and by the Secretary of State in taking decisions on development consent.*

6.1.148 *For nationally significant infrastructure projects of the type covered by the Airports NPS, some impact on amenity for local communities is likely to be unavoidable. Impacts should be kept to a minimum and should be at a level that is acceptable...*

6.1.149 *Decision making*

6.1.150 *The Secretary of State should be satisfied that all reasonable steps have been taken, and will be taken, to minimise any detrimental impact on amenity from emissions of dust, odour, artificial light, smoke and steam. This includes the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.*

6.1.151 *If development consent is granted for a project, the Secretary of State should consider whether there is a justification for all of the authorised project (including any associated development) being covered by a defence of statutory authority against nuisance claims. If the Secretary of State cannot conclude that this is justified, then the defence should be disapplied, in whole or in part, through a provision in the development consent order."*

Local

6.1.152 Thanet's draft local plan says:

6.1.153 *"Activities with the potential to pollute are controlled by wide ranging powers under pollution control legislation. However, the effects of development that might cause the release of pollutants to water, land or air, or from noise, dust, vibration, light, odour or heat, are material considerations when deciding whether or not to grant planning permission. The Council will require any application to include sufficient information to enable the risk of pollution to be assessed."*

6.1.154 and has this policy:

6.1.155 *"Policy SE01 - Potentially Polluting Development*

6.1.156 *Development with potential to pollute will be permitted only where:*

6.1.157 *1) Applicable statutory pollution controls and siting will effectively and adequately minimise impact upon land use and the environment including the effects on health, the natural environment or general amenity resulting from the release of pollutants to water, land or air or from noise, dust, vibration, light, odour or heat."*

[32] Department for Transport (2017) Revised Draft Airports National Policy Statement: new runway capacity and infrastructure at airports in the South East of England. October 2017. https://www.gov.uk/government/publications/revised-draft-airports-national-policy-statement

National guidance

6.1.158 The Environment Agency's guidance note "H4 Odour Management - how to comply with your environmental permit"[33] gives guidance on odour management for installations subject to permitting, including assessing, controlling and monitoring odours.

6.1.159 The Institute of Air Quality Management's Guidance on the assessment of odour for planning[34] provides a framework for assessing odour impacts for planning purposes.

6.1.160 Whether a particular odour will cause an annoyance reaction from human beings in their normal everyday environment is determined by a number of different but interacting factors, including:

- The concentration of the odour in the atmosphere;
- The nature of the odour (how objectionable it is perceived to be);
- How frequently it occurs and for how long.

6.1.161 Odour concentration is expressed as European odour units per cubic metre at standard conditions for olfactometry ($ou_E\ m^{-3}$) as compared to a European reference concentration of a known standard odorant in air (n-butanol). The odour concentration, in simple terms, is the number of times an odorous sample of air has to be diluted with odour-free air to reach its odour threshold. Exposure is usually quantified in terms of a frequency of occurrence over a year of hourly average concentrations above a certain odour concentration limit.

6.1.162 Unlike other forms of air pollution, odours are not generally additive. This reflects the way in which the brain responds to odour. The human brain has a tendency to "screen out" those odours which are always present or those that are in context to their surroundings. For example, an individual is more likely to be tolerant of an odour from a factory in an industrial area than in the countryside. The human brain will also develop a form of acceptance to a constant background of local odours.

6.1.163 With regard to the concentrations of odour in the atmosphere that can be detected and recognised by the human olfactory system, and the levels which would cause annoyance or give rise to complaint, there are clearly a number of factors involved. These factors are commonly associated with the FIDOL acronym:

- Frequency of detection: the number of exposures to an odour within a given time frame;
- Intensity as perceived: the magnitude of the perception of the odour;
- Duration: the time period over which the odour exposure occurs;
- Offensiveness: this is a qualitative judgement to describe the odour;
- Location: the type of receptor will determine its sensitivity to odour, e.g. residential properties are likely to be associated with greater sensitivity than industrial locations.

6.1.164 An olfactory response to an odorant will typically occur due to transient peaks or fluctuations in concentrations over very short periods of time, typically in the order of 1 minute or less. However, H4 provides odour benchmarks based on achievement of a 1 hour mean concentration, not to be exceeded for more than 2% of a year (i.e. a 98th percentile 1-hour mean value). The H4 odour benchmarks can be considered to represent a criterion for 'no reasonable cause for annoyance', rather than a benchmark representative of detection.

6.1.165 In H4, odour generating processes are grouped into three categories dependent upon their perceived offensiveness:

- Highly offensive - processes involving animal or fish remains, brickworks, creamery, fat and grease processing, wastewater treatment, oil refining, livestock feed factory;

[33] https://www.gov.uk/government/publications/environmental-permitting-h4-odour-management. Dated 4 April 2011.
[34] IAQM (2014) Guidance on the assessment of odour for planning.

- Moderately offensive - intensive livestock rearing, fat frying (food processing), sugar beet processing, these are odours which do not obviously fall within the high or low categories; and
- Less offensive - chocolate manufacture, brewery, confectionery, fragrance and flavourings, coffee roasting, bakery.

6.1.166 Annoyance thresholds are then prescribed based on the 98th percentile of hourly averaged odour concentrations during the year and dependent upon the offensiveness of the process, as described above:

- Highly offensive = 1.5 ou_E m^{-3};
- Moderately offensive = 3.0 ou_E m^{-3}; and
- Less offensive = 6.0 ou_E m^{-3}.

Data gathering methodology

6.1.167 This section describes the desk study undertaken to inform the greenhouse gas emissions assessment.

Desk Study

6.1.168 Maps have been examined to identify obvious existing sources of odour in the vicinity of the Proposed Development. The Environmental Health Officer at Thanet District Council was contacted for information about odour complaints from the previous airport operation.

Survey work

6.1.169 No survey work was carried out for the odour assessment.

Consultation

6.1.170 Since 2015 and throughout the undertaking of the survey and assessment work, RiverOak has engaged with consultees with an interest in potential air quality effects. A scoping report, including a chapter covering air quality, was produced and submitted to PINS who provided a scoping opinion. This was followed by a Preliminary Environmental Information Report, which included an interim air quality assessment.

6.1.171 Organisations that were consulted include:

- The Planning Inspectorate (PINS); and
- Thanet District Council.

6.1.172 A summary of the consultee comments and responses provided is provided in **Table 6.3** below along with a response to identify how the matter is dealt with in this report.

Table 6.25 Consultee comments

Consultee	Comments and considerations	How addressed in this ES
PINS	It is proposed to scope out odour assessment from the air quality assessment based on the relatively small size of the development. The Secretary of State does not agree to scoping this out and considers that further justification is required based on the geographic location of potential odour sources and any potential sensitive receptors. The Applicant's attention is drawn to TDC's comments, contained in Appendix 3, in this regard. This justification must include reference to the potential for movement of contaminated material during construction. Otherwise, the applicant should provide an assessment in accordance with the relevant Institute of Air Quality Management (IAQM) standards.	A qualitative and quantitative assessment of odour is included in the ES, in accordance with the IAQM Guidance. The potential for movement of contaminated material during construction will be addressed as part of the Construction Environmental Management Plan (CEMP).
Thanet District Council	Odour assessment - it is agreed that there is not accepted methodology for undertaking odour assessment but noted that this work has been undertaken at other airports, and therefore there could be further assessment of the potential odour effects from the operation of the airport in order to allow for the effect to be scoped out from further assessment.	A qualitative and quantitative assessment of odour is included in the ES in accordance with the IAQM Guidance.

Scope of the assessment

6.1.173 This section sets out information on: the process whereby receptors are identified; the potential receptors that could be affected by the Proposed Development; and the potential effects on receptors that could be caused by the Proposed Development.

6.1.174 The scope of assessment has been informed by: the scoping study; consultee responses to the Scoping Report and the 2017 PEIR; and the design of the Proposed Development.

Approach to identifying receptors

6.1.175 Human receptors have been identified in the same way as for the air quality assessment (qv). Ecological receptors have not been included in the odour assessment.

Spatial and temporal scope

6.1.176 All emissions from airport-related activities are included within this assessment.

6.1.177 In terms of temporal scope, it is proposed to assess just Year 20 of operation, being the year of peak activity. Odour emissions are expected to increase with airport activity, and background odour levels are not expected to change in the future, so only a single assessment year is justified.

Likely significant effects

6.1.178 The likely significant effects from the Proposed Development, which are subject to further discussion in this chapter, are summarised below.

- Products of incomplete combustion from aircraft engines. These are greatest when the engines are at low thrust settings, for example during taxiing or hold.
- Emissions of volatile components of aviation fuel (that is, components that evaporate readily at ambient conditions). The bulk of aviation fuel at Manston Airport will be Jet A1, which is a form

of kerosene (paraffin) and is much less volatile than petrol. Because of the low volatility, it is not usual practice to use vapour recovery to control emissions of Jet A1.

- The airport will also use smaller quantities of avgas (aviation spirit) for piston-engined aircraft. This is similar to petrol, with high volatility, and vapour recovery is normally used to control emissions.

6.1.179 Emissions of unburnt fuel will arise from the following processes:

- Deliveries to fuel farm tanks, filling tankers/bowsers and filling aircraft fuel tanks, displacing vapour within the tanks; and
- Breathing from tanks as temperature and pressure changes affect the mass of vapour in the headspace.

Overall odour baseline

Current baseline

6.1.180 The Proposed Development lies is a rural area but on the edge of the urban area of Ramsgate. Other than two sewage works about 2.5 km south of the airport site, no specific sources of odour have been identified. Sources of odour are likely to be those associated with the rural environment, such as farm activities, those associated with the urban environment such as commercial and light industrial installations, and road traffic.

6.1.181 At those receptors judged most sensitive to potential odours from the Proposed Development, the most likely baseline sources of odour are rural and road sources.

6.1.182 Thanet District Council has said that the previous airport operation caused “only occasional” odour complaints, mainly from the Smuggler’s Leap development[35]. However, details of the complaints could not be provided.

Future baseline

6.1.183 No significant additional sources of odour have been identified among committed or proposed developments.

Environmental measures incorporated into the Proposed Development

6.1.184 This section lists the environmental measures relevant to odour emissions which have been incorporated into the Proposed Development. Where achievable and agreed environmental measures have been incorporated into the Proposed Development, the effect that those environmental measures have on the significance of potential effects is taken into account during the assessment. In some cases, a potential effect may require no further consideration following incorporation of appropriate environmental measures.

6.1.185 A summary of the environmental measures that have been incorporated into the development proposals to date in order to avoid, reduce or compensate for potential adverse air quality effects is provided below in **Table 6.20**.

Table 6.26 Rationale for incorporation of environmental measure

Potential receptor	Predicated changes and potential effects	Incorporated measure
Operational Phase Measures		

[35] Amanda Berry, Thanet District Council (2017). Personal communication.

Potential receptor	Predicated changes and potential effects	Incorporated measure
Human receptors	Odours from aircraft operations	Airfield design and operational measures to minimise the amount of time aircraft have engines running on the ground. Use of fixed electrical ground power (FEGP) to minimise engine use at stand. Airfield design to minimise taxi times.
Human receptors	Odours from unburnt fuel	Vapour recovery on avgas (aviation spirit) tanks.

Assessment methodology

Overview

6.1.186 Methods for assessing odour impacts are generally much less quantitative and precise than for many other topics such as air quality and noise. Instead, considerable judgement is required. This is true even for common, well-studied sources of problem odour such as waste-water treatment works and intensive livestock facilities. There is no consensus on how best to estimate odour impacts from airports.

6.1.187 In particular, there is no validated calculation to derive odour emissions from hydrocarbon emissions and there is no UK hydrocarbon standard benchmark to compare against hydrocarbon modelling predictions that would allow to understand and evaluate quantitatively the odour impact of the proposed site. The best available quantitative approach is the Copenhagen method, discussed below.

6.1.188 The IAQM guidance on odour assessments acknowledges the often subjective and judgement-based nature of odour assessments. It suggests both quantitative and qualitative approaches, acknowledging the weaknesses of each, and recommends that alternative methods should be used side-by-side where practical.

6.1.189 Accordingly, for this assessment, two approaches have been followed.

- A quantitative assessment using the Copenhagen method; and
- A risk-based approach based on the 2014 IAQM guidance on the assessment of odour for planning.

6.1.190 It must be repeated that both these methods should be considered indicative of the risk of odour problems, rather than a robust evaluation. In particular, it is important to recognise that the apparent precision of the quantitative approach is not necessarily reflective of its accuracy.

6.1.191 The above discussion relates to airport operations as a whole. However, it is possible to quantify the effects from unburnt fuel more confidently, as detailed below.

Operation and emission scenarios

6.1.192 Since odour emissions are expected to increase with airport activity, and since the background odour levels are not expected to change in the future, only a single operational year has been assessed, namely Year 20, representing the peak forecast year in terms of movements.

Unburnt fuel vapours

6.1.193 Emissions from the fuel storage tanks are calculated using a simplified version of the US Environmental Protection Agency's AP-42 method[36]. It is assumed that the tanks are fixed-roof tanks; floating roof tanks will typically have lower emissions. The AP-42 methodology estimates losses from filling the tanks (which displaces air which contains fuel vapour) and from diurnal

[36] Jimmy Peress, Tritech Consulting Engineers (2001) Estimate Storage Tank Emissions. CEP Magazine, August 2001. http://people.clarkson.edu/~wwilcox/Design/stortank.pdf

breathing (expansion and contraction of the airspace as the temperature fluctuates over the day–night period).

6.1.194 The three Jet A1 tanks are assumed to have a capacity of 700 m^3 each, and to have a combined throughput of 290,000 m^3 $year^{-1}$ in Year 20. It is assumed that these are served airside by five tankers/bowsers of capacity 38 m^3 each. The AP-42 methodology means there are small differences in the calculated emissions depending on the tank size, but the results are not very sensitive to these assumptions.

6.1.195 The avgas tank is assumed to have a capacity of 20 m^3, and to have a throughput of 35 m^3 $year^{-1}$. It is assumed to be served by a single tanker/bowser of capacity 20 m^3.

6.1.196 ADMS 5 has been used to model dispersion of emissions from the fuel farm tanks. Modelling assumptions are consistent with those used for the main air quality assessment (meteorological data, surface roughness, etc.) Emissions from the tanks have been modelled as point sources from the top of the tanks, with the tanks themselves modelled as buildings. Emissions from tankers and bowsers have been modelled as a point source near the tanks, and 3 m above the ground; this makes the conservative assumption that breathing losses all take place on the fuel farm rather than across the wider airfield.

6.1.197 Published odour values for Jet A1 or kerosene have not been found but odour guidance from the Scottish Environment Protection Agency[37] states that the odour threshold value for diesel is 60 µg m^{-3}, which is therefore equivalent to 1 ou_E m^{-3}. The same relationship is assumed to hold for Jet A1. Despite its higher vapour pressure, avgas is used in such small quantities that it makes a negligible contribution to emissions, so the same odour factor is used for this component.

Aircraft emissions: Risk-based approach

6.1.198 The following risk assessment methodology has been used to assess the potential odour risk at the identified receptors during the operational phase of the Proposed Development using meteorological data obtained from Manston Airport during the 5-year period 2012–2016. It must be noted that the intensity of the odour and the distance between the receptor and the Proposed Development have not been taken into consideration: worst-case intensity is assumed.

6.1.199 This assessment is not a prediction of what will actually occur during the operational life of the site but the likelihood of occurrences. Furthermore, an occurrence does not mean that any of the receptors will experience an effect or give rise to a complaint.

6.1.200 The greatest potential for adverse odour effects to occur is during periods of stable atmospheric conditions with calm or low wind speeds, generally when wind speeds are less than 3 m s^{-1}. This reduces dilution and mixing of odours with ambient air and results in higher odour concentrations at receptor locations. The percentage of time that a receptor is at risk is based on the following calculation:

- Total number of operating hours as a fraction of number of hours when source can operate in a year × fraction of hours when a wind of less than 3 m s^{-1} blows towards the receptor.

6.1.201 It is assumed that the airport operates continuously round the clock; no credit is taken for reduced operations at night. In fact, low wind speeds are generally more common at night so this is a conservative assumption.

6.1.202 The probability that the wind is blowing from the airport towards the receptor, with a speed of less than 3 m s^{-1}, is calculated. A 90° range of wind directions centred on the identified receptor is used to ensure that the spatial extent of the airport is captured, and also takes into account the uncertainty of the measured wind directions and the plume width from the source.

6.1.203 This calculation uses long-term (5 years, 2012–2016) averaged weather data from the Manston Airport synoptic meteorological station.

[37] SEPA (2010) Odour guidance 2010. https://www.sepa.org.uk/media/154129/odour_guidance.pdf

6.1.204 The distance between the receptors and the sources has not been taken into account in the risk calculation. Similarly, the fact that the sources are generally elevated (due to the height of the aircraft engines and the plume rise from the heat of the exhaust) has not been taken into account.

6.1.205 From this calculation, the risk of odour exposure is calculated and rated as described in **Table 6.27**. However, it is worth noting that this is not a prediction of what will actually occur during the operational life of the site, but the likelihood of occurrences.

Table 6.27 Matrix indicating magnitude of risk of odour exposure

At risk percentage	>10%	5–10%	2–5%	1–2%	<1%
Magnitude of risk	High	High	Medium	Low	Negligible

6.1.206 Guidance in respect of the sensitivity of potential odour sensitive receptors is taken from the Environment Agency's Horizontal Guidance Note H4 and from IAQM guidance on the assessment of odour for planning (2014) and summarized in **Table 6.28**.

Table 6.28 Odour sensitivity by receptor types

Sensitivity	Receptor types
High	Dwellings Hospitals Schools / education sites Tourist / cultural sites
Medium	Places of work Offices and other commercial premises Food retailers Playing / recreation fields
Low	Farms Light and heavy industry Footpaths Roads

6.1.207 **Table 6.29** presents a matrix extracted from the IAQM guidance for odour assessment 2014, which shows the interaction between sensitivity of receptors and magnitude of the risk of odour exposure. This has been used to determine the significance of any odour effects due to the airport operation at each identified sensitive receptor.

Table 6.29 Likely magnitude of odour effect at the specific receptor location

Sensitivity	Low receptor sensitivity	Medium receptor sensitivity	High receptor sensitivity
High risk of odour exposure	Slight adverse effect	Moderate adverse effect	Substantial adverse effect
Medium risk of odour exposure	Negligible effect	Slight adverse effect	Moderate adverse effect
Low risk of odour exposure	Negligible effect	Negligible effect	Slight adverse effect
Negligible risk of odour exposure	Negligible effect	Negligible effect	Negligible effect

Aircraft emissions: Quantitative approach

6.1.208 Winther et al[38] used an odour panel to determine the odour emissions from an aircraft main engine and an APU engine at take-off and idle thrust settings. The main engine was the JT8D-219 engine fitted to an MD80 aircraft. The APU was a Honeywell GTCP 131-9A fitted to an Airbus 321-200 aircraft. The odour from the high thrust runs was attributed to NO_2 predominantly, but the odour from the idle runs was attributed to unburnt hydrocarbon (HC) emissions. Using an assumed emission rate of HC from the main engine, they calculated an odour factor of 57 ou per mg of HC. This factor lies midway between factors of about 23 ou/mg HC used in Düsseldorf and Hamburg airport studies and 110 ou/mg HC used at Frankfurt Airport. They did not attempt to derive an ou:HC factor for the APU.

6.1.209 They then carried out a dispersion modelling study, similar to that described in the main air quality chapter of this ES, using emissions based on ICAO databank emission factors and a Gaussian dispersion modelling tool, to calculate concentrations of odour around the airport for seven days of varying meteorological conditions. However, they did not attempt to relate their modelled odour concentrations to actual perceived odours at receptors. It should also be noted that the odour factor was based on a single engine type.

6.1.210 A similar approach of relating HC concentrations derived from dispersion modelling with odour concentrations has been tried at other airports, for example as part of the Stansted Generation 2 project. Generally, these have found poor correlation between modelled HC concentrations and indicators of high odour such as complaints but this may, in part, be due to people's sporadic motivation to raise a complaint.

6.1.211 The wide range of ou:HC ratios should also be noted: a factor of more than 4 just in three studies. This provides an indication of the uncertainty around this approach. It may therefore be concluded that the evidence base for using the Copenhagen approach as a way of estimating odours arising from airports is weak.

6.1.212 Nonetheless, the Copenhagen approach has been used at a number of assessments since, including at Farnborough[39] and City[40] airports in the UK. Neither of these studies attempted to validate the model.

6.1.213 Notwithstanding the weak evidence base for this approach as this approach has been used at other airports, a Copenhagen-style calculation has been carried out for this assessment. This is in the spirit of the IAQM guidance to use a variety of approaches where practical. The methodology may be stated briefly: HC concentrations are calculated at receptors using the same methodology as for the main air quality pollutants such as NO_x (see main air quality chapter), and these are converted to modelled odour concentrations by applying the 57 ou/mg HC factor.

6.1.214 It must be emphasised that the quantitative results obtained should be treated as no more than indicative. They may be compared with results from the other UK studies mentioned above as benchmarks, but are unlikely to be reliable as absolute forecasts of odour levels.

Assessment of odour impact

6.1.215 This section sets out the calculated impact of odours using the two calculation methods.

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[38] Morten Winther, Uffe Kousgaard and Arne Oxbøl (2006) Calculation of odour emissions from aircraft engines at Copenhagen Airport. Science of the Total Environment 366 218–232.
[39] Ove Arup (2009) Rushmoor Borough Council: Farnborough Airport odour assessment. 209721.
[40] City Airport Development Programme, Updated Environmental Statement Chapter 09 - Air Quality (2015). https://www.londoncityairport.com/content/cadp/CADP%201%20Submitted%20Material/CADP%20Updated%20Environmental%20Statement/UES%20Volume%201%20Updated%20ES%20Sept%202015/UES%20Chapter%2009%20-%20Air%20Quality%20(Final).pdf

Unburnt fuel vapours

6.1.216 Emissions of Jet A1 vapour are estimated to be 50 t year^{-3}, and emissions of avgas vapour to be 0.03 t year^{-1}.

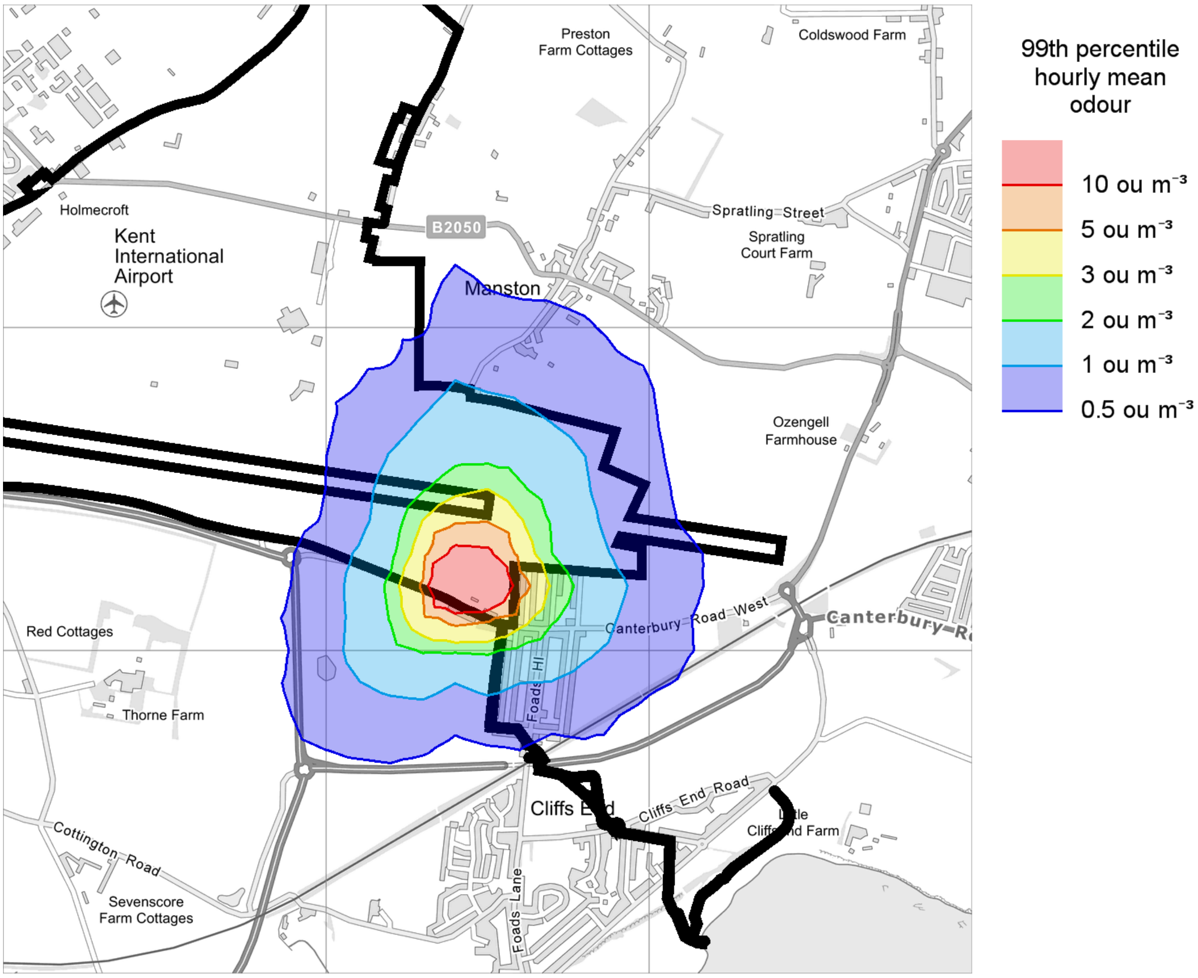
6.1.217 The modelled 98th percentile hourly odour concentrations from this source at selected receptors are given in **Table 6.30**. A contour plot is shown in **Figure 6.15**.

Table 6.30 PCs for 99th percentile hourly odour concentrations from fuel farm, Year 20

Receptor	AQAL (oe_E m^{-3})	PC (ou_E m^{-3})	% PC of AQAL
H34	3	1.71	57.1%
H35	3	2.08	69.4%
H36	3	2.67	89.0%
H37	3	3.20	106.6%
H38	3	4.18	139.4%
H39	3	5.64	188.0%
H40	3	5.67	189.1%
H41	3	4.68	156.0%
H42	3	3.51	117.0%
H43	3	5.57	185.6%
H44	3	9.21	307.0%
H69	3	65.28	2175.9%

6.1.218 Note that the H69 receptor represents the proposed redevelopment of the Jentex site into residential accommodation, which is inconsistent with using the same site for the fuel farm as part of the Proposed Development. This receptor may therefore be disregarded for the present purposes.

Figure 6.15 99th percentile hourly mean odour process contribution from fuel farm, Year 20



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6.1.219 These results suggest that, without mitigation, odour concentrations in Year 20 may be up to 9 ou_E m^{-3} at relevant receptors, and exceedance of the 3 ou_E m^{-3} guideline value may occur at around 30 properties.

Aircraft emissions: Risk-based approach

6.1.220 At the assessed receptors, the probability of the wind blowing from the airport towards that receptor at a speed less than 3 m s^{-1} is between 3.1% and 5.2%, with three of the specific receptors (H46, H47 and H48) being above 5%. These three receptors are to the south of the airfield. Because all these receptors are considered to be High sensitivity, at most receptors the effect is classified as Moderate Adverse, but at the three receptors to the south of the airfield the impact is classified as Substantial Adverse.

Aircraft emissions: Quantitative approach

6.1.221 The Copenhagen method predicts that the 98th percentile hourly odour concentration is less than 1 ou_E m^{-3} at all modelled receptors. The highest odour concentration is 0.65 ou_E m^{-3} at the S02 RAF Museum receptors. These concentrations are comfortably below the 3 ou_E m^{-3} Environment Agency annoyance threshold for moderately offensive odours, and are in fact below the normal limit of detection.

Conclusions of preliminary significance evaluation

6.1.222 It is clear that the two methods of estimating odours from aircraft emissions give very different results, with the risk-based approach suggesting a substantial adverse impact, and the Copenhagen approach suggesting that odours will be undetectable at the 98th percentile. This is a reflection of the difficulty inherent in estimating odours from unusual sources such as airports before they start operating.

6.1.223 The Conclusions on the significance of all those effects that have been subject to assessment are summarised in **Table 6.31**.

Table 6.31 Summary of significance of effects: Year 20

Impact type	Significance Level	Rationale
Odour from fuel farm	High	Significant likelihood of odours above the H4 criterion without further mitigation.
Odour from aircraft operations	Uncertain	Methodologies provide inconsistent results.

6.1.224 The modelled emissions from the fuel farm assume a fixed roof design with no vapour recovery. It is recommended that some form of mitigation be applied to the fuel farm to reduce odours to an acceptable level. This may include vapour recovery or a floating roof design. Such measures can reduce emissions by 80% or more, which should effectively eliminate the risk of an odour problem from the fuel farm. Details of mitigation measures will be provided in the ES.

Appendix 6.5 Figures

6.1.225 For this 2018 PEIR, figures for the air quality chapter have been included in the body of the text. For the ES, larger versions of the figures will be included in this appendix where necessary to make them clearer.

Appendix 7.1

RiverOak Strategic Partners

Manston Airport

No Significant Effects Report (Habitats Regulations Assessment Screening)

October 2017

Amec Foster Wheeler Environment
& Infrastructure UK Limited

Report for

RiverOak Strategic Partners

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This report has been prepared in a working draft form and has not been finalised or formally reviewed. As such it should be taken as an indication only of the material and conclusions that will form the final report. Any calculations or findings presented here may be changed or altered and should not be taken to reflect Amec Foster Wheeler's opinions or conclusions.

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Contents

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1. Introduction

1.1 Background to and purpose of this report

1.1.1.1 This Report forms one of a suite of documents, which together support and explain in detail the content and nature of RiverOak Strategic Partners' (RSP) Development Consent Order (DCO) application in respect of the Manston Airport Project (the Project); the proposals and their policy context are more fully described in the Planning Statement (**Chapter 4 of the Environmental Statement (ES)**) and related supporting documentation accompanying the DCO application.

1.1.1.2 RSP is seeking a DCO (incorporating powers of compulsory acquisition of interests and rights in land) to acquire, re-develop and re-open Manston Airport in Ramsgate, Kent. The proposal focuses on the provision of air cargo services. There are also proposals to provide passenger services and enable aircraft maintenance, repair, overhaul and end-of-life recycling amongst other things.

1.1.1.3 The project is defined as a Nationally Significant Infrastructure Project (NSIP) under s.14(1)(i) and s.23 of the Planning Act 2008 (as amended). Development consent under the Planning Act 2008 is required if a development is an NSIP. An application for a DCO will be examined by the Planning Inspectorate (PINS) who will make a recommendation to the Secretary of State for Transport as to whether the DCO is granted. The Secretary of State will then decide whether the DCO is made.

1.1.1.4 When considering the merits of the application, the Secretary of State and PINS must consider potential effects on European sites. European sites are defined as Special Areas of Conservation (SACs), candidate SACs, Sites of Community Importance (SCI), Special Protection Areas (SPA) and European Marine Sites, which are marine areas designated as SACs and SPAs. UK policy extends the requirements pertaining to European sites to include Ramsar sites and potential SPAs, which would include proposed extensions or alterations to existing SPAs.

1.1.1.5 SPAs are sites classified in accordance with Article 4 of Directive 2009/147/EC on the conservation of wild birds, the codified version of Directive 79/409/EEC as amended (known as the Birds Directive).

1.1.1.6 SACs are designated under Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (known as the Habitats Directive (as amended)). Article 3 of the Habitats Directive requires the establishment of a European network of important high-quality conservation sites that will make a significant contribution to conserving the 189 habitat types and 788 species identified in Annexes I and II of the Habitats Directive.

1.1.1.7 SCIs are sites that have been adopted by the European Commission but not yet formally designated by the government of each country.

1.1.1.8 The term 'European Marine Site' (EMS) (as defined by the Habitats Regulations) refers to those marine areas of both SACs and SPAs, which are protected under the EC Habitats and Birds Directives. These areas range from entirely subtidal to exclusively intertidal. An EMS can be an entire SAC or SPA, or only part of one (the SAC/SPA may also include terrestrial areas). However, 'European Marine Site' is not a statutory site designation: these areas are essentially management units for those parts of Natura 2000 sites which extend beyond the SSSI designations in the UK.

1.1.1.9 Ramsar sites are wetlands of international importance, designated under the Ramsar Convention, which the UK ratified in 1976. The vast majority of Ramsar sites are also designated as a SPA.

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1.1.1.10 If the project is likely to have an effect on a European site, the applicant must provide a Habitats Regulations Assessment (HRA) report as part of the application documentation. The HRA report must show the European site(s) potentially affected, alongside sufficient information to enable the Secretary of State to make an appropriate assessment[1] if required.

1.2 Habitat regulations assessment

1.2.1.1 The Habitats Directive provides, *inter alia*, a framework for the protection of European sites. The Habitats Directive is transposed into the law of England and Wales by The Conservation of Habitats and Species Regulations 2017, as amended (SI 2017 No. 1012) and also known as the 'Habitat Regulations'.

1.2.1.2 Amongst other things, the Habitat Regulations define the process for the assessment of the implications of plans or projects on European sites. This process is termed the Habitats Regulations Assessment (HRA) and, in relation to NSIPs, is specified by the Planning Inspectorate in its advice note entitled '*Habitat Regulations Assessment relevant to National Infrastructure Projects (Advice Note 10)*' (Version 7, January 2016). Further guidance on the HRA process is available at both the national and European level[2].

1.2.1.3 In exercising its duty as Competent Authority, the Secretary of State must comply with Regulation 63 of the Habitat Regulations, as set out below:

- "63(1) A competent authority, before deciding to undertake, or give any consent, permission or other authorisation for, a plan or project which:
    - a) is likely to have a significant effect on a European site or a European offshore marine site (either alone or in combination with other plans or projects), and
    - b) is not directly connected with or necessary to the management of that site,
- must make an appropriate assessment of the implications for that site in view of that site's conservation objectives."

1.2.1.4 In undertaking the assessment under Regulation 63(1)(a) and, if required the appropriate assessment under Regulation 63(1)(b), the Secretary of State must consult Natural England and have regard to any representations that Natural England makes. The HRA is a staged process that is described in Advice Note 10 as:

- Stage 1 - Screening: Screening for Likely Significant Effects (LSEs or an LSE). If no LSEs are identified then an appropriate assessment will not be required; and a 'No Significant Effects Report' will be required instead.
- Stage 2 - Appropriate assessment: If there are LSEs, it is necessary to assess the implications of those LSEs on the affected site's or sites' conservation objectives.
- Stage 3 - Assessment of Alternatives: A consideration of alternatives is required if it cannot be concluded that there will be no adverse effect on the integrity of the affected European site(s).
- Stage 4 - Consideration of Imperative Reasons of Over-riding Public Important (IROPI): If there are no alternatives, an IROPI assessment is required.

1.2.1.5 Stages 1 and 2 are covered by Regulation 63 (as stated above), and Stages 3 and 4 are covered by Regulation 64.

[1] Regulation 5 of the Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009.
[2] ODPM Circular 06/2005: Biodiversity and Geological Conservation – statutory obligations and their impact within the planning system; European Commission (2001) Assessment of plans and projects significantly affecting Natura 2000 sites – Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC; European Commission (2000) Managing Natura 2000 Sites – the Provisions of Article 6 of Article 6 of the "Habitats" Directive 92/43/EEC.

1.2.1.6 This document has been produced because the Project being located in close proximity to several European sites, notably the Thanet Coast and Sandwich Special Protection Area (SPA) and Ramsar. It describes the HRA screening process (i.e. Stage 1), in the form of a 'No Significant Effects Report' (NSER), undertaken in connection with the Project. The HRA screening process has been shaped through the consultation process.

1.3 Consultation

To be completed following further discussions with Natural England, Environment Agency and (potentially) other parties (e.g. RSPB).

Table 1.1 HRA Consultation

Date	Type / Participants	Meeting Scope
26/04/2016	Meeting - Natural England	Project outline; general overview of biodiversity issues including European sites; potential scope of the Evidence Plan process.
03/11/2016	Meeting - Natural England	Project update; use of third party data; HRA Screening Methodology; ornithological survey; assessment parameters.
05/09/2017	Meeting - Natural England	Project update, baseline survey programme, HRA (AQ, Water, noise issues) and EPS; ornithological survey (bird flight line survey).

2. Screening Methodology

2.1 Process outline

2.1.1.1 It is the purpose of the HRA screening stage (Stage 1) to determine whether or not a plan or project is capable of resulting in LSEs on one or more European sites. If a LSE is identified, an appropriate assessment is required (Stage 2) to determine whether it can be concluded that the plan or project will not result in an adverse effect on the integrity of one or more European sites.

2.1.1.2 The HRA screening stage has been characterised by the European Commission in the guidance document '*Assessment of plans and projects significantly affecting Natura 2000 sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC*' as a four-step process. These steps are:

- **Step 1**: *"determining whether the project or plan is directly connected with or necessary to the management of the site";*
- **Step 2**: *"describing the project or plan and the description and characterisation of other projects or plans that in combination have the potential for having significant effects on the Natura 2000 site";*
- **Step 3**: *"identifying the potential effects on the Natura 2000 site";* and
- **Step 4:** "*assessing the significance of any effects on the Natura 2000 site".*

2.1.1.3 When each of these steps has been worked through there are two potential outcomes:

- One or more LSEs on designated features of European sites are identified and the project requires an appropriate assessment (Stage 2);
- No LSEs on designated features of European sites are identified (either because there is no pathway by which such effects could occur or the potential effect can be discounted due to project design/mitigation (see Section 2.4)) and therefore there is no requirement for an appropriate assessment.

2.1.1.4 The originator of the plan or project must provide sufficient information to the competent authority to enable LSEs to be identified, and if they are, to inform an appropriate assessment.

2.1.1.5 In order to determine whether a plan or project is capable of resulting in one or more LSEs on a European site, it is necessary to understand the activities associated with the construction, operation or decommissioning (if relevant) of the project (e.g. the take-off / landing of cargo planes), the potential changes that may occur in the environment as a result (e.g. the production of aircraft noise and pollution) and the effects that this may have on designated features of European sites (e.g. disturbance of fauna resulting in increased energy expenditure and reduced energy intake resulting in lower survival and productivity rates). Through the use of this 'activity – change – effect' concept, it is possible to identify potential European sites (and their designated features) that may be subject to LSEs through the determination of a series of search parameters (see Section 2.2).

2.2 Methodology: Identifying in-combination effects and other plans or projects for inclusion (Step 2)

2.2.1.1 Effects on European sites may result from a proposed development alone and/or in-conjunction with other plans or projects; these potential cumulative effects are described as 'in-combination effects' in the Habitat Regulations. Within the published literature, the main reference that provides relevant and current guidance is:

- Planning Inspectorate (2015). Advice Note 17 Cumulative Effects Assessment relevant to nationally significant infrastructure projects.

This source informed the methods used for the in-combination assessment.

2.2.1.2 The identification of plans and projects to include within the in-combination assessment forms part of Step 2 of the HRA screening process, and.follows the same methodology as that outlined in Section 2.2 for the identification of European sites relevant to the Project. Key to the inclusion of other plans and projects within the assessment are the spatial and temporal overlaps that may occur due to the scale of potential changes (e.g. overlaps in the zones of disturbance caused by simultaneous construction activity) or the areas over which potential receptors may travel (e.g. a bird may pass through several areas where development is proposed when moving between roosting and feeding grounds).

2.2.1.3 Within the search areas, the types of projects included within the assessment are namely:

- projects that are under construction;
- permitted application(s) not yet implemented;
- submitted application(s) not yet determined (both at local and national levels); and
- projects identified in the relevant development plan, recognising that much information on any relevant proposals will be limited.

2.2.1.4 Following the identification of plans and projects within the search areas, an initial screening was undertaken to filter out minor proposals (e.g. extensions to existing dwellings) and those with no potential to overlap with the Project due to differing timescales. **Appendix A** lists the plans and projects included in the assessment.

2.3 Methodology: Identification of the European sites that could be affected by the Project (Step 3)

2.3.1.1 Part of Step 3 of the HRA screening stage is to identify the European sites that could potentially be affected by the Project (alone and/or in-conjunction with other plans or projects). The European sites that should be considered within the HRA screening process are those where there is the potential for an effect to be realised. Key to determining which European sites are included is an understanding of the activities associated with the Project, the geographical scale over which changes due to the different activities may be detectable and the types of receptors (i.e. designated features) susceptible to them. An efficient way to determine these relationships in a structured and transparent way is through the use of the activity – change – effect model.

2.3.1.2 Central to the identification of European sites for consideration within the HRA process is the ability to define evidence based search parameters. In order to achieve this, the following steps are followed (see Table 5.1 for further detail):

- Identification of the Project activities associated with the construction, operation or decommissioning (if applicable) phases that have the potential to result in changes to background environmental parameters (e.g. air quality, land take);
- Determination of the changes that could occur as a result of the activities identified;
- Determination of the scale over which these changes may occur, based on published literature, outputs from the ecological assessment process and/or professional judgement; and

- Identification of the potential receptors[3] (e.g. based on Annex II species listed in the Habitats Directive and Annex I birds listed in the Birds Directive, including functional habitat requirements) that may be affected by the identified changes.

2.3.1.3 The outcome of these steps is a series of search parameters based on potential pathways of effect that can then be used to determine both the European sites for inclusion within the HRA process due to their physical proximity to the Project, and those linked by way of mobile fauna and associated functional habitat.

2.3.1.4 Information on European sites within the UK was gathered using the Joint Nature Conservation Committee website (www.jncc.gov.uk)[4] and the Defra GIS[5] mapping tool MAGIC (www.magic.defra.gov.uk). Data on designations elsewhere within the European Union was gathered using the European Environment Agency's Natura 2000 network viewer (natura2000.eea.europa.eu), in order to determine any potential transboundary impacts.

2.4 Methodology for determining LSEs (Step 4)

2.4.1.1 Step 4 of the HRA screening process is to assess the significance of any effects on the European sites identified in Step 3. The HRA screening process uses the LSE threshold to determine whether effects on European sites should be the subject of further assessment. The Habitat Regulations do not define the term LSE. However, in the Waddenzee case (Case C-127/02), the European Court of Justice found that an LSE exists if it cannot be excluded on the basis of objective information that the plan or project will have significant effects on the conservation objectives of the site concerned, whether alone or in-combination with any other project. The Advocate General's opinion in relation to the Sweetman case (Case C-258/11) further clarifies the position by noting that, for a conclusion that an LSE exists to be made "*there is no need to **establish** such an effect,...,it is merely necessary to determine that there **may** be such an effect*" (original emphasis).

2.4.1.2 For the purposes of this screening stage, an LSE is defined as any identified effect that is capable of resulting in a change in the conservation status of one or more designated features of a European site after all aspects of the plan or project have been considered alone and in-combination with other plans and projects.

2.4.1.3 A precautionary approach has been taken to the screening process. Only those designated features and European sites where it can be demonstrated that there is no likelihood of a significant effect occurring have been screened out. This screening assessment considers mitigation measures that are incorporated into the design of the Project (referred to as 'measures adopted as part of the Project')[6] in reaching conclusions on designated features and individual European sites. This follows the approach endorsed in the case of Hart District Council v The Secretary of State for Communities and Local Government, Luckmore Limited and Barrett Homes Limited (CO/7623/2007), where the High Court held that mitigation and avoidance measures should be taken into account when identifying LSEs, where the projects as a whole includes such measures. If there is a concern over the efficacy of such mitigation measures, then an appropriate assessment would be required on the basis that it would not have been possible to exclude the risk of a significant effect on the basis of objective information.

2.4.1.4 Within this screening assessment, each potential effect is considered using information from surveys undertaken as part of the Environmental Impact Assessment (EIA) process,

[3] Based on baseline environmental survey and desk-study information.
[4] Designated features described within the results sections are those outlined in the SPA Review (Stroud *et al.* 2001) as per JNCC guidance (http://jncc.defra.gov.uk/page-5485)
[5] Geographic Information System
[6] Measures adopted as part of the Project include design measures (e.g. design of drainage infrastructure) and standard construction industry practice (e.g. implementation of the Pollution Prevention Guidance notes - The Environment Agency withdrew these notes in December 2015. However, the measures outlined within these documents remain relevant for the management of potentially polluting activities on construction sites).

published literature (where available), other available baseline data, modelling outputs, proposed avoidance and mitigation measures that are within the project design and professional judgement (informed by IEEM (2016[7])). Where a potential effect has been identified but no LSE is predicted, the reason for that finding is provided.

[7] IEEM (2006). Guidelines for ecological impact assessment in the United Kingdom. Institute of Ecology and Environmental Management, Winchester.

3. Step 1: Relationship between the Project and the Conservation Management of European Sites

3.1.1.1 **Step 1** seeks to determine whether or not the plan or project is directly connected or necessary for the management of a European site.

3.1.1.2 The European Commission guidance states that in order to conclude that a plan or project is directly connected or necessary for the management of a European site, it must relate solely to conservation actions and not be a direct or indirect consequence of other actions.

3.1.1.3 The re-development and operation of Manston Airport is not connected to, or necessary for, the management of any European site.

4. Step 2: Description of the Project

4.1 Description of the Site and the surrounding area

4.1.1 The application site

4.1.1.1 The application site (referred to in this document as the Site) is located on the existing site of Manston Airport, west of the village of Manston and north east of the village of Minster, in Kent. The town of Margate lies approximately 5 km to the north of the Site and Ramsgate approximately 4 km to the east. Sandwich Bay is located approximately 4-5 km to the south east. The northern part of the Site is bisected by the B2050 (Manston Road), and the Site is bounded by the A299 dual carriageway to the south and the B2190 (Spitfire Way) to the west. The existing access to the Site is from the junction of the B2050 with the B2190.

4.1.1.2 The Site covers an area of approximately 296 hectares (732 acres) and comprises a combination of existing buildings and hardstanding, large expanses of grassland, and some limited areas of scrub and/or landscaping. This includes the 2748m long, 60m wide runway, which is orientated in an east-west direction across the southern part of the Site. The existing buildings are clustered along the east and northwest boundaries of the Site

4.1.1.3 A network of hard surfacing, used for taxiways, aprons, passenger car parking, and roads connects the buildings to the runway and to the two main airport entrance points that are located to the east and west of the Site. The buildings and facilities are generally surrounded by grassland; during the previous operation of the airport this was kept closely mown. Landscape planting is limited to lines of ornamental trees and shrubs along some sections of the boundary of the Site such as the B2190, around some buildings and in car parking areas on the eastern edge. Post and wire security fencing of varying heights runs alongside most of the Site's perimeter.

4.1.1.4 The part of the Site to the north of Manston Road (B2050), which bisects the centre of the Site in a roughly east to west direction, is referred to as the 'Northern Grass'. This part of the Site is predominantly grassland, with some areas of hard standing, including a stretch of taxiway that formerly linked across to the main taxiway network. The two museums, the Spitfire and Hurricane Memorial Museum, and the RAF Manston Museum, are located in the southwestern corner of the 'Northern Grass'. A small number of other redundant buildings, such as the former RAF air traffic control tower, are also located on the 'Northern Grass'.

4.1.2 Site history

4.1.2.1 The Site provided a variety of airport-related services from 1916 until it ceased operation in May 2014. It operated as RAF Manston until 1998, and was also a base for the United States Air Force for a period in the 1950s. From 1998 it operated as a private commercial airport with a range of services including scheduled passenger flights, charter flights, air freight and cargo, a flight training school, flight crew training and aircraft testing. More recently it operated as a specialist air freight and cargo hub. Much of the airport infrastructure, including the runway, taxiways, aprons, cargo facilities, and a passenger terminal still remains, with a number of the buildings still in use, including a helicopter pilot training centre, and the Spitfire and Hurricane and RAF Manston museums.

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4.2 Description of the Project

4.2.1 Summary description

4.2.1.1 The aims and purpose of the Project are to reopen and develop Manston Airport into a dedicated air freight facility, which also offers passenger, executive travel, and aircraft engineering services. The proposed DCO will, amongst other things, authorise:

- upgrading the runway and improving the parallel taxiway;
- constructing 19 new air cargo stands;
- constructing four new passenger aircraft stands and a new passenger terminal;
- completely re-fitting the airfield navigation aids;
- refurbishing or replacing the existing fire station and constructing a new fire training area;
- building new air cargo facilities;
- developing a new air traffic control service, demolishing the current Air Traffic Control tower;
- an aircraft recycling facility;
- a flight training school;
- a fixed-base operation for executive travel;
- building new aircraft maintenance hangars and developing areas of the 'Northern Grass' for airport related businesses; and
- highway improvement works to ensure improved access to and around Manston Airport, including a new, permanent, dedicated access on Spitfire Way which will help to reduce airport related traffic on the local road network.

4.2.1.2 A detailed description of the Project is provided in the ES in **Chapter 3**: Description of the Project.

4.2.2 DCO programme and project delivery

4.2.2.1 The submission of the DCO application is scheduled for the first quarter of 2018. Based on this programme and the anticipated determination period, the DCO may be granted in Spring 2019 and this timescale has been assumed when developing the construction/operational programme for this assessment.

4.2.2.2 The forecasting of the air freight and passenger movements for the airport, as discussed further below, has been conducted for the 20-year period from the granting of the DCO. This section outlines the programme for construction and then operation of Manston Airport during this 20-year period.

4.2.2.3 The main activities to be undertaken during year 1 would be the construction activities required to return the Site to full operational use. There may be some limited airport services, for example helicopter and heli-charter services, flight school and training services, and fixed base of operation services; however, these will be dependent on the level of work required to restore the runway and to construct other essential services and utilities.

4.2.2.4 The full reopening of the airport would therefore take place in year 2, currently expected to be 2020, which would also see the start of the air freight services. Passenger services are anticipated to start in year 5, currently 2023.

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4.2.2.5 Three further phases of construction, as described in more detail below, would follow in years 2-4, 4-10 and 10-15. During these three phases of construction the airport would remain operational.

4.3 Other plans and projects

4.3.1.1 A total of 18 other plans and projects have been identified for which in-combination effects with the Project could potentially occur (see Appendix A). Of these, 12 projects/ plans are associated primarily with residential property development, with the remaining including an offshore wind farm, overhead electricity transmission, road improvement and other non-residential developments.

4.3.1.2 The projects and plans involving the construction of new residential housing have the potential to result in additional disturbance to features of European sites (in particular, golden plover and turnstone) due to increased human visitor pressure to areas that these species utilise for foraging and roosting (e.g. coastal habitats and farmland).

4.3.1.3 There is the potential for onshore works (such as cable-laying) for the proposed offshore wind farm extension to disturb turnstone and golden plover foraging and roosting on Pegwell Bay.

4.3.1.4 Construction and operation of the projects and plans also have the potential to effect features of European sites due to increased nitrogen deposition from vehicles, pollution from surface water runoff from the sites, and increased disturbance due to the visual presence of operatives and noise from vehicles and machinery.

4.3.1.5

5. Step 3: Identification of Potential Effects on European Sites

5.1 Scope of screening principles

5.1.1.1 In **Step 3**, the European sites that could be affected by the construction and operation of the Project, either alone or in-combination with other plans or projects, are identified. The following sections of this report outline the discussions which took place with interested parties to identify the potential effects of the Project on sensitive qualifying features.. The outcome of this HRA Screening stage is a list of SPAs, SACs, and Ramsar sites and associated qualifying features for which the potential for LSEs to arise (as a result of works associated with the Project) cannot be excluded.

5.1.1.2 As recommended by PINS (2016)[8], a full summary of the HRA screening process and results from this NSER upon all the European sites potentially affected by the Project is provided in **Appendix B**: No Significant Effects Report: Screening Matrices.

5.1.1.3 In line with the ruling of the European Court of Justice in Waddenzee (c-127/02), an LSE is one which cannot be excluded on the basis of objective information, either individually or in-combination with other plans or projects.

5.1.1.4 In order to undertake a robust assessment, it has been essential to determine the linkages between species, the Project zone, and relevant European sites. For wintering birds, for example, these linkages were determined based on dispersal from roost sites, an understanding of foraging range and movement between inland foraging sites and low tide roost sites.

5.2 European sites included for assessment

5.2.1.1 Each European site is designated as a SAC, classified as an SPA, or listed as a Ramsar site in respect of specific 'qualifying features'. These 'qualifying features' (habitats, mosaics of habitats, species or assemblage of species, and combinations of these) are the reasons for which the site is to be protected and managed for conservation purposes. All receptors that are qualifying features of European sites (Natura 2000 / Ramsar sites) or support such features, and which may potentially be affected by the Project have been considered within this Screening process, as follows:

5.2.1.2 For SPAs, the qualifying features are the birds for which the SPA is classified, under either:

- Article 4(1) of the Birds Directive as rare and vulnerable species, species in danger of extinction or requiring particular attention because of their habitat needs, listed in Annex 1; or
- Article 4(2) of the Birds Directive as regularly occurring migratory species (e.g. on passage or over-wintering or an internationally important assemblage of birds) not listed in Annex 1.

5.2.1.3 All UK SPAs were reviewed in 2001 and 2016, and numerous changes were made to their designated species. These are detailed on the Joint Nature Conservation Committee (JNCC) website (http://jncc.defra.gov.uk/page-2545) and in published literature (Stroud *et al*. 2001, 2016). As a result of the 2001 review, golden plover and little tern no longer appear as qualifying features of the Thanet Coast and Sandwich Bay SPA. However, these changes have yet to be ratified, and therefore, this is understood to mean that until new population data are available, the old qualifying features as detailed in the most recent 2012 SPA

[8] Habitats Regulations Assessment relevant to National Infrastructure Projects. Advice Note 10 (Version 7, January 2016).

Conservation Objectives should be referenced until these SPAs are formally (re) designated.

5.2.1.4 For Ramsar sites, nine 'Criteria' are used to identify wetlands of international importance, these being based on the site supporting rare wetland habitat types (Criteria 1) or specific species or ecological communities (Criteria 2-9 inclusive).

5.2.1.5 For SACs, the qualifying features are the habitats listed in Annex I of the Habitats Directive and the species listed in Annex II of the Habitats Directive. The JNCC provides citations of SACs, indicating qualifying features (habitats and/or species) that are a primary reason for selection of the site, and those which are present as a qualifying feature, but not a primary reason for site selection. However, for the purposes of this assessment, and as indicated on the JNCC site selection webpage for each SAC, all the qualifying features (both primary and non-primary) need to be treated equally.

5.2.1.6 A 15 km radius (from the perimeter of the Order Limits) was used as the initial search area and potential Zone of Influence (ZoI) for the Project. This initial search area took into consideration the potential aircraft flight paths and the environmental changes and effects by which the European sites could be affected, such as disturbance from construction and operations on-site, and pollution derived from aircraft entering and leaving the airfield. It was considered that over 15 km, these effects would be negligible, including the emissions due to aircraft moving to or from the airport.

5.2.1.7 Ten European protected sites are located within the initial search radius of 15 km (see **Figure 5.1** within this report), the details of which (including their qualifying interest features) are presented in **Table C.1** in **Appendix C** (in order of their distance from the Order Limits).

5.3 Identification of potential impacts

5.3.1.1 To determine which of these European sites require consideration within the HRA, it is necessary to understand:

- what types of activities may be associated with the re-development and operation of Manston Airport;
- the receptor groups[9] that may be affected by the potential effects identified (based on Annex I habitats and Annex II species[10] listed on the Habitats Directive and Annex I birds listed in the Birds Directive[11]); and
- the geographic extent over which the potential effects could manifest themselves.

5.3.1.2 A number of habitats and species' receptor groups are likely to be sensitive to activities undertaken during the construction and operational phases of the Project; and the potential for effects to arise on individual species will depend on that species' use of the area. It is necessary to consider the effects on both the qualifying species and the habitats they depend upon, both within the boundaries of European sites, but also on adjacent habitats, which qualifying bird species (such as golden plover) might use for foraging and resting. This habitat would then be considered a 'functional' part of the SPA, and could be located several kilometres from the SPA.

5.3.1.3 In view of this, a number of potential impacts have been identified which may arise as a result of each phase of the Project (it should be noted, that there is an overlap in the timing of parts of the construction and operational phases of the development), and which have the

[9] Note that all Annex II species that could be affected if they were present are included. At this stage, no determination of likelihood of presence based on distribution, habitat type etc. is made to avoid bias in the definition of search terms;
[10] Annex II species features of SACs in the UK are described at http://jncc.defra.gov.uk/ProtectedSites/SACselection/SAC_species.asp. Annex I habitat features of SACs in the UK are described at http://jncc.defra.gov.uk/ProtectedSites/SACselection/SAC_habitats.asp
[11] Annex I bird features of SPAs in the UK are described at http://jncc.defra.gov.uk/page-1418

capacity to significantly affect habitats and species that are the qualifying interest of European sites, as described below.

Construction phase

- Removal of habitats (such as grassland) within the Project area to facilitate construction works. These habitats might be used for foraging/ nesting by qualifying species of birds (e.g. golden plover), and thus be considered 'functional' habitat of the SPA;
- effects of aural and visual disturbance on qualifying species due to noise and vibration and movement of construction vehicles and site operatives;
- loss of pollutants or fine material from the construction site due to surface water flows during rainfall events. This pollution may then find its way into European sites via watercourses or the outfall which flows into Pegwell Bay;
- deposition of oxides of nitrogen from engine exhausts from construction vehicles and generators on habitats within European sites, or functional habitats; and
- deposition of dust from the construction site onto functional habitats and habitats within European sites.

Operational phase

- Disturbance to qualifying species (e.g. golden plover foraging on farmland adjacent to the Site) due to noise and vibration and movement during ground activities, such as cargo loading, plane maintenance and airfield management;
- disturbance to qualifying species due to the activities associated with bird scaring devices (e.g. pyrotechnics, distress call broadcast etc.);
- disturbance to qualifying species (including the airport forming a barrier to the movement of birds between their foraging and roost sites) during aircraft take-off and landing, caused by noise, aircraft presence and shadow cast;
- deposition of oxides of nitrogen from aircraft engines on habitats within European sites, or functional habitats. Results from air quality modelling conclude that the effects of particulates and sulphur on vulnerable habitats are predicted to be negligible and have therefore not been considered further within this assessment (see ES Chapter 6, Air quality);
- disturbance to qualifying species by ground vehicle usage outside the Site (e.g. along roads used by vehicles accessing and leaving the Site);
- deposition of oxides of nitrogen on qualifying habitats close to roads used by vehicles accessing and leaving the Site; and
- effects on qualifying habitats due to pollutants held within surface water runoff from the Site, entering European sites via the outfall or natural watercourses.

Decommissioning phase

5.3.1.4 The potential effects during the decommissioning phase are considered to be similar to those identified during the construction of the Project.

5.4 Screening opinion and consultation

5.4.1.1 Since 2015 and throughout the undertaking of the survey and assessment work, RSP has engaged with consultees with an interest in the potential effects of the Project on biodiversity. An EIA scoping report (see **Appendix 1.1** of the ES), including a chapter covering biodiversity, was produced and submitted to PINS who provided a scoping opinion (see **Appendix 1.2** of the ES).

5.4.1.2 Organisations that were consulted include:

- PINS;
- Natural England (NE);
- Environment Agency (EA);
- Kent County Council (KCC);
- Thanet District Council (TDC);
- The Royal Society for the Protection of Birds (RSPB); and
- The Kent Wildlife Trust (KWT).

5.4.1.3 Meetings have been held with NE and KWT[12]. RSPB confirmed (by email[13]) that they do not wish to meet or participate in the Evidence Plan process for this project other than responding (or not) to the public consultation materials and/or application documents as these are released. KWT indicated that, although they would still like to be consulted, they might not participate in meetings due to resource constraints. Information and an opportunity to engage in the Evidence Plan process has been provided to KCC and TDC. Consultation is planned with the Kent Downs Area of Outstanding Natural Beauty Unit[14]. Consultation with NE continues with respect to ongoing assessment and the Evidence Plan (HRA) process.

5.4.1.4 A summary of the consultee comments and responses received on the Scoping Report, with regard to the HRA is provided in **Table D.1** in **Appendix D**.

5.5 Evidence base

5.5.1 Desk study and literature review

5.5.1.1 A Desk Study was carried out in order to obtain contextual data and to gain further information on European sites within 15 km of the Order Limits and their qualifying interests that are likely to be affected by the Project, the results of which are provided in the ES Appendix 7.1 (Amec Foster Wheeler, 2017b). Primary sources of contextual data identified included:

- The Government's Multi-Agency Geographic Information for the Countryside (MAGIC) website (www.magic.defra.gov.uk) and the JNCC website (www.jncc.defra.gov.uk): details of the locations and reasons for designation of European sites.
- The Kent and Medway Biological Records Centre (KMBRC): priority habitats, and records of legally protected and priority species;
- Studies commissioned by NE into the numbers and distribution of golden plover in the Sandwich Bay and Thanet area, the results of which are reported in Griffiths (2003) and Henderson & Sutherland (2017);
- Kent Ornithological Society (KOS): bird records were extracted from their online database, for all species within 5 km of the Site (http://birdgroups.co.uk/kos/default.asp, accessed in August 2016);

[12] The contact at KWT was Vanessa Evans.
[13] Dated 09/11/2016, from Dora Querido, Conservation Officer, South-east Regional Office.
[14] The Kent Downs AONB Unit is based in Ashford, Kent. http://www.kentdowns.org.uk/

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- Kent Bird Reports 2013 and 2014: annual reports published by KOS, containing notable bird records in Kent (Privett [ed] 2015, 2016);
- Kent Breeding Bird Atlas 2008-13 (Clements *et al*., 2015): results from a county-wide survey, mapping the distribution of all breeding bird species at a tetrad (2x2 km National Grid Reference square) resolution;
- British Trust for Ornithology (BTO): Wetland Bird Survey (WeBS) core count data for 1995/96-2014/15 inclusive, and low tide data for 2002/03 and 2008/09 (the most recent winters for which data was available) were purchased from the BTO, for their Pegwell Bay count sector. In addition, further core count and low tide data for Pegwell Bay was from obtained from the BTO website (www.bto.org); and
- Data derived from Environmental Statements for other proposed and consented developments for which information is publicly available, including:
  - Stone Hill Park (OL/TH/0550), a proposed residential development that shares a common boundary with the Site over much of its area;
  - Land East of Haine Road (OL/TH/14/0050), adjacent to the east of the Site;
  - Land south of Great West Autos (F/TH/12/0722), a now built solar farm, adjacent to the north of the Site;
  - Land east of Worlds Wonder (F/TH/14/0645), a proposed solar farm adjacent to the north of the Site; and
  - Land North of Thorne Farm (F/TH/13/0596): a now built solar farm adjacent to the south of the Site.

5.5.1.2 A literature review was undertaken into studies related to the reaction of birds to visual and aural disturbance caused by aircraft, the results of which are provided in ES Appendix 7.4 (Amec Foster Wheeler, 2017). This information was used to identify the lateral distance at ground level and altitude beyond which birds are unlikely to be disturbed by over-flying aircraft. This review focussed on the qualifying species (or closely related species / species-groups) potentially affected by the Project.

5.5.2 Field surveys

5.5.2.1 Wintering bird surveys were undertaken due to the proximity of the Thanet Coast and Sandwich Bay SPA and Ramsar site, and the Sandwich Bay to Hacklinge Marshes SSSI, all of which are important or designated for their wader and waterfowl interest. Two stand-alone survey methodologies were employed, the results of which are provided in ES Appendix 7.5 (Amec Foster Wheeler, 2017a), as follows:

- Functional habitat surveys, involving the survey of farmland up to 2 km from the boundary of the Site (at the time of survey commencement in September 2016). The functional habitat surveys targeted golden plover (as well as other farmland/ notable bird species) and were carried out once per month from September 2016 to March 2017.
- Pegwell Bay distribution bird surveys were undertaken one day per month, from October 2016 to March 2017, over a six-hour diurnal period capturing a partial tidal cycle within each visit. When possible, survey dates coincided with daytime high tides.

5.6 Identification of search parameters to screen European sites

5.6.1.1 The activities, changes, receptors and potential effects that have been identified are outlined in **Table 5.1**, alongside search parameters. The parameters provide a filter for the identification of European sites. Searches, using the parameters in Table 5.1, have then been undertaken using the JNCC website (www.jncc.gov.uk) and the Defra GIS mapping tool MAGIC (www.magic.defra.gov.uk)[16].

5.6.1.2 In-combination effects for the activities identified in **Table 5.1** will include plans or projects that, if the same search area was imposed upon their site boundaries, would overlap with any European Site(s) that could be affected by the Project alone.

[16] The geographic extent of the search parameters described in Table 5.1 excludes the potential for transboundary effects.

Table 5.1 Identification of search parameters for HRA screening of the Project

Activity	Potential Change	Potential Effect	Geographic Extent
CONSTRUCTION PHASE			
Construction activity including use of plant and presence of workforce	Production of aural and visual stimuli due to noise and vibration and movement of construction vehicles and engineers	Disturbance / displacement of birds (designated features of SPA) resulting in a reduction of energy intake and/or an increase in energy expenditure leading to a reduction in survival or productivity rates.	European sites within **750 m** of the construction site designated for ornithological features. This is a precautionary distance based on information reported on disturbance in the literature (e.g. Cutts, Phelps & Burdon 2009, Ruddock & Whitfield 2007). For European sites supporting designated features (certain waders and wildfowl) that may rely on the functional habitats within close proximity to Manston Airport (i.e. arable farmland and grass fields), the search area has been extended to **5 km**. This distance has been determined by professional judgement and will be used to identify those European sites designated for species listed in Annex I of the Birds Directive that have been recorded within 750 m of the Site.
Use of chemicals (e.g. fuels, solvents etc.) and the liberation of fine material (e.g. through excavation).	Loss of pollutants or fine material from the construction site due to surface water flows during rainfall events.	The introduction of toxic pollutants or sediments resulting in loss of, or damage to terrestrial or freshwater environments leading to effects on habitats, flora, invertebrates, amphibians, bats, otters (as designated features of SACs) and birds (as designated features of SPAs).	European sites supporting terrestrial habitats or species within **100 m** of the construction site, including the outfall. This search parameter is based on professional judgement following a review of the Environment Agency Pollution Prevention Guidance 5 (which suggests control of impacts can be managed within a distance of 50 m), alongside experience of the extent of sediment deposition and pollutant escapes from construction projects. European sites supporting aquatic habitats or species downstream (and within the catchment area) of any watercourse or drainage channel within 100 m of the construction site or at any greater distance where a direct drainage outfall is located. This search parameter, for pollutants entering watercourses / drainage systems is based on the justification outlined immediately above and the potential for mobile pollutants to then disperse downstream.
Use of construction vehicles and generator sets.	Deposition of oxides of nitrogen from engine exhausts.	Deposition of oxides of nitrogen from vehicle emissions resulting in enrichment and/or acidification of the environment leading to alteration of the plant community through changes in baseline conditions resulting in effects on habitats, flora, invertebrates, amphibians,	European sites within **200 m** of the construction site and/ or wider road network. This search parameter is based on Department for Transport (2005) Interim Advice Note 61/04: Guidance for Undertaking Environmental Assessment of Air Quality for Sensitive Ecosystems in Internationally Designated Nature Conservation Sites and SSSIs.

Activity	Potential Change	Potential Effect	Geographic Extent
		bats, otters (as designated features of SACs) and birds (as designated features of SPAs)	
Dust creation during construction activity	Deposition of dust in areas neighbouring the construction site.	Deposition of dust resulting in loss of or damage to terrestrial or freshwater environments from smothering or enrichment resulting in effects on flora vegetation, invertebrates, amphibians, bats, otters (as designated features of SACs) and birds (as designated features of SPAs)	European sites within **200** m of the construction area, and **500** m of the Site entrance. IAQM guidance (http://iaqm.co.uk/guidance) is to assess ecological receptors which are within 50 m of the construction site and within 500 m of the Site entrance. Natural England have requested that the 50 m parameter be increased to 200 m for designated sites.
OPERATION PHASE			
Operation (ground based activities including presence of workforce)	Production of aural and visual stimuli due to noise and vibration and movement during ground activities such as cargo loading, plane maintenance, airfield management (not including bird scaring devices).	Disturbance / displacement of birds (designated features of SPA) resulting in a reduction of energy intake and/or an increase in energy expenditure leading to a reduction in survival or productivity rates.	European sites within **750 m** of the Site designated for ornithological features: This is a precautionary distance based on information reported on disturbance in the literature (e.g. Cutts, Phelps & Burdon 2009, Ruddock & Whitfield 2007). For European sites supporting designated features (certain waders and wildfowl) that may rely on the functional habitats within close proximity to Manston Airport (i.e. arable farmland and grass fields) the search area has been extended to **5 km**. This distance has been determined by professional judgement and will be used to identify those European sites designated for species listed in Annex I of the Birds Directive that have been recorded within 750 m of the Site.
Operation (aircraft take-off and landing)	Production of aural and visual stimuli due to noise, aircraft presence and shadow cast.	Disturbance / displacement of birds (designated features of SPA), including the barrier effects (the airport may form a barrier to the movement of birds between foraging and roost sites), resulting in a reduction of energy intake and/or an increase in energy expenditure leading to a reduction in survival or productivity rates.	Results from the literature review (Amec Foster Wheeler, 2017) indicate a precautionary Lateral Disturbance Distance at ground level of **1 km** from flight paths at altitudes up to **500 m**. This review also indicates that above 500 m, there would be negligible levels of visual disturbance to birds on the ground due to the visual presence and shadow cast from the overflying aircraft. The review also indicates that at ground level, noise levels below 80 dB LAmax are unlikely to result in disturbance to birds (see **Figure 6.1**).

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Activity	Potential Change	Potential Effect	Geographic Extent
Operation (aircraft take-off and landing, and ground-based activities)	Deposition of oxides of nitrogen from aircraft engines; road traffic within the Site, and along roads used by vehicles entering and leaving the Site.	Deposition of oxides of nitrogen from vehicle emissions resulting in enrichment and/or acidification of the environment leading to alteration of the plant community through changes in baseline conditions resulting in effects on habitats, flora, and invertebrates (as designated features of SACs) and birds (designated feature of SPAs).	European sites within **200 m** of the construction site and/ or wider road network. This search parameter is based on Department for Transport (2005) Interim Advice Note 61/04: Guidance for Undertaking Environmental Assessment of Air Quality for Sensitive Ecosystems in Internationally Designated Nature Conservation Sites and SSSIs. To be determined on completion of air quality modelling and further consultation with Natural England.
Operation (aircraft take-off and landing, and ground-based activities)	Release of greenhouse gases from operational aircraft and ground-based vehicles leading to climate change	Alteration to crop patterns / management leading to a reduction in suitable foraging habitat (in particular, winter-sown cereals) for golden plover.	For European sites supporting designated features (certain waders and wildfowl) that may rely on the functional habitats within close proximity to Manston Airport (i.e. arable farmland and grass fields), the search area is **5 km**.
Management of bird strike risk	Use of bird scaring devices (e.g. pyrotechnics, distress call broadcast etc.).	Disturbance / displacement of birds (designated features of SPA) resulting in a reduction of energy intake and/or an increase in energy expenditure leading to a reduction in survival or productivity rates.	A precautionary distance of **1 km** from the runway area has been used, beyond which the effects of disturbance to birds is considered negligible. This distance has been based on trials undertaken at Lydd Airport (www.39essex.com/docs/cases/lydd_final_judgment_15_may_14.pdf).
Management of surface water run-off and mobile pollutants (e.g. fuels and lubricants)	Loss of pollutants from road surface due to surface water flows during rainfall events.	The introduction of toxic pollutants (and the effects of scouring by fluid emitted from the outfall) resulting in loss of or damage to terrestrial or freshwater environments leading to effects on habitats, flora, invertebrates, amphibians, bats, otters (as designated features of SACs) and birds (designated feature of SPAs).	European sites supporting terrestrial habitats or species within **100 m** of the operational site, including the outfall. This search parameter is based on professional judgement following a review of the Environment Agency Pollution Prevention Guidance 5* (which suggests control of impacts can be managed within a distance of 50 m), alongside experience of the extent of sediment deposition and pollutant escapes from construction projects. European sites supporting aquatic habitats or species downstream (and within the catchment area) of any watercourse or drainage channel within **100 m** of the construction site or at any greater distance where a direct drainage outfall is located. This search parameter, for pollutants entering watercourses / drainage systems is based on the justification outlined immediately above and the potential for mobile pollutants to then disperse downstream.

Activity	Potential Change	Potential Effect	Geographic Extent
Ground vehicle usage (including on major routes accessing the airport)	Deposition of oxides of nitrogen from engine exhausts.	Deposition of oxides of nitrogen from vehicle emissions resulting in enrichment and/or acidification of the environment leading to alteration of the plant community through changes in baseline conditions resulting in effects on habitats, flora, invertebrates, amphibians, bats, otters (as designated features of SACs) and birds (designated feature of SPAs)	European sites within **200 m** of the airport boundary and/or major road links with Manston Airport (the wider road network). This search parameter is based on Department for Transport (2005) Interim Advice Note 61/04: Guidance for Undertaking Environmental Assessment of Air Quality for Sensitive Ecosystems in Internationally Designated Nature Conservation Sites and SSSIs.

5.7 Screening summary

5.7.1.1 By applying the search parameters for the potential effects identified in Table 5.1, to the initial search list of European sites provided in Appendix C, a total of four European sites have been identified as being potentially affected by the Project, and other plans and projects for which in-combination effects could occur, as follows (full designation information and their conservation objectives is provided in **Appendix E**):

- Thanet Coast and Sandwich Bay Ramsar Site;
- Thanet Coast and Sandwich Bay SPA;
- Thanet Coast SAC; and
- Sandwich Bay SAC.

5.7.1.2 Given the distance between these sites and the Project, and by applying the search parameters identified in Table 5.1, together with the lack of connectivity and the likely impacts pathways resulting from the Project, none of the qualifying features for the following European sites have been considered for further assessment:

- Stodmarsh SPA
- Stodmarsh Ramsar Site
- Stodmarsh SAC;
- Outer Thames Estuary Marine SPA;
- Margate & Long Sands SCI (Inshore Marine); and
- Blean Complex SAC.

5.8 High level screening of potential impacts

5.8.1.1 The following high-level screening assessment presented in **Table 5.2** identifies each of the qualifying interest features of the four European sites listed previously, together with the potential effects associated with each feature. These are then screened in or out, based on whether it is concluded that they are likely to be significantly affected by the Project (and other projects and plans in combination), whilst taking into account mitigation measures that are included within its design. The rationale for these conclusions are outlined in the table, based on the search parameters provided in Table 5.1, and results from the aforementioned ornithological desk study and field survey as well as the assessment of effects included within the separate ES chapters for noise (ES Chapter 12) and air quality (ES Chapter 6) and cumulative effects (ES Chapter 18).

5.8.1.2 If no LSE is identified from this high-level screening exercise, the effect is ‘screened out’ and the conclusion is reached that the proposed re-opening of Manston Airport will have a 'de minimis' effect both alone and in-combination with other plans or projects. For those effects that cannot be ‘screened out’ at this stage, further detailed consideration into LSEs is provided in Section 6.

Table 5.2 High level screening assessment

Site Name (distance from Order Limits)	Designated Features[17]	Potential Effects	Baseline	Screening rationale	Further consideration
Thanet Coast and Sandwich Bay Ramsar site[18] (adjacent)	Turnstone (non-breeding)	**Construction phase (outfall):** The introduction of toxic pollutants or sediments resulting in loss of or damage to (including scouring) intertidal habitats that turnstone depend upon, due to run-off entering the Ramsar site from the currently operational outfall.	Results from the desk study and field survey indicate that turnstone regularly use the northern shores of Pegwell Bay (within the Ramsar/SPA) for roosting and foraging.	Pollution prevention good practice will be implemented on the construction site. The measures employed will be based on the Environment Agency's Pollution Prevention Guidelines[19]. No LSE is predicted.	Screened out
		Operation Phase (noise from planes): Disturbance / displacement of turnstone resulting in a reduction of energy intake and/or an increase in energy expenditure leading to a reduction in survival or productivity rates due to noise and shadow created by planes on take-off and landing.	Results from the desk study and field survey indicate that turnstone regularly use the northern shores of Pegwell Bay (within the Ramsar/SPA) for roosting and foraging.	Turnstone are known to utilise intertidal habitats close to the inward and outward flight paths of planes to the east of the Site. In view of this, further assessment has been provided in order to determine LSEs.	**Screened in**
		Operation Phase (AQ): Deposition of oxides of nitrogen from aircraft and vehicle emissions resulting in enrichment and/or acidification of the environment leading to alteration of the plant community and the invertebrates that turnstone forage upon.	Results from the desk study and field survey indicate that turnstone regularly forage within the Ramsar/SPA in Pegwell Bay.	Under Environment Agency guidance (EA, 2016), where the Process Contribution (PC) for nitrogen deposition is greater than 0.3 µg m^{-3} at major ecological receptors (SPAs, SACs and Ramsar sites), further assessment may be required. Results from Air Quality (AQ) modelling indicate that intertidal habitats that are utilised by turnstone for foraging and roosting are located within the area where the PC for NOx > 0.3 µg m^{-3}. However, turnstone primarily forage along shorelines and on rocky beaches, neither of which	Screened out

[17] Full designation information is provided in Appendix C
[18] Conservation objectives for all sites are listed in Appendix E
[19] The Environment Agency Pollution Prevention Guidelines (PPGs) were withdrawn in December 2015. However, the measures outlined within these documents remain relevant for the management of potentially polluting activities on construction sites. A review plan for the PPGs is currently underway, resulting in a replacement guidance series, with new branding and title "Guidance for Pollution Prevention" (GPPs). The new series provide environmental good practice guidance for the whole UK, and environmental regulatory guidance directly to Northern Ireland, Scotland and Wales only. For businesses in England, regulatory guidance is available from GOV.UK instead.

Site Name (distance from Order Limits)	Designated Features[17]	Potential Effects	Baseline	Screening rationale	Further consideration
				are identified as habitats vulnerable to nitrogen deposition (http://www.apis.ac.uk/indicative-critical-load-values) and therefore: No LSE is predicted.	
		Operation phase (bird scaring): Disturbance / displacement of turnstone resulting in a reduction of energy intake and/or an increase in energy expenditure leading to a reduction in survival or productivity rates due to noise created by bird scaring activity.	No suitable habitat for foraging/roosting turnstone exists within the ZOI (within 1 km of the Site). The desk study and field survey also provided no evidence to indicate that turnstone utilise habitats within the ZOI.	The nearest point within the Ramsar site which provides suitable foraging/ resting habitat (rocky beaches/ intertidal sand and mud) for turnstone is approximately 1.4 km south-east of the fringes of the airfield where bird scaring methods would be deployed. No LSE is predicted.	Screened out
		Operation phase (barrier effect): Disturbance / displacement of turnstone due to the Project forming a barrier to the movement of birds between foraging and roosting sites, resulting in a reduction of energy intake and/or an increase in energy expenditure leading to a reduction in survival or productivity rates.	Studies undertaken by Hodgson 2016[20] conclude that turnstone flight paths are likely to closely follow the coastline, and are therefore unlikely to be cross the Site.	There is no evidence to indicate that the flight paths of turnstone cross or will cross the Site. No LSE is predicted.	Screened out
		Operation phase (outfall): The introduction of toxic pollutants or sediments resulting in loss of or damage to (including scouring) intertidal habitats that turnstone depend upon, due to run-off entering the Ramsar site from the currently operational outfall.	Results from the desk study and field survey indicate that turnstone regularly forage within close vicinity of the outfall in Pegwell Bay.	The introduction of pollutants and the rate of surface water discharge through the outfall into Pegwell Bay will be controlled through the design of the Project and the discharge permit to be secured. Surface water will be collected in a drainage system and transferred to attenuation ponds where it will be treated as necessary. From here, the water will be pumped into drains that flow into the outfall. The flow of water exiting the outfall into Pegwell Bay will be controlled by the rate at which it can be treated in the ponds and pumped into the	Screened out

[20] Hodgson, I. (2016). Thanet Coast Turnstone (Arenaria interpres) monitoring, January – February 2016. Report to Natural England. Sandwich Bay Bird Observatory Trust: Sandwich.

Site Name (distance from Order Limits)	Designated Features[17]	Potential Effects	Baseline	Screening rationale	Further consideration
				drains. The outfall pipe also contains a series of alternate boards which restrict the flow rate exiting into Pegwell Bay. The system is designed to cope with a 1 in 100 years flood event[21]. No LSE is predicted.	
	Nationally rare wetland invertebrates	**Operation Phase (AQ):** Deposition of oxides of nitrogen from aircraft emissions resulting in enrichment and/or acidification of the environment leading to alteration of the plant community through changes in baseline conditions resulting in direct or indirect effects on listed invertebrates.	The wetland habitats support 15 British Red Data Book invertebrates, as well as a large number of nationally scarce species.	To be determined on completion of air quality modelling and further consultation with Natural England.	**TBC**
Thanet Coast and Sandwich Bay SPA (adjacent)	Golden plover (non-breeding)	**Construction phase (outfall):** The introduction of toxic pollutants or sediments resulting in loss of or damage (including scouring) to intertidal habitats that golden plover depend upon, due to run-off entering the SPA from the currently operational outfall.	Evidence from the desk study and survey indicate that golden plover utilise the mudflats and adjacent saltmarsh within close proximity to the outfall for roosting.	Pollution prevention good practice will be implemented on the construction site. The measures employed will be based on the Environment Agency's Pollution Prevention Guidelines. No LSE is predicted.	Screened out
		Construction phase (noise): Noise, vibration and physical activity within the Site from earthworks, fixed and mobile plant during the construction phase provides potential for foraging/ resting golden plover to be displaced from any suitable farmland adjacent to the Site. Increased noise and vibration may also occur due to an increase in construction road traffic.	Evidence from the desk study and survey indicate that golden plover utilise the arable farmland adjacent to the Site within the 750 m search parameter in Table 5.1, albeit in low numbers.	In view of the presence of golden plover within 750 m of the Site, further assessment has been provided in order to determine LSEs.	**Screened in**
		Operation Phase (AQ):	Evidence from the desk study and survey indicate that golden plover	The intensively managed, arable farmland utilised by golden plover for foraging, which would receive	Screened out

[21] Full details of the on-site water management are provided in 38199cr058i1 – Manston Airport DCO EIA – Flood Risk Assessment.

Site Name (distance from Order Limits)	Designated Features[17]	Potential Effects	Baseline	Screening rationale	Further consideration
		Deposition of oxides of nitrogen from aircraft emissions resulting in enrichment and/or acidification of habitat and a reduction in the invertebrate prey that golden plover depend upon.	utilise the arable farmland adjacent to the Site in low numbers. The intertidal habitat (saltmarsh and mudflats) in Pegwell Bay are used as a roost site by important numbers of golden plover.	a high level of input from herbicides and pesticides, is unlikely to be vulnerable to the effects of acidification and/or enrichment due to nitrogen deposition. The saltmarsh and mudflats used by roosting birds in Pegwell Bay are washed by tidal seawater on a regular basis and therefore the structure of the vegetation and suitability as a roost site is unlikely to be changed to such a degree as to be rendered unsuitable, as a result of nitrogen deposition. No LSE is predicted.	
		Operation phase (outfall): The introduction of toxic pollutants or sediments resulting in loss of or damage (including scouring) to intertidal habitats that golden plover depend upon, due to run-off entering the SPA from the currently operational outfall.	Evidence from the desk study and survey indicate that golden plover utilise the mudflats and adjacent saltmarsh within close vicinity to the outfall for roosting.	The introduction of pollutants and the rate of surface water discharge through the outfall into Pegwell Bay will be controlled through design and discharge permit. Surface water will be collected in a drainage system and transferred to attenuation ponds where it will be treated as necessary. From here, the water will be pumped into drains that flow into the outfall. The flow of water exiting the outfall into Pegwell Bay will be controlled by the rate at which it can be treated in the ponds and pumped into the drains. The outfall pipe also contains a series of alternate boards which restrict the flow rate exiting into Pegwell Bay. The system is designed to cope with a 1 in 100 years flood event[22]. No LSE is predicted.	Screened out
		Operation Phase (climate change): Release of greenhouse gases from aircraft leading to climate change. Climate change may lead to crop management changes resulting in loss of foraging habitat for golden plover.	Evidence from the desk study and survey indicate that golden plover utilise the arable farmland adjacent to the Site in low numbers.	The primary foraging resource for golden plover is early growth stage winter cereals (Kirby 1997, Mason & MacDonald 1999). There is no evidence to indicate that this crop type is particularly vulnerable in the UK to the effects of climate change (Semenov, 2009). No LSE predicted.	Screened out

[22] Full details of the on-site water management are provided in 38199cr058i1 – Manston Airport DCO EIA – Flood Risk Assessment.

Site Name (distance from Order Limits)	Designated Features[17]	Potential Effects	Baseline	Screening rationale	Further consideration
		Operation Phase (noise from planes): Disturbance / displacement of golden plover resulting in a reduction of energy intake and/or an increase in energy expenditure leading to a reduction in survival or productivity rates due to noise and shadow created by planes on take-off and landing.	Results from the desk study and field survey indicate that golden plover regularly use areas of saltmarsh and mudflats in Pegwell Bay (within the SPA) for roosting. Low numbers of golden plover also forage in farmland surrounding the Site.	Golden plover are known to utilise intertidal and farmland habitats close to the inward and outward flight paths of planes. In view of this, further assessment has been provided in order to determine LSEs.	**Screened in**
		Operation phase (bird scaring): Disturbance / displacement of birds resulting in a reduction of energy intake and/or an increase in energy expenditure leading to a reduction in survival or productivity rates due to noise created by bird scaring activity.	The desk study and surveys indicate very low levels of use by golden plover in farmland within the ZOI (within 1 km of the Site).	Potentially suitable habitat for golden plover is located within the ZIO. In view of this, further assessment has been provided in order to determine LSE.	**Screened in**
		Operation phase (barrier effect): Disturbance / displacement of golden plover due to the Project forming a barrier to the movement of birds between foraging and roosting sites, resulting in a reduction of energy intake and/or an increase in energy expenditure leading to a reduction in survival or productivity rates.	Desk study and survey data indicate that golden plover roost primarily on Pegwell Bay and forage in the wider areas of farmland to the south-west.	Desk study and surveys indicate low level of use of farmland around the Site, though it is not known what levels of flight activity by golden plover occur over the now disused airfield at Manston. In view of this, further assessment has been provided in order to determine LSEs.	**Screened in**
	Little tern (breeding)	**N/A**	Little tern no longer breed within the Thanet Coast & Sandwich Bay SPA (Clements *et al*., 2015). Little terns previously bred in summer at Shell Ness (north of Sandwich Bay) and near Plumpudding on the North Thanet coast. When the tide is in the little tern colony at Shell Ness would feed in the shallow coastal waters of Pegwell/Sandwich Bay and in the lower part of the Stour River.	Given the absence of this qualifying interest species from the SPA, no likely significant effects are considered during either construction or operation of the Project.	Screened out

Site Name (distance from Order Limits)	Designated Features[17]	Potential Effects	Baseline	Screening rationale	Further consideration
	Turnstone (non-breeding)	**All phases**	The SPA and Ramsar site share largely common boundaries	Rationale for screening in a per the Ramsar site	**Screened in**
Sandwich Bay SAC (within)	Annex I habitats	**Construction Phase (outfall):** The introduction of toxic pollutants or sediments resulting in loss of or damage to terrestrial or freshwater environments leading to direct or indirect effects on designated features due to run-off entering the SAC site from the currently operational outfall.	Annex I (sand dune) habitats occur at their closest, 2.5 km south of the Site.	All the qualifying habitats (dunes) are located well beyond the 100 m parameter. No LSE predicted.	Screened out
		Operation Phase (AQ): Deposition of oxides of nitrogen from road vehicles and aircraft emissions resulting in enrichment and/or acidification of the environment leading to alteration of the plant communities within the Annex I habitats.	Annex I (sand dune) habitats occur at their closest, 2.5 km south of the Site.	To be determined on completion of air quality modelling and further consultation with Natural England.	**TBC**
		Operation phase (outfall): The introduction of toxic pollutants or sediments resulting in loss of or damage to (including scouring) terrestrial or freshwater environments leading to direct or indirect effects on designated features due to run-off entering the SAC from the currently operational outfall.	Annex I (sand dune) habitats occur at their closest, 2.5 km south of the Site.	All the qualifying habitats (dunes) are located well beyond the 100 m search parameter. No LSE predicted.	Screened out
Thanet Coast SAC (330 m SE)	Annex 1 habitats	**Construction Phase (outfall):** The introduction of toxic pollutants or sediments resulting in loss of or damage to terrestrial or freshwater environments leading to direct or indirect effects on designated features due to run-off entering the SAC site from the currently operational outfall.	The Annex I habitats (reefs and submerged or partially submerged sea caves) are located, at their closest, 330 m from the Site.	The qualifying habitats are located well beyond the ZOI (the 100 m search parameter). No LSE predicted.	Screened out

Site Name (distance from Order Limits)	Designated Features[17]	Potential Effects	Baseline	Screening rationale	Further consideration
		Operation Phase (AQ): Deposition of oxides of nitrogen from aircraft emissions resulting in enrichment and/or acidification of the environment leading to alteration of the plant and animal communities that form the designated features.	The Annex I habitats (reefs and submerged or partially submerged sea caves) are located at their closest, 330 m from the Site.	No critical load value for NOx deposition has been assigned to these Annex I habitat types (see http://www.apis.ac.uk/indicative-critical-load-values , and Table 6.33 in the Air Quality ES chapter). These features are submerged by tidal sea water on a daily basis, and therefore unlikely to be adversely affected by pollution derived from aircraft emissions. No LSE predicted.	Screened out
		Operation phase (outfall): The introduction of toxic pollutants or sediments resulting in loss of or damage to terrestrial or freshwater environments leading to direct or indirect effects on designated features due to run-off entering the SAC from the currently operational outfall.	The Annex I habitats (reefs and submerged or partially submerged sea caves) are located, at their closest, 330 m from the Site.	The qualifying habitats are located well beyond the ZOI (the 100 m search parameter). No LSE predicted.	Screened out

5.8.1.3 The remainder of this report considers the following European sites and potential effects on their features due to the Project (and other projects and plans, in combination):

Thanet Coast & Sandwich Bay SPA (Golden plover – Non-breeding)

- Visual and auditory disturbance caused by aircraft;
- Noise from bird-scaring activities; and
- Barrier effect of Airport.

Thanet Coast & Sandwich Bay SPA and Ramsar (Turnstone – Non-breeding)

- Visual and auditory disturbance caused by aircraft.

Thanet Coast & Sandwich Bay Ramsar (Red Data Book invertebrates)

- Pollution effects (nitrogen deposition from aircraft emissions).

Sandwich Bay SAC (Annex I habitats)

- Pollution effects (nitrogen deposition from aircraft emissions).

6. Step 4: Assessment of Likely Significant Effects

6.1.1.1 As recommended by PINS (2016), a full summary of the HRA screening process, and results from this NSER upon all the European sites potentially affected by the Project is provided in **Appendix B**: No Significant Effects Report: Screening Matrices.

6.2 Thanet Coast & Sandwich Bay SPA - Golden Plover (non-breeding)

6.2.1 Baseline

6.2.1.1 Golden plover is listed in Annex 1 of the Birds Directive[23]. The Thanet Coast & Sandwich Bay SPA was originally designated (under Article 4.1 of the Birds Directive) in part, for the internationally important non-breeding population of golden plover that it supported (during the five-year period 1985/86 – 1989/90, an average peak count of 1,980 golden plover was recorded). Nationally important numbers of non-breeding golden plover are also a notified feature of the Sandwich Bay to Hacklinge Marshes SSSI (which forms one of the two constituent SSSIs of the SPA). However, as part of the third JNCC SPA review (Stroud *et al*., 2016), golden plover was removed as a designated species from the SPA (likely due to declining numbers), although this change is to date unratified. The UK wintering population of golden plover was estimated to be 420,000 birds in winter 2006/07 of which 400,000 were in Britain (Musgrove *et al*., 2013).

6.2.1.2 Golden plover winter on coastal and inland habitats around Sandwich Bay and Pegwell Bay. Their main feeding habitat is on arable fields and grazing marsh located inland of the dunes of Sandwich Bay (to the south of the Site) and roosting on intertidal areas of Pegwell Bay. The birds using the farmland adjacent to the Site are considered part of the SPA population and thus this habitat is considered to be a ‘functional’ part of the SPA.

6.2.1.3 A peak count of 530 golden plover was recorded during the Functional Habitat Survey in 2016/17 (Amec Foster Wheeler, 2017a) in a field adjacent to the southwest of the Site (see **Figure 6.3**). However, this peak count was exceptional during the survey, with the next largest flock being of 33 birds, and the remaining records involving just 1-6 individuals.

6.2.1.4 During the Pegwell Bay Distribution Survey (Amec Foster Wheeler, 2017a), golden plover were primarily recorded in November and December 2016, and in February 2017, when 500-850 birds were counted. No foraging birds were observed, with all records relating to flocks of golden plover resting (roosting or loafing) on intertidal habitat close to the high-water mark along the northern and western fringes of Pegwell Bay during low, mid and the high tide periods (see **Figure 6.4**).

6.2.1.5 No golden plover were recorded within the Site during bird surveys undertaken for the proposed Stone Hill Park development in winter 2015/16 (WSP, 2016), or during the Functional Habitat Surveys in 2016/17. However, there was no access to the Site during the 2016/17 surveys, though approximately 75% of the Site could be adequately surveyed from its perimeter. Much of the non-visible part of the Site was runway, a habitat that is unlikely to be utilised by golden plover.

6.2.1.6 Henderson & Sutherland (2017) and Griffiths (2003) and data provided by the Sandwich Bay Bird Observatory (SBBO) and KOS show that golden plover occur on both intertidal and inland areas around Pegwell Bay in winter. A range of roost sites have been identified, including Pegwell Bay, but also inland on farmland.

6.2.1.7 Henderson & Sutherland (2017) divided their survey area into a number of Recording Areas, with the only records of golden plover within 2 km of the Site being those in their Recording Area 15 to the east of the Site (see **Figure 6.5**). In that area (despite parts in the east being unsuitable for foraging due to the

[23] Directive 2009/147/EC (known as the Birds Directive) on the conservation of wild birds (the codified version of Council Directive 79/409/EEC as amended provides for the identification and classification of Special Protection Areas (SPAs) for rare or vulnerable species listed in Annex I of the Directive, as well as for all regularly occurring migratory species,

presence of tall Brassica crops), fields of ploughed and fallow land close to Pegwell Bay were used for feeding and roosting in the first half of the winter, as follows.

- A flock of 402 birds was roosting and foraging in a field adjacent to the south-east of the Site on 13 November 2016;
- followed by 53 roosting in a different field (1.3 km west of the Site) on 27 November 2016;
- and 43 roosting in the same field as the early November record on 31 December 2016;
- Though no golden plover were recorded in Recording Area 15 in January and February 2017 (a March survey was not undertaken in this Area). These birds also used Pegwell Bay.

6.2.1.8 Henderson & Sutherland (2017) identified a number of other localities frequently used by golden plover. The highest numbers of roosting and foraging golden plover were to the south of the Site, approximately 3.5 km from the Site on arable farmland in the Ash Levels Recording Area 7 where a peak count of 1,030 birds was recorded in January 2017.

6.2.1.9 The mudflats at Pegwell Bay formed a roost site, used intermittently at low tide, with a peak count of 1,000 birds noted there in February 2017. Disturbance caused by bait-diggers and other sources was identified as a continued problem in this area and the likely reason for its intermittent use by golden plover.

6.2.1.10 Other areas of farmland used by roosting and/or foraging birds included:

- Sandwich Marshes (Recording Area 4), with up to 610 birds roosting by the flood-relief pools for the River Stour (4-5 km south of the Site;
- Goshall Valley (Recording Area 8, 4-7 km south, peak 810 birds); and
- Worth Marshes (Recording Area 1, 8-9 km south, peak count 242 birds).

6.2.1.11 Results from the surveys in 2002/03 (Griffiths, 2003) and 2016/17 (Henderson & Sutherland, 2017) show similar patterns of golden plover distribution across the Thanet and Sandwich Bay areas, and indicate that numbers have declined during the intervening years, from a high tide peak count of 4,962 birds (in January 2003) to only 1,536 (in late January 2017).

6.2.1.12 BTO Wetland Bird Survey (WeBS) core count data[24] for Pegwell Bay also shows a general decline in the peak counts of golden plover in Pegwell Bay over the period 2000/01 to 2014/15. A summary of the WeBS data is provided in **Table 6.2** (the figures in parenthesis include additional data obtained for Pegwell Bay outside the standardised WeBS core count dates, obtained from https://app.bto.org/webs-reporting/).

Table 6.2 Peak monthly counts of golden plover in Pegwell Bay, from winters 2000/01-2014/15

Winter	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Peak count	Month
2000/01	196	414	41	950	3,160	4,000	1070	1,404	4,000	Feb
2001/02	0	840	2,680	6,000	7,000	2,000	3750	3,711	7,000	Jan
2002/03	0	1,350	2,450	190	5,800	4,710	150	2,441	5,800 (7,229)	Jan
2003/04	62	1,410	6,240	5,500	8,000	1,125	14	3,193	8,000	Jan

[24] There are two types of WeBS count: Core Counts undertaken at high tide, involving a large number of sites (around 2,800), and Low Tide Counts involving a relatively much smaller number of counts of feeding birds at low tide.

Winter	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Peak count	Month
2004/05	95	0	3,830	5,200	5,330	4,500	920	3,312	5,330	Jan
2005/06	79	2,070	550	7,000	1,900	2,500	595	2,099	7,000	Dec
2006/07	11	663	3,730	945	2,900	4,170	80	1,785	4,170	Feb
2007/08	25	1,500	4,500	5,500	5,000	4,200	0	3,454	5,500	Dec
2008/09	0	0	2,000	3,500	3,230	3,150	5	2,377	3,500	Dec
2009/10	0	700	1,200	60	753	1,100	410	703	1,200 (3,150)	Nov
2010/11	132	160	3,400	51	2,000	0	0	1,148	3,400 (4,000)	Nov
2011/12	1	1100	1,350	3,000	3,500	0	0	2,237	3,500 (3,640)	Jan
2012/13	1	180	2,000	2,820	4,330	2,820	285	2,072	4,330	Jan
2013/14	16	530	820	1,050	1,093	0	0	701	1,093 (2,000)	Jan
2014/15	1	0	1,147	2,456	0	760	0	1,454	2,456	Dec

6.2.2 Future baseline

6.2.2.1 In the absence of development, it is assumed that the Site will remain principally as grassland and hard standing and its immediate vicinity will remain primarily as arable farmland. As a result, the management of this area would be unlikely to change in the foreseeable future and therefore the baseline with respect to the golden plover population of the Thanet Coast & Sandwich Bay SPA would not be altered significantly.

6.2.3 Predicted effects and their significance

6.2.3.1 Distribution data from the locality of the Site indicate that golden plover utilising farmland to the south, north and west are likely to be connected with the Pegwell Bay (Thanet Coast & Sandwich Bay SPA) wintering population (i.e. they disperse from Pegwell Bay at high tide to forage on farmland in the wider area). As a result of the likely movements of birds between high-tide foraging areas around the Site and Pegwell Bay at low tide, and their use of the surrounding farmland for foraging and roosting, there is potential for adverse effects on the golden plover population, due to:

- Auditory, visual, and vibration stimuli caused by vehicles, machinery and their operatives during construction and operation of the Project;
- auditory disturbance caused by any onsite pyrotechnical bird scaring methods during operation of the Project;
- auditory and visual disturbance caused by over-flying aircraft, and aircraft departing from and arriving at the airport; and

- the potential barrier effect of the airport to the movements of birds between foraging and roost sites.

6.2.3.2 All calculations and assessments have been undertaken based on the methodology advocated in BS5228-1:2009+A1:2014 *'Code of practice for noise and vibration control on construction and open sites – Part 1: Noise'*. Furthermore, road traffic noise from construction vehicles will also be assessed. The construction noise will be assessed following the same assessment methodology as the on-site construction activities.

6.2.3.3 The presence of the airport and operational aircraft could also create a barrier effect, causing any golden plover that regularly fly over the Site to alter their normal flight paths to move around the Site. Disturbance could also lead to the loss of foraging areas on farmland, and roost sites on farmland and intertidal habitat, resulting in the birds having to expend greater amounts of energy to find food and shelter, all of which could result in additional mortality and a decline in the population.

6.2.3.4 Golden Plover is a qualifying feature of the Thanet Coast & Sandwich Bay SPA as the SPA regularly supports 0.2% of the population of Great Britain, over the five-year peak mean 1991/92-1995/96 (Article 4.1 qualification)[25]. For the purposes of understanding European and National context and in order to determine significance, with respect to effects on the SPA population[26], Table 6.2 presents a breakdown of population sizes and selection/significance thresholds[27].

Table 6.2 Golden plover populations and selection thresholds

Golden Plover		Population sizes (individuals)	1% Selection/ Significance thresholds
Bio-geographic population		930,000	9,300
GB population		400,000	4,000
Thanet Coast & Sandwich Bay SPA	1985/86-1989/90, an average peak count	1,980	N/A
	1998/99 to 2002/03 five-year mean peak Pegwell Bay 'roost' count	6,332	N/A
	An average of 1.6% of the GB population (5 year peak mean 1998/9-2002/3)	4,190	N/A
	2010/11 to 2014/15 five-year mean peak Pegwell Bay 'roost' count	**3,285**	**33**

6.2.3.5 The five-year mean peak count of golden plover of 3,285 birds for 2010/11-2014/15 (obtained from WeBS core count data for the Pegwell and Sandwich Bays WeBS count sector) has been used as the basis for this assessment. The numbers of golden plover over-wintering in the area has clearly, varied greatly over the period since the SPA was designated, and therefore, this figure represents the most up-to-date value for the likely population size of golden plover for the SPA.

[25] Natura 2000 Standard Data Form: Thanet Coast and Sandwich Bay SPA. http://jncc.defra.gov.uk/
[26] The international and national thresholds of importance for golden plover have been obtained from https://www.bto.org/volunteer-surveys/webs/data/species-threshold-levels, accessed 4 December 2017
[27] There is no fundamental biological reason to take 1% of a population as the threshold level for establishing the level of importance of a site. Nevertheless, this percentage is widely considered to be of value in developing measures that give an appropriate level of protection to populations, and has gained acceptance on this basis throughout the world. The criterion was, for example, adopted by parties involved in the Ramsar Convention 1971. Thereafter, the 1% level of national species totals has been taken as the basis of assessment in various countries, including Britain (Stroud, Mudge & Pienkowski, 1990).

6.2.4 Construction phase

Construction displacement - habitat loss

6.2.4.1 Noise, vibration and physical activity within the Site from earthworks, fixed and mobile plant, and the visual presence of operatives during the construction phase has the potential for foraging and resting golden plover to be displaced from any suitable farmland within 750 m of the Site (see Table 5.1). Increased noise and vibration may also occur due to an increase in construction road traffic. As construction noise, vibration and activity within the Site is currently lacking and also likely to be unpredictable, it has a greater potential to cause disturbance than an increase in road traffic noise and vibration. This is because birds in the vicinity of the airport are likely to be habituated to current road traffic noise and vibration and its more predictable pattern.

6.2.4.2 The work by Griffiths (2003) identified no concentrations of golden plover within 750 m of the Site; the data for this work having been collected whilst Manston Airport was still operational.

6.2.4.3 Survey of farmland habitat around the Site in 2016/17 has shown limited use by golden plover of functional habitat within 750 m of the Site (Amec Foster Wheeler 2017a, Henderson & Sutherland 2017). Between September 2016 and February 2017 inclusive, few golden plover were recorded, with generally five or less birds noted within 2 km of the Site. An exception to this, was during the November survey when a flock of 530 golden plover was recorded in an arable field immediately to the south of the Site at its eastern end (Amec Foster Wheeler, 2017a). Soon after this record, the field was cultivated and no further records were obtained from that location. This flock was also recorded during the surveys reported in Henderson & Sutherland (2017).

6.2.4.4 The desk study and winter bird surveys indicate that golden plover do not make regular use of farmland within 750 m of the Site, although birds may use it opportunistically, depending upon suitability of crop type. Golden plover rarely remain faithful to a single site throughout the winter but tend to use a number of sites dependant on food availability and weather conditions (Percival, 2007). The Site is located adjacent to an extensive area of arable farmland (to the west, north and south), and therefore any birds displaced by the Project are likely to find alternative foraging sites within their usual foraging ranges. This is supported by the desk study and survey results in that birds were generally recorded at any one location during only part of the non-breeding season period, suggesting that they were foraging widely, moving to alternative feeding sites in response to changing crop structure, food availability and weather conditions.

6.2.4.5 Golden plover are very much dependent upon the presence of suitable foraging areas during autumn and winter. Mason & MacDonald (1999), in their study of wintering populations of golden plover in north-east Essex, found that the former species showed a strong association for winter cereals. Much of the foraging activity of golden plover was recorded in fields of cereal less than 100mm in height, with golden plover rarely recorded on other crop or habitat types such as cereal stubble and rape. Kirby (1997) identified many other factors that might influence the changing use of a site by golden plover. One of the main food sources for both species are earthworms, which occur in much higher densities in the early stages of an arable crop rotation, with very few present in fields that have been under continuous arable cultivation for three or more years (Kirby, 1997). Large open fields are most favoured (Kirby 1997, Mason & MacDonald 1999) and during prolonged periods of hard weather, when the ground has been frozen for at least three days, lapwing and golden plover move from arable fields to grassland, where invertebrate prey remains more accessible. Where grassland is not present, the birds often leave the area for warmer climes such as in France and on the Iberian Peninsula (Kirby, 1997).

6.2.4.6 It should also be noted that these studies focus on the use of habitats during the day, and that golden plover are known to use different habitats to forage in during the night (Gillings *et al*., 2005). A study of plovers on Thanet during 2016 (M. Sutherland, unpublished data) involving eight paired visits by day and night provided little evidence one way or the other as to whether the nocturnal distribution differed substantially from the diurnal. It was thought that, while locally, birds may be more dispersed at night, it is unlikely that the broad distribution patterns across the various survey areas would be substantially different from that recorded by day (Henderson & Sutherland, 2017).

6.2.4.7 To conclude, the presence of golden plover on farmland adjacent to the Site is likely to be strongly influenced by crop management, in particular, the rotation and relative proportions of rape and winter wheat, the latter providing the bare ground habitat favoured for foraging birds in autumn and early winter. Results from the desk study and surveys indicate that the area within 750 m of the Site does not form an important part of the foraging grounds for the SPA population of golden plover.

6.2.4.8 Given that the functional habitat surveys and other desk study data (e.g. Henderson & Sutherland, 2017) indicate that farmland within 750 m of the Site is not used on a regular basis by important numbers of golden plover (with a count of 530 birds in a single month) and with the availability of extensive alternative inland feeding habitat within the vicinity, the effects of displacement on the SPA golden plover population are considered not significant. The main roost site for the species (on Pegwell Bay) is located more than 1 km from the Site, and thus is predicted not to be affected by construction works for the Project.

6.2.5 Operational phase

Operational displacement - habitat loss due to aircraft flights and bird scaring activities

6.2.5.1 Once the airport is operational, there is potential for foraging and roosting golden plover to be displaced from arable land, grazing marshes and intertidal habitats (used for roosting) below or near to the flight paths of planes. The altitude, lateral distance and noise of the aircraft are all factors involved in potential disturbance, although separating the effect of aircraft noise from that of visual disturbance is difficult.

6.2.5.2 In addition to any disturbance caused directly by aircraft, methods employed at the airport to reduce/ prevent collision risk by deterring hazardous birds from using the aerodrome and adjacent land may also deter golden plovers from using otherwise suitable habitat up to a distance of 1 km from the Site.

6.2.5.3 There is little documented evidence on the visual and auditory disturbance effects of aircraft on birds and much of this comes from studies that have focussed on geese, ducks, swans and seabirds. Those studies involving waders (such as golden plover) have looked at the effects of microlights and jets. Also, these studies have mainly been based upon effects associated with aircraft altitude rather than lateral distance.

6.2.5.4 A literature review was undertaken by Amec Foster Wheeler on bird disturbance by aircraft (Amec Foster Wheeler, 2017). Results from this literature review and other studies indicate that beyond distances of 500 m in altitude and 1 km ground-level, lateral distance, golden plover are unlikely to be disturbed by the visual presence of flying aircraft.

6.2.5.5 An indicative figure of locations overflown by aircraft below 500 m is shown in **Figure 6.6**. It should be noted that no aircraft are currently operating from the Site and therefore the figure is based on indicative vertical climb profiles, operating procedures and flight paths. The actual procedures and flight paths will be consulted on after the DCO through the CAA's Airspace Change Process (ACP) and the ACP will provide opportunities for engagement with local communities and other stakeholders. The ACP will likely follow the process outlined in the draft ACP guidance CAP1520. The assessment into the effects of disturbance due to the presence of aircraft in flight will be finalised once further clarity has been obtained as to the locations of the flight paths, and through ongoing consultation with NE.

6.2.5.6 Noise levels in excess of 80 dB(LAeq[28]) have been recorded as causing the more severe disturbance incidents in a number of studies, primarily in duck species. However, some degree of habituation is likely to occur, should aircraft departures and arrivals become regular and predictable. NE have indicated a preference for the assessment to be determined on the basis of using the LAmax[29] metric.

6.2.5.7 The area of land (at ground level) where noise levels in excess of 80 dB LAmax are predicted during the day (07:00 to 23:00 hrs) and night (23:00 to 07:00 hrs) are shown in **Figures 6.1a and 6.1b** respectively.

[28] LAeq indicates average exposure noise level (BS 7445-1:2003 Description and measurement of environmental noise – Part 1: Guide to quantities and procedures' BS7445-1:2003). BS 7445 provides guidance for describing and measuring noise from all sources. The standard recommends equivalent continuous A-weighted sound pressure level (LAeq) as the most appropriate basic noise indicator.

[29] Lmax is the RMS (root mean squared) maximum level of a noise source or environment.

The different coloured shaded areas denote the mean number of daily events where 80 dB LAmax will be exceeded, taking into account the proposed flight paths, and combination of different aircraft types/ models that are planned to be in operation in Year 20 when the number of flights will have reached their anticipated peak (worst case scenario).

6.2.5.8 Results from the desk study (Amec Foster Wheeler, 2017b) and the Functional Habitat and Pegwell Bay Distribution surveys (Amec Foster Wheeler, 2017a) indicate that golden plover do not utilise farmland or intertidal habitats for foraging and roosting within the area where 80 dB LAmax is exceeded (see Figures 6.1a and 6.1b). The roosting areas for golden plover in Pegwell Bay are located outside the area where aircraft are predicted to fly over at altitudes of less than 500 m (see Figures 6.4 and 6.6) and are at their closest, 1.5 km from the airport runway (beyond the 1 km ground-level, lateral disturbance distance). Desk study and survey data also indicate that use of the farmland by golden plover in these areas is also low (see Figures 6.3). In view of this, the effects of displacement to golden plover by noise and visual presence from aircraft are considered not significant.

6.2.5.9 Results from the desk study and surveys also indicate that golden plover do not utilise farmland or intertidal habitats within 1 km of the Site on a regular basis. In view of this, the effects of displacement to golden plover by bird scaring activities are considered not significant.

Operational - displacement (barrier effects)

6.2.5.10 Unlike turnstone (the other qualifying/notification wader species of the Thanet Coast and Sandwich Bay SPA and Ramsar Site), golden plover frequently move to inland farmland areas to forage. Movements to and from inland areas and the coast result in the Project forming a barrier to the movement of golden plover between these sites. If the birds have to undertake flights of greater distance due to the presence of the Project, this could result in increased energy expenditure and lost foraging time, leading to increased mortality. Therefore, it is important to know the distribution of golden plover surrounding the airport and their likely flight paths between roosting and foraging areas.

6.2.5.11 Results from the desk study (in particular, Henderson & Sutherland 2017) and surveys indicate that much of the golden plover population roosts at Pegwell Bay, and forages on farmland to the south and south-west (more than 3 km to the south of the Site). The likely flights of golden plover between their main roost site and foraging areas is thus unlikely to take them across the Site, or the vicinity of flight paths of low flying aircraft. In addition, CAA data obtained during part of the previous operational period for Manston Airport (2007-13) revealed only one record of golden plover collision with aircraft, indicating that the airport did not form part of the regular flight paths for this species.

6.2.5.12 In view of the lack of CAA records of golden plover and the likely flight paths of birds, the levels of flight activity by this species over the Site and adjacent areas are predicted to be low, and as a consequence, the effects of barrier effect are considered not significant.

6.2.6 Decommissioning phase effects

6.2.6.1 The same approach would be undertaken for the decommissioning phase as for the construction phase, therefore, no significant effects are anticipated.

6.2.7 Combined Effects

6.2.7.1 None of the proposed or consented developments identified and listed in Appendix A of this document are predicted to lead to the loss of significant areas of suitable foraging and roosting habitat (farmland) for golden plover. These developments are not located in close vicinity to areas where important concentrations of golden plover are known to occur and therefore are not predicted to cause significant levels of disturbance. In view of this, no in-combined effects are anticipated.

6.3 Thanet Coast & Sandwich Bay SPA/ Ramsar - Turnstone (non-breeding)

6.3.1 Baseline

6.3.1.1 The Thanet Coast & Sandwich Bay SPA and Ramsar site are designated for their internationally important non-breeding numbers of turnstone. The SPA qualifying population of turnstone (of 940 individuals, 5-year peak mean counts from 1991/2-1995/6) represent 1.4% of the Western Palearctic population.

6.3.1.2 Turnstone occur almost exclusively in coastal habitats, foraging and resting on rocky shorelines and beaches, and will also forage along the tidelines on sandy beaches and on mudflats. The Site and surrounding farmland provide no opportunities for foraging or resting turnstone, and therefore the species is unlikely to occur in these areas on a regular basis.

6.3.1.3 The Thanet Coast Turnstone Monitoring Report (Hodgson, 2016) concluded from six surveys undertaken between 2001 -2010 that the population of turnstone within the SPA varied from 1,087 to 1,335 birds, with a mean of 1,227. A coordinated count in 2013 showed a marked decline, with 620 turnstone counted. Further coordinated counts in winter 2013/14 (two counts) and latterly in 2016 (single count) confirmed this decline, with 583, 664 and 537 birds recorded respectively. It was suggested in Hodgson (2016) that prior to high tide, the turnstones from the Thanet Coast & Sandwich Bay SPA flew to join a roost, 2.5 km west of Whitstable Harbour on the north Kent coast, within the Swale SPA and some 18 km north-west of the Site. This suggestion was based on results from coastal survey plots. It would therefore appear that the birds, as would be expected for this species, are following the coastline around Thanet and not undertaking any overland movements.

6.3.1.4 WeBS Core Count Survey results indicate that turnstone concentrations within the Thanet Coast & Sandwich Bay SPA occur mainly across the northern extremities of the SPA, heading west toward Whitstable, with Pegwell Bay supporting only a small proportion of the numbers mentioned here. **Table 6.3** shows the peak counts of turnstone each winter, obtained from the WeBS core count data, including additional counts obtained outside the standardised WeBS visit dates. Data for the Thanet Coast WeBS count sectors is very incomplete for the two most recent seasons for which data is available (2013/14 and 2014/15) and has therefore not been included (Frost *et al*. 2017, and https://app.bto.org/webs-reporting/, accessed 4 December 2017).

Table 6.3 Peak counts of turnstone from 2008/09 – 2012/13 for Pegwell Bay and the Thanet Coast

	2008/09	2009/10	2010/11	2011/12	2012/13
Pegwell Bay	130	927	90	65	70
Thanet Coast	722	624	529	396	360

NB: Pegwell Bay includes the WeBS count sector 22412 (which also includes Sandwich Bay). Thanet Coast includes data for WeBS count sectors: 22417, 22418, 22420, 22431 and 22432.

6.3.1.5 During the Pegwell Bay Distribution Survey (Amec Foster Wheeler, 2017a), relatively low numbers of turnstone were recorded, with flocks of roosting and foraging birds primarily seen along the northern and western fringes of Pegwell Bay, near the high-water mark. The largest count of foraging turnstone was of 54 individuals on the northern fringe of Pegwell Bay on 13 October, and of roosting birds, 28 on the western fringe on 14 March. **Figure 6.7** shows the location of the peak counts of turnstone recorded in each 500m grid square.

6.3.2 Future baseline

6.3.2.1 In the absence of development, it is assumed that the Site will remain principally as grassland and hard standing and the land in the immediate vicinity will remain primarily as arable farmland. As a result, the management of this area would be unlikely to change in the foreseeable future and therefore the baseline with respect to the turnstone population of the Thanet Coast & Sandwich Bay SPA and Ramsar site would not be altered significantly.

6.3.3 Predicted effects and their significance

6.3.4 Operational Phase

Operational displacement - habitat loss due to aircraft flights

6.3.4.1 There is the potential for foraging and roosting turnstone in Pegwell Bay to be adversely affected by auditory and visual disturbance caused by over-flying aircraft, and aircraft departing from and arriving at the airport.

6.3.4.2 Results from the desk study (Amec Foster Wheeler, 2017b) and the Pegwell Bay Distribution Survey (Amec Foster Wheeler, 2017a) indicate that turnstone do not utilise intertidal habitats for foraging and roosting within the area where 80 dB LAmax is exceeded (see Figures 6.1a and 6.1b), or where aircraft fly over at altitudes of less than 500 m (see Figures 6.6 and 6.7). In addition, the main foraging and roosting areas for turnstone in Pegwell Bay are located more than 1 km from the airport runway (beyond the 1 km ground-level, lateral disturbance distance). There is no historical evidence to suggest that turnstone were displaced from areas of Pegwell Bay close to the flight paths during the period when the airport was previously operational, and conversely, numbers of turnstone have declined since operation ceased (Hodgson, 2016).

6.3.4.3 There is some evidence to indicate that turnstone will readily habituate to disturbance (Cutts *et al*., 2009) and that this species does not flush (fly away) until approached at very close distance (Borgmann 2010, Smith & Visser 1993, Holloway 1997). Borgmann (2009) recorded an average distance at which wintering turnstone were flushed due to walkers of only 12 m (the equal lowest value of all the species studied). Smit & Visser (1993) in their studies on the effects of human-related disturbance on waders and wildfowl in the Wadden Sea found that turnstone were flushed due to human presence at an average distance of 47 m (compared to 211 m for curlew), the lowest value of the nine species studied. Results from disturbance studies on waders in Findforn Bay (Scotland) also found that turnstone reacted to human disturbance (such as the presence of dog-walkers) at much shorter distances (in this case an average of 14 m) than most other wader species (Holloway, 1997).

6.3.4.4 To conclude, there is no evidence to suggest that turnstone will be disturbed by noise or the presence of aircraft in flight from the Site, and that the effects of displacement on this species are considered not significant.

6.3.5 Decommissioning phase effects

6.3.5.1 The same approach would be undertaken for the decommissioning phase as for the construction phase, therefore, no significant effects are anticipated.

6.3.6 Combined Effects

6.3.6.1 None of the proposed or consented developments identified and listed in Appendix A of this document are predicted to lead to the loss of significant areas of suitable foraging and roosting habitat (intertidal mudflats and rocky shores) for turnstone. These developments are not located in close vicinity to areas where important concentrations of turnstone are known to occur and therefore are not predicted to cause significant levels of disturbance. In view of this, no in-combined effects are anticipated.

6.4 Sandwich Bay SAC – Annex I habitats

6.4.1 Baseline

The Sandwich Bay SAC is designated for the presence of five Annex I habitats (see Appendix C). The land coverage for each habitat within the SAC at its designation (in hectares) has been obtained from the Natura 2000 data form (http://jncc.defra.gov.uk/ProtectedSites/SACselection/n2kforms/UK0013077.pdf), as follows:

- Embryonic shifting dunes (5.68 ha);
- White dunes, shifting dunes along the shoreline (9.09 ha);
- Grey dunes, fixed coastal dunes with herbaceous vegetation (223.93 ha);
- Dunes with *Salix repens ssp. Argentea* (11.37 ha); and
- Dune slacks (7.96 ha).

6.4.1.1 The precise locations of each of the five Annex I habitat types within the SAC is not known, though the description for the SAC indicates the presence of the embryonic and white dunes to be primarily along the seaward side within the northern half of the Site. However, the overall extent of the 'sand dune' Habitat of Principal Importance' has been obtained from www.magic.defra.gov.uk and is shown on **Figure 6.8**.

6.4.2 Future baseline

6.4.2.1 In the absence of development, it is assumed that the Site will remain principally as grassland and hard standing and the land in the immediate vicinity will remain primarily as arable farmland. As a result, the management of this area would be unlikely to change in the foreseeable future and therefore the baseline with respect to the Annex I habitats which the Sandwich Bay SAC is designated for would not be altered significantly.

6.4.3 Predicted effects and their significance

6.4.3.1 There is potential for direct effects resulting from a deterioration in air quality. The principal pollutant of concern associated with traffic and aircraft emissions that might affect sensitive habitats is nitrogen oxide[30] (NOx[31]). Road traffic and aircraft emissions may increase the ambient NOx concentrations to which vegetation is exposed. NOx emissions may also, following chemical conversion in the air, form nitrogen dioxide, which is then deposited. This (nutrient) nitrogen deposition may affect plant communities by causing nutrient enrichment and also by acidifying the soils.

6.4.3.2 Plant and equipment used during construction as well as road traffic generated during the construction phase will produce emissions. During operation, emissions will result from aircraft and airside plant and equipment; and road traffic generated during the operational phase.

6.4.3.3 Effects might arise on designated nature conservation sites/priority habitats sensitive to changes in air quality up to 200 m from roads used by traffic accessing and departing from the airport. The Annex I habitats for which Sandwich Bay SAC is designated are located, at their nearest point, approximately 2.5 km south of the Site. These habitats therefore lie well outside the 200 m search parameter (see Table 5.1) beyond which air quality effects from road traffic and construction-related vehicles might occur, and as such are not considered further in this assessment.

[30] Assessment of sulphur oxides (SO_2) has been scoped out as such emissions are expected to be negligible (see ES Chapter 6, Air Quality, section 6.4).
[31] Nitrogen oxides were taken to be nitrogen dioxide (NO_2) + nitrogen/nitric oxide (NO).

6.4.4 Operational Phase

Operational phase effects - Nitrogen oxides (NO_X) concentrations in air

6.4.4.1 The assessment into the effects of nitrogen deposition on Annex I habitats within the Sandwich Bay SAC will be determined upon completion of the air quality modelling and ongoing consultation with NE.

6.4.5 Decommissioning phase effects

6.4.5.1 The same approach would be undertaken for the decommissioning phase as for the construction phase, therefore, no significant effects are anticipated in relation to the effects on SAC Annex I habitats due to emissions from vehicles during construction.

6.4.6 Combined Effects

6.4.6.1 The assessment into the in-combination effects of nitrogen deposition on Annex I habitats within the Sandwich Bay SAC will be determined upon completion of the air quality modelling and ongoing consultation with NE.

7. Conclusions

7.1.1.1 To be completed upon completion of the air quality modelling.

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Appendix A
Plans and Projects in the In-combination Assessment

Application Reference	Authority	Brief Description	Scale and nature of development likely to give rise to significant cumulative effects with the Project	Approx. Distance and (direction) from the Site
OL/TH/16/0417	Thanet DC	Outline application for mixed use residential and business development comprising 19 dwellings, 4 live-work units, and a detached building incorporating a shop and café, together with associated access roads, paths and vehicle parking, including access and layout.	Potential to give rise to cumulative ecological, transport and drainage, impacts, and noise and air quality should construction phases overlap.	500 m (E)
OL/TH/15/0187	Thanet DC	Outline application for the redevelopment of the existing site for up to 120 dwellings including access, following demolition of existing buildings.	Potential to give rise to cumulative biodiversity, freshwater environment, noise, and traffic effects.	1.2 km (E)
R/TH/15/0250	Thanet DC	Application for approval of access, appearance, landscaping, layout and scale pursuant to condition 1 of planning permission reference F/TH/12/0964 for the development of phase 5 of a mixed use urban extension comprising residential, community and commercial use, open space, infrastructure and new access. Total 469 houses and 1642m^2 of non-residential development.	Potential to give rise to cumulative air quality (dust), biodiversity, freshwater environment, noise and traffic effects.	2.0 km (NE)
OL/TH/15/0537	Thanet DC	Outline application for the erection of 31 dwellings and retail unit, including access.	Potential to give rise to cumulative air quality, biodiversity (bird distribution), freshwater environment (drainage), and transport effects.	1.5 km (SE)
OL/TH/15/0020	Thanet DC	Outline application for the erection of a block of 56 extra care units, 56 dwellings and community use building with retail unit, following demolition of existing buildings and structures, including access.	Potential to give rise to cumulative biodiversity (effects on SPA & SSSI), freshwater environment (drainage, surface water quality) and noise effects.	adjacent (SE)
F/TH/15/0353	Thanet DC	Application for variation of condition 2 attached to planning permission F/TH/11/0893 for the change of use of nurse's home to 29 flats with erection of five-storey extension to allow alterations to internal layout to existing building.	Potential to give rise to cumulative biodiversity effects.	3.2 km (N)
OL/TH/16/1416	Thanet DC	Outline application for erection of 14 detached dwellings including access, layout and scale.	Potential for cumulative air quality (dust), biodiversity, noise and traffic effects.	500 m (E)
OL/TH/16/1715	Thanet DC	Outline application for 48 dwellings including access with all other matters reserved.	Potential to give rise to cumulative air quality, biodiversity, freshwater environment (drainage) and traffic effects.	1.0 km (E)
OL/TH/17/0151	Thanet DC	Outline application for the erection of up to 41 dwellings including access with all other matters reserved.	Potential to give rise to cumulative construction phase air quality (dust), biodiversity, freshwater environment (drainage, flood risk), noise, and traffic effects.	1.0 km (S)

OL/TH/17/0150	Thanet DC	Outline application for the erection of up to 23 dwellings including access with all other matters reserved. Land Adjacent To Oakland Court Cottington Road	Potential to give rise to cumulative biodiversity, freshwater environment (drainage, flood risk), and traffic effects.	1.0 km (S)
OL/TH/17/0152	Thanet DC	Outline Application for the erection of up to 62 dwellings including access with all other matters reserved. Land East Of 40 Canterbury Road West	Potential to give rise to cumulative biodiversity, freshwater environment (drainage, flood risk), and traffic effects.	200 m (S)
OL/TH/16/1765	Thanet DC	Outline application for residential development of up to 250 dwellings and alterations to the surrounding highway network.	Potential to give rise to cumulative air quality, biodiversity, freshwater environment (flood risk), and traffic effects.	2.5 km (N)
KCC/DO/0171/2015	Kent CC	Development of a waste management facility for the sorting of skip waste.	Potential to give rise to cumulative biodiversity and noise effects.	4.0 km (S)
EN010084	PINS NSIP	Thanet Extension Offshore Wind Farm. An offshore wind generating station of capacity up to 340 MW.	Potential to give rise to cumulative biodiversity and traffic effects.	South of the Site
EN020017	PINS NSIP	Richborough Connection. Proposed 400kV electricity transmission connection between Richborough and Canterbury in Kent to connect the proposed new UK to Belgium interconnector (Known as a Nemo Link).	Potential to give rise to cumulative air quality, biodiversity, noise and traffic effects.	3.0 km (S)
TR010006	PINS NSIP	M20 Junction 10a. New Junction and Associated Improvement - South of Ashford.	Potential to give rise to cumulative traffic and transport effects.	N/A
OL/TH/14/0050	Thanet DC	Application for outline planning permission including access for the erection of 785 dwellings, highways infrastructure works (including single carriageway link road), primary school, small scale retail unit, community hall, public open-space.	Potential to give rise to cumulative air quality, biodiversity, freshwater environment (flood risk), and traffic effects.	300 m (E)
OL/TH/11/0910	Thanet DC	Application for outline planning permission for mixed-use development for up to 550 dwellings; up to 63,000sqm Class B1 business floorspace; car showroom; a new local centre comprising up to 2,000sqm convenience retail (class A1, A2, A3), community facilities up to 5,000 sqm (class D1/D2) and community healthcare up to 1,200sqm (class D1); and associated highway works with all matters reserved.	Potential to give rise to cumulative air quality, biodiversity, freshwater environment (flood risk) and traffic effects.	1.7 km (E)

Appendix B
No Significant Effects Report, Screening Matrices

Potential Impacts

8.1.1.1 Potential impacts upon the European sites, which are considered within the submitted No Significant Effects Report (NSER), are provided in Table B.1 below. Impacts have been grouped where appropriate for ease of presentation.

Table B.1 Impacts considered within the screening matrices

Designation	Impacts in submission information	Presented in screening matrices as
Thanet Coast and Sandwich Bay SPA Thanet Coast and Sandwich Bay Ramsar Thanet Coast SAC Sandwich Bay SAC Outer Thames Estuary Marine SPA Margate & Long Sands SCI (Inshore Marine) Stodmarsh SPA Stodmarsh SAC Stodmarsh Ramsar Blean Complex SAC	The introduction of toxic pollutants or sediments resulting in loss of, or damage to terrestrial or freshwater environments leading to direct or indirect effects on designated features due to run-off entering the European sites from the currently operational outfall, during construction and operation.	Effect 1
	Disturbance / displacement of birds (that are qualifying features of the SPAs/Ramsar sites, located within either the SPAs/Ramsars or on functional habitat outside these sites), resulting in a reduction of energy intake and/or an increase in energy expenditure leading to a reduction in survival or productivity rates due to noise and shadow created by planes on take-off and landing during operation.	Effect 2
	Deposition of oxides of nitrogen from aircraft emissions (during operation) and road vehicles (during construction and operation) resulting in enrichment and/or acidification of the environment leading to alteration of the plant community through changes in baseline conditions resulting in direct or indirect effects on designated features.	Effect 3
	Disturbance / displacement of birds (that are qualifying features of the SPAs/Ramsar sites, located within either the SPAs/Ramsars or on functional habitat outside these sites), resulting in a reduction of energy intake and/or an increase in energy expenditure leading to a reduction in survival or productivity rates due to noise created by bird scaring activity.	Effect 4
	Disturbance / displacement of golden plover due to the Project forming a barrier to the movement of birds between foraging and roosting sites, resulting in a reduction of energy intake and/or an increase in energy expenditure leading to a reduction in survival or productivity rates.	Effect 5
	Deposition of dust in areas neighbouring the construction site during the construction phase. Deposition of dust resulting in loss of or damage to terrestrial or freshwater environments from smothering or enrichment resulting in effects on flora vegetation, invertebrates, amphibians, bats, otters (as designated features of SACs) and birds (as designated features of SPAs).	Effect 6
	Production of aural and visual stimuli due to noise and vibration and movement during ground activities during construction and operation, including construction works, cargo loading, plane maintenance, airfield management, but not including bird scaring devices.	Effect 7
	In combination effects	Effect 8

STAGE 1: SCREENING MATRICES

The European Sites included within the assessment are:

- Thanet Coast and Sandwich Bay SPA
- Thanet Coast and Sandwich Bay Ramsar
- Thanet Coast SAC
- Sandwich Bay SAC
- Outer Thames Estuary Marine SPA
- Margate & Long Sands SCI (Inshore Marine)
- Stodmarsh SPA
- Stodmarsh SAC
- Stodmarsh Ramsar
- Blean Complex SAC

Evidence for likely significant effects on their qualifying features is detailed within the footnotes to the screening matrices below.

Matrix Key:

✓ = Likely significant effect **cannot** be excluded

✕ = Likely significant effect **can** be excluded

C = construction

O = operation

D = decommissioning

Where effects are not applicable to a particular feature they are greyed out with n/a.

Stage 1 Matrix A: Thanet Coast and Sandwich Bay SPA

Name of European site: Thanet Coast and Sandwich Bay SPA																								
Distance to Order Limits: adjacent																								
European site features	Likely effects of Project																							
	Effect 1			Effect 2			Effect 3			Effect 4			Effect 5			Effect 6			Effect 7			Effect 8		
	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Turnstone	Xa	Xa	Xa	n/a	TBC	n/a	Xa	xa	Xa	n/a	Xa	n/a	n/a	Xa	n/a	Xa	n/a	Xa	Xa	n/a	Xa	Xb	Xb	Xb
Golden plover	Xa	Xa	Xa	n/a	TBC	n/a	Xa	xa	Xa	n/a	Xb	n/a	n/a	Xb	n/a	Xa	n/a	Xa	Xb	n/a	Xb	Xb	Xb	Xb
Little tern	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Evidence supporting conclusions

a. Table 5.2 High-level Screening Assessment of the No Significant Effects Report
b. Section 6 Assessment of Likely Significant Effects

Stage 1 Matrix B: Thanet Coast and Sandwich Bay Ramsar

Name of European site: Thanet Coast and Sandwich Bay Ramsar Site																								
Distance to Order Limits: adjacent																								
European site features	Likely effects of the Project																							
	Effect 1			Effect 2			Effect 3			Effect 4			Effect 5			Effect 6			Effect 7			Effect 8		
	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Turnstone	Xa	Xa	Xa	n/a	Xb	n/a	Xa	Xa	Xa	n/a	Xa	n/a	n/a	Xa	n/a	Xa	n/a	Xa	Xa	n/a	Xa	Xb	Xb	Xb
Red Data Book invertebrates	Xa	Xa	Xa	n/a	n/a	n/a	Xa	Xb	Xa	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Evidence supporting conclusions

a. Table 5.2 High-level Screening Assessment of the No Significant Effects Report

b. Section 6 Assessment of Likely Significant Effects

Stage 1 Matrix C: Thanet Coast SAC

Name of European site: Thanet Coast SAC																								
Distance to Order Limits: 300 m																								
European site features	Likely effects of the Project																							
	Effect 1			Effect 2			Effect 3			Effect 4			Effect 5			Effect 6			Effect 7			Effect 8		
	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Reefs	n/a	n/a	n/a	n/a	n/a	n/a	Xa	Xa	Xa	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Submerged or partially submerged sea caves	n/a	n/a	n/a	n/a	n/a	n/a	Xa	Xa	Xa	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Evidence supporting conclusions

a. Table 5.2 High-level Screening Assessment of the No Significant Effects Report

Stage 1 Matrix D: Sandwich Bay SAC

Name of European site: Sandwich Bay SAC																								
Distance to Order Limits: within																								
European site features	Likely effects of the Project																							
	Effect 1			Effect 2			Effect 3			Effect 4			Effect 5			Effect 6			Effect 7			Effect 8		
	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Embryonic shifting dunes	Xa	Xa	Xa	n/a	n/a	n/a	Xb	Xb	Xb	n/a	n/a	n/a	n/a	n/a	n/a	Xa	n/a	Xa	n/a	n/a	n/a	Xb	Xb	Xb
Shifting dunes along the shoreline	Xa	Xa	Xa	n/a	n/a	n/a	Xb	Xb	Xb	n/a	n/a	n/a	n/a	n/a	n/a	Xa	n/a	Xa	n/a	n/a	n/a	Xb	Xb	Xb
Fixed coastal dunes with herbaceous vegetation	Xa	Xa	Xa	n/a	n/a	n/a	Xb	Xb	Xb	n/a	n/a	n/a	n/a	n/a	n/a	Xa	n/a	Xa	n/a	n/a	n/a	Xb	Xb	Xb
Dunes with Salix repens ssp. argentea	Xa	Xa	Xa	n/a	n/a	n/a	Xb	Xb	Xb	n/a	n/a	n/a	n/a	n/a	n/a	Xa	n/a	Xa	n/a	n/a	n/a	Xb	Xb	Xb
Humid dune slacks	Xa	Xa	Xa	n/a	n/a	n/a	Xb	Xb	Xb	n/a	n/a	n/a	n/a	n/a	n/a	Xa	n/a	Xa	n/a	n/a	n/a	Xb	Xb	Xb

Evidence supporting conclusions

a. Table 5.2 High-level Screening Assessment of the No Significant Effects Report
b. Section 6 Assessment of Likely Significant Effects

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Stage 1 Matrix E: Outer Thames Estuary SPA

Name of European site: Outer Thames Estuary SPA																								
Distance to Order Limits: 3.4 km																								
European site features	Likely effects of the Project																							
	Effect 1			Effect 2			Effect 3			Effect 4			Effect 5			Effect 6			Effect 7			Effect 8		
	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	n/a	n/a	n/a	Xa	Xa	Xa	n/a	n/a	n/a	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa

Evidence supporting conclusions

a. Table 5.2 High-level Screening Assessment of the No Significant Effects Report

Stage 1 Matrix F: Margate and Long Sands SCI

Name of European site: Margate and Long Sands SCI																								
Distance to Order Limits: 4.8 km																								
European site features	Likely effects of the Project																							
	Effect 1			Effect 2			Effect 3			Effect 4			Effect 5			Effect 6			Effect 7			Effect 8		
	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Sandbanks slightly covered by seawater at all times	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Evidence supporting conclusions

a. Table 5.2 High-level Screening Assessment of the No Significant Effects Report

Stage 1 Matrix G: Stodmarsh SPA

Name of European site: Stodmarsh SPA																								
Distance to Order Limits: 8.4 km																								
European site features	Likely effects of the Project																							
	Effect 1			Effect 2			Effect 3			Effect 4			Effect 5			Effect 6			Effect 7			Effect 8		
	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Bittern (Breeding and Non-breeding)	n/a	n/a	n/a	n/a	Xa	n/a	Xa	Xa	Xa	n/a	Xa	n/a	n/a	Xa	n/a	Xa	n/a	Xa	Xa	n/a	Xa	Xa	Xa	Xa
Hen harrier (Non-breeding)	n/a	n/a	n/a	n/a	Xa	n/a	Xa	Xa	Xa	n/a	Xa	n/a	n/a	Xa	n/a	Xa	n/a	Xa	Xa	n/a	Xa	Xa	Xa	Xa
Gadwall (Breeding)	n/a	n/a	n/a	n/a	Xa	n/a	Xa	Xa	Xa	n/a	Xa	n/a	n/a	Xa	n/a	Xa	n/a	Xa	Xa	n/a	Xa	Xa	Xa	Xa
Gadwall (Non-breeding)	n/a	n/a	n/a	n/a	Xa	n/a	Xa	Xa	Xa	n/a	Xa	n/a	n/a	Xa	n/a	Xa	n/a	Xa	Xa	n/a	Xa	Xa	Xa	Xa
Shoveler (Non-breeding)	n/a	n/a	n/a	n/a	Xa	n/a	Xa	Xa	Xa	n/a	Xa	n/a	n/a	Xa	n/a	Xa	n/a	Xa	Xa	n/a	Xa	Xa	Xa	Xa

Evidence supporting conclusions

a. Table 5.2 High-level Screening Assessment of the No Significant Effects Report;

Stage 1 Matrix H: Stodmarsh SAC

Name of European site: Stodmarsh SAC																								
Distance to Order Limits: 7.7 km																								
European site features	Likely effects of the Project																							
	Effect 1			Effect 2			Effect 3			Effect 4			Effect 5			Effect 6			Effect 7			Effect 8		
	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Desmoulin`s whorl snail	n/a	n/a	n/a	n/a	n/a	n/a	Xa	Xa	Xa	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Evidence supporting conclusions

a. Table 5.2 High-level Screening Assessment of the No Significant Effects Report

Stage 1 Matrix I: Stodmarsh Ramsar

Name of European site: Stodmarsh Ramsar Site																								
Distance to Order Limits: 8.4 km																								
European site features	Likely effects of the Project																							
	Effect 1			Effect 2			Effect 3			Effect 4			Effect 5			Effect 6			Effect 7			Effect 8		
	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 Data Book wetland invertebrates	n/a	n/a	n/a	n/a	n/a	n/a	Xa	Xa	Xa	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Bittern (Non-breeding)	n/a	n/a	n/a	n/a	Xa	n/a	Xa	Xa	Xa	n/a	Xa	n/a	n/a	Xa	n/a	Xa	n/a	Xa	Xa	n/a	Xa	Xa	Xa	Xa
Bittern (Breeding)	n/a	n/a	n/a	n/a	Xa	n/a	Xa	Xa	Xa	n/a	Xa	n/a	n/a	Xa	n/a	Xa	n/a	Xa	Xa	n/a	Xa	Xa	Xa	Xa
Hen harrier (Non-breeding)	n/a	n/a	n/a	n/a	Xa	n/a	Xa	Xa	Xa	n/a	Xa	n/a	n/a	Xa	n/a	Xa	n/a	Xa	Xa	n/a	Xa	Xa	Xa	Xa
Gadwall (Breeding)	n/a	n/a	n/a	n/a	Xa	n/a	Xa	Xa	Xa	n/a	Xa	n/a	n/a	Xa	n/a	Xa	n/a	Xa	Xa	n/a	Xa	Xa	Xa	Xa
Gadwall (Non-breeding)	n/a	n/a	n/a	n/a	Xa	n/a	Xa	Xa	Xa	n/a	Xa	n/a	n/a	Xa	n/a	Xa	n/a	Xa	Xa	n/a	Xa	Xa	Xa	Xa
Shoveler (Non-breeding)	n/a	n/a	n/a	n/a	Xa	n/a	Xa	Xa	Xa	n/a	Xa	n/a	n/a	Xa	n/a	Xa	n/a	Xa	Xa	n/a	Xa	Xa	Xa	Xa

Evidence supporting conclusions

a. Table 5.2 High-level Screening Assessment of the No Significant Effects Report

Stage 1 Matrix J: Blean Complex SAC

Name of European site: Blean Complex SAC																								
Distance to Order Limits: 11.5 km																								
European site features	Likely effects of the Project																							
	Effect 1			Effect 2			Effect 3			Effect 4			Effect 5			Effect 6			Effect 7			Effect 8		
	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Sub-Atlantic and medio-European oak or oak-hornbeam forests of the Carpinion betuli	n/a	n/a	n/a	n/a	n/a	n/a	Xa	Xa	Xa	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Evidence supporting conclusions

a. Table 5.2 High-level Screening Assessment of the No Significant Effects Report

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Appendix C
Designation Information

Table C.1 European sites (and qualifying interest features) within 15 km of the order limits

Site name and designation	Site interest features	Distance and (direction) from Order Limits
Thanet Coast and Sandwich Bay Ramsar	The Ramsar site (covering 2,169 ha) is designated for supporting internationally important numbers of non-breeding turnstone (under Ramsar Criterion 6), and 15 Red Data Book invertebrate species associated with wetlands (under Criterion 2)	Adjacent to Order Limits
Thanet Coast and Sandwich Bay SPA	The SPA (covering 1,838 ha) is designated for populations of European importance of turnstone (non-breeding); golden plover (non-breeding) and little tern (breeding)	Adjacent to Order Limits
Sandwich Bay SAC	The SAC (covering 1,137 ha) is designated for the following Annex I habitats that are a primary reason for selection of this site: • Embryonic shifting dunes; • Shifting dunes along the shoreline with *Ammophila arenaria* ("white dunes"); • Fixed coastal dunes with herbaceous vegetation ("grey dunes") * Priority feature; and • Dunes with *Salix repens ssp. argentea* (*Salicion arenariae*). Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site: • Humid dune slacks.	Within Order Limits
Thanet Coast SAC (including inshore marine)	The SAC (covering 2,816 ha) is designated for the following Annex I habitats that are a primary reason for selection of this site: • Reefs; and • Submerged or partially submerged sea caves.	330 m South-east
Outer Thames Estuary Marine SPA	This marine SPA (covering 379,824 ha) is designated for supporting a population of European importance of the Annex 1 species: red-throated diver (during winter)	~3.4 km North
Margate & Long Sands SCI[32] (Inshore Marine)	Margate and Long Sands starts to the north of the Thanet coast of Kent and proceeds in a north-easterly direction to the outer reaches of the Thames Estuary. It contains a number of Annex I Sandbanks slightly covered by seawater at all times, the largest of which is Long Sands itself.	~4.8 km North
Stodmarsh SAC	The SAC (covering 563 ha) is designated for the following Annex II species that is the primary reason for selection of this site: Desmoulin`s whorl snail (*Vertigo moulinsiana*).	~7.7 km South-west
Stodmarsh Ramsar	The Ramsar site (covering 481 ha) is designated under Ramsar Criterion 2 for supporting: • six British Red Data Book wetland invertebrates; • two nationally rare and five nationally scarce plant species; and • its diverse assemblage of rare wetland birds which includes gadwall (during passage and the breeding season) and bittern, shoveler and hen harrier (in winter)	~8.4 km South-west
Stodmarsh SPA	The SPA (covering 481 ha) is designated for its populations of European importance of bittern, gadwall, shoveler and hen harrier (during winter), and gadwall during the breeding season	~8.4 km South-west

[32] Margate and Long Sands was formally submitted by the government to the European Commission as a candidate Special Area of Conservation on 20 August 2010. Margate and Long Sands cSAC was adopted by the European Commission as a Site of Community Importance (SCI) in 2011. The UK Government then has 6 years from adoption to designate it as a SAC.

Blean Complex SAC	A complex of broad leaved deciduous woodland designated for the Annex I habitat “Sub-Atlantic and medio-European oak or oak-hornbeam forests of the *Carpinion betuli”*.	~11.5 km West

Appendix D
Scoping Opinion, Consultee Responses

Table D.1 Consultee comments

Consultee	Comments and considerations	How addressed in the ES, and this NSER
PINS	The Secretary of State notes that it is indicated in Section 3.5 that the Applicant intends to prepare an Evidence Plan in relation to HRA. It is recommended that preparation of this plan begins, and that NE is contacted, at the earliest opportunity during pre-application. Information on Evidence Plans is provided in Section 4 of this Opinion.	Consultation with NE is ongoing and additional consultations are to occur following publication of the PEI. Consultations to date have included discussions regarding physical scope, methods of survey and assessment, and principles of mitigation. Further consultation will include detailed mitigation measures as the results from planned survey work and modelling become apparent. This will include any potential contamination effects on the designated sites at Pegwell Bay, and potential effects from noise and air quality on surrounding European sites.
PINS	It is suggested in paragraph 6.6.7, and also reflected in paragraph 6.6.12, that direct effects are those that affect receptors on a development site while indirect effects are those that affect offsite receptors. The Secretary of State considers that this approach does not properly reflect how effects should be assessed, e.g. construction works on the boundary of a site or construction and operational traffic movements to and from the site could disturb flora and fauna beyond and at some distance from the boundary, depending on the nature of the activity and the sensitivity of the receptor; and aircraft movements beyond the boundary could increase collision risk with birds. Consideration should be given by the Applicant to how direct and indirect effects are defined and assessed in the EIA.	Agreed and those effects beyond the site boundary which would occur as a direct result of proposal activities are considered as direct effects.
PINS	It is noted that the list of potential receptors scoped in for further assessment in Table 6.2 does not include over-wintering birds or great-crested newts, although Section 6.6 identifies potential for both of these to be found on the Site and a potential need for more detailed survey work. The Secretary of State recommends that potential effects on these species are considered in the EIA.	Potential effects on over-wintering birds and great crested newt to be considered.
PINS	Paragraph 6.6.16 notes that the design of the Project will incorporate measures to avoid or reduce adverse effects or deliver enhancements. Very limited reference is made in this chapter to potential mitigation measures for effects which may not be avoided or reduced as a result of the design, and no reference is made to how potential residual effects will be considered and assessed in the EIA. The Secretary of State expects such matters to be covered in the ES.	Explanation and details to be provided of any mitigation measures for effects which may not be avoided or reduced as a result of the design.
PINS	The Secretary of State draws attention to the need to consider combined effects in addition to cumulative effects. The ecological assessment should take account of noise, vibration, and air quality (including dust) impacts, and include consideration of the interrelationship between effects on ground and surface water and on biodiversity features. The Applicant's attention is drawn to the comments of TDC, contained in Appendix 3 of this Opinion, in this regard. The Secretary of State notes and welcomes that the outcomes of the air quality assessment will be evaluated in the ES biodiversity chapter. Cross-reference should be made in the ES between the relevant topic chapters.	Noise, vibration and air quality outcomes are to be included in the assessment in the ES biodiversity chapter also with cross-reference to be made in the ES between relevant topic chapters.
PINS	The Applicant's attention is drawn to the comments of KCC, contained in Appendix 3 of this Opinion, particularly in relation to the extent of the ecological study areas, and potential effects on nearby internationally designated sites.	Noted.

Consultee	Comments and considerations	How addressed in the ES, and this NSER
Kent County Council	KCC queries why there appears to be no intention to consider the potential effects of air quality and aircraft deposition on the SPA or Ramsar sites; the presence of the features is dependent on the quality of habitats and as such KCC considers there to be a need to consider habitat impacts.	The potential effects of changes to air quality and deposition as a result of the proposals are to be considered.
Kent County Council	Depending on the expected levels of use of the Site, KCC also queries whether there is a need to consider the impacts of traffic and freight travelling to and from the airport on designated sites further afield.	The potential effects of changes to air quality from aircraft and any additional traffic as a result of the proposals are to be considered.
Minster Parish Council	Topics to be covered assume a zone of influence of 5 km or, in the case of the road network, the local impact. The potential for the impact of operational development to exceed this distance seems clear, particularly with regard to noise impact upon the resident population beneath and adjacent to flight paths and the impact upon the nearby SPA and Ramsar site in terms of ecology.	Potential noise impacts on the Thanet Coast and Sandwich Bay SPA will be considered pending outcome of noise modelling.
Natural England	NE welcomes the recognition in this chapter [Air Quality] that there is the potential for air quality impacts on vegetation and ecosystems as well as human health. We are generally satisfied with the methodology proposed where it relates to the assessment of impacts on the natural environment and we would be happy to work with the applicant to identify and agree appropriate, sensitive non-human receptors as recommended in paragraph 3.46 of your Scoping Opinion. We are pleased to see that air quality impacts will be assessed not only from the aircraft themselves but also from the additional traffic that will be associated with the airport during both the construction and operational phases of the development. Paragraph 5.6.2 of the Scoping Report provides criteria from the Design Manual for Roads and Bridges (DMRB) guidance on when a formal air quality assessment of vehicular emissions is likely to be required. Such an assessment will need to be carried out for designated nature conservation sites sensitive to air quality impacts where they fall within 200 m of a road meeting one or more of the criteria listed here.	Designated nature conservation sites sensitive to air quality effects that they fall within 200 m of a road meeting one or more of the criteria listed in the chapter to be identified and air quality impacts subsequently assessed and included within the ES. .
Natural England	As this is the chapter most closely aligned to NE's remit it is worth making a more general point here about the early stage this project appears to be at, certainly in terms of the level of detail reflected in the Scoping Report, with most of the information in this chapter being extremely generic. We share your concerns around the 'limited detail and evidence' provided on key areas such as the gathering of baseline data, the approach to be taken to assessing environmental impacts and proposed mitigation measures (Scoping Opinion, paragraph 3.8). However, we can advise you that Amec Foster Wheeler have recently contacted us to seek more detailed advice on biodiversity issues and in particular in putting together an HRA Evidence Plan.	The level of baseline knowledge of the Site is growing as access has become available. A detailed knowledge will therefore be available to support the assessment as documented within the ES. Consultation with NE in regard to preparation of the Evidence Plan to continue.

Consultee	Comments and considerations	How addressed in the ES, and this NSER
Natural England	We note from Section 6.5 of the Scoping Report that a 10 km search radius has been used to identify statutory sites which may be affected by the Project and we support your request (Scoping Opinion, paragraph 3.59) that the Environmental Statement (ES) provide justification for a zone of influence of this size. We consider that the designated sites listed below are those which are most likely to be affected by the development, all of which fall within the current 10 km zone, but we will work with the applicant as more detailed information becomes available to assess whether or not there are any other relevant sites outside this. • Sandwich Bay to Hacklinge Marshes Site of Special Scientific Interest (SSSI) (0.9 km) • Sandwich Bay Special Area of Conservation SAC (0.9 km) • Thanet Coast SAC (0.9 km) • Thanet Coast and Sandwich Bay SPA (0.9 km) • Thanet Coast and Sandwich Bay Ramsar site (0.9 km) • Sandwich & Pegwell Bay National Nature Reserve (NNR) (0.9 km) • Thanet Coast SSSI (4.3 km) • Outer Thames Estuary SPA (4.7 km) • Margate & Long Sands SAC (6 km) • Stodmarsh SSSI / SAC / SPA / Ramsar site / NNR (7.6 km) • Preston Marshes SSSI (8.9 km)	The designated sites listed are to be considered in the assessment particularly with regard to changes in air quality/deposition and noise effects.
Natural England	We are generally happy with the broad summary of impacts scoped in for further assessment as outlined in paragraph 6.6.12 of the Scoping Report. We would add that when assessing the potential impact of management measures to reduce bird collision risk the ES also covers any implications stemming from the resumption of the 13 km bird strike safeguarding zone defined by the International Civil Aviation Organisation (ICAO) which would require all future planning applications within this zone to be assessed for their potential impacts on bird numbers and movements. When assessing all impacts on designated sites a comparison should be made between what is proposed in the DCO and the previous airport operations.	Mitigation measures to reduce bird collision and the implications stemming from the resumption of the 13 km bird strike safeguarding zone to be considered.
Natural England	We agree with your request that the potential for effects on relevant habitats and species resulting from pollution incidents during both the construction and operational phases of the airport should remain scoped in at this stage (Scoping Opinion, paragraph 3.34), particularly given the confirmed presence of contamination on site (Scoping Report, Chapter 9). We support Thanet District Council's request that a Construction Environmental Management Plan (CEMP) should form part of the ES.	Effects from pollution incidents during construction and operation of the airport to be considered, and a CEMP provided as part of the ES.
Natural England	We do not believe that Table 6.2 of the Scoping Report currently provides a comprehensive cross-reference of each designated site with the likely pathways of impact by which the Project could affect it. We would query why the potential for deterioration in water quality is not picked up for those sites with a hydrological link to the airport. We also support Kent County Council's query as to why it is not proposed to consider the potential effects of air quality and aircraft deposition on SPA and Ramsar sites.	More detail on likely pathways to designated sites to be provided. Potential effects of air quality changes/nutrient nitrogen deposition on any sensitive habitats within European sites to be considered.

Consultee	Comments and considerations	How addressed in the ES, and this NSER
Natural England	NE notes [Ground and Surface Water] the main site discharge point from the runway and apron areas is via a pipe running out to the designated sites at Pegwell Bay and that if the applicant wishes this discharge to continue under their operation of the site then they will need to apply to the Environment Agency (EA) for a new discharge permit. In our initial meeting with the applicant on 26 April 2016 we advised that we would not wish to see any reduction in the quality of this discharge from what was previously permitted. We are pleased to see that the ES will give further consideration to the effects on water quality targets at Pegwell Bay and associated designated sites (Scoping Report, paragraph 7.6.4) and we also support your Scoping Opinion request (paragraph 3.35) that the potential for accidental spillages to Pegwell Bay via the site drainage network during construction remains scoped in at this early stage.	Noted. The potential effects to water quality targets at Pegwell Bay and associated designated nature conservation sites to be considered.

Appendix E
Conservation Objectives

Thanet Coast and Sandwich Bay SPA (Site Code: UK9012071)

With regard to the SPA and the individual species and/or assemblage of species for which the site has been classified (the 'Qualifying Features' listed below), and subject to natural change;

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.

Qualifying Features:

- Golden plover (*Pluvialis apricaria*): non-breeding;
- Turnstone (*Arenaria interpres*): non-breeding; and
- Little tern (*Sterna albifrons*): breeding.

Thanet Coast SAC (Site Code: UK0013107)

With regard to the SAC and the natural habitats and/or species for which the site has been designated (the 'Qualifying Features' listed below), and subject to natural change;

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.

Qualifying Features:

- H1170. Reefs; and
- H8330. Submerged or partially submerged sea caves.

Sandwich Bay SAC (Site Code: UK0013077)

With regard to the SAC and the natural habitats and/or species for which the site has been designated (the 'Qualifying Features' listed below), and subject to natural change;

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.

Qualifying Features:

- H2110. Embryonic shifting dunes;

- H2120. Shifting (white) dunes along the shoreline, with marram grass (*Ammophila arenaria*);
- H2130. Fixed dunes with herbaceous vegetation ("grey dunes") - dune grassland;
- H2170. Dunes with *Salix repens ssp. Argentea - d*unes with creeping willow; and
- H2190. Humid dune slacks.

Outer Thames Estuary SPA and proposed SPA (Site Code: UK9020309)

With regard to the SPA and pSPA and the individual species and/or assemblage of species for which the site has been or may be classified (the 'Qualifying Features' including the 'Additional Qualifying Features' listed below), and subject to natural change;

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.

Qualifying Features:

- A001 Red-throated diver (*Gavia stellata*): Non-breeding

Additional Qualifying Features*

- A193 Common tern (*Sterna hirundo*): Breeding; and
- A195 Little tern (*Sterna albifrons*): Breeding.

*Government has initiated public consultation on the scientific case for the classification of these features as part of this Special Protection Area (SPA)

Margate and Long Sands SCI (Site Code: UK0030371)

With regard to the SCI and the natural habitats and/or species for which the site has been designated (the 'Qualifying Features' listed below), and subject to natural change;

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 the qualifying natural habitats rely.

Qualifying Features

- H1110. Sandbanks which are slightly covered by sea water all the time

Stodmarsh SPA (Site Code: UK9012121)

With regard to the SPA and the individual species and/or assemblage of species for which the site has been classified (the 'Qualifying Features' listed below), and subject to natural change;

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.

Qualifying Features:

- Great bittern (*Botaurus stellaris*): Non-breeding;
- Gadwall (*Anas strepera*): Breeding;
- Gadwall: Non-breeding;
- Shoveler (*Anas clypeata*): Non-breeding;
- Hen harrier (*Circus cyaneus*): Non-breeding;
- Waterbird assemblage; and
- Breeding bird assemblage.

Stodmarsh SAC (Site Code: UK0030283)

With regard to the SAC and the natural habitats and/or species for which the site has been designated (the 'Qualifying Features' listed below), and subject to natural change;

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 the habitats of qualifying species;
- The structure and function of the habitats of qualifying species;
- The supporting processes on which the habitats of qualifying species rely;
- The populations of the qualifying species; and
- The distribution of the qualifying species within the site.

Qualifying Features:

- Desmoulin`s whorl snail (*Vertigo moulinsiana*)

Blean Complex SAC (Site Code: UK0013697)

With regard to the SAC and the natural habitats and/or species for which the site has been designated (the 'Qualifying Features' listed below), and subject to natural change;

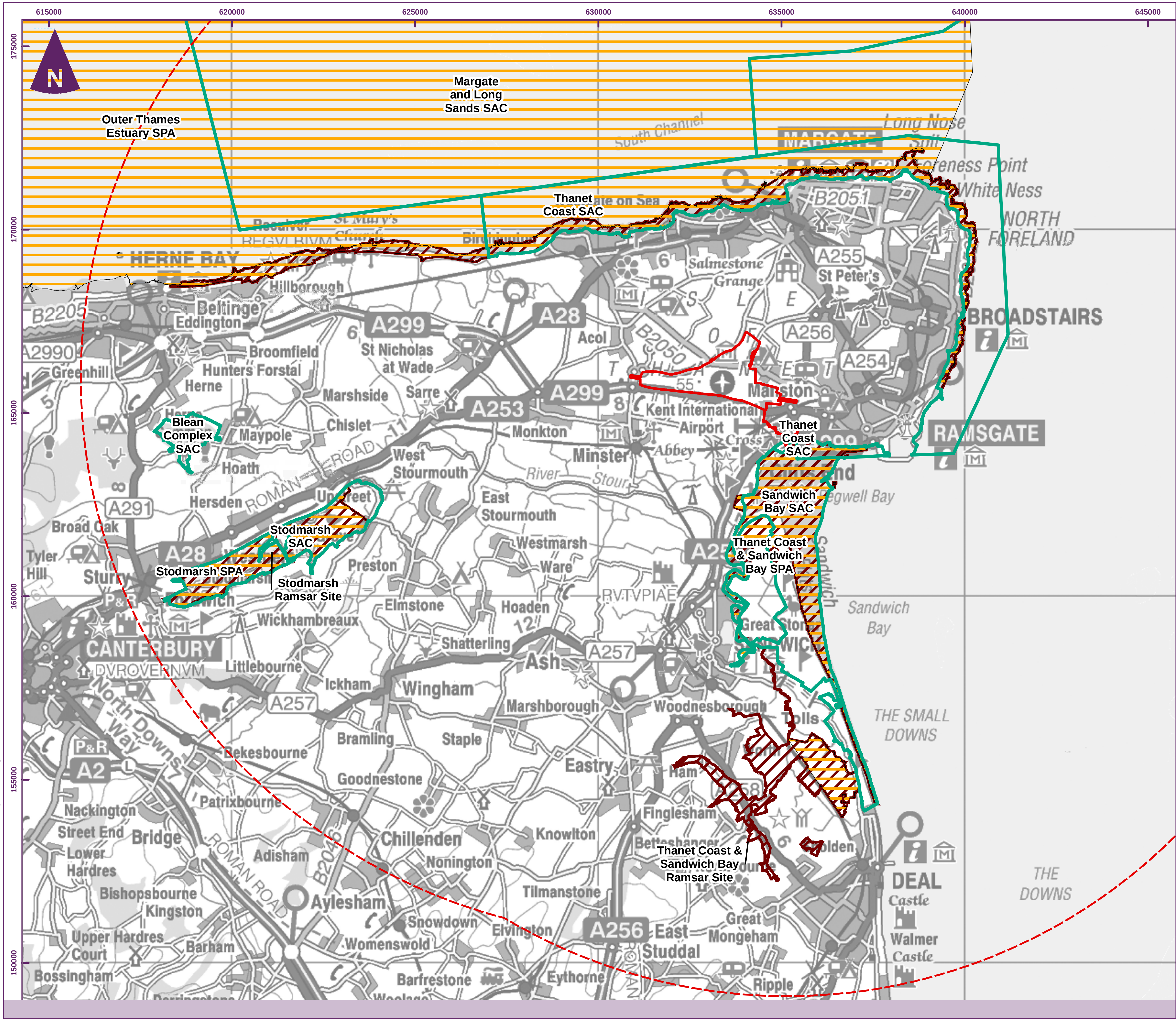
Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring;

- 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.

Qualifying Features:

- H9160. Sub-Atlantic and medio-European oak or oak-hornbeam forests of the *Carpinion betuli*; Oak-hornbeam forests

January 2018
Doc Ref. 38199CR056i1



Key

Application boundary

Special Area of Conservation (SAC)

Special Protection Area (SPA)

Ramsar site

0 1 2 3 4 5 6 km

Scale at A3: 1:100,000

Client

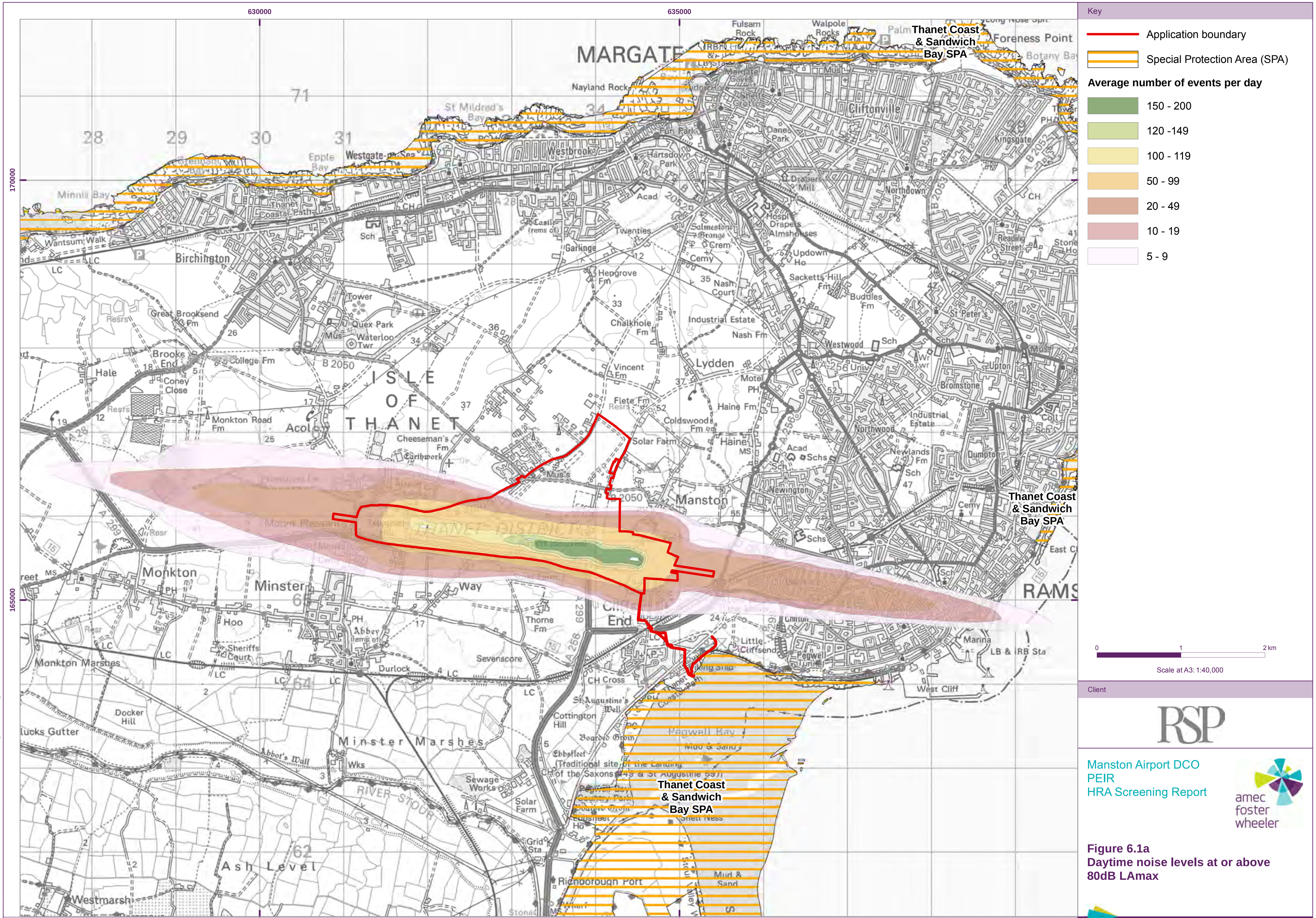
RSP

Manston Airport DCO
PEIR
HRA Screening Report

amec foster wheeler

Figure 5.1
Statutory designated sites within 15 km of the Order Limits

December 2017 38199-Lon143a.mxd parkj



Client

RSP

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PEIR
HRA Screening Report

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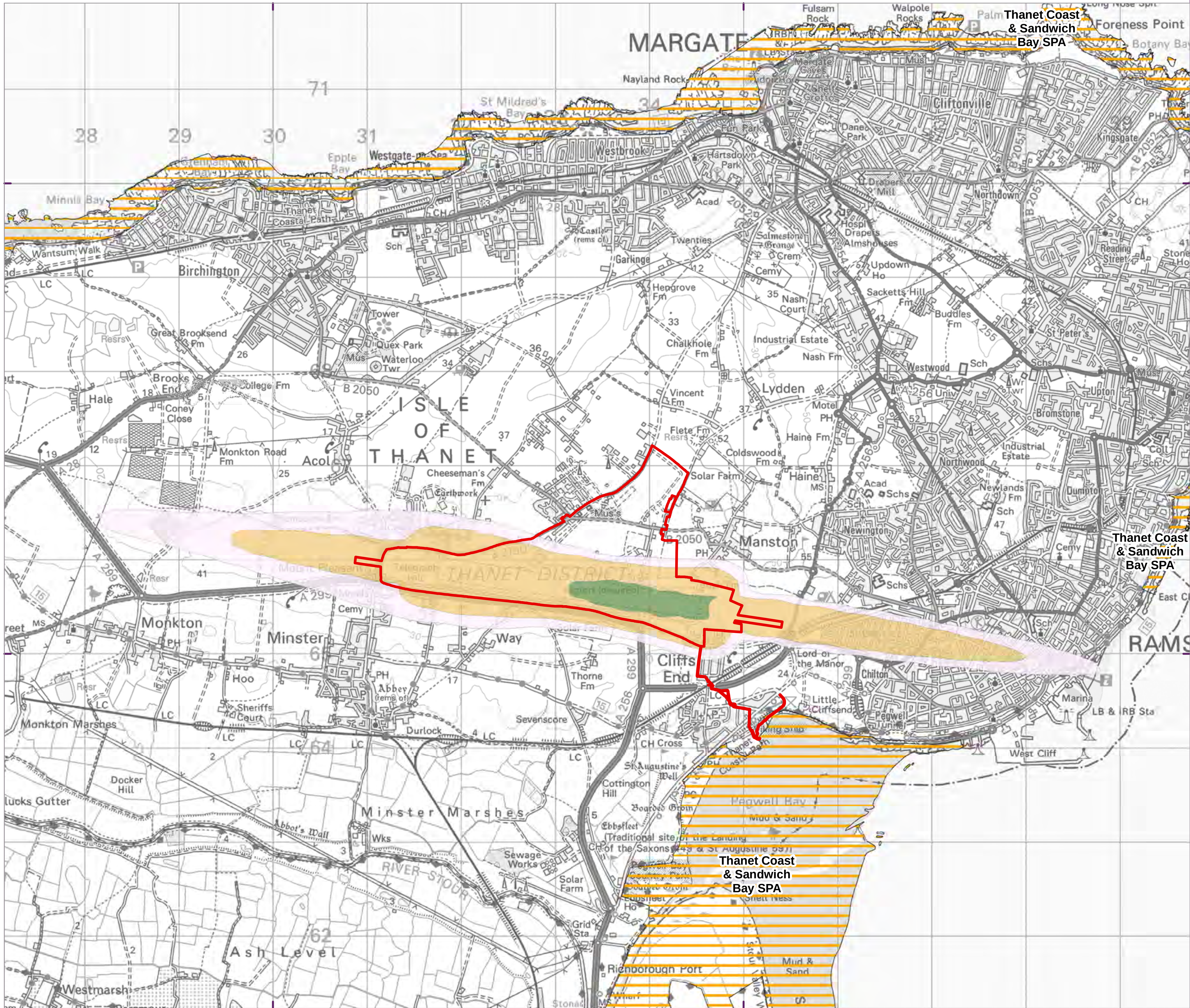
Figure 6.1a
Daytime noise levels at or above 80dB LAmax



Key

Application boundary

Special Protection Area (SPA)

Average number of events per day

5 - 9

2 - 4

1

0 1 2 km

Scale at A3: 1:40,000

Client

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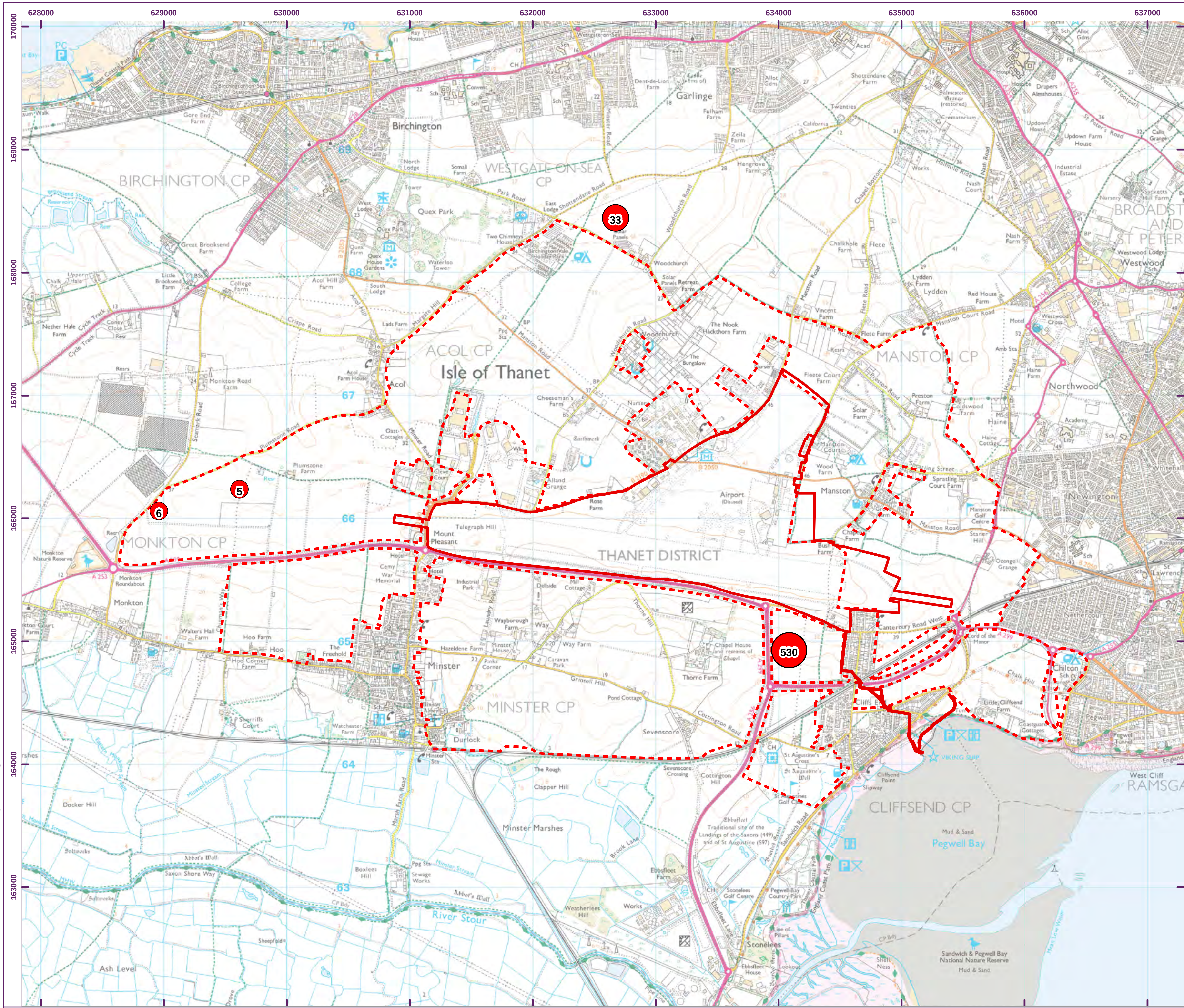
Figure 6.1b
Night-time noise levels at or above 80dB LAmax

December 2017 38199-Lon232.mxd parkj

file: H:\Projects\38199 LON Manston Airport DCO EIA\Drawings\ArcGIS\Figures\38199-Lon232.mxd



Key

Application boundary

Functional habitat survey area

Golden Plover Peak Count

1 - 20 birds

21 - 99 birds

100+ birds

0 0.5 1 1.5 km

Scale at A3: 1:30,000

Client

RSP

Manston Airport DCO
PEIR
HRA Screening Report

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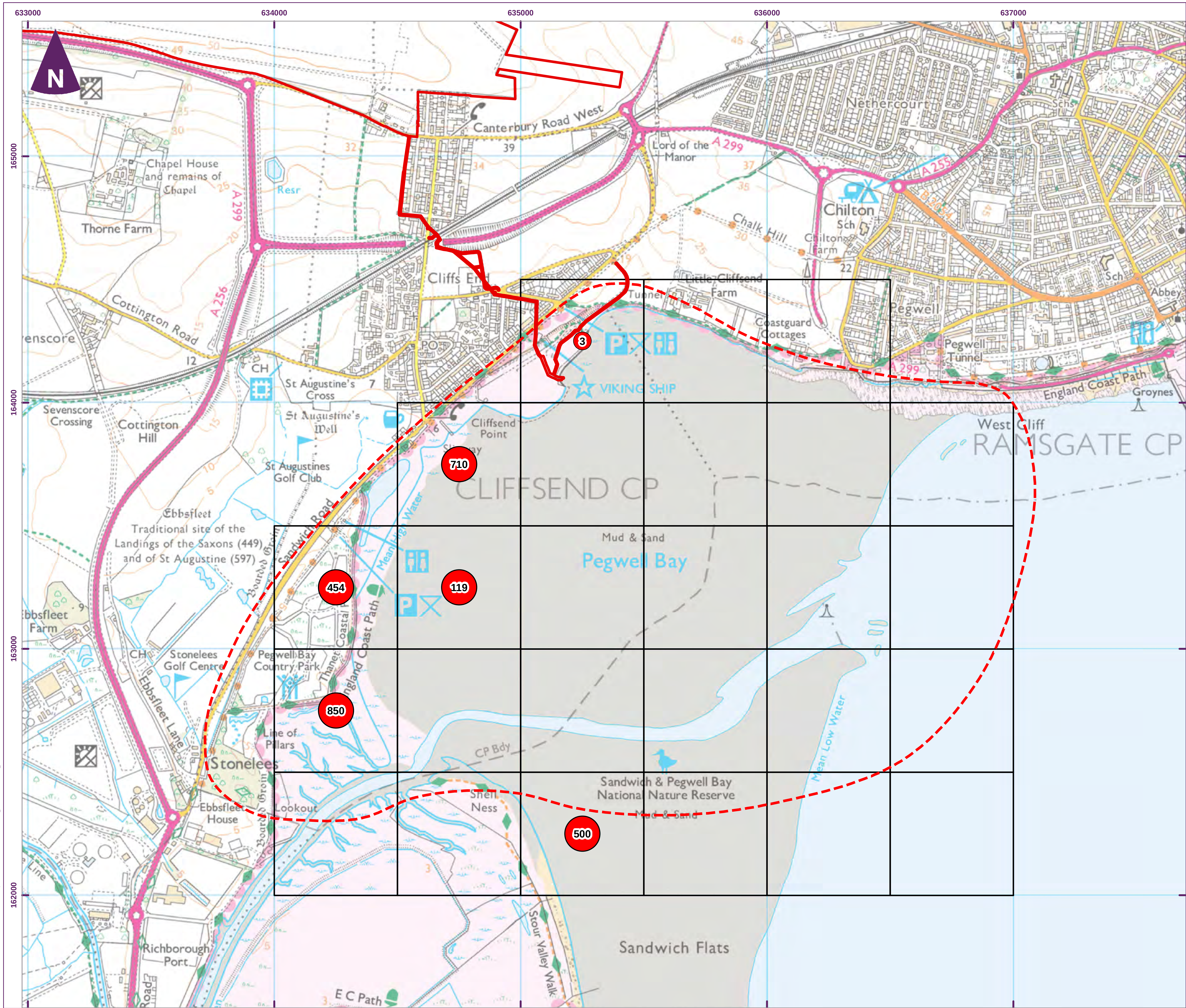
Figure 6.3
Functional Habitat Survey 2016/17: peak counts of Golden Plover

December 2017 38199-Lon220.mxd parkj

file: H:\Projects\38199 LON Manston Airport DCO EIA\Drawings\ArcGIS\Figures\38199-Lon220.mxd



Key

- Application boundary
- Survey area
- 500 x 500 m recording grid

Golden Plover Peak Count

- 1-20 individuals
- 21-99 individuals
- 100+ individuals

0 250 500 750 m

Scale at A3: 1:15,000

Client

RSP

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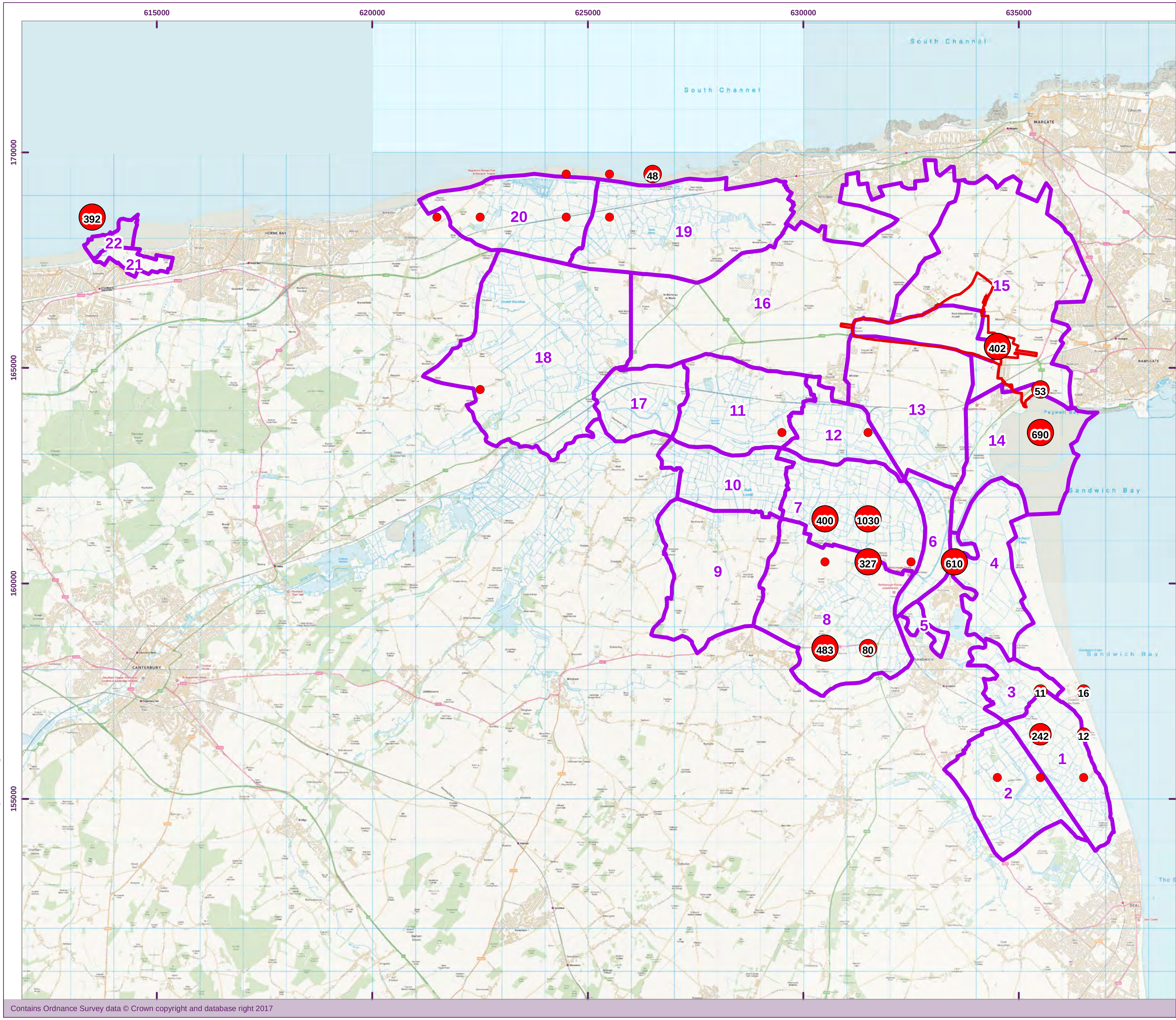
Figure 6.4
Pegwell Bay Distribution Survey 2016/17: peak counts of Golden Plover in each 500m grid square

December 2017 38199-Lon221.mxd parkj

file: H:\Projects\38199 LON Manston Airport DCO EIA\Drawings\ArcGIS\Figures\38199-Lon221.mxd



Client

RSP

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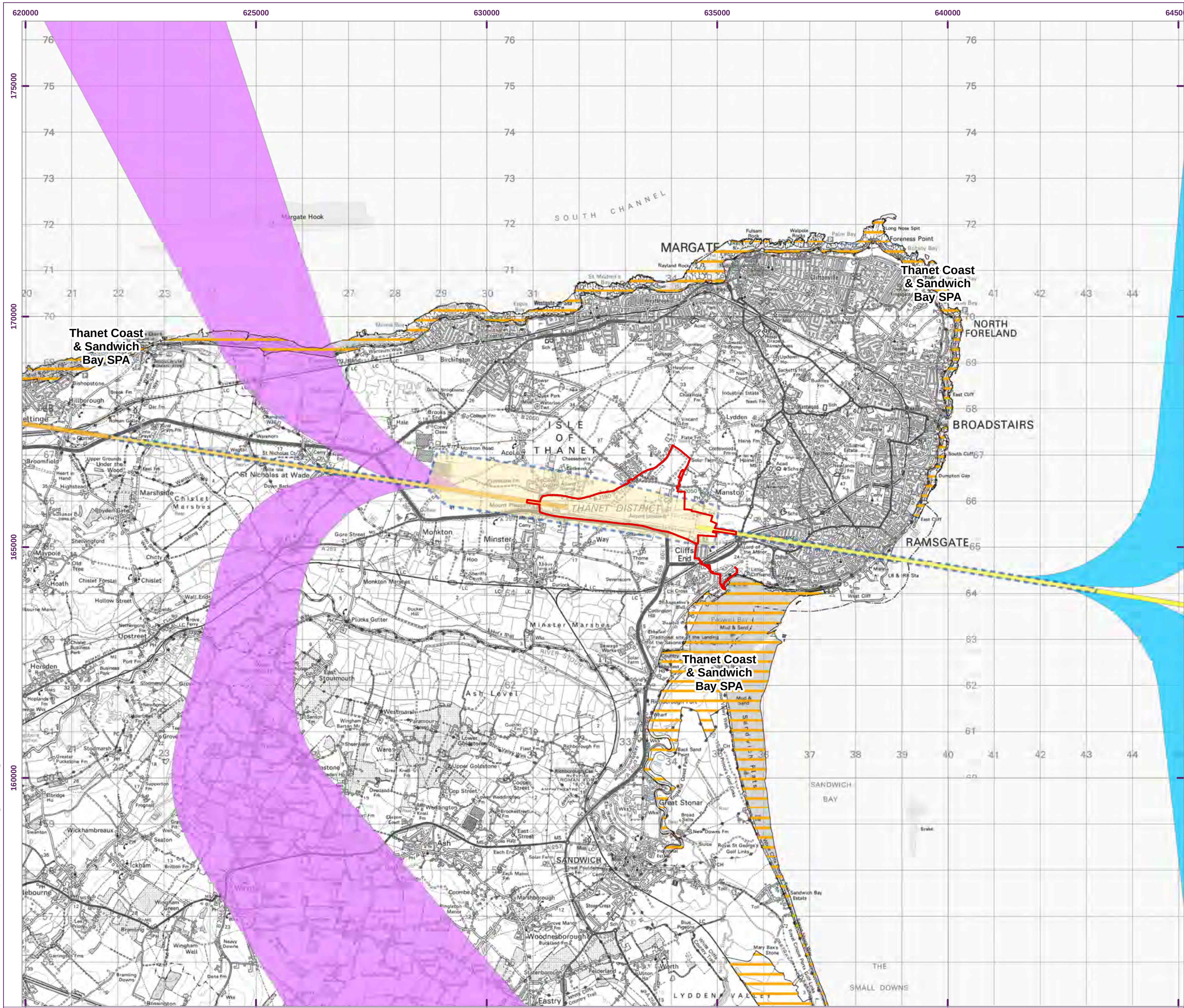
Figure 6.5
Henderson & Sutherland (2017): peak counts of golden plover

December 2017 38199-Lon222.mxd parkj

file: H:\Projects\38199 LON Manston Airport DCO EIA\Drawings\ArcGIS\Figures\38199-Lon222.mxd



Key

- Application boundary
- Flight paths below 500m
- Special Protection Area (SPA)
- Approaches from the East
- Approaches from the West
- Departures to the East
- Departures to the West

0 1 2 3 4 km

Scale at A3: 1:80,000

Client

RSP

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Figure 6.6
Proposed flight lines of aircraft under 500m in altitude

December 2017 38199-Lon229.mxd parkj

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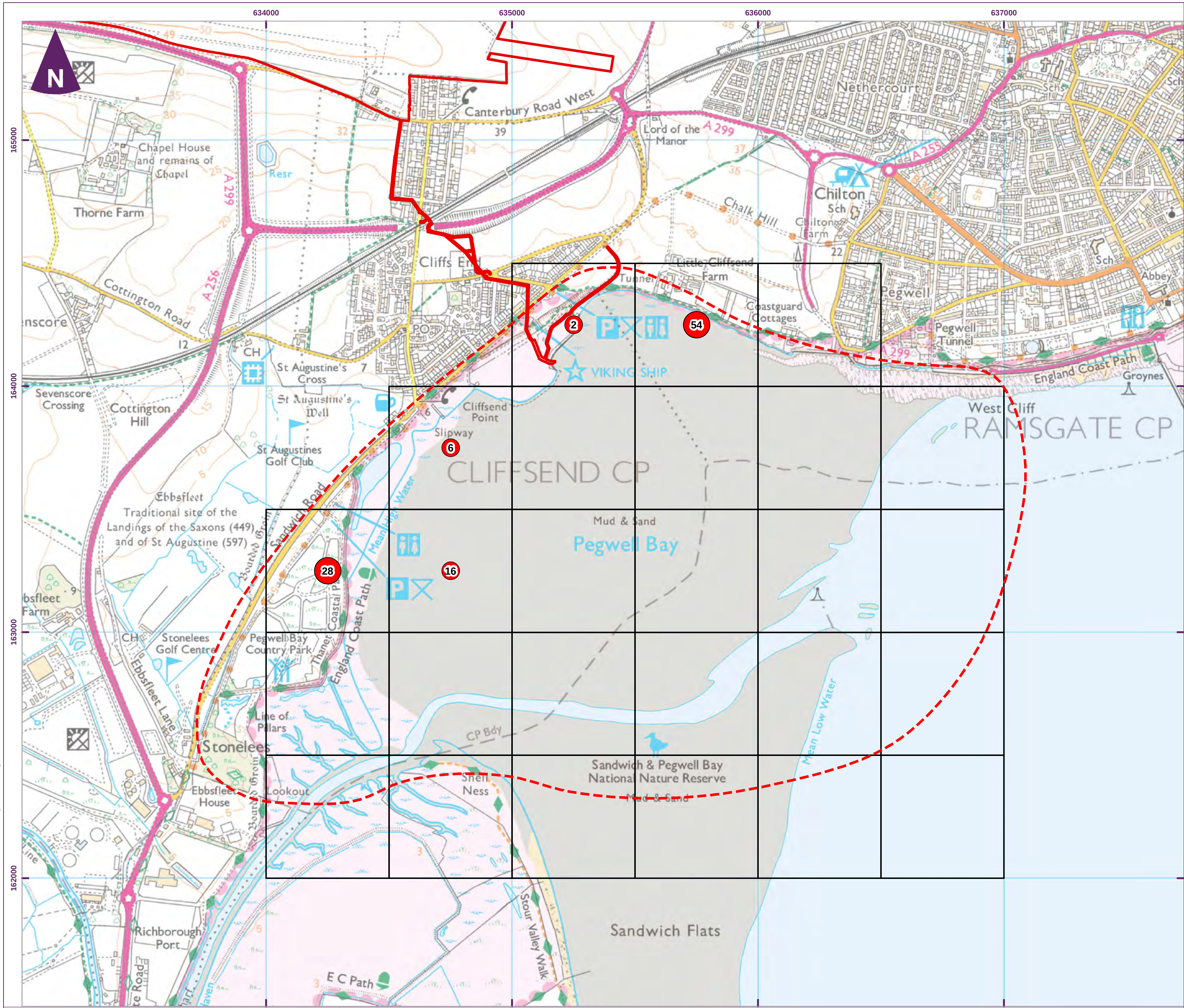

Key

- Application boundary
- Survey area
- 500 x 500 m recording grid

Turnstone Peak Count

- 1-20 individuals
- 21-99 individuals
- 100+ individuals

0 0.25 0.5 0.75 km

Scale at A3: 1:15,000

Client

RSP

Manston Airport DCO
PEIR
HRA Screening Report

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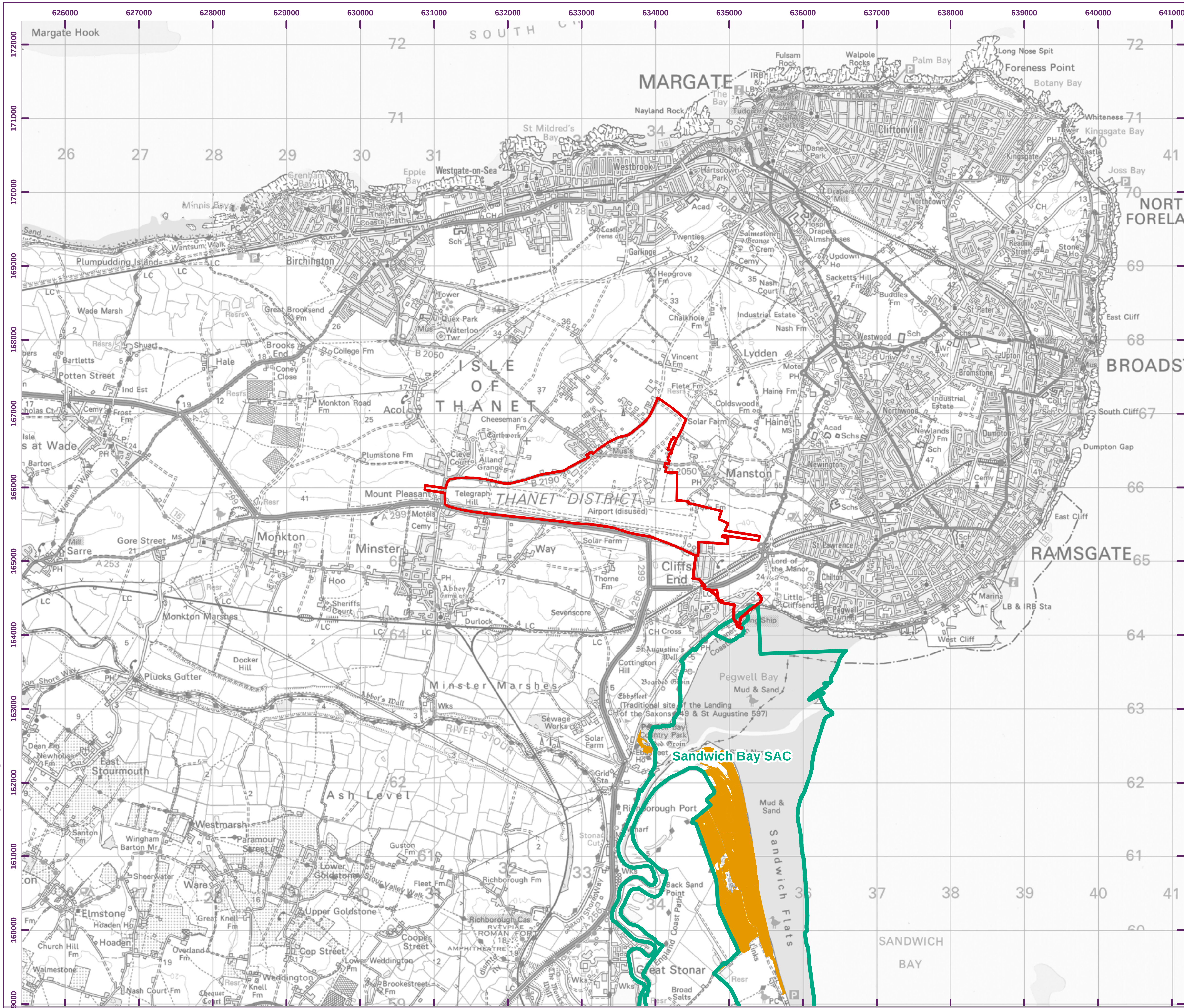
Figure 6.7
Pegwell Bay Distribution Survey 2016/17: peak counts of Turnstone in each 500m grid square

December 2017 38199-Lon223.mxd parkj

file: H:\Projects\38199 LON Manston Airport DCO EIA\Drawings\ArcGIS\Figures\38199-Lon223.mxd



Key

- Application boundary
- 5km search area
- Special Area of Conservation (SAC) - Sandwich Bay
- Priority Habitat - Coastal sand dunes

0 500 1,000 1,500 2,000 2,500 m

Scale at A3: 1:50,000

Client

RSP

Manston Airport DCO
PEIR
HRA Screening Report

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Figure 6.8
Sandwich Bay SAC - extent of Priority Habitat, Coastal Sand Dunes

December 2017 38199-Lon224.mxd squij

file: H:\Projects\38199 LON Manston Airport DCO EIA\Drawings\ArcGIS\Figures\38199-Lon224.mxd

Appendix 7.2

RiverOak Strategic Partners

Manston Airport DCO EIA

Ecological Desk Study

June 2017

Amec Foster Wheeler Environment
& Infrastructure UK Limited

Report for

RiverOak Strategic Partners

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Document revisions

No.	Details	Date
1	Draft version 2	12/05/2017
2	Draft version 3	23/11/2017

Contents

1. Introduction

1.1 Background

RiverOak Investment Corp LLC (RiverOak) is planning to reopen Manston Airport (hereon within this report referred to as the Site) as a new air freight and cargo hub for the South East. This Site, covering approximately 325 hectares (ha), is located within the district of Thanet in Kent, close to the coastal town of Ramsgate. The approximate central point of the Site is at National Grid Reference (NGR) TR 330 657.

There was an operational airport at the Site between 1916 and 2014. Until 1998 it was operated by the Royal Air Force as RAF Manston, and, for a period in the 1950s, was also a base for the United States Air Force (USAF). From 1998 it was operated as a private commercial airport with a range of services including scheduled passenger flights, charter flights, air freight and cargo, a flight training school, flight crew training and aircraft testing. In the most recent years it was operating as a specialist air freight and cargo hub servicing a range of operators. Although the airport was closed in May 2014, much of the airport infrastructure, including the runway, taxiways, aprons, cargo facilities and passenger terminal remain intact.

The proposed Manston Airport development involves the development of an air freight and cargo facility with the capacity to handle more than 10,000 air transport movements (ATMs) of cargo aircraft per year as part of the provision of air cargo transport services.

2. Defining Protected and Notable Species and Habitats

A number of sites, habitats and species are protected or controlled through either statute, or national or local policy. Boxes 1 and 2 define and provide details of those that are considered within this report. The scientific names of all species cited in this report are provided in Appendix A. Further details of legislation and policy related to biodiversity are provided in Appendix B.

Box 1 Designated Wildlife Sites, and Priority Habitats and Species

Statutory nature conservation sites

Internationally important Sites: Special Areas of Conservation (SACs) and candidate SACs, Special Protection Areas (SPAs) and proposed SPAs, Sites of Community Importance, Ramsar Sites and European offshore marine Sites.

Nationally important Sites: Sites of Special Scientific Interest (SSSIs) that are not subject to international designations and National Nature Reserves (NNRs)

Local Nature Reserves (LNRs) are statutory Sites that are of importance for recreation and education as well as nature conservation. Their level of importance is defined by their other statutory or any non-statutory designation (e.g. if an LNR is also an SSSI but is not an internationally important Site, it will be of national importance). If an LNR has no other statutory or non-statutory designation it should be treated as being of district-level importance for biodiversity (although it may be of greater socio-economic value).

Non-statutory nature conservation sites

Local Wildlife Sites (LWS): In Kent LWS are designated on a county level, by a specialist panel that includes representatives from that includes amongst others Kent County Council, Natural England and the Kent Wildlife Trust. Kent LWS were previously known as Sites of Nature Conservation Importance (SNCIs).

Priority habitats and species

In this report, the geographic level at which a species/habitat has been identified as a priority for biodiversity conservation is referred to as its level of ‘species/habitat importance’. For example, habitats and species of principal importance for the conservation of biological diversity in England (see the third bullet point below) are identified as of national species/habitat importance reflecting the fact that these species/habitats have been defined at a national level. The level of importance therefore pertains to the species/habitat as a whole rather than to individual areas of habitat or species populations, which cannot be objectively valued, other than for waterfowl, for which thresholds have been defined for national/international ‘population importance’.

- International importance: populations of species or areas of habitat for which European Sites are designated;
- International importance: populations of birds meeting the threshold for European importance (1% of the relevant international population);
- National importance: habitats and species of principal importance for the conservation of biological diversity in England, and listed under Section 41 (s41) of the Natural Environment and Rural Communities (NERC) Act 2006. These habitats and species are listed on: http://jncc.defra.gov.uk/page-5705 They include those former UK Biodiversity Action Plan (UK BAP) priority habitats and species that occur in England;
- National importance: Species listed as being of conservation concern in the relevant UK Red Data Book (RDB) or Birds of Conservation Concern (BoCC) Red List[1] (Eaton *et al*., 2015);
- National importance: Nationally Scarce species, which are species recorded from 16-100 10x10km squares of the national grid;
- National importance: Populations of birds comprising at least 1% of the relevant British breeding/wintering population (where data are available);
- National importance: Ancient woodland (i.e. areas that have been under continuous woodland cover since at least 1600); and
- County importance: Species and habitats listed in the Kent local Biodiversity Action Plan (LBAP)[2].

Box 2 Legally Protected and Controlled Species

Legal protection

Many species of animal and plant receive some degree of legal protection. For the purposes of this study, legal protection refers to:

- Species included on Schedules 1, 5 and 8 of the *Wildlife and Countryside Act 1981* (as amended), excluding:
  - species that are only protected in relation to their sale (see Section 9[5] and 13[2]), reflecting the fact that the proposed development does not include any proposals relating to the sale of species; and
  - species that are listed on Schedule 1 but that are not likely to breed on or near the Site, given that this schedule is only applicable whilst birds are breeding;
- Species included on Schedules 2 and 5 of The *Conservation of Habitats and Species Regulations 2010* (as amended); and
- Badgers, which are protected under the *Protection of Badgers Act 1992*.

A summary of the legislation pertaining to faunal species that may occur on the Site is provided in Appendix B.

Legal control

Schedule 9 of the *Wildlife and Countryside Act 1981* (as amended) lists species of animal that it an offence to release or allow to escape into the wild and species of plant that it is an offence to plant or otherwise cause to grow in the wild.

2.1 Purpose of report

This report details the methods adopted and results of an ecological desktop study for the Site. These results will be used, along with the results from other ecological studies, to inform an Environmental Impact Assessment (EIA) to support a Development Consent Order (DCO) application for the Site.

[1] Red-listed criteria include: historical decline in the breeding population; and/or severe breeding population decline over 25 years/longer term: severe non-breeding population decline over 25 years/longer term; severe breeding range decline over 25 years/longer term; severe non-breeding range decline over 25 years.
[2] Kent BAP (2016) [Online] Available from: http://www.kentbap.org.uk/

3. Methods

3.1 Desk study

A data-gathering exercise was undertaken to obtain information relating to statutory and non-statutory nature conservation sites, priority habitats and species, and legally protected and controlled species (see Boxes 1 and 2). Data were requested from Kent and Medway Biological Records Centre (KMBRC) and obtained through a review of the Multi-agency Geographic Information for the Countryside (Magic)[3] website, open access aerial mapping resources[4] and aerial photographs of the Site and surrounding area and from Ordnance Survey maps[5]. Data were gathered for:

- Statutory designated sites (national and international) on or within a 10 kilometre (km) radius of the Site;
- Non-statutory designated sites of nature conservation interest located on, or within 2 km of the Site;
- Ancient woodland and other Habitats of Principal Importance (HPI) on, or within 5 km of the Site (where not already covered by statutory and non-statutory sites);
- Records of legally protected and otherwise notable species made on, or within 5 km of the Site, including records of bats and bat roosts from the Kent Bat Group;
- Granted European Protected Species Mitigation Licences (EPSML) within 5 km of the Site;
- Water bodies (potential great crested newt breeding habitat) within 500 metres (m)[6] of the Site, not separated from the Site by barriers (e.g. major roads, rivers, etc.) to great crested newt movement.

Analysis of species data focuses only on records from post 2000, as older records may not give an accurate picture of the current ecological interest on the Site. This contextual information is important as it may point to notable species that could occur on the Site itself.

Further data and contextual information was obtained from the following sources:

- Natural England (NE): studies commissioned by NE into the numbers and distribution of golden plover in the Sandwich Bay and Thanet area, the results of which are reported in Griffiths (2004) and Henderson & Sutherland (2017);
- Sandwich Bay Bird Observatory (SBBO): provided a map showing the main locations for wintering golden plover in the Sandwich Bay area, derived from ongoing studies into the species by the SBBO;
- Kent Ornithological Society (KOS): bird records were extracted from their online database, for all species within 5 km of the Site (http://birdgroups.co.uk/kos/default.asp, accessed in August 2016);
- Kent Bird Reports 2013 and 2014: annual reports published by the Kent Ornithological Society, containing notable bird records in Kent (Privett [ed] 2015, 2016);
- Kent Breeding Bird Atlas 2008-13 (Clements *et al*., 2015). Results from a county-wide survey, mapping the distribution of all breeding bird species at a tetrad (2x2 km) resolution;

[3] http://magic.defra.gov.uk/MagicMap.aspx
[4] http://maps.google.co.uk
[5] https://www.ordnancesurvey.co.uk/osmaps
[6] English Nature (2001). Great Crested Newt Mitigation Guidelines. English Nature, Peterborough. This states that 500 m is generally accepted to be the dispersal distance of great crested newts over land, between breeding ponds. Note: English Nature is now Natural England.

- British Trust for Ornithology (BTO): Wetland Bird Survey (WeBS) core count data for 1995/96-2014/15 inclusive, and low tide data for 2002/03 and 2008/09 (the most recent winters for which data was available) was purchased from the BTO, for their Pegwell Bay count sector. In addition, further core count and low tide data for Pegwell Bay was from obtained from the BTO website (www.bto.org);
- Civil Aviation Authority (CAA): birdstrike data from the former Kent International Airport; and
- Data derived from Environmental Statements for other proposed and consented developments for which information is publicly available, including:
  - Stone Hill Park (OL/TH/0550), a proposed residential development that shares a common boundary with the Site over much of its area;
  - Land East of Haine Road (OL/TH/14/0050), adjacent to the east of the Site;
  - Land south of Great West Autos (F/TH/12/0722), a now built solar farm, adjacent to the north of the Site;
  - Land east of Worlds Wonder (F/TH/14/0645), a proposed solar farm adjacent to the north of the Site; and
  - Land North of Thorne Farm (F/TH/13/0596): a now built solar farm adjacent to the south of the Site.

4. Results

4.1 Statutory nature conservation sites

There are 17 statutory designated nature conservation sites within 10 km of the Site. Summary descriptions of these, with the approximate distances from the Site (in ascending order) are provided in Table 4.1, and their locations in relation to the Site are shown on Figure 4.1a.

Table 4.1 Statutory designated nature conservation sites within 10 km of the Site

Site name and designation	Site interest features	Distance (metres) and direction from Site
International		
Thanet Coast and Sandwich Bay – Ramsar	The Ramsar site (covering 2,169 ha) is designated for supporting internationally important numbers of non-breeding turnstone (under Ramsar Criterion 6), and 15 Red Data Book invertebrate species associated with wetlands (under Criterion 2). In addition, the Ramsar site supports nationally important numbers of ringed plover and greenshank during spring/autumn passage, and golden plover, sanderling, red-throated diver and great crested grebe in winter.	925 m South-east
Thanet Coast and Sandwich Bay – SPA	The SPA (covering 1,838 ha) is designated for populations of European importance of turnstone (non-breeding); golden plover (non-breeding) and little tern (breeding)	925 m South-east
Sandwich Bay – SAC	The SAC (covering 1,137 ha) has primarily been designated due to the presence of four Annex I habitats: embryonic shifting dunes; shifting dunes along the shoreline with European marram grass - 'white dunes'; fixed coastal dunes with herbaceous vegetation; and dunes with *Salix repens* ssp. *argentea*.	925 m South-east
Thanet Coast – Marine SAC	The Marine SAC (covering 2,816 ha) contains the longest continuous stretch of coastal chalk in the UK, and is primarily designated for two Annex I Habitats: Reefs, and submerged or partially submerged sea caves.	925 m South-east
Outer Thames Estuary – Marine SPA	This marine Sea inlet (covering 379,824 ha) regularly supports internationally important numbers of the Annex I Species (red-throated diver) in winter.	3,500 m North
Margate and Long Sands – Site of Community Importance SCI (Inshore Marine)	Margate and Long Sands starts to the north of the Thanet coast of Kent and proceeds in a north-easterly direction to the outer reaches of the Thames Estuary. It contains a number of sand banks (an Annex I habitat) slightly covered by seawater at all times, the largest of which is Long Sands itself.	4,840 m North
Stodmarsh – SAC	The SAC (covering 563 ha) is designated for a sizeable population of the rare Desmoulin's whorl snail that lives beside ditches within pastures on the floodplain of the River Stour where reed sweet-grass, large sedges and common reed dominate the vegetation.	7,700 m South-west
Stodmarsh – Ramsar	The Ramsar site (covering 481 ha) is designated under Ramsar Criterion 2 for supporting: six British Red Data Book wetland invertebrates; 2 nationally rare and 5 nationally scarce plant species; and its diverse assemblage of rare wetland birds which includes gadwall during passage and the breeding season, and bittern, shoveler and hen harrier in winter. Otter is also recorded here.	8,450 m South-west
Stodmarsh - SPA	The SPA (covering 481 ha) is designated for its populations of European importance of bittern, gadwall, shoveler and hen harrier (during winter), and gadwall during the breeding season.	8,450 m South-west
National		

Site name and designation	Site interest features	Distance (metres) and direction from Site
Sandwich and Pegwell Bay – NNR	The NNR (covering 629 ha) contains a complex mosaic of habitats including inter-tidal mudflats, saltmarsh, shingle beach, sand dunes, ancient dune pastures, chalk cliffs, wave cut platform and coastal scrubland. It supports the only ancient dune pasture in Kent. The reserve is of international importance for its wader and wildfowl populations. 615 Hectares (ha) of the NNR is managed as a Kent Wildlife Trust Reserve.	925 m South-west
Sandwich Bay to Hacklinge Marshes – SSSI	The SSSI (covering 1,790 ha) contains the most important sand dune system and sandy coastal grassland in South East England. There are also a wide range of other habitats such as mudflats, saltmarsh, chalk cliffs, freshwater grazing marsh, scrub and woodland are found here. This SSSI comprises grazing marsh habitats within Minster Marshes and often supports large wintering populations of waders, some of which regularly reach levels of National Importance. Associated with the SSSI are outstanding assemblages of both terrestrial and marine plants and invertebrates. Notified features include: non-breeding populations of golden plover, grey plover, ringed plover and sanderling, and the assemblage of breeding birds within areas of lowland open waters and their margins.	925 m South-east
Thanet Coast - SSSI	The SSSI (covering 817 ha) is notified for its coastal habitats and the plant and invertebrate communities they support; geological features and breeding and non-breeding bird populations. Non-breeding populations of golden plover, grey plover, ringed plover and sanderling; breeding little tern; and the variety of passage bird species all form notified features of the SSSI.	4,500 m East
Stodmarsh – NNR	The NNR (covering 249 ha) supports internationally important habitats including reedbeds, fens, ditches, wet grassland and open water which provide an ideal habitat for breeding and wintering birds, invertebrates and rare plants. Water voles are found on the reserve.	7,700 m South-west
Stodmarsh – SSSI	The SSSI (covering 623 ha) is notified for its wetland habitats and the plant and invertebrate communities they support. The SSSI is also notified for its breeding bird assemblage associated with open waters and their margins, and specifically for nationally important breeding populations of bearded tit, Cetti's warbler, gadwall, pochard and shoveler.	7,700 m South-west
Preston Marshes - SSSI	The SSSI (covering 43 ha) is the last remaining area of fen vegetation within the Little Stour Valley, and is notified for its reedswamp habitat and the present of the plant, sharp-leaved pondweed.	8,900 m South-west
Local		
Prince's Beachlands LNR	A narrow coastal site located between two sections of Sandwich and Pegwell Bay NNR and within the Sandwich Bay to Hacklinge Marshes SSSI. A complex mosaic of habitats of international importance for its bird populations.	~3,680m South-east
Bishopstone Cliffs LNR	A clifftop grassland important for insects, with some rare varieties, and birds, such as sand martin (nesting in the cliffs), skylark, meadow pipit and corn bunting. The LNR is part of Reculver Country Park.	~9,220m North-west

4.2 Non-statutory nature conservation sites

There are three non-statutory sites of nature conservation value within 2 km of the Site boundary (see Figure 4.1b):

- Pegwell Bay Infilled Dry Valley Local Wildlife Site (LWS, ref TH02), located 1 km south-east of the Site:
- Roadside Nature Reserve (RNR, ref. TH04), 1.5 km north of the Site; and

- Woods and Grassland, Minster Marshes LWS (ref. TH12). The LWS is located approximately 1.6 km to the south of the Site.

4.3 Habitats of Principal importance (HPI)

No HPI was identified within the Site during the desk study, however, there are multiple parcels of HPI within the 5 km search radius of the Site. All of the wetland and coastal habitats (apart from the maritime cliffs) are located to the south of the Site, much of which within the Thanet Coast and Sandwich Bay SPA, Ramsar site and SACs. These include the following habitat types (Figure 4.2 shows the location of these habitats in relation to the Site:

- Traditional Orchards: there are several separate orchards within the 5 km search area, the closest of which is at Thorne Farm (560 m south of the Site); and the largest at Manston (750 m north east, covering 0.8 ha);
- Deciduous woodland (Lowland Mixed Deciduous Woodland and Wood-pasture and Parkland): relatively small blocks of woodland are scattered throughout the search area, including eight blocks within 1 km of the Site boundary, and the largest single block covering approximately 20-30 ha that forms part of the Quex Park, 1.7 km north of the Site;
- Lowland Fens: four small areas of this habitat (covering between 1-4 ha each) are located within 2 km of the Site, within Sandwich Bay SAC, the closest of which is 1.0 km south of the Site. In addition, there is a much larger (70 ha) area of fenland south of the River Stour (within the SPA/Ramsar but out with the SAC, and 2.9 km south of the Site);
- Reedbeds: a single 0.9 ha block of reedbed, is located within Sandwich Bay SAC, 1.2 km south of the Site, with a larger area (covering approximately 6 ha) adjacent to the River Stour, 3.1 km south of the Site (out with the SAC);
- Intertidal Mudflats: a large area of mudflats (covering approximately 260 ha within the search area) are exposed at low tide, south of the River Stour in Sandwich Bay, the closest of which is 2.3 km south of the Site. The area of mixed sand and mud (covering 250 ha at low tide), north of the River Stour that forms Pegwell Bay had not been classified as a priority habitat at the time of writing this report. All of these areas are within the SAC/SPA/Ramsar sites;
- Coastal Saltmarsh: a continuous fringe of saltmarsh (at its closest point 1 km south of the Site) stretches around the western and south western fringes of Pegwell Bay, and extends south-west along the banks of the River Stour. All of this saltmarsh (covering approximately 100 ha) is within the SAC/SPA/Ramsar sites;
- Maritime Cliffs & Slopes: a broken chain of this habitat runs for 3 km within the search area along the northern fringe of Pegwell Bay and north around the coast of Thanet, at its closest 800 m south of the Site, and part of the SAC/SPA/Ramsar sites. Another broken stretch of this habitat (running for 10km within the search area), extends along the north Thanet coast from Minnis Bay to Thanet (4-5 km north of the Site);
- Coastal Sand Dunes: an extensive area of coastal sand dunes (of which 140 ha are within the search area) stretches from the southern end of Pegwell Bay (at its closest point, 2.6 km south of the Site), south along the coast adjacent to Sandwich Bay. All of this habitat is within the SAC, with the northern half also within the SPA/Ramsar.
- Coastal Vegetated Shingle: a narrow band of this habitat (3.7 km south of the Site) forms a boundary between the Sand Dune and Mudflat habitats, stretching south for more than 1.5 km within the search area (all within the SAC/SPA/Ramsar);
- Coastal and Floodplain Grazing Marsh: there are several extensive blocks of this habitat that form a loose chain of grazing marsh stretching across the Minster Marshes and Ash Levels (none of which is within the SAC/SPA/Ramsar sites), the closest of which is 1.7 km south of the Site, and in total covering approximately 140 ha;

- Good Quality Semi-improved Grassland: there are two blocks of this habitat within the search area (but not within the SAC/SPA/Ramsar sites): one near the Ebbsfleet Sewage Treatment Works (2.6 km south of the Site, covering approximately 20 ha), and the other at Richborough Farm (4.7 km south of the Site, covering 3 ha); and
- Hedgerows and fresh standing water also occur within 5 km of the Site.

4.4 Waterbodies

Six water bodies were identified within 500 m of the Site (see Figure 4.3), of which one was located within the Site itself; and another lies adjacent to the Site, at its northern tip. The water bodies outside the Site are all separated from the Site by main roads/ dual carriageways, with two south of the A299, one north-west of the B2190 and one north-east of the B2050 (the Manston Road).

4.5 Protected or otherwise notable species

The following legally protected and otherwise notable species have been recorded within 5 km of the Site since 2000. Where possible, a measurement of the distance from the Site is provided. Species with the potential to utilise the Site (for example, for foraging, roosting or breeding) are discussed further, as follows:

Birds

KMBRC provided a summary table of the bird records they hold within 5 km of the Site. Table C1 in Appendix C shows a summary of the records of protected or otherwise notable bird species provided (as defined in Box 1). Further details of the numbers and occurrence of bird species that form the qualifying or notified interest of statutory designated sites of nature conservation value (shown in Table 4.1) is discussed, as follows:

Golden Plover

The Thanet Coast & Sandwich Bay SPA was originally designated in part for the internationally important non-breeding population of golden plover that it supports. Nationally important numbers of non-breeding golden plover are also notified features of the Sandwich Bay to Hacklinge Marshes SSSI and Thanet Coast SSSI. However, as part of the third JNCC SPA review (Stroud *et al*., 2016), golden plover was removed as a designated species from the SPA (likely due to declining numbers), although this change is to date unratified. The UK population was estimated to be 420,000 birds in winter (Musgrove *et al*., 2013).

There is the potential for golden plover to use the farmland adjacent to the Site for foraging and roosting. These birds would be considered part of the SPA population. No golden plover were recorded within the Site during bird surveys undertaken for the proposed Stone Hill Park development in winter 2015/16 (WSP, 2016)[7]. Henderson & Sutherland (2017)[8] and Griffiths (2004) and data provided by the SBBO and KOS show that golden plover occur on both intertidal and inland areas around Pegwell Bay in winter. A range of roost sites were used, including Pegwell Bay, but also inland on farmland. Henderson & Sutherland (2017) divided their survey area into a number of Recording Areas (see Figure 4.4). The only records of golden plover within 2 km of the Site were those in their Recording Area 15 to the east of the Site. The Recording Areas most frequently used by the highest numbers of roosting and foraging golden plover were to the south of the Site, the closest of which is approximately 3.5 km from the Site on arable farmland in the Ash Levels (Area 7). Figure 4.4 shows the peak count of golden plover in each 1 km grid square, as recorded during the

[7] Once monthly walkover surveys were undertaken within the Site from November 2015 to February 2016 inclusive.

[8] Surveys for golden plover and lapwing were undertaken across the wide area from the north coast of Thanet to Sandwich Bay, twice-monthly from November 2016 to March 2017 inclusive. The work was broadly a repeat of the surveys carried out in winter 2002/03 (Griffiths, 2004).

2016/17 surveys by Henderson & Sutherland (2017)[9]. Table 4.2 provides further details on usage by golden plover of the 22 Recording Areas employed by Henderson & Sutherland (2017).

Table 4.2 Golden plover: level and type of use in each recording Area (Henderson & Sutherland, 2017)

Area No.	Area (distance and direction from Site)	% of [10]birds	Peak count	Description of use of the Recording Area
1	Worth Marshes east (7.5km south)	6	242	Regular; with a peak count of 242 birds in January, usually foraging in sheep grazed pastures
2	Worth Marshes west (8.0 km south)		87	Recorded on three occasions and always in flight, with a maximum of 87 birds in February. However, thought likely sometimes to feed in this area.
3	St George's (6.3 km south)		11	One record of 11 birds roosting in pasture in November
4	Sandwich Marshes (2.6 km south)	18	610	Up to 610 roosting at the flood-relief pools adjoining the R Stour in November-December, but subsequently few present, and none noted on the farmland. Interchange with the low-tide roost in Pegwell Bay occurs.
5	Monks' Wall (5.8 km south)		0	None recorded
6	Richborough Marshes (3 km south)		6	One record of six birds roosting on wet, ploughed land in December
7	Ash Levels (east) (2.6 km south)	28	1,030	The most strongly favoured area, holding 28% of all birds counted throughout the winter, and a maximum of 1,030 present in late January. While small numbers were noted feeding, most records were of roosting birds. A few were seen in sheep pasture but most occurred on winter cereal fields.
8	Goshall Valley (4.5 km south)	11	810	Recorded on three visits (all foraging and roosting in winter cereal), with a peak count of 810 in early January. Interchange with Areas 4 and 7 was evident, and probably also Area 14, as 80 birds were seen flying north east towards Pegwell Bay on a falling tide on 11 February.
9	Nash-Westmarsh (4.5 km south-west)		0	None recorded. A substantial part of the area near Nash favoured in previous years now has been planted with fruit trees, making it unsuitable for Golden Plovers.
10	Ash Levels (west) (3.2 km south-west)		0	None recorded, despite the area being broadly similar in land use/habitat to Area 7
11	Monkton Marshes (1.5 km south-west)		0	None recorded
12	Minster Marshes (1.6 km south-west)		4	One record, involving four birds in late December
14	Pegwell Bay (0.5 km south-east)	15	690	The mudflats form a roost site, used intermittently at low tide. During survey visits, a peak count of 690 birds was recorded (in late November) though none was present on several survey dates. Regular visits to the area outside the survey (in winter 2016/17) produced peak counts of 880 in November, 150 in December, 800 in January, 1000 in February but none in March. Disturbance caused by bait-diggers and other sources continues to be a problem in this area.
15	Upland Thanet (east) (adjacent to the east)		402	Some areas, especially to the east, were unsuitable because of the tall Brassica crops. Areas of ploughed/fallow land closer to Pegwell Bay were used for feeding and roosting in the first half of the winter, as follows. A flock of 402 birds was roosting and foraging in a field adjacent to the south-east of the Site on 13 November; followed by 53 roosting in a different field (1.3 km west of the Site) on 27 November; and 43 roosting in the same field as the early November record on 31 December. None were recorded in Area 15 in January and February (a March survey was not undertaken in this Area). These birds also used Pegwell Bay.

[9] The location of the birds has been placed in the centre of the 1 km grid square; though the count could have occurred anywhere within the square.
[10] The percentage of the total number of golden plover recorded during the Henderson & Sutherland (2017) survey, is provided for the main Areas used by the species.

Area No.	Area (distance and direction from Site)	% of [10]birds	Peak count	Description of use of the Recording Area
16	Upland Thanet (west) (adjacent to the west)		1	None recorded in survey visits. Outside the survey visits, one golden plover was seen with 43 Lapwings, feeding in oil seed rape at TR330685 on 1st December 2016.
17	Sarre Marshes (4 km west)		0	None recorded.
18	Wantsum Marshes (5 km west)		1	One record of a bird feeding in winter cereal on 13 November. Outside the survey visits, a flock of 90 was feeding in winter wheat just north of Chislet (in the south east of Area 18) on 21 January.
19	Minnis Bay Marshes (2.5 km north-west)		28	Up to 28 birds were recorded roosting in the fields
20	Reculver (6.5 km north-west)		4	Up to four birds were recorded overflying the area on three visits. Outside the survey visits, a flock of 20 was roosting in oilseed rape stubble at TR245690 on 6th March 2017.
21	Swalecliffe (16 km north-west)		0	None recorded. Much of this area has been rendered unsuitable since previous survey by the establishment of static caravan parks and a football ground.
22	Long Rock (17 km north-west)	12	392	Up to 392 were recorded roosting in the intertidal zone in December-January. Golden plover were noted in this area only in the early morning, after which disturbance by visitors caused the birds to depart.

Results from the surveys in 2002/03 (Griffiths, 2004) and 2016/17 (Henderson & Sutherland, 2017) indicate that numbers of golden plover have declined in the Sandwich Bay / Thanet area during the intervening years, from a high tide peak count of 4,962 birds (in January 2003) to only 1,536 (in late January 2017).

KMBRC provided a summary of the 1,073 records of golden plover (within approximately 5 km of the Site) they hold, the most recent of which being in 2012 and the closest to the Site, being on the intertidal mudflats of Pegwell Bay. Wetland Bird Survey (WeBS) core count data for Pegwell Bay was purchased from the British Trust for Ornithology (BTO), a summary of which is provided in Table 4.2.

Table 4.2 Peak monthly counts of golden plover in Pegwell Bay, from winters 2000/01-2014/15

Winter	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Peak count	Month
2000/01	196	414	41	950	3,160	4,000	1070	1,404	4,000	Feb
2001/02	0	840	2,680	6,000	7,000	2,000	3750	3,711	7,000	Jan
2002/03	0	1,350	2,450	190	5,800	4,710	150	2,441	5,800	Jan
2003/04	62	1,410	6,240	5,500	8,000	1,125	14	3,193	8,000	Jan
2004/05	95	0	3,830	5,200	5,330	4,500	920	3,312	5,330	Jan
2005/06	79	2,070	550	7,000	1,900	2,500	595	2,099	7,000	Dec
2006/07	11	663	3,730	945	2,900	4,170	80	1,785	4,170	Feb
2007/08	25	1,500	4,500	5,500	5,000	4,200	0	3,454	5,500	Dec
2008/09	0	0	2,000	3,500	3,230	3,150	5	2,377	3,500	Dec

Winter	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Peak count	Month
2009/10	0	700	1,200	60	753	1,100	410	703	1,200	Nov
2010/11	132	160	3,400	51	2,000	0	0	1,148	3,400	Nov
2011/12	1	1100	1,350	3,000	3,500	0	0	2,237	3,500	Jan
2012/13	1	180	2,000	2,820	4,330	2,820	285	2,072	4,330	Jan
2013/14	16	530	820	1,050	1,093	0	0	701	1,093	Jan
2014/15	1	0	1,147	2,456	0	760	0	1,454	2,456	Dec

Turnstone

The Thanet Coast & Sandwich Bay SPA and Ramsar site are designated for their internationally important non-breeding numbers of turnstone. The SPA qualifying population of turnstone (of 940 individuals, 5-year peak mean counts from 1991/2-1995/6) represent 1.4% of the Western Palearctic population. Turnstone almost exclusively occur in coastal habitats, foraging and resting on rocky shorelines and beaches, but will also forage along the tidelines on sandy beaches and on mudflats. The Site and surrounding farmland provide no opportunities for foraging or resting turnstone, and therefore the species is unlikely to occur in this area.

The Thanet Coast Turnstone monitoring report (Hodgson, 2016) concluded from six surveys undertaken between 2001 -2010 that the population of turnstone within the SPA varied from 1,087 to 1,335 birds, with a mean of 1,227. A coordinated count in 2013 showed a marked decline, with 620 turnstone counted. Further coordinated counts in winter 2013/14 (two counts) and latterly in 2016 (single count) confirmed this decline, with 583, 664 and 537 birds recorded respectively. It was suggested in Hodgson (2016) that prior to high tide, the turnstones from the Thanet Coast & Sandwich Bay SPA flew to join a roost, 2.5 km west of Whitstable Harbour on the north Kent coast, within the Swale SPA and some 18 km north-west of the Site. This suggestion was based on results from coastal survey plots. It would therefore appear that the birds, as would be expected for this species, are following the coastline around Thanet and not undertaking any overland movements. Tabulated survey results from the report indicate that turnstone concentrations within the Thanet Coast & Sandwich Bay SPA occur mainly across the northern extremities of the SPA, heading west toward Whitstable, with Pegwell Bay supporting only a small proportion of the numbers mentioned here (see Table 4.3).

Little Tern

A breeding population of six pairs of Little tern is a qualification feature of the Thanet Coast & Sandwich Bay SPA, and a notified feature of the Thanet Coast SSSI. However, as part of the third JNCC SPA review (Stroud *et al*., 2016), little tern was removed as a designated species of the SPA, due to recent extirpation from the SPA, although this change is as yet, unratified. The little tern almost exclusively occurs in coastal habitats, nesting and foraging along shorelines and beaches. The Site and surrounding farmland provides no opportunities for foraging, resting or nesting little tern, and therefore the species is unlikely to occur in this area.

Other SPA/Ramsar qualifying and SSSI notified species

The Sandwich Bay and Hacklinge Marshes SSSI and Thanet Coast SSSI (both constituent SSSIs of the Thanet Coast & Sandwich Bay SPA) are notified (as well as for golden plover) for their nationally important non-breeding numbers of grey plover, ringed plover and sanderling. Table 4.3 shows the peak winter counts in Pegwell Bay for the notified feature species of these SSSIs, together with those for turnstone (an SPA designated species). As with turnstone and little tern, grey plover, ringed plover and sanderling primarily inhabit coastal habitats and the Site and surrounding farmland provide no foraging or resting opportunities for these species, and therefore they are unlikely to occur in this area.

Table 4.3 Peak winter counts of SSSI species at Pegwell Bay[11]

Species	2010/11	2011/12	2012/13	2013/14	2014/15
Sanderling	93	120	101	120	106
Ringed plover	27	17	52	17	79
Grey plover	387	370	175	481	230
Turnstone	11	13	65	7	16
Golden plover	3,400	3,500	4,330	1,093	2,456

The SSSI is also notified for its breeding bird assemblage associated with lowland open waters and their margins; though none of the species that potentially form this assemblage are likely to utilise the Site or adjacent farmland due to the lack of suitable wetland habitat. Further afield, the Stodmarsh SPA/Ramsar/SSSI is designated for a variety of wetland bird species (see Table 4.1), both during and outside the breeding season. Of these, only hen harrier has the potential to occur within/adjacent to the Site.

Lapwing

Lapwing is not a qualifying or notified feature of the Thanet Coast and Sandwich Bay SPA and its constituent SSSIs, although it is a species of principal importance (as listed under Section 41 of NERC), and is also a BoCC red-listed species in Eaton *et al*. (2015). Lapwing and golden plover occupy very similar habitats in winter (including farmland), with surveys undertaken primarily for golden plover also capturing utilisation by lapwing. KMBRC provided a summary of the 1,271 records of lapwing they hold, within 5 km of the Site, the closest of which is located within the same 10 km grid reference as the Site. A five-year peak mean count of 11,890 lapwing was recorded in Pegwell Bay for the period 2008/09-2012/13 (as obtained from WeBS core count data). Results from the 2016/17 surveys also indicated a decline in lapwing numbers in the area, with a peak count of 6,171 birds recorded in November 2016, and a distribution that was broadly similar to that of golden plover (Henderson & Sutherland 2017). Data obtained from the KOS website (www.kentos.org.uk/) shows that lapwing occur year-round within Pegwell Bay (1.8 km south-east of the Site), with a peak count of 22,000 birds recorded there on the 5 January 2013. No lapwing were recorded within the Site during the winter bird surveys undertaken for the proposed Stone Hill Park development in 2015/16 (WSP, 2016).

Other legally protected bird species

A pair of barn owl (a WCA Schedule 1 species) was found to be roosting in one of the on-site buildings in July 2015 (WSP, 2016).

Birdstrike data

The CAA provided data from Kent International Airport on birdstrike for the period 2007 to 2017[12]. Within this period reports of birdstrike occurred annually between 2009 and 2013 (with the airport closing in 2014).

[11] The figures provided are obtained from WeBS core counts for Pegwell Bay. The winter period is defined as September-March inclusive, covering the months when the species concerned are most likely to be present.
[12] The CAA were asked if there were any birdstrike data prior to 2007 and they responded (email, dated 21.11.17, from P. Pinheiro, Intelligence Lead) that there was one birdstrike reported in 2003 and noted that birdstrike reporting mechanisms and regulations saw various changes and updates over the years.

During that five year period there was a total of 18 reports, 11 of which were confirmed. Eleven species were involved with one report of an unknown species and another with no remains found. The species included three waders (golden plover, dunlin and ringed plover), two gulls (herring and common gulls); a raptor (kestrel), woodpigeon, a corvid (rook) and two passerines (linnet and meadow pipit). The number of birds struck involved singletons on 14 occasions, two birds on two occasions (woodpigeon and ringed plover); no birds on one occasion with a single record when the number was unknown. Of the 18 reports aircraft were damaged on two occasions: once with a strike involving a kestrel and once with a single bird of an unknown species.

Badger

The location of Badger records is provided in the Confidential Appendix D This information should not be made available in the public domain; such records are therefore located within confidential.

Bats

No records of bats were provided from within the Site. Within 5 km of the Site, there were 125 records of bats (since 2000), of at least six species: Common pipistrelle; Nathusius' pipistrelle; soprano pipistrelle; brown long-eared bat; Natterer's bat and serotine. Table 4.4 shows the summarised data received from Kent Bat Group. Further information on the bat records is provided in Table C2 in Appendix A.

Table 4.4 Summary of bat records from within 5 km of the Site.

Species	No. of Records	Date of most recent record	Distance and direction from Site of the nearest record
Brown long-eared bat	20	2015	2.5 km south-west
Common pipistrelle	44	2015	1.0 km north-west
Nathusius' pipistrelle	2	2015	2.9 km north-east
Soprano pipistrelle	14	2015	2.4 km south-west
Pipistrellus Spp.	15	2015	1.5 km south-west
Natterer's bat	23	2015	3.4 km north-west
Serotine	1	2001	2.2 km south-east
***Chiroptera Spp*.**	6	2015	2.0 km north-east

The closest record was of three grounded common pipistrelles, 1.0 km north-west of the Site, in 2012. The closest roost is located, 2.4 km to the south-west of the Site, with a peak count of 668 individual soprano pipistrelles utilising the roost; this count was undertaken in July and included juveniles on the wing. Typically, this roost supports between 250 and 350 fully grown (adult) bats.

A search on MAGIC (accessed 03.07.2017) showed one granted European Protected Species Mitigation Licence (EPSML) within 5 km of the Site, and that was for bats. The licence ran from August 2011 until October 2012, and covered the disturbance of a resting (non-breeding) place for soprano, common and Nathusius pipistrelles, and brown long-eared bat.

Stone Hill Park

Results from a partial survey of the buildings on-site in October 2015, for the proposed Stone Hill Park development, revealed bat roosts in four of the nine buildings inspected (WSP, 2016). Hibernation surveys undertaken for the same project in January to March 2016 confirmed one structure on-site as a brown long-eared bat hibernation roost. Bat activity surveys comprising walked manual transects and the deployment of automated detectors were undertaken in September 2015 to determine levels of bat activity at the Site and species of bat using the Site. The surveys recorded five species of bat active over the Site: common pipistrelle, soprano pipistrelle, noctule, serotine and Nathusius' pipistrelle. Overall levels of activity recorded during the September activity surveys were considered to be low (WSP, 2016).

Dormouse

KMBRC data revealed no records of dormouse since 2000 within the 5 km radius of the Site.

Water vole and otter

KMBRC data revealed that since 2000 there have been 130 records of water vole within 5 km of the Site. The closest of these were at Minster Marshes, 2.8 km south of the Site. One dated record of otter exists from 1952, which was 4.9 km south of the Site.

Amphibians

KMBRC data provided one record of great crested newt, in 2011 at Monkton Chalk Pit Nature Reserve, 2.9 km to the west of the Site. Records of three further native amphibian species were provided (see Table 4.5).

Table 4.5 Summary of amphibian records within 5 km of the Site

Species	Number of records since 2000	Distance and direction of the closest record to the Site
Common frog	46	2.2 km east
Common toad	1	2.0 km east
Smooth newt	8	1.7 km south

A search on MAGIC (accessed 03.07.2017) showed that there were no granted EPSML for great crested newt within 10 km of the site.

Stone Hill Park

As part of collecting baseline ecological data for the proposed Stone Hill development, the area within the Site and 500m of its boundary was assessed for its potential to support great crested newt (GCN). Potentially suitable terrestrial habitat was present on-site, and a total of four potentially suitable water bodies were identified (both on-site, and off-site within 500m of its boundary). These waterbodies were then subject to Habitat Suitability Index (HSI) assessments along with environmental DNA (eDNA) testing if assessed as suitable (undertaken in 2015). Two of the water bodies were assessed as unsuitable to support GCN and were therefore ruled out of further survey. The remaining two water bodies were assessed as potentially suitable for GCN and samples for eDNA testing were taken, and a single presence/likely absence survey was also undertaken using good practice guidelines (egg searching, bottle trapping and torching). The presence/likely absence survey recorded no GCN, and subsequent eDNA testing confirmed the absence of GCN from both water bodies. It was concluded that as GCN had been confirmed as absent from the surrounding water bodies, this species was unlikely to be using potentially suitable terrestrial habitat on the Site (WSP, 2016).

Reptiles

KMBRC provided records of three species of reptile within 5 km of the Site, a summary of which is shown in Table 4.6.

Table 4.6 Summary of reptile records within 5 km of the Site

Species	Legal status / Designation	Number of records since 2000	Distance and direction of the closest record to the Site
Grass snake	WCA, SPI	11	2.9 km west
Slow-worm	WCA, SPI	59	2.3 km north
Viviparous Lizard	WCA, SPI	21	1.85 km south-east

Key: WCA = Wildlife & Countryside Act 1981 (as amended); SPI = species of principal importance for conservation in England as listed on Section 41 of the NERC Act 2006.

Other mammals

Records for a further three mammal species were provided by KMBRC for within 5 km of the Site. These included 106 records of brown hare since 2000, the closest of which being 1.85 km south-east of the Site. A total of 88 records of hedgehog were received, with the closest being 0.2 km east of the Site. Four records of harvest mouse were provided, the closest being 4.3 km south-west of the Site. All three are species of principal importance.

Invertebrates

KMBRC provided records of 137 species of invertebrates within 5 km of the Site, since 2000. Of these, are 10 priority species (listed on Section 41 of NERC) including three butterflies (wall brown, small heath and small blue), a robber-fly, wasp and bee, and four moths. In addition, 16 species are classified as Notable[13], 13 species as Notable A[14], 55 species as Notable B[15] and 53 are classified as IUCN Red-listed[16]. The IUCN Red-listed species recorded here, are mainly those associated with saltmarsh and sand dune habitats, and are therefore likely to be confined to areas outside the Site. However, there is the potential for some species to occur on-site, including the wall brown and small heath butterflies. A summary of the invertebrate records provided is shown in Table C3 in Appendix C.

Vascular plants

Table 4.7 provides a summary of the KMBRC records of protected or otherwise notable vascular plant species found within 5 km of the Site.

Table 4.7 Vascular plants recorded within 5 km of the Site since 2000

Species	Legal status / designation	Number of records since 2000	Distance and direction of nearest record to the Site
Basil Thyme	SPI	5	2.6 km west
Bedstraw Broomrape	WCA8	1	4.5 km south
Cornflour	SPI	4	1.85 km south-east

[13] Notable - Species which are estimated to occur within the range of 16 to 100 10km squares. (Subdivision into Notable A and Notable B is not always possible because there may be insufficient information available). Superseded by Nationally Scarce, and therefore no longer in use.
[14] Notable A - Taxa which do not fall within RDB categories but which are none-the-less uncommon in Great Britain and thought to occur in 30 or fewer 10 km squares of the National Grid or, for less well-recorded groups, within seven or fewer vice-counties. Superseded by Nationally Scarce, and therefore no longer in use.
[15] Notable B -Taxa which do not fall within RDB categories but which are none-the-less uncommon in Great Britain and thought to occur in between 31 and 100 10 km squares of the National Grid or, for less-well recorded groups between eight and twenty vice-counties. Superseded by Nationally Scarce, and therefore no longer in use.
[16] IUCN Red-listing - The IUCN Red List Index (RLI) measures overall trends in extinction risk for groups of species based on genuine changes in their Red List status over time. Habitat availability, population and subpopulation size, number of mature individuals and extent of occurrence are all quantified during the designation of red-list species.

Deptford Pink	SPI	3	4.5 km south
Divided Sedge	SPI	20	1.5 km south-west
Man Orchid	SPI	2	2.7 km west
Martin's Ramping-fumitory	WCA8	3	0.1 km west
Prickly Saltwort	SPI	9	1.8 km south-east
Sea Barley	SPI	1	3.3 km east
Tubular water-dropwort	SPI	12	1.5 km south-west

Key: SPI, Species of Principal Importance (Section 41 of NERC); WCA8, The Wildlife and Countryside Act (1981) (as amended) Schedule 8.

Controlled species

KMBRC provided records of 14 legally controlled species (included under Schedule 9 of the Wildlife and Countryside Act 1981, as amended) recorded within 5 km of the Site since 2000; all of which were outside the Site boundary (see Table 4.8).

Table 4.8 Legally controlled species found within 5 km of the Site

Species	Most recent record	NGR	Record location
Nuttall's Waterweed	2014	TR2863	Various
Japanese Knotweed	2015	TR3665	Pegwell
Yellow Archangel	2002	TR3764	Ramsgate
Wall Cotoneaster	2015	TR3470	Various
Himalayan Cotoneaster	2015	TR3665	Pegwell North
Japanese Rose	2015	TR3463	Various
New Zealand Pigmyweed	2014	TR3160	Various
Water Fern	2004	TR3763	Various
Three-cornered Garlic	2013	TR3870	Cliftonville
Wireweed	2013	TR3966	Various
Wakame	2013	TR3567	Various
Chinese Mitten Crab	2006	TR3564	Pegwell bay
American Slipper Limpet	2014	TR3965	Various
American Mink	2014	TR3663	Various

National Grid Reference (NGR) of the Site: TR3365

5. Summary

5.1 Designated sites

No sites with statutory designation for biodiversity conservation lie within the Site boundary. Seventeen statutory designated sites are located within 10 km of the Site. Of these, nine are of international importance, including the Thanet Coast and Sandwich Bay SPA/Ramsar site, Sandwich Bay SAC and Thanet Coast Marine SAC, all of which are at their closest, 925 m east of the Site. The constituent SSSIs of the SPA include the Thanet Coast SSSI and Sandwich Bay to Hacklinge Marshes SSSI, the latter also being located 925 east of the Site. These sites are designated for a variety of biodiversity including for their habitats, flora and invertebrate interests, but also for non-breeding populations of birds, in particular, golden plover which could potentially occur within, or adjacent to the Site.

5.2 Habitats of Principal Importance (HPI)

Nine HPI have been identified within 2 km of the Site, none of which occur within the Site. These habitats consist of wood pasture & parkland; deciduous woodland; lowland fens; reedbeds; coastal & floodplain grazing marsh; coastal saltmarsh; mudflats; and maritime cliffs & slopes. Numerous isolated and scattered parcels of woodland occur within 2 km of the Site, and the remaining coastal and wetland HPI occur to the south and south-east of the Site around Pegwell Bay. .

5.3 Protected and notable species

The desk study identified a number of legally protected and otherwise notable species within 5 km of the Site (though none within the Site). Many of the species identified are highly specialist, occupying unique and rare niches found only in habitats that do not occur within the Site. However, the desk study revealed records for other species which might utilise the Site and adjacent area, as follows:

- Birds: records of protected and otherwise notable species that could potentially utilise the Site / adjacent area for foraging, roosting or breeding, including: golden plover (an SPA species), WCA Schedule 1 species (hobby, quail, barn owl and kingfisher) and a wide range of priority species associated with farmland (such as skylark, corn bunting and yellowhammer) as well as woodland and scrub habitats.
- Bats: records of at least six species, which might utilise the Site for foraging or roosting. Four summer and one hibernation bat roosts were identified in a total of five buildings on-site in 2015 and 2016 (WSP, 2016).
- Amphibians: one record of great crested newt (GCN within 5 km of the Site. In addition, the desk study revealed six water bodies within 500 m of the Site (which could potentially support breeding GCN), one of which was within the Site. As a result of assessment and survey, WSP (2016) concluded that GCN were unlikely to occur on-site.
- Reptiles: the desk study revealed records of viviparous lizard, grass snake and slow worm within 5 km of the Site, all of which could potentially occur within the Site.
- Other mammals: records of three other priority mammal species: hedgehog, brown hare and harvest mouse, all of which could potentially occur on-site.
- Invertebrates: records for a large number of species, including ten priority species, though many are likely to be associated with coastal habitats that do not occur on-site.
- Plants: records of protected and priority species, some of which could also potentially occur within the Site.

- Invasive species: records of 14 legally controlled species were received for within 5 km of the Site, all of which were out with the Site, though could potentially occur on-site.

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Appendix A
Scientific names of species referred to in this report

Common/ English name	Scientific name
Mammals	
Badger	*Meles meles*
Bat/*Chiroptera Sp.*	*Chiroptera Sp.*
Brown hare	*Lepus europaeus*
Brown long-eared bat	*Plecotus auritus*
Common pipistrelle	*Pipistrellus pipistrellus*
Dormouse	*Muscardinus avellanarius*
Otter	*Lutra lutra*
Harvest mouse	*Micromys minutus*
Hedgehog	*Erinaceus europaeus*
Nathusius' pipistrelle	*Pipistrellus nathusii*
Natterer's bat	*Myotis nattereri*
Pipistrelle/Pipistrellus species	*Pipistrellus species*
Serotine bat	*Eptesicus serotinus*
Soprano pipistrelle	*Pipistrellus pygmaeus*
Water vole	*Arvicola amphibious*
Birds	
Red-throated diver	*Gavia stellata*
Black-throated diver	*Gavia arctica*
Great northern diver	*Gavia immer*
Great crested grebe	*Podiceps cristatus*
Slavonian grebe	*Podiceps auritus*
Black-necked grebe	*Podiceps nigricollis*
Balearic shearwater	*Puffinus mauretanicus*
Storm petrel	*Hydrobates spp*
Leach's petrel	*Oceanodroma leucorhoa*
Bittern	*Botaurus stellaris*
Little egret	*Egretta garzetta*
Purple heron	*Ardea purpurea*
Black stork	*Ciconia nigra*
White stork	*Ciconia ciconia*

Common/ English name	Scientific name
Glossy ibis	*Plegadis falcinellus*
Spoonbill	*Platalea leucorodia*
Bewick's swan	*Cygnus columbianus*
Whooper swan	*Cygnus cygnus*
White-fronted goose	*Anser albifrons*
Barnacle goose	*Branta leucopsis*
Brent goose	*Branta bernicla*
Shelduck	*Tadorna tadorna*
Wigeon	*Anas penelope*
Gadwall	*Anas strepera*
Teal	*Anas crecca*
Mallard	*Anas platyrhynchos*
Pintail	*Anas acuta*
Garganey	*Anas querquedula*
Shoveler	*Anas clypeata*
Pochard	*Aythya ferina*
Tufted duck	*Aythya fuligula*
Scaup	*Aythya marila*
Long-tailed duck	*Clangula hyemalis*
Common scoter	*Melanitta nigra*
Velvet scoter	*Melanitta fusca*
Goldeneye	*Bucephala clangula*
Smew	*Mergus albellus*
Honey buzzard	*Pernis apivorus*
Black kite	*Milvus migrans*
Red kite	*Milvus milvus*
Marsh harrier	*Circus aeruginosus*
Hen harrier	*Circus cyaneus*
Montagu's harrier	*Circus pygargus*
Goshawk	*Accipiter gentilis*
Osprey	*Pandion haliaetus*
Merlin	*Falco columbarius*

Common/ English name	Scientific name
Hobby	*Falco subbuteo*
Peregrine	*Falco peregrinus*
Grey partridge	*Perdix perdix*
Quail	*Coturnix coturnix*
Corncrake	*Crex crex*
Crane	*Grus grus*
Avocet	*Recurvirostra avosetta*
Little ringed plover	*Charadrius dubius*
Ringed plover	*Charadrius hiaticula*
Kentish plover	*Charadrius alexandrinus*
Dotterel	*Charadrius morinellus*
Golden plover	*Pluvialis apricaria*
Grey plover	*Pluvialis squatarola*
Lapwing	*Vanellus vanellus*
Sanderling	*Calidris alba*
Temminck's stint	*Calidris temminckii*
Purple sandpiper	*Calidris maritima*
Ruff	*Philomachus pugnax*
Snipe	*Gallinago gallinago*
Woodcock	*Scolopax rusticola*
Black-tailed godwit	*Limosa limosa*
Bar-tailed godwit	*Limosa lapponica*
Whimbrel	*Numenius phaeopus*
Curlew	*Numenius arquata*
Greenshank	*Tringa nebularia*
Green sandpiper	*Tringa ochropus*
Wood sandpiper	*Tringa glareola*
Turnstone	*Arenaria interpres*
Arctic skua	*Stercorarius parasiticus*
Mediterranean gull	*Larus melanocephalus*
Little gull	*Larus minutus*
Herring gull	*Larus argentatus*

Common/ English name	Scientific name
Kittiwake	*Rissa tridactyla*
Sandwich tern	*Sterna sandvicensis*
Roseate tern	*Sterna dougallii*
Common tern	*Sterna hirundo*
Arctic tern	*Sterna paradisaea*
Little tern	*Sterna albifrons*
Black tern	*Chlidonias niger*
Puffin	*Fratercula arctica*
Turtle dove	*Streptopelia turtur*
Cuckoo	*Cuculus canorus*
Barn owl	*Tyto alba*
Short-eared owl	*Asio flammeus*
Nightjar	*Caprimulgus europaeus*
Kingfisher	*Alcedo atthis*
Bee-eater	*Merops apiaster*
Hoopoe	*Upapa epops*
Wryneck	*Jynx torquilla*
Lesser spotted woodpecker	*Dendrocopus minor*
Short-toed lark	*Calandrella brachydactyla*
Woodlark	*Lullula arborea*
Skylark	*Alauda arvensis*
Sand martin	*Riparia riparia*
Tawny pipit	*Anthus campestris*
Tree pipit	*Anthus trivialis*
Meadow pipit	*Anthus pratensis*
Yellow wagtail	*Motacilla flava*
Grey wagtail	*Motacilla cinerea*
Dunnock	*Prunella modularis*
Nightingale	*Luscinia megarhynchos*
Bluethroat	*Luscinia svecica*
Whinchat	*Saxicola rubetra*
Ring ouzel	*Turdus torquatus*

Common/ English name	**Scientific name**
Fieldfare	*Turdus pilaris*
Song thrush	*Turdus philomelos*
Redwing	*Turdus iliacus*
Mistle thrush	*Turdus viscivorus*
Cetti's warbler	*Cettia cetti*
Grasshopper warbler	*Locustella naevia*
Aquatic warbler	*Acrocephalus paludicola*
Dartford warbler	*Sylvia undata*
Barred warbler	*Sylvia nisoria*
Wood warbler	*Phylloscopus sibilatrix*
Firecrest	*Regulus ignicapillus*
Spotted flycatcher	*Muscicapa striata*
Red-breasted flycatcher	*Ficedula parva*
Pied flycatcher	*Ficedula hypoleuca*
Bearded tit	*Panurus biarmicus*
Willow tit	*Parus montanus*
Golden oriole	*Oriolus oriolus*
Red-backed shrike	*Lanius collurio*
Starling	*Sturnus vulgaris*
House sparrow	*Passer domesticus*
Tree sparrow	*Passer montanus*
Brambling	*Fringilla montifringilla*
Serin	*Serinus serinus*
Linnet	*Carduelis cannabina*
Twite	*Carduelis flavirostris*
Common crossbill	*Loxia curvirostra*
Parrot crossbill	*Loxia pytyopsittacus*
Bullfinch	*Pyrrhula pyrrhula*
Hawfinch	*Coccothraustes coccothraustes*
Lapland bunting	*Calcarius lapponicus*
Snow bunting	*Plectrophenax nivalis*
Yellowhammer	*Emberiza citrinella*

Common/ English name	Scientific name
Ortolan bunting	*Emberiza hortulana*
Reed bunting	*Emberiza schoeniclus*
Corn bunting	*Miliaria calandra*
Herpetofauna	
Common frog	*Rana temporaria*
Common toad	*Bufo bufo*
Smooth newt	*Lissotriton vulgaris*
Grass snake	*Natrix natrix*
Slow-worm	*Anguis fragilis*
Viviparous lizard	*Zootoca vivipara*
Flora	
Basil Thyme	*Clinopodium acinos*
Bedstraw Broomrape	*Orobanche caryophyllacea*
Cornflour	*Centaurea cyanus*
Deptford Pink	*Dianthus armeria*
Divided Sedge	*Carex divisa*
Man Orchid	*Orchis anthropophora*
Martin's Ramping-fumitory	*Fumaria reuteri*
Prickly Saltwort	*Kali turgidum*
Sea Barley	*Hordeum marinum*
Sharp-leaved pondweed	*Potamogeton acutifolius*
Invasive species	
Nuttall's Waterweed	*Elodea nuttallii*
Japanese Knotweed	*Fallopia japonica*
Yellow Archangel	*Lamoastrum galeobdolon argentatum*
Wall Cotoneaster	*Cotoneaster horizontalis*
Himalayan Cotoneaster	*Cotoneaster simonsii*

Common/ English name	Scientific name
Japanese Rose	*Rosa rugosa*
New Zealand Pigmyweed	*Crassula helmsii*
Water Fern	*Azolla filiculoides*
Three-cornered Garlic	*Allium triquetrum*
Wireweed	*Sargassum muticum*
Wakame	*Undaria pinnatifida*
Chinese Mitten Crab	*Eriocheir sinensis*
American Slipper Limpet	*Crepidula fornicata*
American Mink	*Neovison vison*
Other Invertebrates	
White-clawed Crawfish	*Austropotamobius pallipes*

Appendix B
Legislation

All wild mammals (including rabbits and foxes)

Under the *Wild Mammals (Protection) Act 1996* it is an offence intentionally to cause unnecessary suffering to any wild mammal.

Badger

The Protection of Badgers Act 1992 makes it an offence to:

- wilfully kill, injure or take a badger;
- attempt to kill, injure or take a badger; or
- cruelly ill-treat a badger.

It is also an offence to interfere with a badger set by:

- damaging a badger sett or any part of it
- destroying a badger sett;
- obstructing access to, or any entrance of, a badger sett;
- disturbing a badger when it is occupying a badger sett, or

intending to do any of those things or being reckless as to whether his actions would have any of those consequences.

Bats (Rhinolophidae and Vespertilionidae)

All British bat species are listed in Schedule 5 of the *Wildlife and Countryside Act 1981* (as amended) and Schedule 2 of the *Conservation of Habitats and Species Regulations 2010* (as amended). They are afforded full protection under Section 9(4) of the Act and Regulation 41 of the Regulations. These make it an offence, *inter alia*, to:

- deliberately capture, injure or kill a bat;
- deliberately disturb a bat (this applies anywhere, not just at its roost), in particular in such a way as to be likely to:
  - impair their ability to survive, breed or reproduce, or rear or nurture their young;
  - impair their ability to hibernate or migrate.
- affect significantly the local distribution or abundance of that bat species;
- damage or destroy a breeding site or resting place of any bat;
- intentionally or recklessly disturb a bat while it is occupying a structure or place that it uses for shelter or protection; or
- intentionally or recklessly obstruct access to any place that a bat uses for shelter or protection (this is taken to mean all bat roosts whether bats are present or not).

In addition, five British bat species are listed on Annex II of the Habitats Directive. These are:

- Greater horseshoe bat (*Rhinolophus ferrumequinum*)
- Lesser horseshoe bat (*Rhinolophus hipposideros*)
- Bechstein's bat (*Myotis bechsteinii*)
- Barbastelle (*Barbastella barbastellus*)
- Greater mouse-eared bat (*Myotis myotis*)

In certain circumstances where these species are found the Directive requires the designation of Special Areas of Conservation (SACs) by EC member states to ensure that their populations are maintained at a favourable conservation status. Outside SACs, the level of legal protection that these species receive is the same as for other bat species.

Birds

With certain exceptions[17], all wild birds, their nests and eggs are protected by section 1 of the *Wildlife and Countryside Act 1981* (as amended). Therefore, it is an offence, *inter alia*, to:

- intentionally kill, injure or take any wild bird;
- intentionally take, damage or destroy the nest of any wild bird while it is in use or being built; or
- intentionally take or destroy the egg of any wild bird.

These offences do not apply to hunting of birds listed in Schedule 2 of the Act subject to various controls.

Bird species listed on Schedule 1 of the Act receive further protection, thus for these species it is also an offence to:

- intentionally or recklessly disturb any bird while it is nest building, or is at a nest containing eggs or young; or
- intentionally or recklessly disturb the dependent young of any such bird.

For golden eagle, white-tailed eagle and osprey, it is also an offence to:

- take, damage or destroy the nest of these species (this applies at any time, not only when the nest is in use or being built).

Dormouse

Dormouse is listed in Schedule 5 of the *Wildlife and Countryside Act 1981* (as amended) and Schedule 2 of the *Conservation of Habitats and Species Regulations 2010* (as amended). This species is afforded full protection under Section 9(4) of the Act and Regulation 41 of the Regulations. These make it an offence, *inter alia*, to:

- deliberately capture, injure or kill any such animal;
- deliberately disturb any such animal, in particular in such a way as to be likely to:
  - impair their ability to survive, breed or reproduce, or rear or nurture their young;
  - impair their ability to hibernate or migrate.
  - affect significantly the local distribution or abundance of that species;
- damage or destroy a breeding site or resting place of any such animal;
- intentionally or recklessly disturb any of these animals while it is occupying a structure or place that it uses for shelter or protection; or
- intentionally or recklessly obstruct access to any place that any of these animals uses for shelter or protection.

Great crested newt

The great crested newt is listed in Schedule 5 of the *Wildlife and Countryside Act 1981* (as amended) and Schedule 2 of the *Conservation of Habitats and Species Regulations 2010* (as amended). It is afforded

[17] Some species, such as game birds, are exempt in certain circumstances.

protection under Section 9(4) of the Act and Regulation 41 of the Regulations. These make it an offence, *inter alia*, to:

- deliberately capture, injure or kill any such newt;
- deliberately disturb any such newt, in particular in such a way as to be likely to:
  - impair their ability to survive, breed or reproduce, or rear or nurture their young;
  - impair their ability to hibernate or migrate.
  - affect significantly the local distribution or abundance of that species;
- deliberately take or destroy the eggs of such a newt;
- damage or destroy a breeding site or resting place of any such newt;
- intentionally or recklessly disturb any such newt while it is occupying a structure or place that it uses for shelter or protection; or
- intentionally or recklessly obstruct access to any place that any such newt uses for shelter or protection.

This relates to both the aquatic and terrestrial habitat they occupy. The legislation applies to all life stages of this species.

Reptiles

The four widespread[18] species of reptile that are native to Britain, namely common or viviparous lizard, slow worm, adder and grass snake, are listed in Schedule 5 of the *Wildlife and Countryside Act 1981* (as amended) and are afforded limited protection under Section 9 of this Act. This makes it an offence, *inter alia*, to:

- intentionally kill or injure any of these species.

Otter

The otter is listed in Schedule 5 of the *Wildlife and Countryside Act 1981* (as amended) and Schedule 2 of the *Conservation of Habitats and Species Regulations 2010* (as amended). This species is afforded full protection under Section 9(4) of the Act and Regulation 41 of the Regulations. These make it an offence, *inter alia*, to:

- deliberately capture, injure or kill any such animal;
- deliberately disturb any such animal, in particular in such a way as to be likely to:
  - impair their ability to survive, breed or reproduce, or rear or nurture their young;
  - impair their ability to hibernate or migrate.
  - affect significantly the local distribution or abundance of that species;
- damage or destroy a breeding site or resting place of any such animal;
- intentionally or recklessly disturb any of these animals while it is occupying a structure or place that it uses for shelter or protection; or
- intentionally or recklessly obstruct access to any place that any of these animals uses for shelter or protection.

[18] The other native species of British reptile (sand lizard and smooth snake) receive a higher level of protection in England and Wales under the *Conservation of Habitats and Species Regulations 2010* and the *Wildlife and Countryside Act 1981* (as amended). However, the distribution of these species is restricted to only a very few sites. All marine turtles (*Cheloniidae and Dermochelyidae*) are also protected.

Water vole

The water vole is listed in Schedule 5 of the *Wildlife and Countryside Act 1981* (as amended) and is afforded limited protection under Section 9 of this Act. This makes it an offence, *inter alia*, to:

- intentionally kill, injure, or take (handle) a water vole;
- intentionally or recklessly disturb water voles while they are using such a structure or place; or
- intentionally or recklessly damage or destroy or obstruct access to any structure or place which water voles use for shelter or protection.

White-clawed crayfish

The white-clawed crayfish is listed in Schedule 5 of the *Wildlife and Countryside Act 1981* (as amended) and is afforded limited protection under Section 9 of this Act. This makes it an offence, *inter alia*, to:

- intentionally take individuals of this species.

Insects

The insects listed in Schedule 5 of the *Wildlife and Countryside Act 1981* (as amended) and afforded full protection under Section 9 of this Act are:

- the rainbow leaf beetle (*Chrysolina cerealis*), lesser silver water beetle (*Hydrochara craboides*) and violet click beetle (*Limoniscus violaceus*);
- the mire pill beetle (*Curimopsis nigrita*)*;
- the beetles *Graphoderus zonatus, Hypebaeus flavipes* and *Parcymus aeneus*;
- the large copper (*Lycaena dispar*), heath fritillary (*Mellicta athalia*), marsh fritillary (*Eurodryas aurinia*) and swallowtail (*Papilio machaon*) butterflies;
- the field (*Gryllus campestris*) and mole (*Gryyllotalpa gryllotalpa*) crickets;
- the New Forest cicada (*Cicadetta montana*);
- the southern damselfly (*Coenagrion mercuriale*) and Norfolk aeshna dragonfly (*Aeshna isosceles*);
- the wart-biter grasshopper (*Decticus verrucivorus*);
- the Barberry carpet (*Pareulype berberata*), black veined (*Siona lineata*), Essex emerald (*Thetida smaragdaria*), fiery clearwing (*Bembecia chrysidiformis*), Fisher's estuarine (*Gortyna borelii*), New Forest Burnet (*Zygaena viciae*), reddish buff (*Acosmetia caliginosa*) and Sussex emerald (*Thalera fimbrialis*) moths.

This makes it an offence, *inter alia*, to:

- intentionally kill, injure, or take (handle) any of these species (* except the mire pill beetle);
- intentionally or recklessly damage, destroy or obstruct access to any place that any of these species uses for shelter or protection; or
- intentionally or recklessly disturb any of these species while it is occupying a structure or place that it uses for shelter or protection.

Other terrestrial and freshwater invertebrates

In addition to crayfish, insects and spiders, the following terrestrial and freshwater invertebrates are listed in Schedule 5 of the *Wildlife and Countryside Act 1981* (as amended) and afforded full protection under Section 9 of this Act:

- the medicinal leech (*Hirudo medicinalis*);
- a fairy shrimp (Chirocephalus diaphanus);
- the tadpole shrimp or apus (*Triops cancriformis*);
- the freshwater pearl mussel (*Margaritifera margaritifera*);
- the glutinous (*Myxas glutinosa*), sandbowl (*Catinella arenaria*) and Roman (*Helix pomatia*) snails.

This makes it an offence, *inter alia*, to:

- intentionally kill, injure, or take (handle) any of these species;
- intentionally or recklessly damage, destroy or obstruct access to any structure or place that any of these species uses for shelter or protection; or
- intentionally or recklessly disturb any of these species while it is occupying a structure or place that it uses for shelter or protection.

Directive 2009/147/EC (The Wild Birds Directive), 2009

Certain species receive protection at a European level due to appearing on Annex I of the Directive 2009/147/EC of The European Parliament and of The Council of 30 November 2009 on the conservation of wild birds (codified version).

Certain endangered, rare, or vulnerable bird species, which warrant special protection, are included on Annex I of the Directive 2009/147/EC of The European Parliament and of The Council of 30 November 2009 on the conservation of wild birds (codified version); also referred to as the *Wild Birds Directive*.

The *Wild Birds Directive* recognises that habitat loss and degradation are the most serious threats to the conservation of wild birds. It therefore places great emphasis on the protection of habitats for endangered as well as migratory species (listed in Annex I), especially through the establishment of a coherent network of Special Protection Areas (SPAs) comprising all the most suitable territories for these species. Together with Special Areas of Conservation (SACs) designated under *Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora ('Habitats Directive')*, SPAs form a network of pan-European protected areas known as Natura 2000.

Ramsar Sites

Ramsar sites are wetlands of international importance designated under the Ramsar Convention. Sites proposed for selection are advised by the UK statutory nature conservation agencies, or the relevant administration in the case of Overseas Territories and Crown Dependencies, co-ordinated through JNCC. In selecting sites, the relevant authorities are guided by the Criteria set out in the Convention. The Criteria pertaining specifically to birds are as follows:

- Criterion 5: A wetland should be considered internationally important if it regularly supports 20,000 or more waterbirds; and
- Criterion 6: A wetland should be considered internationally important if it regularly supports 1% of the individuals in a population of one species or subspecies of waterbird.

In the UK, the first Ramsar sites were designated in 1976 since which, many more have been designated. The initial emphasis was on selecting sites of importance to waterbirds within the UK, and consequently many Ramsar sites are also Special Protection Areas (SPAs) classified under the Birds Directive. However, greater attention is now being directed towards non-bird features which are increasingly being taken into account, both in the selection of new sites and when reviewing existing sites.

Natural Environment and Rural Communities Act 2006

Section 40 of the *Natural Environment and Rural Communities (NERC) Act 2006* places duties on public bodies to have regard to the conservation of biodiversity in the exercise of their normal functions. In particular, Section 41 of the NERC Act requires the Secretary of State to publish a list of species which are of Principal Importance for conservation in the UK. This list is largely derived from the 'Priority Species' listed under the former UK Biodiversity Action Plan (BAP), which continue to be regarded as Priority Species under the subsequent country-level biodiversity strategies. The Section 41 list replaces the list published by Defra in 2002 under Section 74 of the *Countryside and Rights of Way (CRoW) Act 2000*.

Birds of Conservation Concern: Red List birds

Red and Amber list bird are those listed as being of high or medium conservation concern (respectively) in Birds of Conservation Concern (BoCC) 4: the population status of birds in the United Kingdom, Channel Islands and Isle of Man (Eaton *et al*., 2015). Red list species are those that are Globally Threatened according to IUCN criteria; and/or those whose population or range has declined rapidly in recent years; and/or those that have declined historically and not shown a substantial recent recovery.

Appendix C
Desk Study Data

Table C1 Protected and other notable bird species within 5 km of the Site (KMBRC summary table)

Species	Legal status	No. of records since 2000	Year of most recent record	Distance from site (km)
Red-throated diver	Annex 1; WCA1	319	2012	1.85
Black-throated diver	Annex 1; WCA1	171	2012	1.85
Great northern diver	Annex 1; WCA1	93	2012	4.13
Slavonian grebe	Annex 1; WCA1; BoCC (Red)	36	2011	1.85
Black-necked grebe	WCA1	10	2012	1.85
Balearic shearwater	SPI; BoCC (Red)	13	2009	1.85
Storm petrel	Annex 1	11	2012	3.20
Leach's petrel	Annex 1; WCA1	32	2012	1.85
Bittern	Annex 1; WCA1; SPI	14	2011	1.85
Little egret	Annex 1	1244	2012	1.85
Purple heron	Annex 1; WCA1	36	2013	0.50
Black stork	Annex 1	5	2006	1.85
White stork	Annex 1	30	2010	1.85
Glossy ibis	Annex 1	6	2010	1.85
Spoonbill	Annex 1; WCA1	87	2012	1.85
Bewick's swan	Annex 1; SPI; WCA1	33	2012	1.85
Whooper swan	Annex 1; WCA1	40	2012	0.50
White-fronted goose	SPI; BoCC (Red)	131	2012	1.86
Barnacle goose	Annex 1	25	2012	1.85
Brent goose	SPI	817	2012	1.85
Shelduck	Annex 1	1021	2012	1.75
Pintail	WCA1	278	2012	1.85
Garganey	WCA1	125	2012	1.80
Pochard	BoCC (Red)	78	2012	2.80
Scaup	WCA1; SPI; BoCC (Red)	28	2009	1.85
Long-tailed duck	WCA1; BoCC (Red)	32	2008	1.75
Common scoter	WCA1; SPI; BoCC (Red)	371	2012	1.85
Velvet scoter	WCA1; BoCC (Red)	29	2012	1.85
Goldeneye	WCA1	49	2012	1.75
Smew	Annex 1	8	2012	3.80
Honey buzzard	Annex 1; WCA1	93	2012	1.75

Species	Legal status	No. of records since 2000	Year of most recent record	Distance from site (km)
Black kite	Annex 1	24	2012	1.85
Red kite	Annex 1; WCA1	99	2012	1.65
Marsh harrier	Annex 1; WCA1	596	2012	1.85
Hen harrier	Annex 1; WCA1; SPI; BoCC (Red)	404	2012	1.75
Montagu's harrier	Annex 1; WCA1	120	2013	0.50
Goshawk	WCA1	6	2005	1.85
Osprey	Annex 1; WCA1	94	2012	1.75
Merlin	Annex 1; WCA1; BoCC (Red)	580	2012	1.85
Hobby	WCA1	457	2013	0.50
Peregrine	Annex 1; WCA1	807	2012	1.85
Grey partridge	SPI; BoCC (Red)	369	2012	0.50
Quail	WCA1	88	2012	1.85
Corncrake	Annex 1; WCA1; SPI; BoCC (Red)	20	2011	1.75
Crane	Annex 1	35	2012	1.75
Avocet	Annex 1; WCA1	290	2012	1.85
Little ringed plover	WCA1	173	2012	1.75
Ringed plover	Cited; BoCC (Red)	984	2012	1.85
Kentish plover	WCA1	100	2012	1.85
Dotterel	WCA1; BoCC (Red)	42	2009	1.85
Golden plover	Annex 1; Cited	1073	2012	1.85
Grey plover	Cited	985	2012	1.85
Lapwing	SPI; BoCC (Red)	1271	2012	0.50
Sanderling	Cited	911	2012	1.85
Temminck's stint	WCA1	53	2012	1.85
Purple sandpiper	WCA1	198	2012	1.85
Ruff	Annex 1; WCA1; BoCC (Red)	163	2012	1.85
Woodcock	BoCC (Red)	340	2012	0.50
Black-tailed godwit	WCA1; SPI; BoCC (Red)	505	2012	1.85
Bar-tailed godwit	Annex 1	1071	2012	1.85
Whimbrel	WCA1; BoCC (Red)	729	2013	1.85
Curlew	SPI; BoCC (Red)	1066	2012	1.86
Greenshank	WCA1	747	2012	1.75

Species	Legal status	No. of records since 2000	Year of most recent record	Distance from site (km)
Green sandpiper	WCA1	435	2012	1.80
Wood sandpiper	Annex 1; WCA1	106	2012	1.75
Turnstone	Cited	850	2012	1.85
Arctic skua	BoCC (Red)	126	2012	1.85
Mediterranean gull	Annex 1; WCA1	369	2012	1.85
Little gull	WCA1	148	2012	1.85
Herring gull	SPI; BoCC (Red)	842	2012	0.50
Kittiwake	BoCC (Red)	218	2012	1.85
Sandwich tern	Annex 1	1095	2012	1.85
Roseate tern	Annex 1; WCA1; SPI; BoCC (Red)	86	2012	1.85
Common tern	Annex 1	531	2012	1.85
Arctic tern	Annex 1	111	2012	1.85
Little tern	Annex 1; Cited; WCA1	297	2012	1.85
Black tern	Annex 1; WCA1	114	2012	1.85
Puffin	BoCC (Red)	29	2006	1.85
Turtle dove	SPI; BoCC (Red)	386	2012	0.50
Cuckoo	SPI; BoCC (Red)	497	2012	0.50
Barn owl	WCA1	176	2012	0.50
Short-eared owl	Annex 1	543	2012	2.80
Nightjar	Annex 1; SPI; BoCC (Red)	1	2004	1.85
Kingfisher	Annex 1; WCA1	343	2012	1.75
Bee-eater	WCA1	20	2012	1.85
Hoopoe	WCA1	47	2012	1.85
Wryneck	WCA1; BoCC (Red)	66	2012	1.85
Lesser spotted woodpecker	SPI; BoCC (Red)	86	2005	1.75
Short-toed lark	Annex 1	7	2011	1.85
Woodlark	Annex 1; WCA1; SPI	74	2012	4.83
Skylark	SPI; BoCC (Red)	621	2012	0.50
Shorelark	WCA1	64	2012	1.85
Tawny pipit	Annex 1	34	2012	1.85
Tree pipit	SPI; BoCC (Red)	140	2012	1.85

Species	Legal status	No. of records since 2000	Year of most recent record	Distance from site (km)
Yellow wagtail	SPI; BoCC (Red)	534	2012	0.50
Grey wagtail	BoCC (Red)	367	2012	1.85
Dunnock	SPI	584	2012	0.50
Nightingale	BoCC (Red)	96	2012	1.75
Bluethroat	Annex 1; WCA1	35	2007	1.85
Whinchat	BoCC (Red)	435	2012	1.85
Ring ouzel	SPI; BoCC (Red)	295	2012	4.83
Fieldfare	WCA1; BoCC (Red)	456	2012	1.86
Song thrush	SPI; BoCC (Red)	645	2012	0.50
Redwing	WCA1; BoCC (Red)	679	2013	1.85
Mistle thrush	BoCC (Red)	452	2012	0.50
Cetti's warbler	WCA1	223	2012	2.80
Grasshopper warbler	SPI; BoCC (Red)	58	2012	1.80
Aquatic warbler	Annex 1; SPI; BoCC (Red)	9	2005	1.75
Dartford warbler	Annex 1; WCA1	41	2012	1.85
Barred warbler	Annex 1	28	2010	1.85
Wood warbler	SPI; BoCC (Red)	33	2012	1.75
Firecrest	WCA1	564	2012	1.85
Spotted flycatcher	SPI; BoCC (Red)	164	2012	0.50
Red-breasted flycatcher	Annex 1	52	2013	1.85
Pied flycatcher	BoCC (Red)	182	2012	0.50
Bearded tit	WCA1	34	2012	1.85
Willow tit	SPI; BoCC (Red)	10	2009	1.85
Golden oriole	WCA1; BoCC (Red)	100	2012	1.75
Red-backed shrike	Annex 1; WCA1; BoCC (Red)	67	2011	1.85
Starling	SPI; BoCC (Red)	637	2013	0.50
House sparrow	SPI; BoCC (Red)	386	2012	0.50
Tree sparrow	SPI; BoCC (Red)	239	2012	0.50
Brambling	WCA1	386	2012	1.86
Serin	WCA1	49	2012	1.85
Linnet	SPI; BoCC (Red)	718	2012	0.50
Twite	SPI; BoCC (Red)	171	2012	1.85

Species	Legal status	No. of records since 2000	Year of most recent record	Distance from site (km)
Lesser redpoll	SPI; BoCC (Red)	298	2012	1.86
Common crossbill	WCA1	189	2012	1.85
Parrot crossbill	WCA1	2	2004	2.16
Bullfinch	SPI	157	2012	0.50
Hawfinch	SPI; BoCC (Red)	26	2010	1.85
Lapland bunting	WCA1	130	2012	1.85
Snow bunting	WCA1	427	2012	1.85
Yellowhammer	SPI; BoCC (Red)	200	2012	0.50
Ortolan bunting	Annex 1	9	2003	2.16
Reed bunting	SPI	484	2012	1.86
Corn bunting	SPI; BoCC (Red)	558	2012	0.50

Table C2 A summary of bat records received from Kent Bat Group within 5 km search radius of the Site

Species	Foraging	Roosting	Hibernation	Grounded	Droppings
Brown long-eared	1		18		1
Common pipistrelle	34	2	3	5	
Nathusius’ pipistrelle	2				
Soprano pipistrelle	7	7			
Pipistrellus Sp.	13	2			
Natterer’s			23		
Serotine	1				
Chiroptera Sp.		2	4		

Table C3 Summary of the invertebrate records provided by KMBRC

Vernicular name	Scientific name	Not able	Notabl e A14	Nota ble B	Red-listed	Records since 2000	Most recent record
Variable damselfly	*Coenagrion pulchellum*				✔	1	2006
Asiraca clavicornis	*Asiraca clavicornis*			✔		2	2010
Dune tiger beetle	*Cicindela martima*			✔		4	2012
Bembidion (Notaphemphanes) ephippium	*Bembidion (Notaphemphanes) ephippium*	✔				2	2004
Pogonus littoralis	*Pogonus littoralis*			✔		1	2002
Amara (Amara) curta	*Amara (Amara) curta*			✔		2	2012
Amara (Amara) spreta	*Amara (Amara) spreta*			✔		1	2002
Ophonus (Ophonus) ardosiacus	*Ophonus (Ophonus) ardosiacus*			✔		1	2005
Saltmarsh short-spur	*Anisodactylus poeciloide*				✔	1	2001
Dicheirotrichus obsoletus	*Dicheirotrichus obsoletus*			✔		1	2012
Lucinus depressus	*Lucinus depressus*			✔		1	2012
Demetrias (Demetrias) monostigma	*Demetrias (Demetrias) monostigma*			✔		2	2002
Isochnus sequensi	*Isochnus sequensi*				✔	4	2002
Microplontus campestris	*Microplontus campestris*			✔		2	2002
Pselactus spadix	*Pselactus spadix*			✔		2	2002
Tanymecus palliatus	*Tanymecus palliatus*			✔		2	2002
Hypera (Hypera) fuscocinerea	*Hypera (Hypera) fuscocinerea*			✔		1	2002
Haliplus (Liaphlus) variegatus	*Haliplus (Liaphlus) variegatus*				✔	1	2012
Oxypoda lurida	*Oxypoda lurida*	✔				1	2002
Aleochara (coprochara) verna	*Aleochara (coprochara) verna*				✔	2	2004
Gabrius psseticus	*Gabrius psseticus*			✔		2	2002
Hypocaccus (hypocaccus) metallicus	*Hypocaccus (hypocaccus) metallicus*				✔	2	2004
Nicrophorus interruptus	*Nicrophorus interruptus*			✔		1	2007
Stag beetle	*Lucanus cervus*			✔		2	2006

Vernicular name	Scientific name	Not able	Notabl e A14	Nota ble B	Red-listed	Records since 2000	Most recent record
Athous (Orthathous) campyloides	*Athous (Orthathous) campyloides*			✔		1	2002
Adrastus rachifer	*Adrastus rachifer*				✔	2	2002
Rhagonycha lutea	*Rhagonycha lutea*			✔		1	2002
Hedobia (Ptinomorphus) imperialis	*Hedobia (Ptinomorphus) imperialis*			✔		1	2002
Meligethes fulvipes	*Meligethes fulvipes*	✔				2	2002
Meligethes rotundicollis	*Meligethes rotundicollis*	✔				3	2002
Atomaria (Anchicera) scutellaris	*Atomaria (Anchicera) scutellaris*				✔	1	2002
Adonis' ladybird	*Hippodamia (Adonia) variegata*			✔		2	2001
Mordellistena (Mordellina) acuticollis	*Mordellistena (Mordellina) acuticollis*				✔	1	2002
Crypticus quisquilius	*Crypticus quisquilius*			✔		2	2003
Black-headed cardinal beetle	*Pyrochroa coccinea*			✔		1	2006
Lissodema denticolle	*Lissodema denticolle*			✔		1	2002
Cabbage flea beetle	*Phyllotreta cruciferae*			✔		1	2002
Flax flea beetle	*Longitarsus parvulus*		✔			2	2012
Longitarsus pratensis	*Longitarsus pratensis*				✔	2	2002
Mallow flea beetle	*Podagrica fuscicornis*			✔		3	2004
Mallow flea beetle	*Podagrica fuscipes*		✔			1	2005
Kalcapion semivittatum	*Kalcapion semivittatum*		✔			1	2002
Five-spot ermel	*Ethmia terminella*				✔	1	2011
Dotted ermel	*Ethmia dodecea*			✔		7	2006
Comfrey ermel	*Ethmia quadrillella*		✔			2	2011
Bordered ermel	*Ethmia bipunctella*				✔	21	2015
Alder signal	*Stathmopoda pedella*			✔		4	2011
Painted neb	*Eulamprotes wilkella*			✔		25	2011

Vernicular name	Scientific name	Not able	Notabl e A14	Nota ble B	Red-listed	Records since 2000	Most recent record
Wainscot neb	*Monochroa palustrellus*			✔		9	2010
Mallow groundling	*Platyedra subcinerea*	✔				62	2011
Hollyhock seed moth	*Pexicopia malvella*			✔		92	2011
Fen crest	*Brachmia inornatella*			✔		5	2011
Seathorn groundling	*Gelechia hippophaella*				✔	1	2006
Beet moth	*Scrobipalpa ocellatella*	✔				38	2011
Coast groundling	*Caryocolum vicinella*			✔		1	2003
Narrow groundling	*Caryocolum alsinella*	✔				1	2007
Meadow groundling	*Caryocolum proxima*				✔	1	2004
Straw obscure	*Oegoconia caradjai*			✔		5	2011
Rest harrow	*Aplasta ononaria*				✔	38	2011
Bright wave	*Idaea ochrata*				✔	96	2011
Sub-angled wave	*Scopula nigropunctata*				✔	6	2011
Tawny wave	*Scopula rubiginata*				✔	2	2009
Kent bent-wing	*Phyllocnistis xenia*				✔	16	2011
Ground lackey	*Malacosoma castrensis*				✔	22	2011
Scarce chocolate-tip	*Clostera anachoreta*				✔	15	2011
Silver barred	*Deltote bankiana*				✔	6	2011
White spot	*Hadena albimacula*				✔	1	2007
Small ranunculus	*Hecatera dysodea*				✔	72	2011
Toadflax brocade	*Calophasia lunula*				✔	65	2015
Concolorous	*Photedes extrema*				✔	2	2011
Flame brocade	*Trigonophora flammea*				✔	1	2003
Dotted footman	*Pelosia muscerda*				✔	5	2011
Pigmy footman	*Eilema pygmaeola*				✔	26	2011

Vernicular name	Scientific name	Not able	Notabl e A14	Nota ble B	Red-listed	Records since 2000	Most recent record
Olive cresent	*Trisateles emortualis*				✔	1	2001
Dark crimson underwing	*Catocala sponsa*				✔	2	2006
Scarce black arches	*Nola aerugula*				✔	2	2011
Swallowtail	*Papilio machaon*				✔	1	2003
Small blue	*Cupido minimus*				✔	1	2008
Small heath	*Coenonympha pamphilus*				✔	61	2015
Wall Brown	*Lasiommata megera*				✔	14	2012
Bulrush veneer	*Calamotropha paludella*			✔		32	2011
Powdered grass-veneer	*Thisanotia chrysonuchella*			✔		2	2010
Waste grass-veneer	*Pediasia contaminella*			✔		37	2011
Salt-marsh grass-veneer	*Pediasia aridella*			✔		29	2011
Hook-tipped grass-veneer	*Platytes alpinella*				✔	37	2011
Marbled yellow pearl	*Evergestis extimalis*			✔		246	2011
Giant water veneer	*Schoenobius gigantella*			✔		59	2011
Diamond-spot sable	*Loxostege sticticalis*				✔	1	2002
Sulphur pearl	*Sitochroa palealis*	✔				10	2011
Golden pearl	*Anania verbascalis*			✔		1	2001
Twin-spot honey	*Aphomia zelleri*				✔	35	2011
Kent knot-horn	*Moitrelia obductella*				✔	13	2011
Rosy-striped knot-horn	*Oncocera semirubella*			✔		66	2011
Gorse knot-horn	*Pempelia genistella*		✔			19	2011
Silver-edged knot-horn	*Pima boisduvaliella*				✔	3	2011
Hoary knot-horn	*Gymnancyla canella*		✔			31	2011
Spindle knot-horn	*Nephopterix angustella*			✔		58	2011
Saltmarsh knot-horn	*Ancylosis oblitella*	✔				9	2011

Vernicular name	Scientific name	Notable	Notable A14	Notable B	Red-listed	Records since 2000	Most recent record
Agate knot-horn	*Nyctegretis lineana*				✔	15	2011
Wormwood knot-horn	*Euzophera cinerosella*			✔		46	2011
Long-legged tabby	*Synaphe punctalis*			✔		64	2011
Flecked general	*Stratiomys singularior*	✔				2	2008
Dotted bee-fly	*Bombylius discolor*	✔				3	2010
Crochet-hooked stiletto	*Thereva plebeja*	✔				1	2003
Hornet robberfly	*Asilus crabroniformis*	✔				1	2000
Volucella inanis	*Volucella inanis*	✔				1	2008
Volucella zonaria	*Volucella zonaria*	✔				1	2011
Melieria picta	*Melieria picta*	✔				1	2009
Myopites eximius	*Myopites eximius*				✔	2	2008
Myopites inulaedyssentericae	*Myopites inulaedyssentericae*				✔	1	2002
Hydrotaea parva	*Hydrotaea parva*	✔				1	2002
Hedychrum niemelai	*Hedychrum niemelai*				✔	5	2009
Small velvet ant	*Smicromyrme rufipes*			✔		4	2013
Spider-hunting wasp	*Evagetes pectinipes*				✔	4	2013
Brown-headed mason wasp	*Odynerus (Odynerus) melancephalus*		✔			3	2008
Mud wasp	*Podalonia affinis*				✔	5	2013
Lestiphorus bicinctus	*Lestiphorus bicinctus*			✔		1	2002
Four-banded weevil-wasp	*Cerceris quadricincta*				✔	13	2014
Bee wolf	*Philanthus triangulum*				✔	9	2013
Sea-aster colletes bee	*Colletes (colletes) halophilus*		✔			1	2005
Margined colletes	*Colletes (colletes) marginatus*		✔			1	2001
Trimmer's mining bee	*Andrena (hoplandrena) trimmerana*			✔		1	2008

Vernicular name	Scientific name	Not able	Notabl e A14	Nota ble B	Red-listed	Records since 2000	Most recent record
Andrena (Cnemidandrena) nigriceps	*Andrena (Cnemidandrena) nigriceps*			✔		1	2007
Andrena (Plastandrena) pilipes	*Andrena (Plastandrena) pilipes*			✔		8	2010
Andrena (Micradrena) alfkenella	*Andrena (Micradrena) alfkenella*				✔	1	2004
Andrena (Micradrena) minutuloides	*Andrena (Micradrena) minutuloides*		✔			4	2009
Lasioglossum (Evylaeus) malachurum	*Lasioglossum (Evylaeus) malachurum*			✔		2	2007
Lasioglossum (Evylaeus) pauxillum	*Lasioglossum (Evylaeus) pauxillum*		✔			2	2008
Hairy-legged mining bee	*Dasypoda hirtipes*			✔		1	2007
Silvery leaf-cutter bee	*Megachile (Eutricharaea) leachella*			✔		5	2009
Coelioxys (Coelioxys) mandibularis	*Coelioxys (Coelioxys) mandibularis*				✔	2	2006
Nomada flavopicta	*Nomada flavopicta*			✔		1	2009
Nomada fucata	*Nomada fucata*		✔			7	2009
6-Banded nomad bee	*Nomada fulvicornis*				✔	3	2009
Anthophora (Dasymegilla) quadrimaculata	*Anthophora (Dasymegilla) quadrimaculata*		✔			3	2007
Bombus (Thoracobombus) sylvarum subsp.distinctus	*Bombus (Thoracobombus) sylvarum subsp.distinctus*	✔				1	2010
The shining ram's-horn	*Segmentina nitida*				✔	20	2012

NB: those entries in **bold** are priority species, listed on Section 41 of NERC 2006

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Appendix 7.3

Appendix 7.2

Biodiversity Receptors, Environmental Change and ZoI Tables

Appendix 7.2A: Evaluation of Receptors

A1.1 **Table 7A.1** lists the receptors that are relevant to the assessment because they are either legally protected or of sufficient biodiversity importance that an effect on them could be significant, and which could be affected by the proposed development. A justification is provided for any receptors that are scoped out of further assessment because they are assessed as being of insufficient value for likely effects to be significant.

Table 7A.1 Evaluation of important receptors

Legally protected and/or 'Important' receptors recorded within the study area from desk study and/or field surveys	Legally protected and controlled species (see Box 7.2 in Chapter 7)?	Designated biodiversity sites and priority habitats and species (see Box 7.1 in Chapter 7)?	Justification if receptors are of insufficient value for effects to be significant (Box 7.3 in Chapter 7)	Scoping conclusion
Arable	No	No	All monoculture fields with little floral diversity. Common and widespread habitat throughout Kent and the UK. Assessed as being of insufficient biodiversity value. Arable fields do support wintering waders including golden plover (Thanet Coast & Sandwich Bay SPA qualifying interest species), which is evaluated separately.	Scoped Out
Arable field margins	No	Yes	Very narrow field margins populated by common arable weed species. Receptor considered of poor quality and does not fulfil Priority Habitat criteria. Assessed as being of insufficient biodiversity value.	Scoped Out
Poor semi-improved grassland	No	No	Poor-semi-improved grassland is present across much of the Site. Poor semi-improved grassland is a common and widespread habitat throughout Kent and the UK. Assessed as being of insufficient biodiversity value. This habitat may support priority species of invertebrate or invertebrate assemblages, as well as breeding priority bird species, which are evaluated separately.	Scoped Out
Semi improved grassland	No	TBC	Areas of semi improved neutral grassland is abundant within the site with as yet unknown degree of floral diversity. Areas of semi improved grassland are widely replicated within Kent. Value cannot be assessed until botanical interest surveyed and floral diversity/vegetation communities identified. See Table 7B.1	Scoped In
Reedbeds	No	Yes	See Table 7B.1	Scoped In
Tall ruderal	No	No	A species-poor habitat which is common and widespread habitat throughout Kent and the UK. Assessed as being of insufficient biodiversity value.	Scoped Out

Legally protected and/or 'Important' receptors recorded within the study area from desk study and/or field surveys	Legally protected and controlled species (see Box 7.2 in Chapter 7)?	Designated biodiversity sites and priority habitats and species (see Box 7.1 in Chapter 7)?	Justification if receptors are of insufficient value for effects to be significant (Box 7.3 in Chapter 7)	Scoping conclusion
Scrub (dense and scattered)	No	No	A species-poor habitat which is common and widespread habitat throughout Kent and the UK. Assessed as being of insufficient biodiversity value.	Scoped Out
Amenity grassland	No	No	A species-poor habitat which is common and widespread habitat throughout Kent and the UK. Assessed as being of insufficient biodiversity value.	Scoped Out
Buildings	TBC	TBC	Many site buildings with potential for roosting bats. Scoped in until building inspections undertaken and any subsequent (presence of legally protected/priority species) roosts identified.	Scoped In
Scattered trees	No	No	Scattered trees present within the Site typically comprising locally common, immature species. Where they are part of a hedgerow they are considered within that receptor. Otherwise, they are a common and widespread habitat throughout Kent and the UK. Assessed as being of insufficient biodiversity value on this Site.	Scoped Out
Hedgerows (species-poor)	No	Yes	See Table 7B.1.	Scoped In
Standing open water/ponds	No	Yes	See Table 7B.1	Scoped In
Hardstanding	No	No	Extensive areas of hardstanding comprising concrete or tarmac surfaces (e.g. former runway, taxiing aprons and access roads) are present. Very limited flora. A common and widespread habitat throughout Kent and the UK. Assessed as being of insufficient biodiversity value.	Scoped Out
Bare ground	No	No	Areas of disturbed soil and gravel, principally around buildings with limited flora. A common and widespread habitat throughout Kent and the UK. Assessed as being of insufficient biodiversity value.	Scoped Out
Ephemeral/short perennial	No	No	Area of former bare ground (disturbed soil/gravel) with a sparse vegetation community comprising abundant and widespread plant species. A common and widespread	Scoped Out

Legally protected and/or 'Important' receptors recorded within the study area from desk study and/or field surveys	Legally protected and controlled species (see Box 7.2 in Chapter 7)?	Designated biodiversity sites and priority habitats and species (see Box 7.1 in Chapter 7)?	Justification if receptors are of insufficient value for effects to be significant (Box 7.3 in Chapter 7)	Scoping conclusion
			habitat throughout Kent and the UK. Assessed as being of insufficient biodiversity value.	
Traditional orchards	No	Yes	Habitats not sensitive to the any changes in air quality. It is not known if these orchards are intensively managed e.g. with densely planted apple trees with a heavily managed short amenity grassland understorey. Assessed as being of insufficient biodiversity value.	Scoped Out
Native woodland: Semi-natural broad-leaved woodland, broad-leaved plantation woodland and ancient semi-natural woodland, wet woodland	No	Yes	See Table 7B.1	Scoped In
Reedbeds	No	Yes	See Table 7B.1	Scoped In
Coastal floodplain/grazing marsh	No	Yes	See Table 7B.1	Scoped In
Bats	Yes	Yes	See Table 7B.1	Scoped In
Great crested newts	Yes	Yes	See Table 7B.1	Scoped In
Reptiles	Yes	Yes	See Table 7B.1	Scoped In
Breeding bird assemblage: **Priority/BoCC Red list species**	No	Yes	See Table 7B.1	Scoped In
Nesting birds	Yes	No	See Table 7B.1	Scoped in (legal requirements)
WCA Schedule 1 species: Breeding barn owl	Yes	Yes	See Table 7B.1	Scoped In
Kestrel	Yes	Yes	See Table 7B.1	Scoped out
Winter bird assemblage: **Priority/BoCC Red list species**	No	Yes	See Table 7B.1	Scoped In

Legally protected and/or 'Important' receptors recorded within the study area from desk study and/or field surveys	Legally protected and controlled species (see Box 7.2 in Chapter 7)?	Designated biodiversity sites and priority habitats and species (see Box 7.1 in Chapter 7)?	Justification if receptors are of insufficient value for effects to be significant (Box 7.3 in Chapter 7)	Scoping conclusion
Invertebrates/ invertebrate assemblages	No	Yes	See Table 7B.1	Scoped In
Badger	Yes	No	No evidence of badgers found on Site. Badgers are sufficiently common and widespread in Kent that an impact upon the local population would not be significant (in EIA terms). However, they cannot be scoped out at this stage due to legal requirements only.	Scoped out (except in relation to legal requirements only)
Terrestrial priority species (brown hare, common toad, hedgehog)	No	Yes	See Table 7B.1	Scoped In
Thanet Coast & Sandwich Bay SPA/Ramsar: **Wintering: Golden plover**	Yes	Yes	See Table 7B.1	Scoped In
Thanet Coast & Sandwich Bay SPA: **Wintering: Turnstone**	Yes	Yes	See Table 7B.1	Scoped In
Thanet Coast & Sandwich Bay SPA: **Breeding: Little tern**	Yes	Yes	See Table 7B.1	Scoped In
Thanet Coast & Sandwich Bay Ramsar: **Ramsar criterion 2: Supports 15 British Red Data Book wetland invertebrates.** **Ramsar criterion 6: Turnstone occurr at levels of international importance.**	Yes	Yes	See Table 7B.1	Scoped In
Stodmarsh SPA/Ramsar:	Yes	Yes	See Table 7B.1	Scoped In

Legally protected and/or 'Important' receptors recorded within the study area from desk study and/or field surveys	**Legally protected and controlled species (see Box 7.2 in Chapter 7)?**	**Designated biodiversity sites and priority habitats and species (see Box 7.1 in Chapter 7)?**	**Justification if receptors are of insufficient value for effects to be significant (Box 7.3 in Chapter 7)**	**Scoping conclusion**
Wintering: Hen harrier				
Stodmarsh SPA/Ramsar: **Wintering: Bittern**	Yes	Yes	See Table 7B.1	Scoped In
Stodmarsh SPA/Ramsar: **Breeding: Gadwall**	Yes	Yes	See Table 7B.1	Scoped In
Stodmarsh SPA/Ramsar: **Wintering: Gadwall**	Yes	Yes	See Table 7B.1	Scoped In
Stodmarsh SPA/Ramsar: **Wintering: Shoveler**	Yes	Yes	See Table 7B.1	Scoped In
Stodmarsh Ramsar: **Ramsar criterion 2 - six British Red Data Book wetland invertebrates, two nationally rare plants and five nationally scarce species; and a diverse assemblage of rare wetland birds.**	Yes	Yes	See Table 7B.1	Scoped In
Stodmarsh SAC: **Annex II species - Desmoulin`s whorl snail**	Yes	Yes	See Table 7B.1	Scoped In
Thanet Coast SSSI: **Annex 1 reefs and submerged or partially submerged sea caves.**	No	Yes	See Table 7B.1	Scoped In
Margate and Long Sands SCI (inshore marine): **a number of Annex I Sandbanks slightly covered by seawater at all times**	No	Yes	See Table 7B.1	Scoped In

Legally protected and/or 'Important' receptors recorded within the study area from desk study and/or field surveys	**Legally protected and controlled species (see Box 7.2 in Chapter 7)?**	**Designated biodiversity sites and priority habitats and species (see Box 7.1 in Chapter 7)?**	**Justification if receptors are of insufficient value for effects to be significant (Box 7.3 in Chapter 7)**	**Scoping conclusion**
Sandwich Bay SAC: **complex of Annex 1 shifting dune systems**	No	Yes	See Table 7B.1	Scoped In
Stodmarsh SAC/SSSI and Stodmarsh NNR: **Annex II species - Desmoulin's whorl snail**	No	Yes	See Table 7B.1	Scoped in
Sandwich Bay to Hacklinge Marshes SSSI: **Sand dune system and sandy coastal grassland; mudflats; saltmarsh; chalk cliffs; outstanding assemblages of marine plants and invertebrates; freshwater grazing marsh, scrub and woodland; outstanding assemblages of terrestrial plants and invertebrates; and nationally significant populations of waders.**	No	Yes	See Table 7B.1	Scoped in
East Blean Woods SSSI: **Primary deciduous woodland comprising mixed coppice with oak and sweet chestnut and a small plantation of Scot's pine. Diverse ground flora indicative of a long history of woodland cover. Also of interest for its moth and butterfly**	No	Yes	See Table 7B.1	Scoped in

Legally protected and/or 'Important' receptors recorded within the study area from desk study and/or field surveys	Legally protected and controlled species (see Box 7.2 in Chapter 7)?	Designated biodiversity sites and priority habitats and species (see Box 7.1 in Chapter 7)?	Justification if receptors are of insufficient value for effects to be significant (Box 7.3 in Chapter 7)	Scoping conclusion
assemblage which includes the rare heath fritillary. A wide range of woodland bird species.				
Preston Marshes SSSI: **fen vegetation and one of only two known localities in Kent for the rare sharp-leaved pondweed *Potamogeton acutifolius*.**	No	Yes	See Table 7B.1	Scoped in
Sandwich and Pegwell Bay NNR and Kent Wildlife Trust Reserve: **a complex mosaic of habitats of international importance for its bird population**	No	Yes	See Table 7B.1	Scoped in
Blean Woods SAC/NNR: **Ancient woodland and Blean Complex SAC Annex 1 sub-Atlantic and medio-European oak or oak-hornbeam forests of the *Carpinion betuli* and are one of the British strongholds for the heath fritillary butterfly**	No	Yes	See Table 7B.1	Scoped in
Prince's Beachlands LNR: **a complex mosaic of habitats of international importance for its bird population.**	No	Yes	See Table 7B.1	Scoped in

Legally protected and/or 'Important' receptors recorded within the study area from desk study and/or field surveys	**Legally protected and controlled species (see Box 7.2 in Chapter 7)?**	**Designated biodiversity sites and priority habitats and species (see Box 7.1 in Chapter 7)?**	**Justification if receptors are of insufficient value for effects to be significant (Box 7.3 in Chapter 7)**	**Scoping conclusion**
Bishopstone Cliffs LNR: **Clifftop grassland**	No	Yes	See Table 7B.1	Scoped in

Appendix 7B: Environmental changes and zones of influence

A1.2 Receptors have only been assessed against potential environmental changes to which they are likely to be sensitive. For example, “hedgerow” as a receptor would not be sensitive to light, noise and vibration. Whether a receptor is sensitive or not to an environmental change has been determined based on professional judgement, project design, statutory guidance and appropriate relevant literature.

A1.3 All designated sites with birds listed on the citation and individual bird assemblages are included within the ornithological section of **Table 7B.1** and assessed against specific environmental changes relating to birds only. Where designated sites also cite terrestrial habitats/species these are dealt with in Section 1 of the table. All environmental changes and the associated Zones of Influence (ZoI) in relation to ecological and ornithological receptors are described in **Table 7C.1**.

Table 7B.1 Environmental changes and Zones of Influence (ZoI)

Section 1 deals with ecological receptors and Section 2 with ornithological receptor

Receptor	**Environmental Change**	**ZoI (where receptor is sensitive to the environmental change) – distances defined in Table 7C**	**Receptor within ZoI?**	**Conclusion – is there the potential for significant effect and/or contravention of protected species legislation? (Yes/No – if no, a justification is provided on why the effects are scoped out)**
Section 1 – Ecological Receptors				
Reedbeds	Land-take/Land cover change/construction/ decommissioning	Within the construction/ decommissioning area	No	Yes – The receptor is within the ZoI.
	Dust deposition	Within 50m of construction/ the Site	No	
	Pollution	Within 15m discharge outfall	No	
	Air quality change/deposition	Within 200m of road, aircraft flight path	TBC – additional road/flight path information required	
Deciduous woodland: Semi-natural broad-leaved woodland, broad-leaved plantation woodland and ancient semi-natural woodland, traditional orchard, wood pasture and parkland	Land-take/Land cover change/construction/ decommissioning	Within the construction/ decommissioning area	No	Yes – The receptor is within the ZoI.
	Dust deposition	Within 50m of construction/the Site	Yes	
	Pollution	Within 15m discharge outfall	No	
	Air quality change/deposition	Within 200m of road, aircraft flight path	Yes	

Hedgerows	Land-take/Land cover change/construction/ decommissioning	Within the construction/ decommissioning area	Yes	Yes – The receptor is within the ZoI.
	Dust deposition	Within 50m of the Site	Yes	
	Pollution	Within 15m discharge outfall	No	
	Air quality change/deposition	Within 200m of road, aircraft flight path	Yes	
Ponds/standing open water	Land-take/Land cover change/ construction/ decommissioning	Within the construction area	Yes	Yes – The receptor is within the ZoI. See Water Environment Chapter 8.
	Dust deposition	Within 50m of construction site	Yes	
	Pollution	Within 15m discharge outfall	No	
	Air quality change/deposition	Within 200m of access road, aircraft flight path	?	
Great crested newts	Land-take/Land cover change/construction/ decommissioning	Within the construction area and to a distance of 500m	TBC	TBC (to be confirmed)
	Increased light, noise and vibration	100m from proposed working area	TBC	
	Dust deposition	Within 50m of a construction site	TBC	
	Pollution	Within 15m of discharge outfall	No	
Bats	Land-take/Land cover change/construction/ decommissioning	Within the construction area	TBC	TBC
	Increased light, noise and vibration	500m from proposed working area	TBC	

Badger	Land-take/Land cover change /construction/ decommissioning	Within the construction area	Yes	Yes – Receptor is within the ZoI.
	Increased light, noise and vibration	30m from active sett	No	
	Increased vehicle movement	Within the Site and immediate area	Yes	
Reptiles	Land take/Land cover change	Within the construction area	TBC	TBC.
	Increase vehicle movement	Within the Site	TBC	
Terrestrial priority Invertebrates (*Dorycera graminum*, stag beetle, Black-headed Mason Wasp, Four-banded Weevil-wasp, Heath Grasper, Hornet Robberfly Desmoulin's Whorl Snail, *Paraclusia tigrina, Homoneura interstincta, Dolichopus virgultorum, Sisyra dalii, Tillus elongates, Ptiolina obscura, Pipizella virens, Platycheirus immarginatus, Volucella inflate, Aulogastromyia anisodactyla, Dicraeus scibilis, Elachiptera pubescens, Speccafrons* halophile, *Zophomyia tenella, Hylaeus pictipes, Neurigona erichsoni*, picture-winged fly, *pipunculid Nephrocerus flavicornis, Brachypalpoides lenta, Anopheles algeriensis* and moths/butterflies)	Land-take/Land cover change /construction/ decommissioning	Within the construction area	TBC	TBC. Any species recorded during invertebrate survey within the Site? Other species were recorded but not within the zone of influence and therefore scoped out. Should these species be listed within a designated site, these are dealt with separately under the named designated site receptor.
Aquatic/marine priority Invertebrates: Shining ramshorn snail; *Peltodytes caesus*, dog whelk, oyster	Land-take/Land cover change /construction/ decommissioning	Within the construction area	No	No – Receptors would not be subject to significant effects due to environmental measures included within the proposed development. See Water **Chapter 8** for details of assessment of water borne effects. Should these species be listed within a designated site, these are dealt
	Pollution	Within 15m of discharge outfall	Yes	

				with separately under the named designated site receptor.
Terrestrial priority species (brown hare, common toad, hedgehog)	Land-take/Land cover change construction/ decommissioning	Within the construction area/the Site	Yes	No. Receptor would not be subject to significant effects due to environmental measures included within the proposed development. Environmental measures such as leaving no trenches left open overnight, no external lighting used between dusk and dawn and following Method Statements would reduce the risk to terrestrial priority species. Large areas of suitable habitat would be retained. The proposed works and associated environmental measures would not significantly impact local species populations.
	Increased light, noise and vibration	~30m from the construction area	Yes	
	Increased vehicle movement	Within the Site and associated external access routes	Yes	
	Pollution	Within 15m of discharge outfall	No	
Protected plant species (Schedule 15, WCA) Martin's ramping fumitory	Land-take/Land cover change /construction/ decommissioning	Within the construction area/ the Site	TBC	TBC if within Site Should these species be listed within a designated site, these are dealt with separately under the named designated site receptor.
	Dust deposition	Within 50m of a construction area/the Site	TBC	
	Pollution	Within 15m of discharge outfall	TBC	
	Air quality change/deposition	Within 200m of access road, aircraft flight path	TBC	
Marine mammals (common seal, grey seal)	Land-take/Land cover change /construction/ decommissioning	Within the construction area/Site	No	No – Receptor would not be subject to significant effects due to environmental measures included within the proposed development. Only few records of these species have been recorded along the River Stour. Both grey and common seal are considered to be rarely present
	Pollution	Within 15m of discharge outfall	Yes	

				and there are no suitable haul out areas. Following the environmental measures within the proposed development notably, and the risk of killing/injuring these species and contravening legislation is considered to be very low to negligible. If a protected species is recorded within the working area, works would stop immediately and the project ecologist contacted. All in-water works would follow environmental measures listed within Water Environment **Chapter 8**. These would ensure no direct or indirect effects upon the receptor occur.
	Air quality change/deposition	Within 200m of access road, aircraft flight path	TBC	TBC
Marine and/or Freshwater fish (barbell, European eel, sea trout, Atlantic salmon, sea lamprey, thornback skate)	Land-take/Land cover change /construction/ decommissioning	Within the construction area/Site	No	No? – Receptor would not be subject to significant effects due to environmental measures included within the proposed development. All in-water works would follow environmental measures listed within Water Environment **Chapter 8.** These would ensure no direct or indirect effects upon the receptor occur (and are scoped out in that Chapter) Consequently, pollution would be kept to a minimum. The proposed works and associated environmental measures would not significantly impact local species populations. See Water Environment **Chapter 8** for details of assessment of water borne effects.
	Pollution	Within 15m of discharge outfall	Yes	

	Air quality change/deposition	Within 200m of access road, aircraft flight path	TBC	
Thanet Coast and Sandwich Bay Ramsar	Land-take/Land cover change/construction/ decommissioning	Within the construction area/Site	No	TBC - Terrestrial habitats and invertebrates listed within citation not significantly affected by proposals. The Ramsar is located 0.925 km at its closest point from the Site. Environmental measures reduce any risk of indirect effects of water-borne pollution. See Water chapter 8.for details of assessment of water borne effects, and Air chapter 6. For details of assessment of air quality effects.
	Pollution	Within 15m discharge outfall	Yes	
	Dust deposition	Within 50m of construction/Site	No	
	Air quality change/deposition	Within 200m of access road, aircraft flight path	TBC	
Stodmarsh Ramsar: The site supports a number of uncommon invertebrates and plants	Land-take/Land cover change/construction/ decommissioning	Within the construction area	No	TBC - Terrestrial habitats, plants and invertebrates listed within citation not significantly affected by proposals other than potential effects from AQ changes/deposition? The Ramsar site is located 8.45 km from the Site at its closest point. Environmental measures reduce any risk of indirect effects of pollution. See Water chapter 8.for details of assessment of water borne effects, and Air chapter 6. For details of assessment of air quality effects.
	Dust deposition	Within 50m of a construction site	No	
	Pollution	Within 15m discharge outfall	No	
	Air quality change/deposition	Within 200m of access road, aircraft flight path	TBC	

Thanet Coast SSSI: Annex I reefs and submerged or partially submerged sea caves.	Land-take/Land cover change/construction/ decommissioning	Within the construction area/Site	No	TBC – Receptor would not be subject to significant effects (other than potentially for air quality changes) due to environmental measures included within the proposed development. The SSSI is located 4.5 km from the Site. Environmental measures would ensure pollution is prevented and no indirect effects upon these designated habitats would occur.
	Dust deposition	Within 50m of a construction site	No	
	Pollution	Within 15m discharge outfall	No	
	Air quality change/deposition	Within 200m of access road, aircraft flight path	TBC	
Sandwich Bay SAC: complex of Annex 1 shifting dune systems	Land-take/Land cover change/construction/ decommissioning	Within the Site	No	TBC – Receptor would not be subject to significant effects (other than potentially for air quality changes) due to environmental measures included within the proposed development The SAC is located 0.925 km from the Site and is listed for its shifting dune habitats, environmental measures would reduce any potential indirect effects of the proposed works.
	Dust deposition	Within 50m of a construction area	No	
	Pollution	Within 15m discharge outfall	Yes	
	Air quality change/deposition	Within 200m of access road, aircraft flight path	TBC	
Stodmarsh SAC/SSSI and Stodmarsh NNR: Annex II species - Desmoulin's whorl snail	Land-take/Land cover change /construction/ decommissioning	Within the Site	No	TBC – Receptor would not be subject to significant effects (other than potentially for air quality changes) due to environmental measures included within the proposed development Stodmarsh SAC/SSSI and NNR is located 0.415km from the Site and as such there would be no direct impact on the site. Environmental measures would reduce effects upon the River Stour which is directly linked to the
	Dust deposition	Within 50m of a construction area	No	
	Pollution	Within 15m discharge outfall	No	

				SAC/SSSI/NNR and therefore no indirect pollution effects are anticipated. See Water Environment Chapter 8 and Air Quality Chapter 6 for detailed measures and assessment on water/air pathways.
	Air quality change/deposition	Within 200m of access road, aircraft flight path	TBC	
Sandwich Bay to Hacklinge Marshes SSSI: Sand dune system and sandy coastal grassland; mudflats; saltmarsh; chalk cliffs; outstanding assemblages of marine plants and invertebrates; freshwater grazing marsh, scrub and woodland; outstanding assemblages of terrestrial plants and invertebrates.	Land-take/Land cover change /construction/ decommissioning	Within the Site	No	TBC – Receptor would not be subject to significant effects due to environmental measures included within the proposed development Although within the ZoI due to the potential spread of dust and pollution, environmental measures included specifically for dust suppression and measures included within the Water and Environment chapter 8 relating to indirect pollution would reduce any potential significant effects to a non-significant level.
	Dust deposition	Within 50m of a construction area	No	
	Pollution	Within 15m discharge outfall	Yes	
	Air quality change/deposition	Within 200m of access road, aircraft flight path	TBC	
East Blean Woods SSSI: Primary deciduous woodland comprising mixed coppice with oak and sweet chestnut and a small plantation of Scot's pine. Diverse ground flora indicative of a long history of woodland cover. Also of interest for its moth and butterfly assemblage which includes the rare heath fritillary.	Land-take/Land cover change /construction/ decommissioning	Within the Site	No	TBC – Receptor is not within the ZoI. Receptor would not be subject to any significant effects (other than potentially for air quality changes). The SSSI is located 11.3 km from the Site and any indirect effects are considered negligible. Heath fritillary butterfly legislation would not be contravened due to the distance from the Site.
	Increased light, noise and vibration	~30m from suitable heath fritillary habitat	No	
	Dust deposition	Within 50m of a construction area	No	
	Pollution	Within 15m discharge outfall	No	

	Air quality change/deposition	Within 200m of access road, aircraft flight path	TBC	
Preston Marshes SSSI: fen vegetation and one of only two known localities in Kent for the rare sharp-leaved pondweed *Potamogeton acutifolius*.	Land-take/Land cover change construction/ decommissioning	Within the Site	No	TBC. Receptor is not within the ZoI? Receptor would not be subject to any significant effects (other than potentially for air quality changes). The SSSI is located 8.8 km from the Site and any indirect effects are considered negligible. Areas of sharp leaved pondweed would remain unaffected.
	Dust deposition	Within 50m of a construction area	No	
	Pollution	Within 15m discharge outfall	No	
	Air quality change/deposition	Within 200m of access road, aircraft flight path	TBC	
Sandwich and Pegwell Bay NNR and Kent Wildlife Trust Reserve: a complex mosaic of habitats of international importance for its bird population	Land-take/Land cover change /construction/ decommissioning	Within the Site	No	TBC – Receptor would not be subject to significant effects due to environmental measures included within the proposed development The NNR and KWTR is located 0.925 km from the Site, any potential indirect effects of dust or pollution are minimised by environmental measures.
	Dust deposition	Within 50m of a construction area	No	
	Pollution	Within 15m discharge outfall	Yes	
	Air quality change/deposition	Within 200m of access road, aircraft flight path	TBC	
Blean Woods NNR: Ancient woodland and Blean Complex SAC: Annex I sub-Atlantic and medio-European oak or oak-hornbeam forests of the Carpinion betuli and are one of the British strongholds for the heath fritillary butterfly	Land-take/Land cover change /construction/ decommissioning	Within the Site	No	TBC/No? – Receptor is not within the ZoI? Receptor would not be subject to any significant effects (other than potentially for air quality changes). The SAC/NNR is located 11.5 km from the Site and any indirect effects are considered negligible due to the implementation of environmental measures.
	Increased light, noise and vibration	~30m from suitable heath fritillary habitat	No	
	Dust deposition	Within 50m of a construction area	No	
	Pollution	Within 15m discharge outfall	No	

	Air quality change/deposition	Within 200m of access road, aircraft flight path	TBC	Heath fritillary butterfly legislation would not be contravened due to the distance from the Site.
Prince's Beachlands LNR: a complex mosaic of habitats of international importance for its bird population. Noted for butterflies, fungi and reptiles.	Land-take/Land cover change /construction/ decommissioning	Within the Site	No	TBC – Receptor is not within the ZoI? Receptor would not be subject to any significant effects (other than potentially for air quality changes). The LNR is located 3.68 km from the Site and any indirect effects are considered negligible. Reptiles and butterflies within the LNR would remain unaffected by works due to the distance of the proposed works.
	Dust deposition	Within 50m of a construction area	No	
	Pollution	Within 15m discharge outfall	No	
	Air quality change/deposition	Within 200m of access road, aircraft flight path	TBC	
Bishopstone Cliffs LNR: Clifftop grassland	Land-take/Land cover change /construction/ decommissioning	Within the construction area/Site	No	TBC/No – Receptor is not within the ZoI? Receptor would not be subject to any significant effects (other than potentially for air quality changes). The LNR is located 9.2 km north-west from the Site and any indirect effects are considered negligible.
	Dust deposition	Within 50m of construction site	No	
	Pollution	Within 15m discharge outfall	No	
	Air quality change/deposition	Within 200m of access road, aircraft flight path	TBC	
Section 2 - Ornithology Receptors				
Thanet Coast & Sandwich Bay SPA/Ramsar: **Wintering: Golden plover**	Land-take/Land cover change /construction /decommissioning	Within the construction area/Site	No	Yes – Receptor is within the ZoI.
	Land-take/Land cover change /construction/	Within 100m of the Site	Yes	

	decommissioning : displacement			
	Increased light, noise and vibration from Site: Disturbance	Within 250m of the Site	Yes	
	Increased light, noise and vibration from aircraft taking off and landing: Disturbance	Within 500m vertical distance (altitude) and 1 km lateral distance of aircraft flight paths; and, for noise, within 85dB contour	Yes	
Thanet Coast & Sandwich Bay SPA: Breeding: Little tern	Land-take/Land cover change / construction/ decommissioning	Within the construction area/Site	No	No – Receptor is not within ZoI Little tern no longer breeds within the Thanet Coast & Sandwich Bay SPA. Given the absence of this qualifying interest species from the SPA, no significant adverse effects are considered during either construction or operation.
	Land-take/Land cover change /construction/ decommissioning : displacement	Within 100m of the Site	No	
	Increased light, noise and vibration from Site: Disturbance	Within 250m of the Site	No	
	Increased light, noise and vibration from aircraft taking off and landing: Disturbance	Within 500m vertical distance (altitude) and 1 km lateral distance of aircraft flight paths; and, for noise, within 85dB contour	No	
Thanet Coast & Sandwich Bay SPA: Wintering: Turnstone	Land-take/Land cover change /construction/ decommissioning	Within the construction area/Site	No	Yes – Receptor is within the ZoI. Marked decline in numbers using the SPA this century with the majority of birds using the northern extremities of the SPA and peak winter counts for Pegwell Bay from 2010/11 to 2014/15 ranging from 7 to 65 birds.
	Land-take/Land cover change /construction /decommissioning : displacement	Within 100m of the Site	No	
	Increased light, noise and vibration: Disturbance	Within 250m of the Site	No	

	Increased light, noise and vibration from aircraft taking off and landing: Disturbance	Within 500m vertical distance (altitude) and 1 km lateral distance of aircraft flight paths; and, for noise, within 85dB contour.		
Stodmarsh SPA/Ramsar: Wintering: Hen harrier	Land-take/Land cover change /construction/ decommissioning	Within the construction area/Site	No	TBC – Receptor is not within the ZoI to be confirmed with further information on flight paths. Stodmarsh is 7.6 km distant from the Site.
	Land-take/Land cover change /construction /decommissioning : displacement	Within 100m of the Site	No	
	Increased light, noise and vibration: Disturbance	Within 250m of the Site	No	
	Increased light, noise and vibration from aircraft taking off and landing: Disturbance	Within 500m vertical distance (altitude) and 1 km lateral distance of aircraft flight paths; and, for noise, within 85dB contour.	TBC	
Stodmarsh SPA/Ramsar: Wintering: Gadwall	Land-take/Land cover change /construction/ decommissioning	Within the construction area/Site	No	TBC – Receptor is not within the ZoI to be confirmed with further information on flight paths. Stodmarsh is 7.6 km distant from the Site.
	Land-take/Land cover change /construction decommissioning: displacement	Within 100m of the Site	No	
	Increased light, noise and vibration: Disturbance	Within 250m of the Site	No	
	Increased light, noise and vibration from aircraft taking off and landing: Disturbance	Within 500m vertical distance (altitude) and 1 km lateral distance of aircraft flight paths; and,	TBC	

		for noise, within 85dB contour.		
Stodmarsh SPA/Ramsar: Breeding: Gadwall	Land-take/Land cover change /construction/ decommissioning	Within the construction area/Site	No	TBC – Receptor is not within the ZoI to be confirmed with further information on flight paths. Stodmarsh is 7.6 km distant from the Site
	Land-take/Land cover change /construction/ decommissioning: displacement	Within 100m of the Site	No	
	Increased light, noise and vibration: Disturbance	Within 250m of the Site	No	
	Increased light, noise and vibration from aircraft taking off and landing: Disturbance	Within 500m vertical distance (altitude) and 1 km lateral distance of aircraft flight paths; and, for noise, within 85dB contour.	TBC	
Stodmarsh SPA/Ramsar: Wintering: Bittern	Land-take/Land cover change /construction/ decommissioning	Within the construction area/Site	No	TBC – Receptor is not within the ZoI to be confirmed with further information on flight paths. Stodmarsh is 7.6 km distant from the Site
	Land-take/Land cover change /construction/ decommissioning displacement	Within 100m of the Site	No	
	Increased light, noise and vibration: Disturbance	Within 250m of the Site	No	
	Increased light, noise and vibration from aircraft taking off and landing: Disturbance	Within 500m vertical distance (altitude) and 1 km lateral distance of aircraft flight paths; and, for noise, within 85dB contour.	TBC	
Stodmarsh SPA/Ramsar: Wintering: Shoveler	Land-take/Land cover change /construction/ decommissioning	Within the construction area/Site	No	TBC – Receptor is not within the ZoI to be confirmed with further information on flight paths.

	Land-take/Land cover change /construction/ decommissioning: displacement	Within 100m of the Site	No	Stodmarsh is 7.6 km distant from the Site.
	Increased light, noise and vibration: Disturbance	Within 250m of the Site	No	
	Increased light, noise and vibration from aircraft taking off and landing: Disturbance	Within 500m vertical distance (altitude) and 1 km lateral distance of aircraft flight paths; and, for noise, within 85dB contour.	TBC	
Sandwich Bay & Hacklinge Marshes SSSI: **Over-wintering: Grey plover and sanderling** **Passage: Ringed plover**	Land-take/Land cover change /construction/ decommissioning	Within the construction area/Site	No	Yes – Receptor is within the ZoI
	Land-take/Land cover change /construction/ decommissioning: displacement	Within 100m of the Site	No	
	Increased light, noise and vibration: Disturbance	Within 250m of the Site	No	
	Pollution	Within 15m of a discharge outfall	Yes	
	Increased light, noise and vibration from aircraft taking off and landing: Disturbance	Within 500m vertical distance (altitude) and 1 km lateral distance of aircraft flight paths; and, for noise, within 85dB contour.	TBC	
WCA Schedule 1 species: **Breeding barn owl**	Land-take/Land cover change /construction/ decommissioning	Within the construction area/Site	TBC	Yes – Receptor is within the ZoI - TBC
	Increased light, noise and vibration: Disturbance	Nest site on/within 250m of the Site	TBC	

	Pollution	Within 15m of a discharge outfall	No	
	Increased light, noise and vibration from aircraft taking off and landing: Disturbance	Within 500m vertical distance (altitude) and 1 km lateral distance of aircraft flight paths; and, for noise, within 85dB contour.	TBC	
Winter bird assemblage: Priority/ BoCC Red list species: curlew and lapwing	Land-take/Land cover change /construction/ decommissioning	Within the construction area	TBC	Yes – Receptor is within the ZoI
	Land-take/Land cover change /construction/ decommissioning: displacement	Within 100m of the Site	TBC	
	Increased light, noise and vibration: Disturbance	Within 250m from Site	TBC	
	Increased light, noise and vibration from aircraft taking off and landing: Disturbance	Within 500m vertical distance (altitude) and 1 km lateral distance of aircraft flight paths; and, for noise, within 85dB contour.	TBC	

Appendix 7C: Justification for defining zones of influence

A1.4 Receptors have only been assessed against potential environmental changes to which they are likely to be sensitive. Whether a receptor is sensitive or not to an environmental change has been determined based on professional judgement, project design, statutory guidance and appropriate relevant literature.

Table 7C.1 Justification for defining zones of influence (ZoI)

Environmental change	**Receptor (sensitive to environmental change or scale of environmental change)**	**Zone of Influence**	**Justification**
Land-take/Land cover change /construction/decommissioning	All receptors	Within Site	Land-take/land cover change will take place in areas where construction/decommissioning are planned. Other areas within and outside the site boundary will not be affected by land-take/land cover change.
	Japanese Knotweed	Within ~7m of a construction area	Rhizomes from Japanese knotweed are considered to extend up to ~7m laterally from the base of the parent plant (Knotweed Code of Practice, Environment Agency 2013). Any ground disturbance within this area may promote the spread of the species.
Disturbance - Displacement	Golden plover	Within 250m of Site	This zone of influence is based on a combination of best practice and professional judgment. 250m is a mean displacement distance for wintering golden plover at wind farm sites in Germany (Hotker *et a*l. (2006).
	Other/all SPA/SSSI bird species	Within 500m vertical distance (altitude) and 1 km lateral distance of aircraft flight paths; and, for noise, within 85dB contour.	Lateral disturbance distance would be assumed to be a precautionary 1km from flight paths at altitudes up to 500m (based on review by Drewitt 1999). Above 500m no disturbance by visual presence or shadow cast. For noise, use of 85db contour as the level where no impact is expected as described in the SoS decision on Lydd Airport. To be refined after further noise modelling.
Increased light, noise and vibration	Designated Sites	Dependent on site qualifying features	Flora not considered to be impacted by light, noise or vibration. If any of the species below listed as a designated feature, ZoI listed below are implemented.

Environmental change	**Receptor (sensitive to environmental change or scale of environmental change)**	**Zone of Influence**	**Justification**
	Bats	500m from a construction area	Typically disturbance of roosting bats is unlikely to take place in areas over **500m** from the source. This is a precautionary distance based on professional judgement following a review of the Natural England and Natural Resources Body for Wales (previously CCW) guidance document ‘Disturbance and protected species: understanding and applying the law in England and Wales’ (2007).
	Badger	Sett ~30m from construction area	This zone of influence is based upon guidance from English Nature “Badgers and Development” (2002).
	Otter	500m from source	This zone of influence is based on professional judgement. Typically disturbance of otters is unlikely to take place in areas over **500m** from the source. This distance is a precautionary distance based on professional judgement following a review of Scottish Natural Heritage guidance ‘Otters & Development’.
	Water vole	Minimum ~5m from watercourse/ body to construction area	This zone of influence is based on professional judgement and best practice guidance. Water vole conservation handbook 3rd edition 2011.
	GCN	Up to 500m from a construction area	This zone of influence is based on best practice guidance. Great crested newt mitigation guidelines, English Nature 2001.
	Terrestrial priority species, Norfolk hawker, heath fritillary	~30m from suitable habitat	This zone of influence is based on the maximum limit priority species listed may be affected by light, noise and vibration based on professional judgement.
	Barn owl	Nest site within 200m of Site	This zone of influence is based on best practice guidance. Survey Methodology and Techniques for use in Ecological Assessment: Developing Best Practice in Survey and Reporting (Shawyer, 2011)

Environmental change	Receptor (sensitive to environmental change or scale of environmental change)	Zone of Influence	Justification
	All SPA/SSSI qualifying interest species	Within 250m of Site	This zone of influence is based on a combination of best practice guidance and professional judgement. Disturbance buffer zone distance represents a precautionary approach for golden plover, based on a recommended 250m distance (Cutts *et al* 2009), set to sensitive species such as redshank.
Dust deposition	Designated sites, watercourses, waterbodies, Priority habitat and Priority plant species	Within ~50m of Site	The zone of influence is based on usual deposition distances for dust from construction sites.
Increased vehicle movement	Badgers, otter, brown hare, hedgehog, reptiles	Within the Site and associated external access routes	This zone of influence is based on an increase in vehicle movement on site during construction/decommissioning and risk of direct collision.
Pollution	Statutory sites, watercourses, waterbodies, great crested newts, otter, water vole, aquatic Priority species	Within 7m of a watercourse bank-top and 15m for a tidally influenced watercourse	This zone of influence is based on the Environment Agency stand-off distance that negates the requirements for a Flood Defence Consent (from a main river). Distance represents a precautionary approach for ditches i.e. non main river. Based on potential inputs of pollution to watercourses and waterbodies from construction related surface run off (in the absence of mitigation measures).
Deposition of oxides of nitrogen[1] from engine exhausts/vehicle emissions	Change can result in enrichment and/or acidification of the environment leading	European/international sites within 10km, and national/local sites	Based on the Environment Agency's guidance note "Air emissions risk assessment for your environmental permit"[2]. To identify any significant effect, the air quality assessment will determine, in the long term, if the process contribution (PC) to air concentration or

[1] Assessment of sulphur oxides (SO_2) has been scoped out as such emissions are expected to be negligible (see Air Quality chapter, section 6.4).
[2] Environment Agency (2016) 'Air emissions risk assessment for your environmental permit'. https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit, dated 2 August 2016.

Environmental change	Receptor (sensitive to environmental change or scale of environmental change)	Zone of Influence	Justification
	to alteration of the plant community through changes in baseline conditions resulting in effects on (priority) habitats, flora, invertebrates, amphibians, bats, otters (as designated features of SACs) and birds (designated feature of SPAs)	within 2km of the proposal site. European sites/ sensitive habitats within 200m of the construction/ operational site, and arrival/ departure roads to site.	deposition within any sensitive part of the designated site is more than 1% of the critical load and level. Where the PC is greater than 1% of a long term critical load or level and the predicted environmental concentration/deposition (PEC[3]) is greater than 70% this is a likely significant effect. In the short term, where the PC to concentrations within the designated site is less than 10% of the short term critical level, the emission is unlikely to have a significant effect. Over 10 km, the emissions due to aircraft moving to or from the airport are likely to be deposited in a dispersed manner due to their ejection at altitude. This will be determined as the assessment progresses. European sites/sensitive habitats within 200m of the construction/ operational site, and arrival/departure roads to site. This search parameter is based on Department for Transport (2005) Interim Advice Note 61/04: Guidance for Undertaking Environmental Assessment of Air Quality for Sensitive Ecosystems in Internationally Designated Nature Conservation Sites and SSSIs.

[3] PEC = process contribution + background levels

Appendix 7.4

Technical note:
Bird disturbance by aircraft – a literature review

1. Introduction

1.1 Background

RiverOak Investment Corp LLC (RiverOak) is planning to reopen Manston Airport as a new air freight and cargo hub for the South East. This site is located within the district of Thanet in the county of Kent, close to the coastal town of Margate (the approximate central point of the site is at National Grid Reference [NGR] TR 330 657).

There was an operational airport at the site between 1916 and 2014. Until 1998 it was operated by the Royal Air Force as RAF Manston, and, for a period in the 1950s, was also a base for the United States Air Force (USAF). From 1998 it was operated as a private commercial airport with a range of services including scheduled passenger flights, charter flights, air freight and cargo, a flight training school, flight crew training and aircraft testing; in the most recent years it was operating as a specialist air freight and cargo hub servicing a range of operators. Although the airport was closed in May 2014 much of the airport infrastructure, including the runway, taxiways, aprons, cargo facilities and passenger terminal remain intact.

The proposed Manston Airport development involves the development of an air freight and cargo facility with the capacity to handle more than 10,000 air transport movements (ATMs) of cargo aircraft per year as part of the provision of air cargo transport services.

The airport location is within 2 km of the Kent Coast which includes a number of sites designated for wildlife, and birds in particular. This includes Sandwich Bay to Hacklinge Marshes Site of Special Scientific Interest (SSSI), Thanet Coast and Sandwich Bay Special Protected Area (SPA) and Thanet Coast and Sandwich Bay Ramsar Site.

In an English Nature Bird Network information note (Drewitt 1999), disturbance to birds is described as “any situation in which a bird behaves differently from its preferred behaviour”. Disturbance of birds by naturally occurring phenomenon include changes of conditions (i.e. weather or tides) and the presence of predators. The same review also describes bird disturbance as “any situation in which human activities cause a bird to behave differently from the behaviour it would exhibit without the presence of that activity”. Human activities that can directly conflict with the natural environment, creating disturbance can include dog walking, fishing, over flight by aircraft, cycling and the use of boats and other vessels on water bodies.

Responses to disturbance can range from slight changes of behaviour such as becoming alert and observing the disturbance source to more major responses including taking flight and leaving a site for a number of hours or in some cases days (Drewitt 1999). Species and individuals that respond to disturbance events by taking flight are typically expending greater levels of energy, and also reducing the time they have available to feed and as such are increasing pressure on their individual energy budgets, which has the potential to impact their survival and other functions such as breeding success (Burger 1981, Zonfrillo 1992, Davidson and Rothwell 1993).

In a review of disturbance of wildfowl in coastal/estuarine environments, (Davidson and Rothwell 1993), disturbance of birds by overflying aircraft is identified as having the potential to cause widespread disturbance that can cause long-lasting changes in behaviour and in some cases, long term changes of distribution (Smit and Visser 1989).

1.2 Purpose of this Report

This review looks at the available literature to assess typical responses of birds and in particular waterfowl (i.e. ducks, geese and waders) to overflights by aircraft. The effects of altitude, lateral distance and noise on the levels of disturbance are described, with the information being used to determine parameters that could inform the assessment of effects of aircraft operation on waterbirds. This includes:

1.3 Disturbance altitudes and distances – existing evidence

Bird disturbance due to commercial aircraft operation is an increasingly important issue in the UK due to current and proposed expansion of the aviation industry. In the UK to date, this issue has been identified as being investigated only with regard to two proposed extensions of smaller regional airports (i.e. at Lydd and Southend Airports. Impact assessments connected with these projects have identified much of the most relevant literature and this has highlighted that there is a paucity of contemporary and species or situation specific studies available.

Data from the UK and Europe is available, with much of the data relating to geese (Owens 1977), waders (Heinen 1986) and ducks (Komenda-Zehnder *et al.* 2003), though there are also a number of studies from sites in the United States of America which provide useful information using analogous species (Belanger & Bedard 1989 and Miller 1994).

Additional information from airport management plans, bird strike management protocols and other construction manuals have also been reviewed and in some cases can provide useful information (IECS 2009 and Jacobs 2009).

The most relevant report and a source of many of the references included in this review is the English Nature document from 1999 – *Disturbance effects of aircraft on birds* (Drewitt 1999). This includes a summary of the disturbance effects of proximity on birds. Species referenced in this report include brent geese[1] (Owens 1977, Miller 1994 and Ward *et al.,* 1994), kittiwake, guillemot and gannet (Dunnet 1977, Zonfrillo 1992), waders; including lapwing, curlew and golden plover (Heinen 1986, Visser 1986 and Evans 1994) and ducks; including tufted duck and pochard (Komenda-Zehnder *et al.* 2003).

Where possible, additional studies have been identified and accessed to provide additional evidence and figures.

In many of these studies, minimum disturbance altitudes have been estimated (i.e. the altitude at which no disturbance occurs) along with maximum disturbance altitudes (i.e. the altitude at which all or the majority of birds are disturbed). A small number of the reports also provide lateral distances at which no disturbance occurs. Noise has also been considered in a number of reports, with studies and environmental assessments for other airports including measured noise levels to assess the tolerance limits of birds.

Table 1.1 shows a summary of the species, the aircraft type observed and the disturbance altitude (minimum and maximum where available) and lateral distance (where available).

[1] The scientific names of all species mentioned in this report are provided in Appendix 1.

Table 1.1 Summary table of estimated disturbance altitudes and distances from available literature

Species and location	Aircraft type	Minimum disturbance altitude (m) (i.e. no disturbance)	Maximum disturbance altitude (m) (i.e. all or most birds disturbed)	Minimum lateral distance for no disturbance (Km)	Reference
Brent goose, Alaska, USA	Helicopter	1,220-1,830 m	305-460 m	-	Miller (1994)
Brent goose, Alaska, USA	Large plane	610 m	<610 m	>0.8 km	Ward *et al* (1994)
Brent and Canada goose, Alaska, USA	Helicopter and civil aircraft	>1,000 m	305-760 m	1.2-2 km	Ward *et al* (1999)
Brent goose, Alaska, USA	Helicopter	1,070 m	-	-	Jensen (1990)
Brent goose, Essex, UK	Small planes and helicopters	-	<500 m	1.5 km	Owens (1977)
Kittiwake and guillemot, Aberdeenshire, UK	Helicopter/small fixed wing	150 m	-	-	Dunnet (1977)
Gannet, Firth of Clyde, UK	Larger fixed wing (Hercules)	-	200 m	-	Zonfrillo (1992)
Roosting shorebirds, Wadden Sea, Germany	Small planes	300 m	<150 m	-	Heinen (1986)
Shorebirds, Voordelta, Netherlands	Not specified	-	150 m	1 km	Baptist & Meininger (1984)
Waders, Terchelling, Netherlands	Jets	-	-	>1 km	Visser (1986)
Lapwing, curlew, golden plover and pink-footed goose, Ribble Estuary, UK	Microlights	300 m	<150 m	-	Evans (1994)
Tufted Duck, Coot, Pochard, Switzerland	Small plane	300 m	150 m	-	Komenda-Zehnder *et al* (2003)
Tufted Duck, Coot, Pochard, Switzerland	Helicopter	450 m	80 m	-	Komenda-Zehnder *et al* (2003)
Whooper Swan, Glasgow UK	Planes, Helicopter	-	-	1.3 km	Rees *et al* (2005)
Brunnich's guillemot, Svalbard, Norway	Helicopter			>6 km	Fjeld, *et al* (1988)

The studies of brent geese in the USA and UK provide a range of disturbance altitudes and distances. The studies from Alaska include both modelled (Miller 1994) and observed responses (Ward *et al.* 1994 and

1999). The modelled approach used a simulation model that assessed the behavioural and energetic responses of a flock of 18,000 individual Pacific black brant[2]. This assessed two different types of helicopter (a Bell 206 and a larger Bell 412) flying through the area and modelled the responses of all geese within 3.3-3.5 km from the flight line. The minimum disturbance altitudes for the two different aircraft were estimated at <915 m for the Bell 206 and <1,065 m for the larger Bell 412.

By contrast the field investigation at Izembek Lagoon, Alaska (Ward *et al.,* 1994) recorded responses to large fixed wing planes and found that the worst disturbance occurred with aircraft flying at altitudes of less than 610 m. This study also recorded a lateral disturbance distance with aircraft eliciting a response from the birds up to 800 m away.

A later publication, regarding the same location (Ward *et al.,* 1999), investigated the impact of disturbance on Canada geese and found that species was less sensitive to disturbance events compared to brent geese. In this study, 51% of brent goose flocks flew in response to overflight by helicopters compared to only 11% of Canada goose. For planes, 33% of brent goose flocks flew, compared to only 5% of Canada goose flocks. For fixed wing aircraft, this study recorded a decreased disturbance impact, with increased altitude with minimum disturbance levels for both species occurring between 600 and 915m above ground level. For helicopters, no clear pattern is seen with fairly consistent levels of disturbance across all altitudes. This study found that lateral distance between the aircraft and bird flocks was the most important parameter, with responses of both species decreasing with increased distance values. Lowest levels of disturbance for both species were recorded at distances between 1.2 km and 2 km.

The variance in the results of these studies highlights a common theme across the literature that suggests that helicopters create greater levels of disturbance when compared to fixed-wing aircraft, often creating disturbance at much greater altitudes and lateral distances.

A study of brent geese in the UK (Owens 1977) assessed the impacts of human disturbance at a number of sites around the Essex coast. A series of surveys were carried out, with the various responses to disturbance recorded. This included overflights by aircraft, loud noises and the presence of people on the ground. This study suggests that the brent geese were particularly susceptible to aircraft disturbance, particularly any plane less than 500 m in altitude and up to 1.5 km away. Slow and noisy aircraft were especially harmful, presumably due to the combination of both a visual and aural cue. The study does suggest that habituation is possible, with geese at Leigh Marsh ceasing to respond to regular aircraft departures from nearby Southend Airport, though unusual aircraft still caused a disturbance response in the same geese.

It is important to note that the type of aircraft encountered in 1977 are likely to have been considerably louder and slower than more modern aircraft. Additional studies have also suggested that brent geese are one of the more sensitive species of waterbird when considering disturbance by aircraft (Heinen 1986) suggesting that any altitudes or distances associated with this species are likely to be at the upper limit of any estimates for groups of species.

A review of research conducted in the Wadden Sea and delta area in the Netherlands (Smit and Visser 1993) summarises disturbance altitudes and distances for a number of different species (including waders) and aircraft type. Observations from the Noordvaarder (Terschelling), an area in the Wadden Sea, (Visser 1986) included instances of disturbance by military jets, helicopters and small civil aircraft as the area included test areas and shooting ranges for jets. The study suggested that helicopters and small civil aircraft cause considerably more disturbance both more frequently and over greater distances than the jet aircraft. This is likely to be connected to the speed and associated noise of the slower aircraft.

In this study, all of the aircraft encountered were at altitudes of less than 300 m and while disturbance from jets could be detected up to 1.2 km away, this caused relatively few disturbance events with birds taking flight between 5-16% of the time. Species studied in this research included oystercatcher, bar-tailed godwit and curlew. Oystercatcher were shown to be the most tolerant to disturbance, with bar-tailed godwit and curlew both exhibiting similar disturbance reactions.

The review by Smit and Visser (1993) provides a summary of the results from a PhD study carried out in the German Wadden Sea (Heinen 1986) that assessed disturbance responses of a number of different waterbird species. Brent geese were found to be the most strongly reacting species (disturbance in 64-92% of instances) along with curlew (42-86%) and redshank (70%); shelduck and bar-tailed godwit were found to be

[2] Brant is the North American name for Brent goose.

less sensitive (42% and 38% respectively). The study also found that civil aircraft flying at >300 m disturbed in 8%, 150-300 m in 66% and <150 m 70% of cases.

In the UK, wader disturbance from overflights of ultra-light aircraft (i.e. microlights) were assessed in the Ribble Estuary (Evans 1994) along with the responses of over-wintering pink-footed geese. This report found that no detectable disturbance was observed in lapwing, curlew, golden plover and pink-footed geese when overflown by aircraft at altitudes greater than 1,000 feet (approximately 300 m), with the first signs of disturbance noted around 500 feet (approximately 150 m). Despite being based on a relatively short surveying period, the study suggests that the birds had become habituated to the aircraft.

A study of human disturbance impacts on overwintering whooper swans in the Black Cart floodplain, an area adjacent to Glasgow Airport (Rees *et al.* 2005), found that while helicopters and aircraft created a disturbance response in feeding birds at lateral distances >1 km, the response was only noted in a relatively low proportion of the feeding flock, especially when compared to other human disturbances (a mean of 31.5% birds, compared to a mean of 57.7% respectively). This study concludes that the reaction of the birds to aircraft was not "marked" and the presence of pedestrians had a significantly greater impact than vehicles (i.e. cars, vans, motorbikes) and aircraft. Whooper swans are particularly site faithful, often returning to the same wintering locations year on year. This study found that within the core flock of 100-130 birds, there were repeat sightings of a number of individuals that could easily be identified both within a winter and also to some extent between winters. Glasgow Airport is a fairly busy commercial airport with regular flights departing and arriving. The continued presence of this wintering population suggests that these birds have become habituated to the disturbance caused by the aircraft.

An experimental approach was taken to assess the effects of aircraft disturbance on waterbird populations on lakes in the lowlands of Switzerland (Komenda-Zehnder 2003). A number of species were observed in these experiments, although the most abundant species were tufted duck, pochard and coot. In this experiment, 326 experimental overflights were carried out at a range of altitudes using both helicopters and civil aircraft. This study found that the behaviour of the birds was not significantly influenced if planes flew at 300 m above ground level or 450 m for the helicopter. The helicopters used in this study were larger and louder than the planes used making it difficult to determine whether the visual or acoustic cues were responsible for the differences in behaviour. The duration of the effect was also assessed, with most birds returning to "normal" behaviour within 5 minutes of the disturbance event. It was also noted that there were different responses to the two types of planes used in the experiment. A larger, slower plane had a much stronger effect, which is consistent with the findings of other studies (Smit and Visser 1993, Owens 1977).

Experimental overflights were also used to assess the effect of disturbance on a small sub-colony of Brünnich's guillemot in Svalbard, Norway (Fjeld *et al.* 1988). Using a Bell 212 helicopter, a large and quite noisy aircraft, a series of flights were carried out, with the responses of the colony recorded. The distance at which responses were recorded were as far away as 6 km (lateral distance). Responses were always recorded within the colony at lateral distances of 2.5 km or less.

1.4 Noise levels and disturbance

Separating the effect of aircraft noise and the visual disturbance they can create is difficult, with the relevant literature often struggling to identify whether it is the audible or visual appearance of an aircraft that causes disturbance events. Kempf and Hüppop (1998) state that "*since the visual faculties of birds tend to be essentially far better developed than their auditory faculties, they respond less to noise than is generally assumed*" and while silent aircraft can cause similar reactions to noisy aircraft, some research (Ward *et al.* 1999) suggests that louder aircraft cause more severe disturbance effects than comparable quieter aircraft.

Some efforts have been made to identify noise level thresholds, at which disturbance begins to have a detrimental effect, with modelled and observed noise levels becoming an important part of Ecological Impact Assessments of airport extension projects such as for London Ashford Airport (Lydd) and London Southend Airport.

As part of supplementary information to the Environmental Statement for the Lydd project (Parsons and Brinckerhoff 2007), a literature review was completed, that drew together relevant studies that quoted recorded noise levels and bird disturbance, many of which focus on wildfowl species with much of the research carried out in North America.

In a study of harlequin duck in Canada (Goudie and Jones 2004), birds that experienced regular exposure to overflights from military aircraft in a testing area, showed an intensification of alert responses when noise levels exceeded 80 dB(A). Repeated overflights were also shown to increase the likelihood of alert responses, with the effects of the exposure lasting for up to two hours after the event.

In response to a request to increase aircraft activity in a military area in North Carolina, USA, an assessment was carried out to determine if the waterfowl present at the site (American black ducks, American wigeon, gadwall and American green-winged teal) were adversely affected by aircraft disturbance (Conomy *et al.* 1998). In this study, wildfowl responses were compared to aircraft overflights where the sound exposure levels exceeded 80 dB(A). The level of 80 dB(A) was chosen as the threshold to eliminate noise sources other than aircraft. This review suggests that the louder levels of aircraft disturbance did not adversely affect time-activity budgets for the observed waterfowl with ≤1.4% of their time spent responding to aircraft. Very few individual birds were disturbed by aircraft, with between 1.4% and 3.0% of the individuals observed showing any response.

A study of crested tern, at a colony on the Great Barrier Reef, Australia (Brown 1990), used recorded aircraft noise levels between 65 dB(A) – 95 dB(A) and recorded the behavioural responses of each bird in the colony. While alert and scanning behaviours became notable at noise levels of 65-70 dB(A), the startle or escape responses were only recorded when exposure levels reached greater than 90 dB(A).

Whilst noise has the potential to have a damaging effect on birds regularly overflown by aircraft, it is apparent from the literature that quantifying the level at which noise starts to have a detrimental effect on a population or concentrations of birds is difficult to separate from the visual impact and is likely to be both site and species specific.

1.5 Existing recommendations and practice

The Civil Aviation Authority (CAA) recognise the potential impact of aircraft disturbance and provide the following recommendations for pilots with regard to areas with sensitive fauna (CAA 2012):

"*As elsewhere in the world, offshore islands, headlands, cliffs, inland waters and shallow estuaries attract flocks of birds for breeding, roosting and feeding at various times of the year. Within 20 nautical miles or so of such locations concentrations of birds flying mostly below 1,500 feet (457 metres) may be encountered.*

In order to lessen the risk of bird strikes, pilots of low flying aircraft should, whenever possible, avoid flying at less than 1,500 feet above surface level over areas where birds are likely to concentrate. Where it is necessary to fly lower than this, pilots should bear in mind that the risk of a bird strike increases with speed (it is a fact that birds rarely hit an object moving slower than 80 knots). Apart from endangering aircraft by flying close to bird colonies, the breeding of the birds may be upset and the practice should be avoided on conservation grounds. It should also be appreciated that, especially in the case of sea bird colonies, concentrations of birds may be soaring on lee waves downwind of the areas where they breed."

Such advice is only an advisory notice for civil pilots and is made with reference to the disturbance risk to birds and also to bird strike risk for pilots. In addition to general avoidance altitudes, the CAA also publish information on "Bird Sanctuaries" which highlights locations of particular importance for breeding and wintering birds. Such locations are accompanied by specific avoidance altitudes and times of year, with sites protected by areas of up to 3 nautical miles (5.5 km) and altitude limits up to 4,000 feet (1,219 m) (CAA 2012).

In the USA, the Federal Aviation Administration recommend that aircraft fly above 610 m when crossing sensitive wildlife areas.

Many of the reviews and reports that have estimated disturbance altitudes and/or lateral distances have also provided recommendations of flight heights or distances that could be adopted to minimise disturbance to birds.

The English Nature information note (Drewitt 1999) provided the following recommendations:

- Flights over sensitive bird areas should be at least 500 m above surface levels and preferably over 1,000 m (especially for helicopters).

- Unpredictable, curving flight lines are more disturbing than predictable, straight flight lines.
- Cliff-nesting and other colonial seabirds during the breeding season and flocks of waterfowl during the winter are most vulnerable, especially during severe weather conditions.

The experimental flights completed in Switzerland (Komenda-Zehnder 2003) were commissioned by the Swiss Federal Office for Civil Aviation and the Swiss Agency for the Environment, Forests and Landscape with a view to informing advice relating to disturbance of birds by overflights of aircraft. This report, based on the responses of mixed assemblages of wildfowl, recommends a minimum flight altitude of 450 m above ground level, an altitude that would compensate for both small planes and helicopters.

Expansion plans for Southend Airport were required to take into considerations the potential impact of aircraft disturbance on the adjacent Crouch and Roach Estuaries SPA/Ramsar/SSSI, which is located to the east of the airport and supports over 20,000 waterfowl during the winter (including brent geese). As part of discussions with Natural England, it was agreed that an increased flight frequency was not likely to result in any significant impact upon the designated features of the protected areas, assuming that "*the altitude of overflights remains unchanged from that currently employed*" (Jacobs 2009). Assessing the typical approach and departure protocols for the airfield, overflights of the designated areas by departing aircraft should be at altitudes of at least 1,500 feet (457 m) and between 1,500 feet (457 m) and 730 feet (222 m) on arrival. This provisional agreement was based on the assumption that the birds, already habituated to some degree to the flight paths and altitudes of aircraft would not be adversely impacted by an increase in the number of flights.

Guidelines for the operation of aircraft in Antarctica have been created to avoid conflict with the large breeding colonies of albatross, penguin and other seabirds (Antarctic Treaty Consultative Parties 2004) suggest that all bird colonies are not to be over flown below 2,000 feet (approximately 610 m) above ground level and that all landings should not occur within half a nautical mile (approximately 930 m) of bird colonies. It also goes on to recommend that a vertical separation of 2,000 feet (approximately 610 m) and a horizontal separation of a quarter of a nautical mile (approximately 460 m) should be maintained from the coastline where possible. Any flight that crosses the coastline should do so at right angles and above 2,000 feet (approximately 610 m).

Similar flight altitudes are also recommended by the Canadian Wildlife Service, who carried out a detailed review of available literature, and concluded that any aircraft flying near areas with bird concentrations in the Inuvialuit Settlement Region, in the north-western Canada, should maintain a minimum altitude of 650 m (2,100 feet) in areas known to support birds. However, where higher concentrations were known (bird sanctuaries, breeding colonies, moulting areas), a more cautionary altitude of 1,100 m should be applied (Canadian Wildlife Service 2006).

These final two recommendations have been prepared for particularly remote locations and the bird species found here are likely to be less habituated to disturbance events or background noise, so these should be treated as cautionary recommendations that suit these particular circumstances.

1.6 Bird strike and bird scaring

In response to the potential risk of bird strike on and around airfields, most airfield operators utilise a range of different bird scaring methods to discourage birds from feeding, roosting or breeding on grass areas within airport boundaries.

The CAA provide detailed advice and recommendations for operators (CAA 2014) and it is understood that this document will be used as the basis of any bird scaring activities within Manston Airport, should the site become operational.

The guidance document provides the following recommendation with reference to designated sites;

"Aerodromes operating adjacent to or in close proximity to designated nature conservation sites should discuss their bird/wildlife control management plans with the relevant conservation agency to ensure that any activities carried out meet the requirements of the relevant environmental legislation."

The guidance recommends that airfield operators undertake some degree of off-airfield wildlife surveys up to 13 km from the airfield site to support their own policy with regard to safety. While there is some degree of flexibility in the design of any off-airfield bird/wildlife surveys, the assessments should be of a high enough quality to identify;

- Wildlife attractants; and
- Concentrations and regular movement patterns of hazardous birds at different times of the year.

Where airfields are located in close proximity to sensitive sites, this information can be used to tailor any bird scaring practices to ensure that scaring actions are not having any significant negative impact on designated species or locations.

Careful planning of grass management and the implementation of a "long grass policy" can discourage bird species from an airfield. However, in some cases, more active management practices may be required and it would likely be these that have the greatest potential to have a negative impact on any adjacent or nearby designated sites.

Active deterrents utilise a combination of visual and audible cues to control bird movements around an airfield, dispersing them effectively. Examples of active deterrents include;

- Distress calls;
- Pyrotechnic bird scaring cartridge (BSC) or bird scaring rockets;
- Lures;
- Birds of prey;
- Flags;
- Weighted plastic balls on water; and
- Plastic tape (that vibrates/hums in the wind).

2. Discussion

2.1 Designated sites and species

The proposed reopening of Manston Airport would result in increased volumes of air traffic arriving and departing directly overhead an area of coast that is protected by multiple designations. This section of coast is part of:

- Thanet Coast and Sandwich Bay SPA;
- Thanet Coast and Sandwich Bay Ramsar Site;
- Sandwich Bay to Hacklinge Marsh SSSI, and;
- Thanet Coast SSSI.

Table 2.1 details the bird species that form part of the qualifying or notified interest of these statutory designated sites. The SPA and Ramsar sites, and Thanet Coast SSSI extend over considerable sections of the coast, covering areas of 1,881, 2,182 and 817 hectares (ha) respectively. These extend along the northern coast of Kent as well as the area around Ramsgate and Sandwich Bay. The area likely to be adjacent to the arrival and departure flight path, and therefore at greatest risk from regular disturbance, is Pegwell Bay, which forms the northern part of the Sandwich Bay to Hacklinge Marshes SSSI, but is also part of the Sandwich Bay and Thanet Coast SPA/Ramsar site.

Table 2.1 Summary of qualifying / notified bird species of statutory sites

Designated Site	Species included in designation
Thanet Coast and Sandwich Bay SPA (Natura 2000 Standard Data Form)	Turnstone (940 individuals representing at least 1.3% of the wintering Western Palearctic populations (5 year peak mean 1991/2-1995/6))
	Golden plover (411 individuals representing 0.2% of the wintering GB population (5 year peak mean 1991/92-1995/96)
	Little tern (6 breeding pairs representing 0.3% of the GB breeding population 5 year mean, 1992-1996)
Thanet Coast and Sandwich Bay SPA (Third Review)	Turnstone (1,086 individuals representing at least 0.72% of the wintering Western Palearctic population (5 year peak mean 2004/5-2009/10))
Thanet Coast and Sandwich Bay Ramsar Site	Turnstone (1,007 individuals representing an average of 1% of the wintering Western Palearctic population (5 year peak mean 1998/9-2002/3))
Sandwich Bay to Hacklinge Marshes SSSI	The SSSI is notified for its non-breeding populations of golden plover, grey plover, ringed plover and sanderling, and its breeding bird assemblage associated with lowland open waters and their margins. The citation also makes reference to "*Large*" numbers of waders and wildfowl in winter and passage (spring & autumn), with dunlin being the most common species, and oystercatcher, curlew and redshank also occurring. Wildfowl include mallard, shelduck and brent goose, and breeding birds include ringed plover, oystercatcher and little tern.
Thanet Coast SSSI	The SSSI is notified for its internationally important numbers of non-breeding turnstone; nationally important numbers of non-breeding grey plover, ringed plover and sanderling; breeding little tern; and variety of passage birds. The SSSI citation makes reference to a breeding colony of little tern, in nationally important numbers, breeding on Plumpudding Island.

N.B. The numbers on the Natura 2000 Standard Data Form for Thanet Coast and Sandwich Bay SPA remain the figures to be used for Habitat Regulations Assessment purposes. The data from the Third Network Review of the UK SPA network (Stroud *et al*., [eds] 2016) is provided for context.

Turnstone

Turnstone is listed under both the Thanet Coast & Sandwich Bay SPA and Ramsar designations, and is a notified feature of the Thanet Coast SSSI; these sites supporting populations of both national and international importance. The species occurs almost exclusively in coastal habitats, particularly along rocky shorelines / beaches, and is very rarely seen inland.

Regular co-ordinated counts of turnstone have been carried out most winters between 2001 and 2016, designed to accurately record the number of turnstone within the Thanet Coast and Sandwich Bay SPA. The survey area is divided into 21 sectors, with the area around Pegwell Bay covered by two count sectors. The northern part of Pegwell Bay held peak numbers of 927 individuals in 2010 but in more recent years, as is common for the SPA in general, has supported fewer individuals. Between 2014 and 2016, typical counts were between 14-34 individuals though a count of 88 was recorded in March 2014 (Hodgson 2016).

The survey also highlights that the main high tide roost sites for turnstone (i.e. roost sites that regularly support at least 10% of the total count) are located on the northern Kent Coast between Whitstable and Herne Bay (at its nearest point, approximately 13 km northwest of Manston Airfield). During the monitoring program, other roost sites have periodically supported a larger proportion of the total count (than Whitstable to Herne Bay), such as the area east of Birchington (4 km north of the airfield), however this site was used most regularly between 2001 and 2003. In the most recent survey (in 2016), all of the key roost sites were located on the northern part of the SPA between Whitstable and Margate.

Turnstone have been shown to habituate to human disturbance (Titley and Peckham 2004) and were shown to tolerate presence of humans as close as 10 metres where activity was regular. Turnstone have been shown to habituate readily to regular disturbance and have a high tolerance to disturbance (see Table 2.3) and are therefore unlikely to be significantly affected by an increase in air traffic.

Golden Plover

Golden plover is also a qualifying species for the Thanet Coast & Sandwich Bay SPA, and is listed under "other noteworthy fauna" in the Ramsar designation. It is found throughout the winter (generally from October-March), where it feeds and roosts on both intertidal and inland areas around much of the Kent coast. One of the main concentrations of golden plover is around Pegwell Bay, where their main feeding habitat is on arable fields and grazing marsh located inland, outside of the SPA. The Wetland Bird Survey (WeBS) five-year peak mean count of golden plover for 2010/11-14/15 for Pegwell Bay (which is covered by WeBS Count Sector 22412) was 3,285 individuals (http://app.bto.org/webs-reporting/).

An English Nature Report from 2003 (Griffiths 2003) identified the Pegwell Bay population of golden plover as one of two major populations within the wider Thanet Coast and Sandwich Bay SPA. This report found that while the Pegwell Bay population roosted or rested in significant numbers in the intertidal part of the bay, much of the populations' feeding effort took place in the arable and pasture fields that border the designated area. This report recommended that all of the fields between Deal and Pegwell Bay (between Minster and Sandwich) and east of the River Stour should also be included in the SPA as they represented important feeding areas adjacent to the SPA.

More recent field utilisation has been discussed with the Sandwich Bay Bird Observatory and augmented with observations from winter bird surveys carried out by Amec Foster Wheeler in 2016/17. This has found that land utilisation by golden plover has not changed significantly (in terms of distribution and habitat type) since 2003. The southern part of Pegwell Bay is still well used by golden plover, along with a number of arable and pasture fields in the surrounding area. Of note in relation to potential disturbance from the proposals, is a small field directly to the south of Manston Airport (and adjacent to the northwest of Cliffs End village) where a flock of 530 golden plover were observed roosting by Amec Foster Wheeler staff on 9 November 2016. Golden plover were recorded in this field on two occasions, with the second and final observation involving two birds foraging there on 7 December) after which the field was ploughed, and no further golden plover were observed during the rest of the winter.

Unlike turnstone, golden plover show moderate response levels to disturbance (see Table 2.3). Of greatest concern with respect to the proposed development would be the potential impact of aircraft on feeding/roosting flocks using arable and pasture land in close proximity to the airfield that may also sit outside the SPA.

Little Tern

Little tern is listed as a designated species for the Thanet Coast and Sandwich Bay SPA and notified feature of the Thanet Coast SSSI, and historically has bred in two main locations; (i) Plumpudding Island (in Minnis Bay) on the northern coast (NGR TR280692, approximately 5 km northwest of the airfield), and (ii) a point at the mouth of the River Stour and the northern extreme of Sandwich Bay, 2.5 km from the eastern end of the airfield (English Nature 2000). The breeding population of little tern in the SPA has declined significantly since its designation, from a mean of 30 pairs during 1986-90 to 6 pairs during 1992-96. By 2000, regular breeding had ceased within the SPA and since 2009, no fledged young have been reported in the county (Clements *et al*. 2015). No nesting little terns were reported in Kent in 2014 (Privett [ed] 2016) and the species is now a passage migrant and non-breeding summer visitor to the Pegwell Bay area. Little terns are almost exclusively found in coastal habitats (and occur very infrequently inland), foraging in the shallow waters just offshore, and resting/ nesting on beaches.

Tern species have shown relatively high tolerance to aircraft noise (Brown 1990), and it is likely that both of the breeding sites within the SPA are distant enough from the airfield for noise not to be of major significance.

Other Species

The Sandwich Bay to Hacklinge Marshes SSSI citation also makes reference to the SSSI providing an important landfall for migrating birds and supports large wintering populations of waders, some of which regularly reach levels of national importance. Table 2.2 provides the five-year peak mean counts (obtained from WeBS core high tide counts during 2010/11-2014/15) for the species listed in the SSSI citation (including grey plover, sanderling and ringed plover, which form part of the notified interest of the SSSI) for Pegwell Bay (http://app.bto.org/webs-reporting/). None of these figures exceed their respective national thresholds of importance for a site. The SSSI is also notified for supporting an important breeding bird assemblage associated with lowland open waters and their margins, though the citation provides no further details as to the species involved.

The Thanet Coast SSSI is also notified for its variety of migrant bird species that occur, though no specific species are provided in the citation.

Table 2.2 Five-year peak mean figures for species listed in the Sandwich Bay and Hacklinge Marshes SSSI (Pegwell Bay area only)

Species	5 year peak mean (2010/11 – 2014/15)
Brent goose	1,609
Shelduck	161
Mallard	362
Oystercatcher	946
Ringed plover	188
Grey plover	361
Sanderling	129
Dunlin	1,429
Curlew	520
Redshank	176
Little tern	52

To understand typical disturbance responses for many of these species, it is possible to use the TIDE (Tidal River Development) tool kit (http://www.tide-project.eu/), a project part funded by the European Union and created as part of Interreg IVB North Sea Region Programme. As part of the tool kit, a waterbird disturbance mitigation tool (Cutts *et al.* 2013) was created that features species accounts for a range of waterfowl and waders and categorizes them based on their tolerance of disturbance (green – least sensitive, to red – most sensitive). Table 2.3 provides details from the toolkit.

Table 2.3 Summary of species accounts included in the TIDE waterbird disturbance mitigation toolkit

Species	Disturbance Potential	Thanet Coast and Sandwich SPA	Thanet Coast and Sandwich Bay Ramsar Site	Sandwich Bay to Hacklinge Marshes SSSI
Brent goose	High Sensitivity - highly sensitive to noise disturbance and they react in a variable manner to visual disturbance. They have been found to react to up to 92% of aircraft passes although this declined to 64% with habituation.			X

Species	Disturbance Potential	Thanet Coast and Sandwich SPA	Thanet Coast and Sandwich Bay Ramsar Site	Sandwich Bay to Hacklinge Marshes SSSI
Shelduck	High Sensitivity - generally highly sensitive to visual disturbance. However, the species is subject to a high degree of habituation and further exposure can lead to no response to stimuli.			X
Mallard	Moderate Sensitivity - relatively tolerant species that will habituate rapidly to activity. There is very little information on the effects of noise disturbance, but there was no observed response to loafing and foraging birds in a moderately 'noisy' tidal freshwater site on a busy navigation.			X
Oystercatcher	Moderate Sensitivity - relatively tolerant of disturbance and will habituate rapidly to ongoing activity. There is little information on the effects of noise disturbance, but direct observation at a highly disturbed site saw a reaction to only 9% of events with a degree of habituation assumed.			X
Ringed plover	Low Sensitivity; extremely tolerant with habituation - an extremely tolerant species that habituates to anthropogenic activities rapidly. Their reaction to noise or construction works is likely that again they have a high threshold given their general high tolerance.		X	X
Grey plover	Moderate Sensitivity - Limited data suggest that they are a relatively disturbance tolerant species, although their ability to habituate to works is unknown. It is also largely unclear how tolerant they are to noise disturbance			X
Dunlin	Low Sensitivity - a relatively tolerant species that habituates to various stimuli. Despite a general tolerance of visual disturbance they can be disturbed by overflying aircraft which combine visual stimuli with noise and have a resemblance to raptor predators.			X
Curlew	Moderate Sensitivity - evidence indicates that they are an extremely wary species that does not habituate to stimuli rapidly. Considered to be highly reactive to aircraft, although some observations have shown no reactions to machinery operation or aircraft passing overhead.			X
Redshank	High Sensitivity to Noise Disturbance; Tolerant of Visual Disturbance - relatively tolerant species that habituates to works rapidly. Despite a tolerance of visual disturbance, they are highly disturbed by overflying aircraft which have a resemblance to raptors. Redshank were seen to react to aircraft overhead at noise levels of 72 dB (heads-up) and 88 dB			X
Turnstone	Low Sensitivity; extremely tolerant with habituation - thought to be an extremely tolerant species that habituates rapidly. There is no published evidence with regard their reaction to noise, but it is likely that again they have a high threshold.	X	X	

Species	Disturbance Potential	Thanet Coast and Sandwich SPA	Thanet Coast and Sandwich Bay Ramsar Site	Sandwich Bay to Hacklinge Marshes SSSI
Golden Plover	Moderate Sensitivity; Reasonably tolerant of moderate level visual disturbance but birds closer than 200 m to potential activities should be considered when commencing works and efforts should be made to avoid high level disturbance. Of particular note is the potential for inland roosts in arable fields adjacent to estuarine/riverine habitat – a similar disturbance distance threshold should be used. Moderately sensitive to noise stimuli, a precautionary approach assumes a tolerance up to 72 dB but with caution at levels above 55dB. As the species often flies between the intertidal and adjacent terrestrial habitat to roost and feed the presence of activity behind flood defences can also have an influence on behaviour.	X		X
Sanderling	Low Sensitivity; extremely tolerant with habituation - thought to be an extremely tolerant species that rapidly habituates to anthropogenic activity. They are tolerant of people, allowing walkers to approach as close as 6-50 m. No direct disturbance reactions relating to aircraft are listed in the toolkit though there was no evidence of reactions to noise levels up to 90 dB from nearby piling operations.		X	X

N.B. **X** indicates species included in designation.

2.2 Conclusion and Recommendations

Given the species found in close proximity to Manston Airfield, the referenced material relating to wading bird species, is of particular relevance and can be used as a proxy when estimating the likely responses to increased disturbance of the birds found in the area. It is also important to consider other species that are attracted to the area such as wintering mallard, shelduck and brent goose.

The altitudes at which aircraft disturb wading birds have been found to be on average 300 m or more above ground level. Disturbance to other wildfowl (such as brent goose) is reduced at greater altitudes, typically between 450-610 m).

Lateral distances have not been as widely reported, though disturbance distances in excess of 1 km have been reported for some species such as brent goose and whooper swan.

Noise levels in excess of 80 dB(A) have been recorded as causing the more severe disturbance incidents in a number of studies. This included species such as harlequin duck, American wigeon, gadwall and crested tern.

To conclude, for the species that form the qualifying/notified interest of the Thanet Coast and Sandwich Bay SPA/Ramsar and Sandwich Bay to Hacklinge Marshes SSSI, significant levels of disturbance are unlikely to occur (within the SPA, and on other functional habitat used by the SPA/SSSI species), if:

- All over-flights are at, or in excess of altitudes of 500 m;
- Aircraft flight routes ensure that aircraft are in excess of 1 km from the SPA boundary; and
- The SPA boundary and functional habitat used by SPA/SSSI species is outside the 80 dB(A) noise contour for aircraft operations at the airfield (where noise levels would be at their greatest).

While it is anticipated that some degree of habituation is likely to occur, should aircraft departures and arrivals become regular and predictable, maintaining these buffer distances of both altitude and lateral distance should restrict the levels of disturbance and the designated areas affected.

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Appendix 1. Species names

The following table details the scientific names of any species listed in the above report

Species name	Scientific name
American black duck	*Anas rubripes*
American wigeon	*Anas americana*
Bar-tailed godwit	*Limosa lapponica*
Brent goose (Brant)	*Branta bernicla*
Brünnich's guillemot	*Uria lomvia*
Canada goose	*Branta canadensis*
Coot	*Fulica atra*
Crested tern	*Thalasseus bergii*
Curlew	*Numenius arquata*
Dunlin	*Calidris alpina*
Gadwall	*Anas strepera*
Gannet	*Morus bassanus*
Golden plover	*Pluvialis apricaria*
Great crested grebe	*Podiceps cristatus*
Greenshank	*Tringa nebularia*
Green-winged teal	*Anas carolinensis*
Grey plover	*Pluvialis squatarola*
Guillemot	*Uria aalge*
Harlequin duck	*Histrionicus histrionicus*
Kittiwake	*Rissa tridactyla*
Lapwing	*Vanellus vanellus*
Little tern	*Sternula albifrons*
Mallard	*Anas platyrhynchos*
Oystercatcher	*Haematopus ostralegus*

Pink-footed goose	*Anser brachyrhynchus*
Pochard	*Aythya ferina*
Redshank	*Tringa totanus*
Red-throated diver	*Gavia stellata*
Ringed plover	*Charadrius hiaticula*
Sanderling	*Calidris alba*
Shelduck	*Tadorna tadorna*
Tufted duck	*Aythya fuligula*
Turnstone	*Arenaria interpres*
Whooper swan	*Cygnus cygnus*

Appendix 7.5

RiverOak Strategic Partners

Manston Airport DCO EIA

Winter Bird Survey Report 2016-17

June 2017

Amec Foster Wheeler Environment
& Infrastructure UK Limited

Report for

RiverOak Investment Corp

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Document revisions

No.	Details	Date
1	Draft version	08/06/17

Contents

1. Introduction

1.1 Background

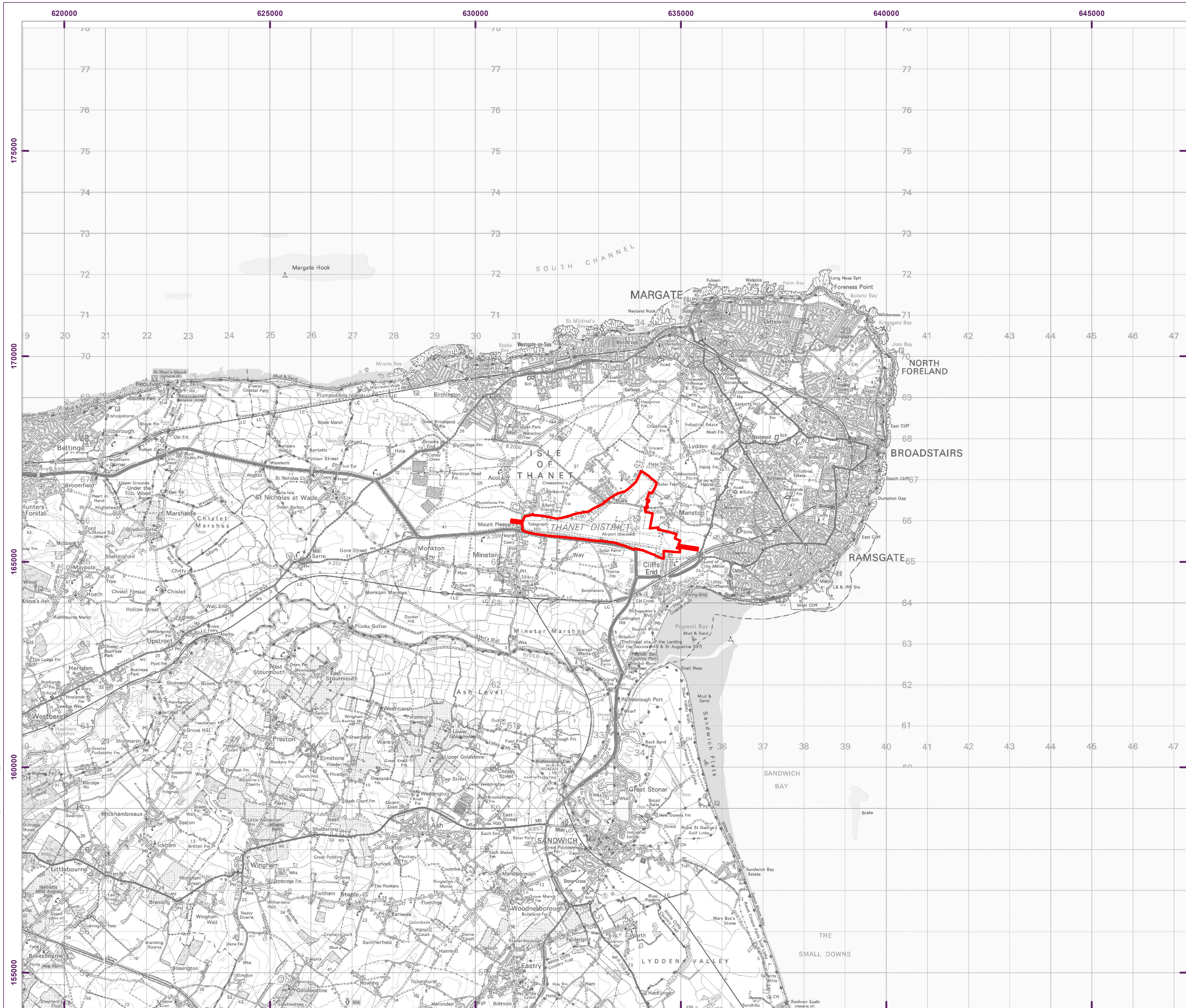
RiverOak Strategic Partners (RiverOak) intends to submit an application for development consent to reopen Manston Airport (hereon within this report referred to as the Site) as a new air freight and cargo hub for the South East. The Site, covering approximately 325 hectares (ha), is located within the district of Thanet in Kent, close to the coastal town of Ramsgate. The approximate central point of the Site is at National Grid Reference (NGR) TR 330 657 (see Figure 1.1).

There was an operational airport at the Site between 1916 and 2014. Until 1998 it was operated by the Royal Air Force as RAF Manston, and, for a period in the 1950s, was also a base for the United States Air Force (USAF). From 1998 it was operated as a private commercial airport with a range of services including scheduled passenger flights, charter flights, air freight and cargo, a flight training school, flight crew training and aircraft testing. In the most recent years it was operating as a specialist air freight and cargo hub servicing a range of operators. Although the airport was closed in May 2014, much of the airport infrastructure, including the runway, taxiways, aprons, cargo facilities and passenger terminal remain intact.

The proposed Manston Airport development involves the development of an air freight and cargo facility with the capacity to handle more than 10,000 air transport movements (ATMs) of cargo aircraft per year as part of the provision of air cargo transport services.

1.2 Purpose of report

This report details the methods adopted and results of a programme of winter bird surveys undertaken in 2016-17. These results will be used, along with the results from other ecological studies, to inform an Environmental Impact Assessment (EIA) to support a Development Consent Order (DCO) application for the Site. A list of the bird species mentioned in this report, with their scientific names is provided in Appendix A, with summary information on the legislation and designations relating to birds in Appendix B.



Key

The Site

0 1 2 3 4 5 km

Scale at A3: 1:90,000

Client

RSP

Manston Airport DCO EIA
Winter Bird Report 2016/17

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Figure 1.1
Location of the Site

June 2017 38199-Lon85.mxd squij

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2. Methodology

There are eight statutory designated nature conservation sites of ornithological importance within 10 km of the Site, the details of which (including the reasons for their designation and distance from the Site) are provided Table 2.1. The search distance of 10 km is considered to be a distance beyond which, any statutory designated sites are highly unlikely to be adversely affected by the proposed development, through for example: visual and noise disturbance from overflying aircraft, noise disturbance from the airport itself, and any potential air pollution. It is acknowledged however that this distance may need to be reviewed and potentially increased as further information becomes available, and in light of consultation with bodies such as Natural England. The locations of these statutory sites are shown on Figure 2.1.

Table 2.1 Statutory designated sites of ornithological importance within 10 km of the Site

Site name and designation	Site interest features	Distance and (direction) from Site
International		
Thanet Coast and Sandwich Bay – Ramsar	The Ramsar site (covering 2,169 ha) is designated for supporting internationally important numbers of non-breeding turnstone (under Ramsar Criterion 6), and 15 Red Data Book invertebrate species associated with wetlands (under Criterion 2). In addition, the Ramsar site supports nationally important numbers of ringed plover and greenshank during spring/autumn passage, and golden plover, sanderling, red-throated diver and great crested grebe in winter.	925 m (South-east)
Thanet Coast and Sandwich Bay – SPA	The SPA (covering 1,838 ha) is designated for populations of European importance of turnstone (non-breeding); golden plover (non-breeding) and little tern (breeding)	925 m (South-east)
Outer Thames Estuary – Marine SPA	This marine Sea inlet (covering 379,824 ha) regularly supports internationally important numbers of the Annex I Species (red-throated diver) in winter.	3.5 km (North)
Stodmarsh – Ramsar	The Ramsar site (covering 481 ha) is designated under Ramsar Criterion 2 for supporting: six British Red Data Book wetland invertebrates; 2 nationally rare and 5 nationally scarce plant species; and its diverse assemblage of rare wetland birds which includes gadwall during passage and the breeding season, and bittern, shoveler and hen harrier in winter.	8.5 km (South-west)
Stodmarsh - SPA	The SPA (covering 481 ha) is designated for its populations of European importance of bittern, gadwall, shoveler and hen harrier (during winter), and gadwall during the breeding season.	8,5 km (South-west)
National		
Sandwich Bay to Hacklinge Marshes – SSSI	The SSSI (covering 1,790 ha) contains the most important sand dune system and sandy coastal grassland in South East England. Notified features include: non-breeding populations of golden plover, grey plover, ringed plover and sanderling, and the assemblage of breeding birds within areas of lowland open waters and their margins.	925 m (South-east)
Thanet Coast - SSSI	The SSSI (covering 817 ha) is notified for its coastal habitats and the plant and invertebrate communities they support; geological features and breeding and non-breeding bird populations. Non-breeding populations of golden plover, grey plover, ringed plover and sanderling; breeding little tern; and the variety of passage bird species all form notified features of the SSSI.	4.5 km (East)
Stodmarsh – SSSI	The SSSI (covering 623 ha) is notified for its wetland habitats and the plant and invertebrate communities they support. The SSSI is also notified for its breeding bird assemblage associated with open waters and their margins, and specifically for nationally important breeding	7.7 km (South-west)

Site name and designation	Site interest features	Distance and (direction) from Site
	populations of bearded tit, Cetti's warbler, gadwall, pochard and shoveler.	

It is therefore necessary to consider the potential for airport operations to result in adverse effects on the bird species which form the qualifying / notified interest of these designated sites, in particular, due to its proximity, the nearby Thanet Coast and Sandwich Bay SPA/SSSI (and their constituent SSSIs) which are primarily designated for their numbers of waders and waterfowl they hold outside the breeding season. In order to better understand the use of the intertidal habitats by birds in the area where direct effects may manifest (such as Pegwell Bay) and associated functional habitats outside of the designated site boundaries, a programme of winter bird surveys was initiated in September 2016. It should be noted that at the time the surveys were undertaken, details of the likely aircraft flight paths in and out of the proposed airport; the flight altitudes (within close vicinity of the airport) and the aircraft types that would be used were not known.

To establish the level of usage and distributions of interest species within the area, two survey methodologies were employed: a 'Functional Habitat Survey' and 'Pegwell Bay Distribution Survey'. Each method is standalone and focuses on different land areas (see Figures 2.2 & 2.3), with the Functional Habitat Survey covering land surrounding the Site. Both methods involve surveys undertaken during the non-breeding period (in particular, during winter) when the notified/qualifying species and other relevant species are most likely to be present.

For both methodologies, all surveys were undertaken by a suitably experienced and qualified ornithologist, with extensive experience in undertaking intertidal surveys and surveys for golden plover. All surveys were undertaken in daylight hours and in various weather conditions, with stoppages made only for severe winds, impenetrable fog or heavy rain due to associated health and safety risks, and bird recording implications. The results of each survey were recorded on pre-formatted field survey sheets, which were photographed / scanned and electronically stored soon after completion of the survey.

2.1 Functional Habitat Survey

The aim of the Functional Habitat Survey was to determine the extent of use of the farmland surrounding the Site by birds, focussing on those listed as interest species in the non-breeding period for the nearby designated nature conservation sites (in particular, golden plover). There was no access to the Site itself though an estimated 45% of the land within the red line boundary of the Site could be viewed from outside. Much of the Site not viewable from outside its boundary comprised of the hardstanding of the runway, a habitat of limited value to any bird species. The Survey Area (shown on Figure 2.2) included all open land (excluding residential areas) extending to approximately 2 km from the Site boundary, or to the nearest significant boundary. It was envisaged that the survey area would include all land in which any target species present, might potentially be disturbed by over-flying aircraft or activities within the airport, although as stressed previously, details of the flight paths and altitudes were not known at the time of survey commencement, and the preparation of this document. The survey area also encompassed the area potentially disturbed by pyrotechnics, gas cannons etc. (a potential technique to scare birds from the airport runway and adjacent land). A review of studies into disturbance to birds by aircraft indicates that birds are generally disturbed by over-flying aircraft up to 500 m in altitude, and to a lateral distance of 1 km (Amec Foster Wheeler, 2017).

Within the survey area, a walk / drive-over method of survey was employed, during which (publicly accessible) transects and standing observation points were identified. These vantage points and transects provided coverage of all land parcels within the survey area. Surveys involved the field surveyor driving / walking between optimal observation points and intensively scanning each field with binoculars and a telescope. The main focus was on recording the number and activity (foraging, loafing, roosting etc.) of target species, but other notable species / assemblages seen are also recorded, together with an estimate of their numbers (see below).

The following species were recorded during the Functional Habitat Survey:

- Target Species
  - Golden plover; and
  - Ringed plover, grey plover, turnstone, sanderling and little tern (as other qualifying species of the Thanet Coast and Sandwich Bay SPA/Ramsar Site and notified species of their constituent SSSIs: the Thanet Coast SSSI and Sandwich Bay to Hacklinge Marshes SSSI);
- Notable species / assemblages
  - Species listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended)[1];
  - Species listed on Annex 1 of the Birds Directive[2];
  - Species of Principal Importance (SPI), on Section 41 of the Natural Environment and Rural Communities Act 2006 (NERC)[3] (in particular, lapwing);
  - Birds of Conservation Concern (BoCC); red-listed species (Eaton *et al*., 2015);
  - Flocks of 20 or more birds of all other species (winter thrushes, gulls, corvids); and
  - All other waterfowl.

For both target species and notable species, the following details were recorded:

- Time of observation
- Location of observation (the coded field within which it was recorded)
- Habitat type (winter-sown cereals, ploughed/bare ground etc.)
- Number of individuals present; and
- Activity (foraging, roosting, commuting, loafing etc.).

All the fields / land parcels within the survey area were given a unique field identification code for ease of recording and reporting findings (see Figure 2.1). The Functional Habitat Survey was undertaken once per month from September 2016 to March 2017 inclusive, with each monthly visit taking up to two days to complete.

2.2 Pegwell Bay Distribution Survey

The main aim of the Pegwell Bay Distribution Survey was to determine the current population size, distribution and usage by each waterbird species in Pegwell Bay. The survey area included those extensive areas of intertidal habitat (primarily mudflats, but also adjacent habitats) likely to be used by congregations of foraging and roosting waders and wildfowl. The counts primarily focussed on the area of intertidal mudflats north of the River Stour (which separates Pegwell Bay to the north, from the Sandwich Flats to the south); these being clearly visible from the survey viewpoints, adjacent to the west and north of the saltmarsh and mudflats. Where visible, any congregations of birds south of the River Stour were also recorded, though this area was only partly visible from the viewpoints (the dashed red line in Figure 2.3 shows the extent of intertidal habitat visible from the viewpoints).

During each survey visit, the surveyor walked along the publicly accessible transect, stopping at convenient viewpoints to record the birds. From each viewpoint, the surveyor intensively scanned the areas of intertidal

[1] Though protection given to listed schedule 1 species only extends to breeding birds, some species potentially present within the Survey area, such as Peregrine, are largely sedentary, individuals seen in winter are therefore likely to nest within the local area, if not within the survey area.

[2] Some species receive protection at a European level due to appearing on Annex 1 of the Directive 2009/147/EC of The European Parliament and if the Council of 30th November 2009 on the conservation of wild birds (codified version).

[3] In May 2008, Natural England and Defra published the Section 41 list of habitats and species of principal importance for the conservation of biodiversity in England. The list contains all UK Biodiversity Action Plan (BAP) priority habitats and species known to occur in England in addition to species of particular conservation significance in England. The production of the list is a requirement of the Natural Environment & Rural Communities (NERC) Act 2006 and it will be used to guide and prioritise future conservation action in England.

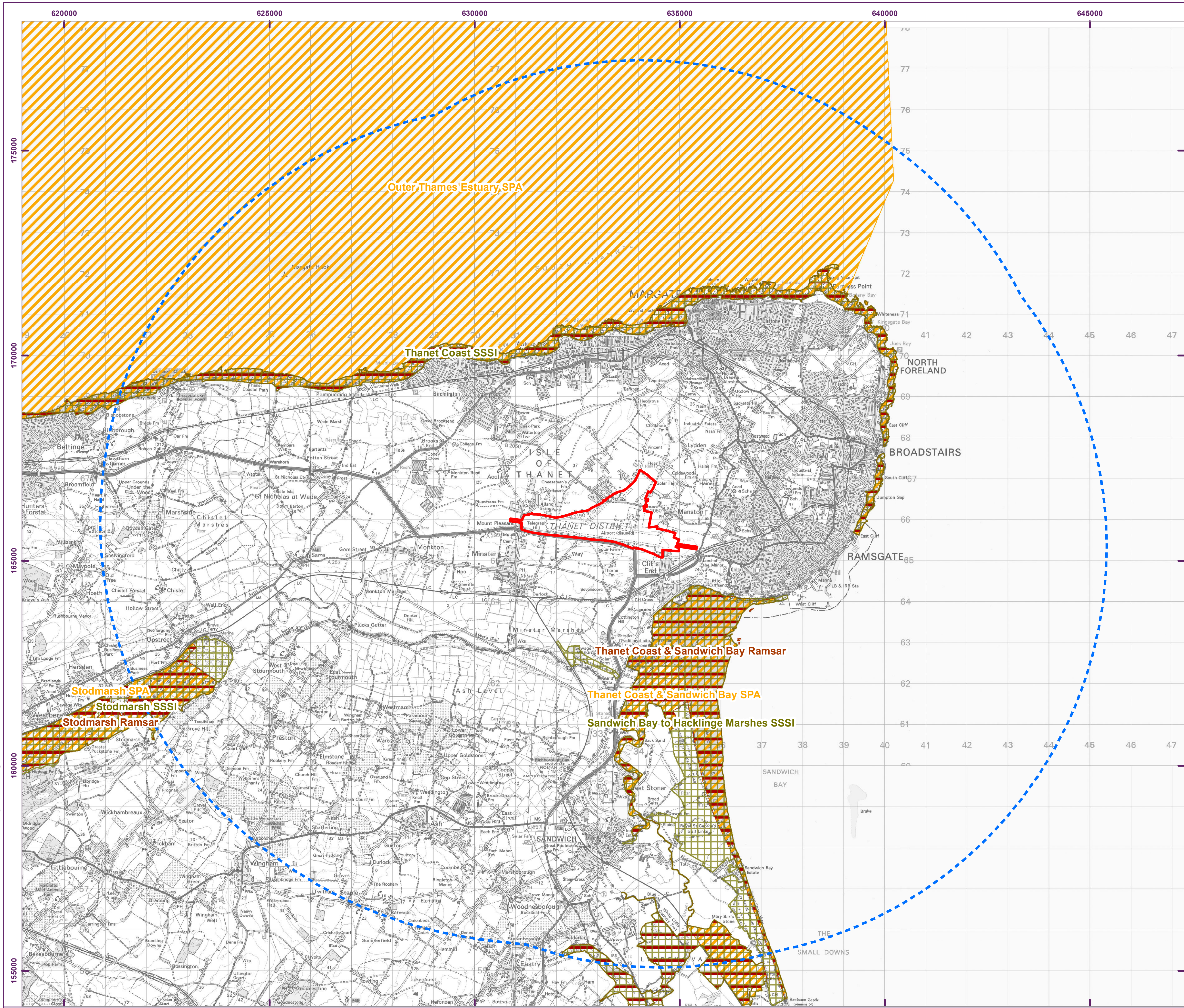
habitat with binoculars and a high powered, high-specification telescope[4]. The viewpoints allowed an almost full coverage of the survey area to be achieved. The focus of the Distribution Survey was on the recording and mapping of waders and other waterbirds using Pegwell Bay throughout the tidal cycle. Any major recreational (or other) disturbances during the visits were recorded.

A six-hour diurnal survey was undertaken one day per month (from October 2016 to March 2017 inclusive), capturing a partial tidal cycle within each visit, and where possible, including a high tide. During each survey visit, three counts were undertaken, each over an approximately one-hour period, where possible, capturing the bird numbers at low, mid and high tide. Within each count, the following information was recorded:

- The distribution and number of all species of wader and wildfowl (and any large congregations of gulls) using the intertidal and adjacent habitats;
- the behaviour of observed waterbirds (foraging, loafing[5], roosting etc.);
- tidal state and location of water's edge;
- time of observations; and
- any disturbance, via public or otherwise (predator etc.).

During each one-hour count, the flocks of birds were given a unique 'flock number' and their location marked on recording maps. To enable the results to be analysed and shown visually, the data from the recording maps was transferred onto a spreadsheet and each flock allocated a National Grid Reference (NGR) 500 x 500 m Square, equating to their approximate location at the start of each one-hour count (the birds were continually moving with the tide)[6].Each 500m square was given a unique identification letter (A-Z) (see Figure 2.3).

[4]Telescope – Leica APO Televid 82 (Angled) with 25-50x WW ASPH, zoom lens
[5] Loafing refers to birds that are resting but are alert (not roosting)
[6] It should be noted that flocks of foraging waders often moved rapidly over the mudflats with the changing tide, and so the 500m squares allocated to each flock position represent their approximate location at the start of viewing / detecting the flock.



Key

- The Site
- 10km search area
- SPA
- Ramsar
- SSSI

0 1 2 3 4 5km

Scale at A3: 1:90,000

Client

RSP

Manston Airport DCO EIA
Winter Bird Report 2016/17

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Figure 2.1
Statutory designated sites of ornithological importance within 10 km of the Site

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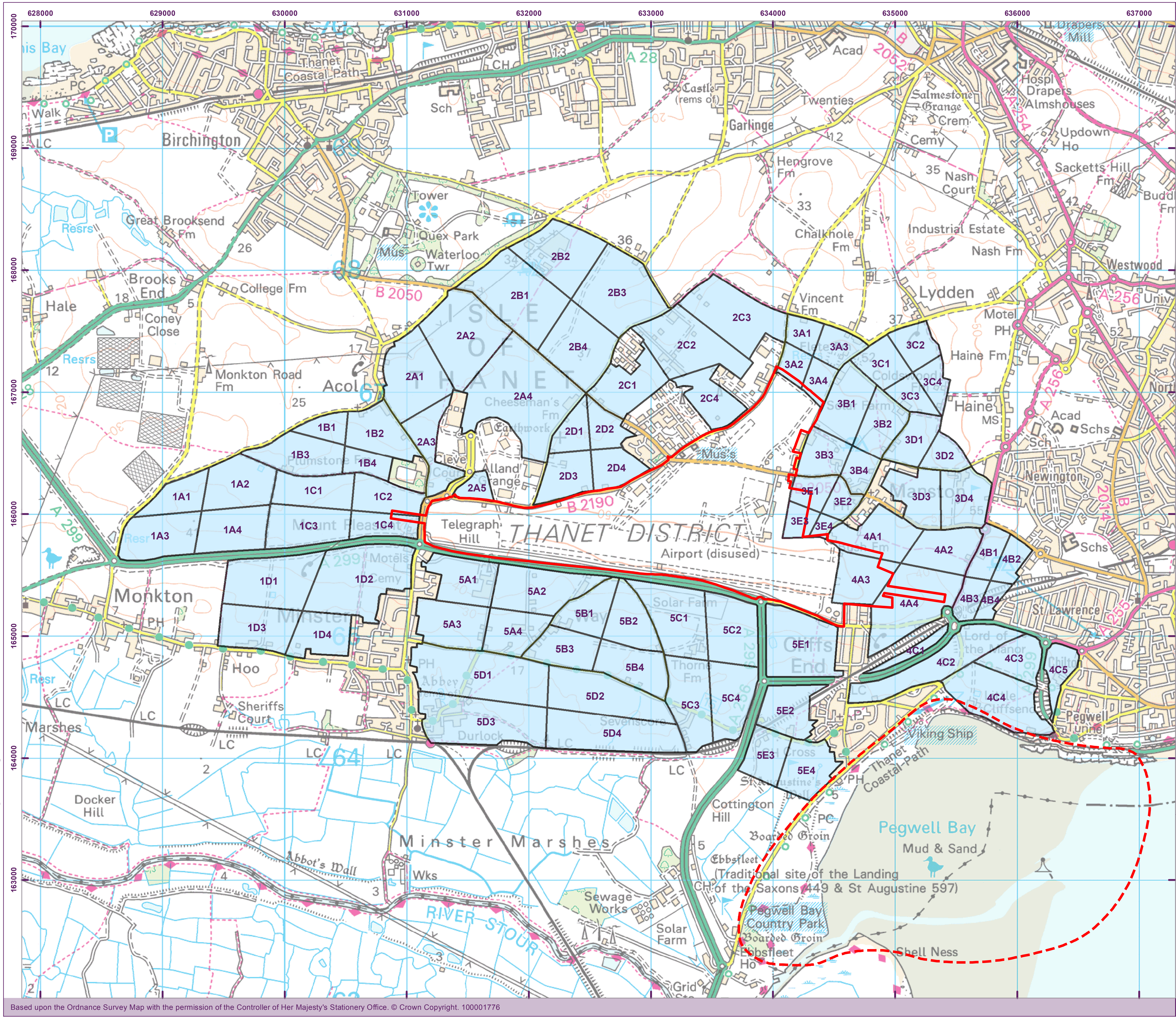

Key

The Site

Survey Area for the Pegwell Bay Distribution Survey

Functional habitat survey area

0 0.5 1 1.5 km

Scale at A3: 1:30,000

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Figure 2.2
Functional Habitat Survey: Survey Area and Field Identification Codes

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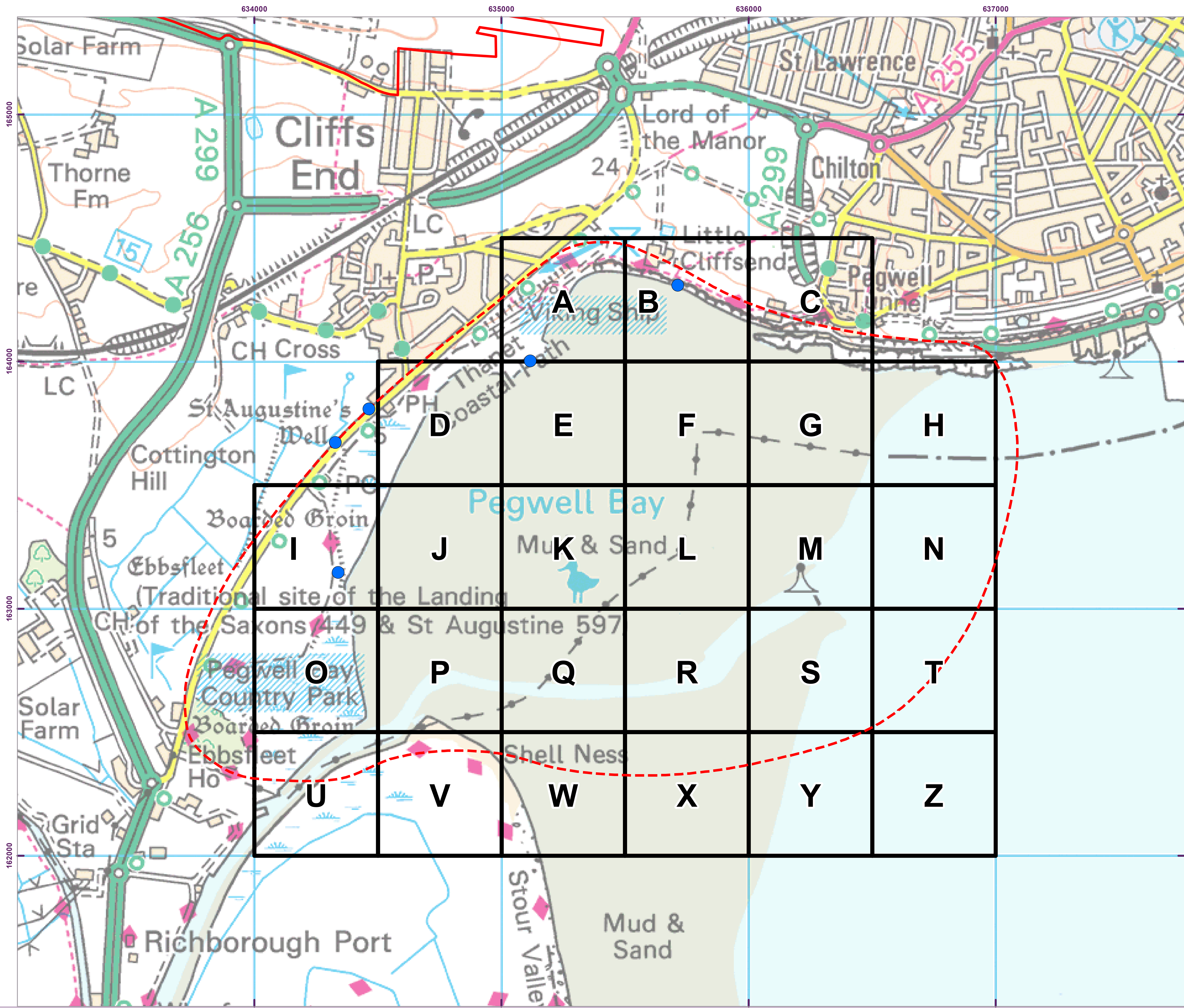

Key

The Site

Survey area

Viewpoints

500 x 500 m recording grid

0 0.25 0.5 0.75 km

Scale at A3: 1:15,000

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Figure 2.3
Pegwell Bay Distribution Survey: Survey Area and View Points

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3. Results

3.1 Functional Habitat Survey

The total number of each species counted within the survey area during each survey from September 2016 to March 2017 (numbered 1-7 respectively) is presented in Table D1 in Appendix D, with details of each visit (dates, times and weather conditions) provided in Table C1 in Appendix C.

A total of 66 bird species were recorded during the Functional Habitat Survey, including

- One target species, as defined in Section 2.1: golden plover;
- Five species listed on Annex I of the Birds Directive: hen harrier, merlin, golden plover, Mediterranean gull and short-eared owl;
- Seven species listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended): hen harrier, merlin, Mediterranean gull, fieldfare, redwing, Cetti's warbler and firecrest, of which only Cetti's warbler is known to breed in the local area (Clements *et al*., 2015);
- 17 SPI: brent goose, grey partridge, hen harrier, lapwing, curlew, herring gull, skylark, yellow wagtail, dunnock, song thrush, starling, house sparrow, linnet, twite, lesser redpoll, reed bunting and corn bunting; and
- 20 BoCC Red-listed species: grey partridge, hen harrier, merlin, lapwing, curlew, herring gull, skylark, yellow wagtail, grey wagtail, whinchat, fieldfare, song thrush, redwing, mistle thrush, starling, house sparrow, linnet, twite, lesser redpoll and corn bunting.

Further details on the target and notable species recorded during the survey are provided as follows:

Golden Plover and Lapwing

Golden plover and lapwing are frequently seen in association with each other during winter, often foraging in mixed flocks on farmland, and for this reason, the usage of the survey area by these species has been treated together here. All records of golden plover and lapwing recorded during the Functional Habitat Survey are shown in Table D2 in Appendix D, including four records in fields outside but adjacent to the survey area. There were no records of either species within the Site boundary, and approximately 90% of the habitat within the Site was considered largely unsuitable for the species (i.e. long grass at the time of survey, plus hardstanding and buildings). Peak counts across the survey area were 530 golden plover (on 9 November) and 128 lapwing on 9 February. The peak monthly counts of golden plover and lapwing are presented in Table 3.1 (excluding records of birds flying over the area, and records outside the survey area boundary) and their locations shown on Figure 3.1.

Table 3.1 Counts of Golden Plover and Lapwing during each monthly survey

Species	Field ID	1	2	3	4	5	6	7
Golden plover	1A1			6	1			
	1A2			2	1		5	
	5E1			530	2			
Lapwing	1A1		9					

Species	Field ID	1	2	3	4	5	6	7
	2B1				1			
	2B2				6	61	128	
	5E1			14	1			

Lapwing and golden plover were recorded foraging in a variety of habitats and crop types, including short grassland, winter wheat and ploughed, bare ground. No one area held either species for any prolonged period through the survey, though field 2B2 (containing oilseed rape) held lapwing (primarily loafing birds) on three survey dates, and field 5E1 (ploughed, bare ground) supported foraging / loafing golden plover and lapwing on two dates.

Other Notable Species

Very few species of wildfowl and waders were recorded during the Function Habitat Survey, but did include a flock of 110 dark-bellied race of brent goose, foraging in a field of winter cereal (Field 4C4) on 9 February. Of the bird of prey species, there were regular sightings of kestrel and buzzard hunting over the survey area, and occasional sparrowhawk. Merlin were seen hunting over the area on two dates (26 September and 8 November); a female hen harrier was hunting over field 5C2 on 6 January; and a rough-legged buzzard was flying over field 1A3 on 10 October, after which it headed towards Pegwell Bay. Outside the survey area, a short-eared owl was hunting over grassland within the airfield on 7 March.

Flocks of black-headed gull, common gull and herring gull were regularly seen foraging and loafing in fields across the survey area, with peak counts of 110 black-headed gull (in field 1B3 on 7 December and field 2B3 on 9 February); 300 herring gull (in field 4C4 on 7 March); and 103 common gull (in field 3B3 on 9 February). More unusual were a single Mediterranean gull (foraging in field 4C4 on 7 March) and Caspian gull (loafing in field 3B3 on 9 February).

Flocks of up to 63 redwing and 85 fieldfare were seen foraging in fields and hedgerows throughout much of the survey period, and flocks of up to 136 starling were also recorded feeding in fields. Up to six corn buntings were seen feeding in fields across the survey area from October-December and again in March, though an exceptional count of 20 birds was seen in cereal stubble (field 1D2) on 9 November. Meadow pipit, skylark and linnet were also recorded widely across the survey area, often foraging in cereal stubble, with peak counts of 84 meadow pipit (in field 1A1 on 7 December); 18 linnet (field 1A2 on 10 October); and 135 skylark (field 1A1 on 7 December). Of particular note, was a flock of seven twite (now a rare wintering species in Kent) feeding in oilseed rape (field 2B2) on 8 November. A single firecrest was noted on two dates, in hedgerows surrounding field 2B2 on 10 October, and field 4A3 on 9 November, and a migrant yellow wagtail was recorded on 26 September, and whinchat, stonechat and four wheatear on 10 October.

3.2 Pegwell Bay Distribution Survey

A total of three one-hour counts were recorded on six (once-monthly) survey dates from October 2016 to March 2017 inclusive, with the dates, times, tidal states and weather conditions provided in Table C2 in Appendix C. Each one-hour count was undertaken within a part of the tidal cycle, defined here as:

- HT: within approximately one hour either side of high tide;
- MT (E): 'mid-tide' with the water ebbing (going out) after a high tide, approximately 1-4 hours after high tide;
- LT: within approximately one hour either side of low tide; and

- MT (R): ‘mid tide’ with the water rising after a low tide, approximately 1-4 before high tide.

A total of 25 species of wildfowl and waders and five species of gull were recorded during the Pegwell Bay Distribution Survey. Table 3.2 shows the peak counts of each species recorded during each one-hour count. The peak numbers of all species of wildfowl and waders excluding gulls (counts combined) within each 500m square on any one-hour count during High Tide, Mid-Tide Ebbing, Low Tide and Mid-Tide Rising are shown on Figures 3.2a-d respectively.

Table 3.2 Pegwell Distribution Survey: peaks numbers during each 1-hour count

	Visit 1 (Oct)			Visit 2 (Nov)			Visit 3 (Dec)			Visit 4 (Jan)			Visit 5 (Feb)			Visit 6 (Mar)		
Species	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**
Brent goose		24	26	27	27	27				13	33		92	2	98	1	13	35
Shelduck	86	91	51	33	4	3	7	9	8	58	78	66	25	6	8	52	49	43
Wigeon	112	83	53	647	568	458	175	253	627	80	697	326	224	316	167	173	134	132
Gadwall												16						
Teal								1		14	66	31	59			12	8	8
Mallard	6			2	40	27	24	11	242	16	126	94	120	48	7		2	2
Pintail			2									4						
Shoveler							6	8		10	21	23	16			11	15	13
Red-throated diver			1		1	1												
Great crested grebe					1				1									
Cormorant							58	65			3		2,500	720	2,000		55	360
Little egret	8	6	5	1					1							1	1	1
Oystercatcher	2,000	317	308	144		56	205	213	261	103	188	55	193	105		74		
Golden plover			**3**	**850**			**454**		**710**				**119**	**132**	**500**			

	Visit 1 (Oct)			Visit 2 (Nov)			Visit 3 (Dec)			Visit 4 (Jan)			Visit 5 (Feb)			Visit 6 (Mar)		
Species	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**
Grey plover	**22**	**12**		**13**		**3**					**16**	**35**						
Lapwing	12			1,376	3	131	1,303	1,189	1,384		2	17	896	890	506			
Knot	6	3	4	12		47	7		6			5		2		1	19	
Sanderling									**4**			**16**		**2**				
Dunlin	40	88	3	238		37	44	406	438	45	527	162	27	42			52	
Snipe												1	1					
Black-tailed godwit								3						2				
Bar-tailed godwit	6	34	32	4		35					6	1						1
Curlew	19	58	84	55		49	48	25	29	29	105	174	72	178	192	105	108	128
Redshank	86	21	12	28	3	6	12	17	9	9		21	32	21	39	13	28	26
Turnstone	**2**	**54**		**23**	**12**	**3**						**5**		**12**			**20**	**28**
Black-headed gull	7	58	52				58	109	134	157	311	476	22			514		35
Common gull	1	12	2					4			1	180				100		37
Lesser black-backed gull	800		851									3						
Herring gull		17	348							46	25	90				519		

	Visit 1 (Oct)			Visit 2 (Nov)			Visit 3 (Dec)			Visit 4 (Jan)			Visit 5 (Feb)			Visit 6 (Mar)		
Species	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**
Great black-backed gull		1								11		17				100		

Note: Bold font indicates a non-breeding, qualifying / notified interest species of the Thanet Coast and Sandwich Bay SPA / Ramsar site, and its constituent SSSIs

Of the bird species that form the non-breeding, qualifying / notified interest of the Thanet Coast and Sandwich Bay SPA / Ramsar site, and its constituent SSSIs: turnstone, golden plover, grey plover and sanderling were recorded during the Pegwell Bay Distribution Survey, though no ringed plover were noted. The numbers and use of the survey area by these species is discussed further, as follows:

Turnstone

Relatively low numbers of turnstone were recorded during the Pegwell Bay Distribution Survey, with flocks of roosting and foraging birds primarily seen along the northern and western fringes of Pegwell Bay, near the high water mark in 500 m grid squares: A, B, I and J. The largest count of foraging birds was of 54 individuals in Square B (on the northern fringe of Pegwell Bay) on 13 October, and of roosting birds, 28 in Square I (on the western fringe) on 14 March. Roosting was also recorded in Squares D, J and I, though the shoreline within Square B was the only regularly used site. Figure 3.3 shows the location of the peak counts of turnstone recorded in each 500m grid square.

Golden Plover

Golden plover were primarily recorded in November, December and February when 500-850 were counted. No foraging birds were observed, with all records relating to flocks of golden plover resting (roosting or loafing) on intertidal habitat close to the high water mark along the northern and western fringes of Pegwell Bay in Squares A, D, I, J, O and W (see Figure 3.4), during low, mid and the high tide periods. The largest counts included: 850 birds in Square O on 17 November; 710 in Square D on 20 December; and 500 on the sand banks in Square W on 14 February.

Grey Plover

Low numbers of grey plover were recorded on three of the six survey dates (in October, November and January). Flocks of roosting grey plover were confined to Squares D, I and J (near the high water mark, in the west of Pegwell Bay), with a peak count of 13 birds (in Square D) on 13 October. Loose flocks of up to 19 foraging birds (in each square) were seen widely across the survey area (see Figure 3.5).

Sanderling

Low numbers of sanderling were recorded at scattered locations across Pegwell Bay, on three of the six survey dates (in December, January and February). Groups of sanderling were recorded foraging along the shoreline (all during the mid, rising tide period), including: four birds in Square M on 20 December; a total of 16 birds in Squares F and D on 19 January; and two in Square D on 14 February (see Figure 3.6). No roosting birds were observed.

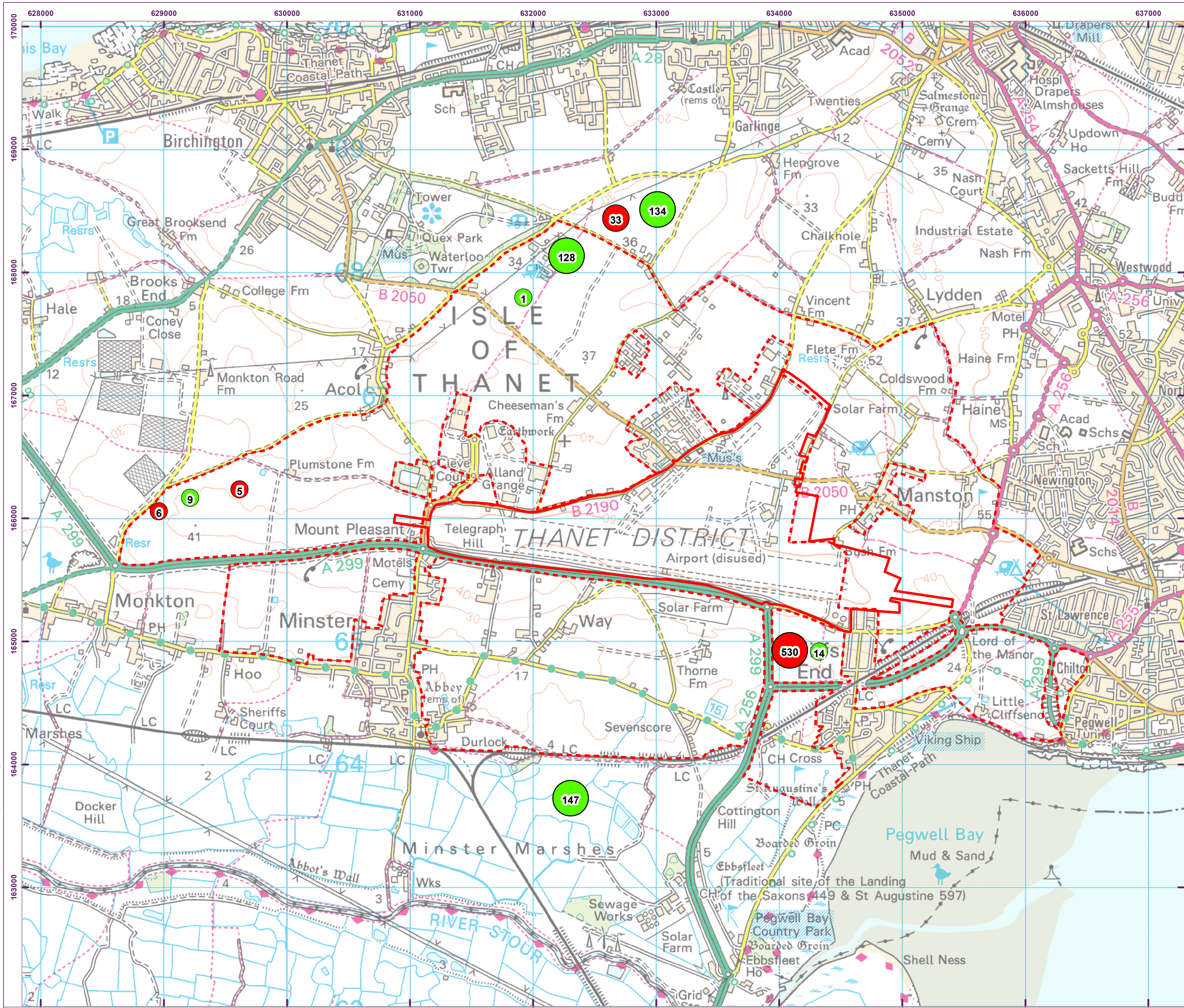
Other Species of Wildfowl and Waders

Eight species of waterfowl (geese and ducks) were recorded, of which wigeon were by far the most numerous. Wigeon were present throughout the survey period (mainly foraging and loafing birds, with few seen roosting), with a peak count of 697 birds recorded within the survey area on 19 January, including 666 foraging along the shoreline in Square M (in the east of Pegwell Bay). Brent geese were seen on most survey visits, with a peak count of 98 birds recorded in the survey area on 14 February, including 93 loafing on the water at high tide in Square K (in the centre of Pegwell Bay). Up to 91 loafing and roosting shelduck (very few foraging) were seen throughout the survey period, with the highest numbers in Squares D, I, J and O, near the high water mark, on the western fringes of Pegwell Bay. Mallard, teal and shoveler were also recorded on a regular basis, and gadwall and pintail were infrequent visitors.

Thirteen species of wader were recorded, of which oystercatcher, curlew, redshank and dunlin were recorded throughout the survey period. Loose groups of 20-50 oystercatchers were foraging widely across the mudflats, with total counts of 100-300 birds across the survey area. The only notable congregation of roosting oystercatchers, involved 2,000 birds on the sand banks, south of the River Stour (in Square V) on 13 October, at high tide. The saltmarsh and shoreline in Square D (near the high water mark, on the western fringes of Pegwell Bay) was a favoured site for roosting waders at high tide, with peak counts of 169 curlew and 36 redshank in February, and 44 dunlin in March, otherwise, loose groups of foraging waders were recorded widely across the open mudflats during the mid and low tide periods. Large flocks of loafing and roosting lapwing were seen in Squares D, I, J and O (near the high water mark, on the western fringes of Pegwell Bay), with peak counts of 1,376 and 1,384 birds in November and December respectively. Of the remaining wader species, up to 35 bar-tailed godwits were foraging on the mudflats in October-November and there were infrequent records of knot, snipe and black-tailed godwit.

A very large flock of cormorant (numbering up to 2,500 birds) was seen loafing along the shoreline in Square S (on the southern shores at the mouth of the River Stour) at low tide on 14 February, after which it moved onto the sand banks in Square W (south of the River Stour) at high tide. During the following survey visit, on 14 March, a flock of 360 cormorant was observed loafing in Square H (in the far north-east of Pegwell Bay), at high tide.

Five species of gull (great black-backed, lesser black-backed, herring, common and black-headed) were recorded on a regular basis, foraging and resting in Pegwell Bay throughout much of the survey period. The largest counts included 850 lesser black-backed gull and 100 herring gull foraging at the mouth of the River Stour (in Square R) at low tide on 13 October, after which they moved to loaf/roost on the sand banks in Square V (south of the River Stour) at high tide. A mixed flock of herring/great black-backed/common and black-headed gulls, totalling 1,200 individuals was seen foraging along the shoreline in Square M (on the northern shores at the mouth of the River Stour) at low tide on 14 March; and a mixed flock of 300 black-headed gull and 180 common gull was roosting/loafing on the water in Square J (near the high water mark in the west of Pegwell Bay) at high tide on 19 January.



Key

The Site

Functional habitat survey area

Golden Plover Peak Count

1 - 20 birds

21 - 99 birds

100+ birds

Lapwing Peak Count

1 - 20 birds

21 - 99 birds

100+ birds

0 0.5 1 1.5 km

Scale at A3: 1:30,000

Client

RSP

Manston Airport DCO EIA
Winter Bird Report 2016/17

amec foster wheeler

Figure 3.1
Functional Habitat Survey: Peak Counts of Golden Plover and Lapwing in each Field

May 2017 38199-Lon87.mxd squij

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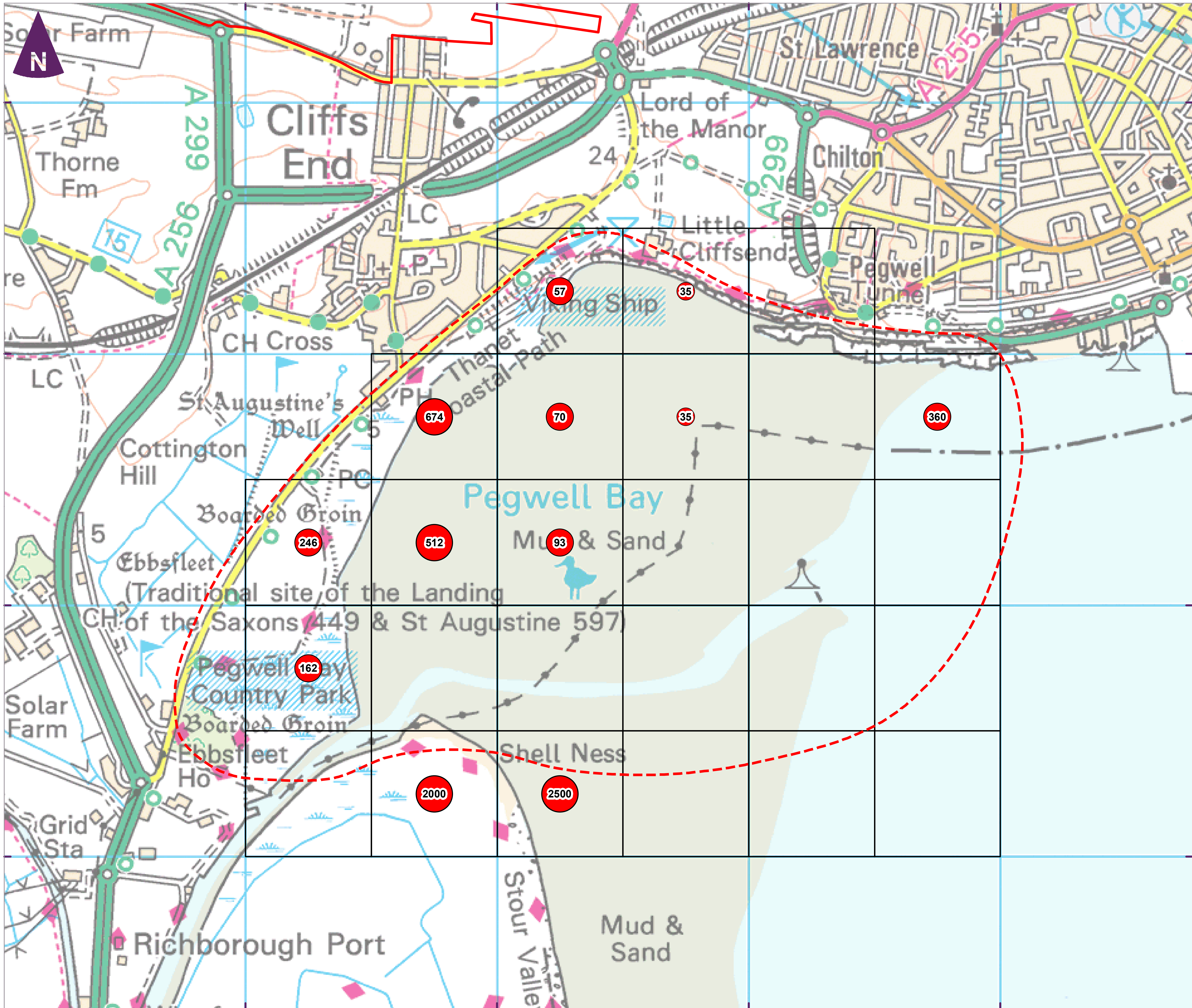

Key

The Site

Survey area

500 x 500 m recording grid

Wildfowl and Wader Peak Count

1-49 individuals

50-499 individuals

500+ individuals

0 0.25 0.5 0.75 km

Scale at A3: 1:15,000

Client

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Figure 3.2a
Pegwell Bay Distribution Survey: Peak counts of all Wildfowl and Waders Species in each 500m grid square (during High Tide)

June 2017 38199-Lon88.mxd squij

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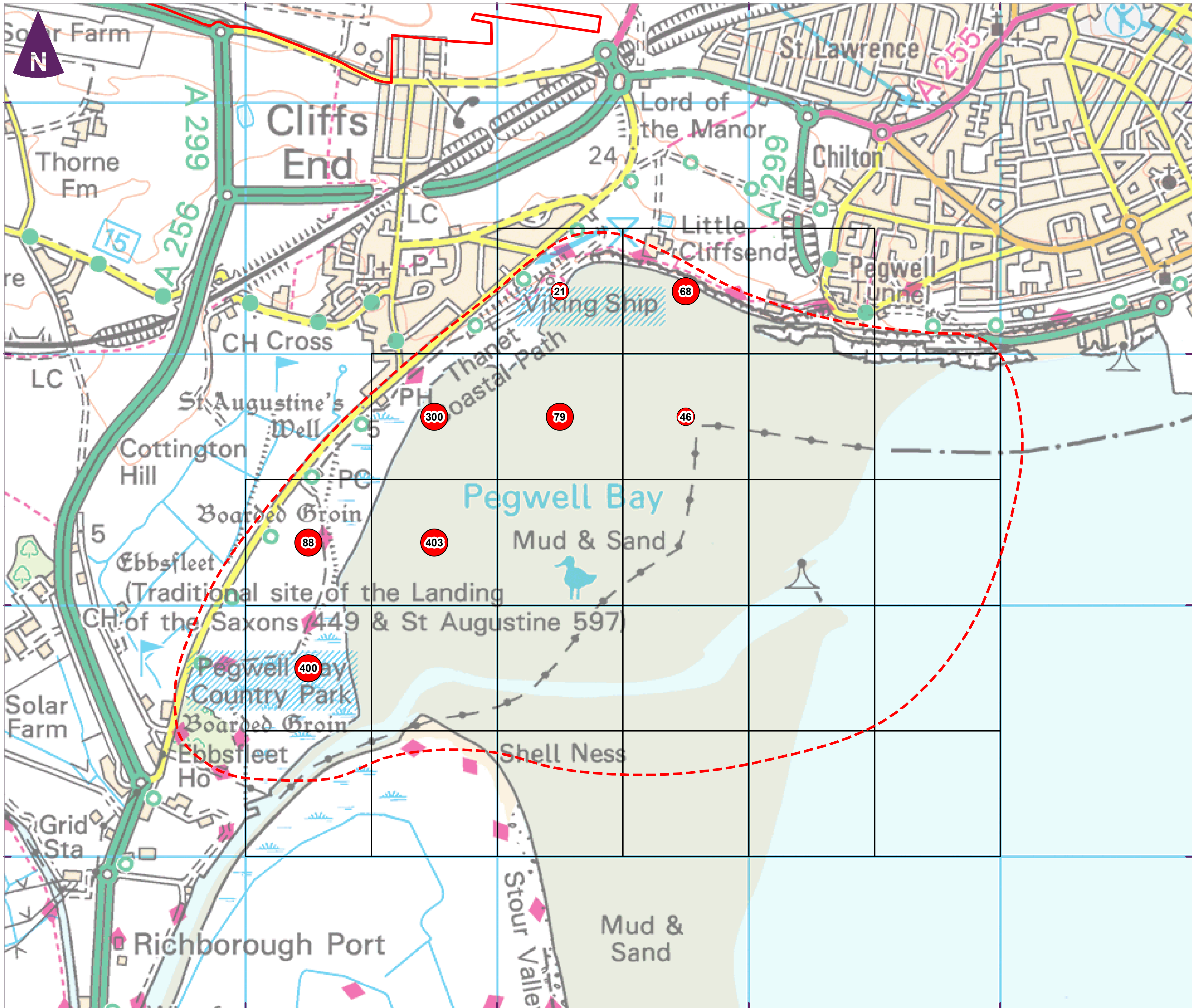

Key

- The Site
- Survey area
- 500 x 500 m recording grid

Wildfowl and Wader Peak Count

- 1-49 individuals
- 50-499 individuals
- 500+ individuals

0 0.25 0.5 0.75 km

Scale at A3: 1:15,000

Client

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Figure 3.2b
Pegwell Bay Distribution Survey: Peak counts of all Wildfowl and Waders Species in each 500m grid square (during Mid Tide, Ebbing)

June 2017 38199-Lon89.mxd squij

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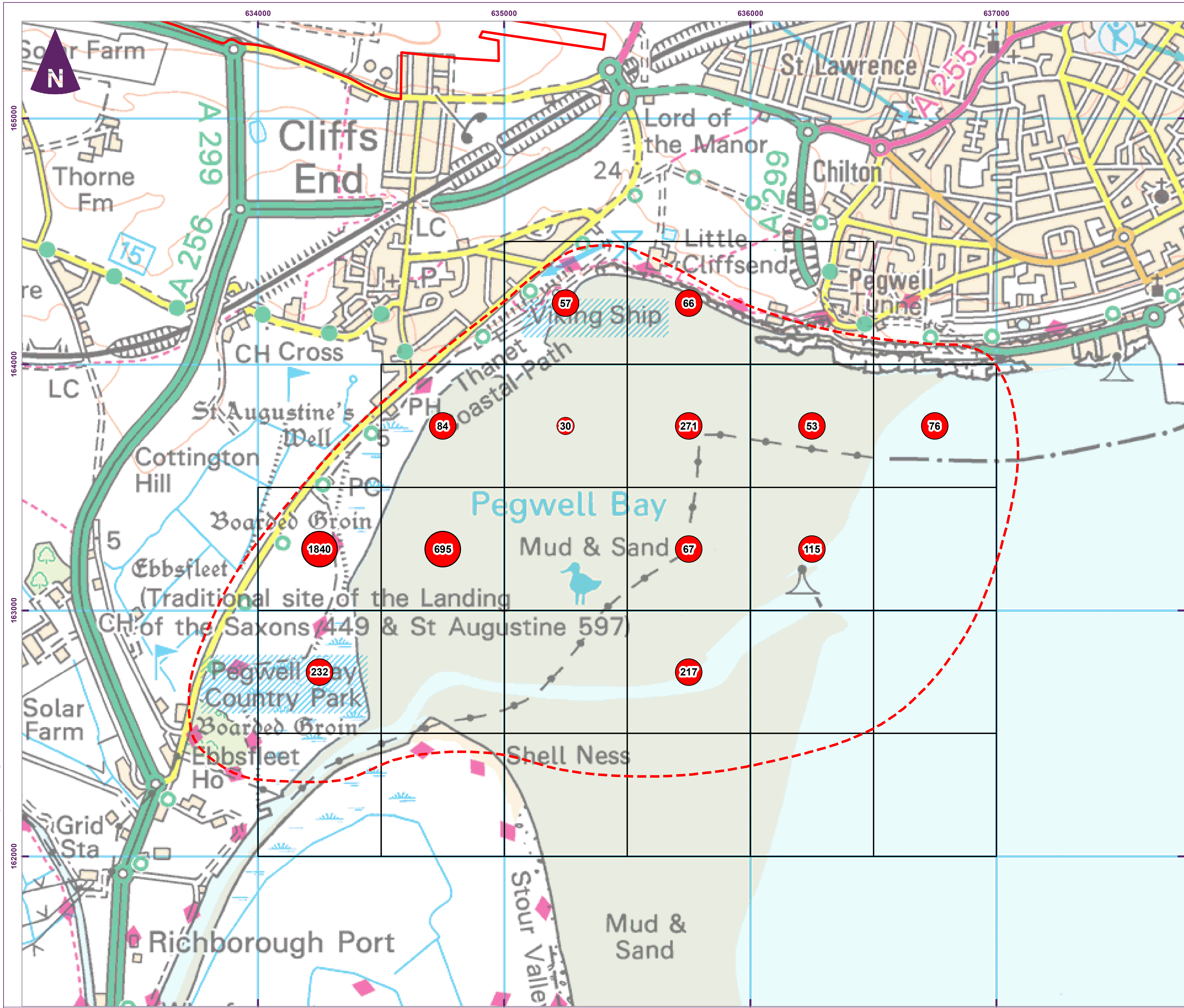

Key

- The Site
- Survey area
- 500 x 500 m recording grid

Wildfowl and Wader Peak Count

- 1-49 individuals
- 50-499 individuals
- 500+ individuals

0 0.25 0.5 0.75 km

Scale at A3: 1:15,000

Client

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Figure 3.2c
Pegwell Bay Distribution Survey: Peak counts of all Wildfowl and Waders Species in each 500m grid square (during Low Tide)

June 2017 38199-Lon90.mxd squij

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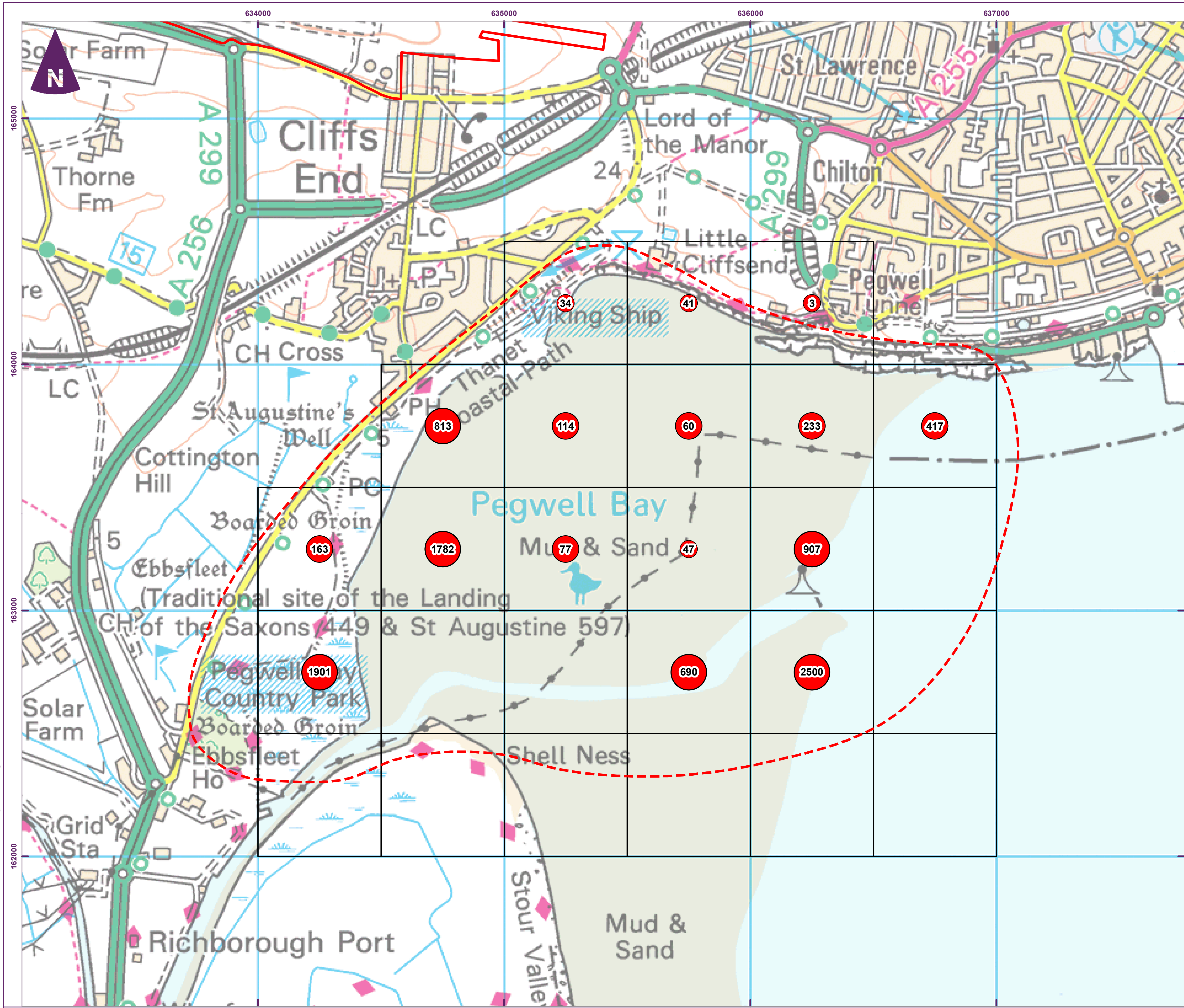

Key

The Site

Survey area

500 x 500 m recording grid

Wildfowl and Wader Peak Count

1-49 individuals

50-499 individuals

500+ individuals

0 0.25 0.5 0.75 km

Scale at A3: 1:15,000

Client

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Figure 3.2d
Pegwell Bay Distribution Survey: Peak counts of all Wildfowl and Waders Species in each 500m grid square (during Mid Tide, Rising)

June 2017 38199-Lon91.mxd squij

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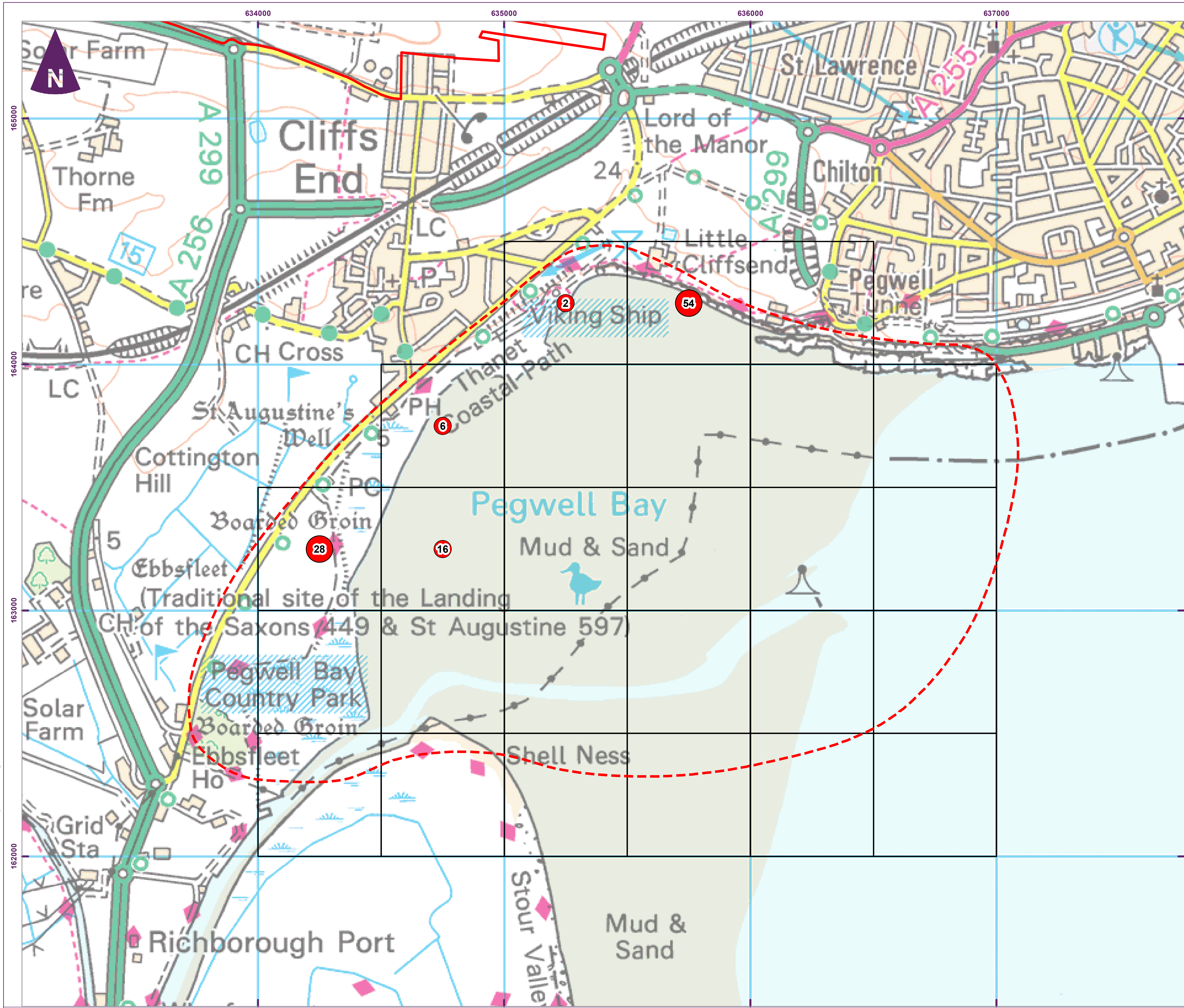

Client

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Figure 3.3
Pegwell Bay Distribution Survey: Peak counts of Turnstone in each 500m grid square

June 2017 38199-Lon92.mxd squij

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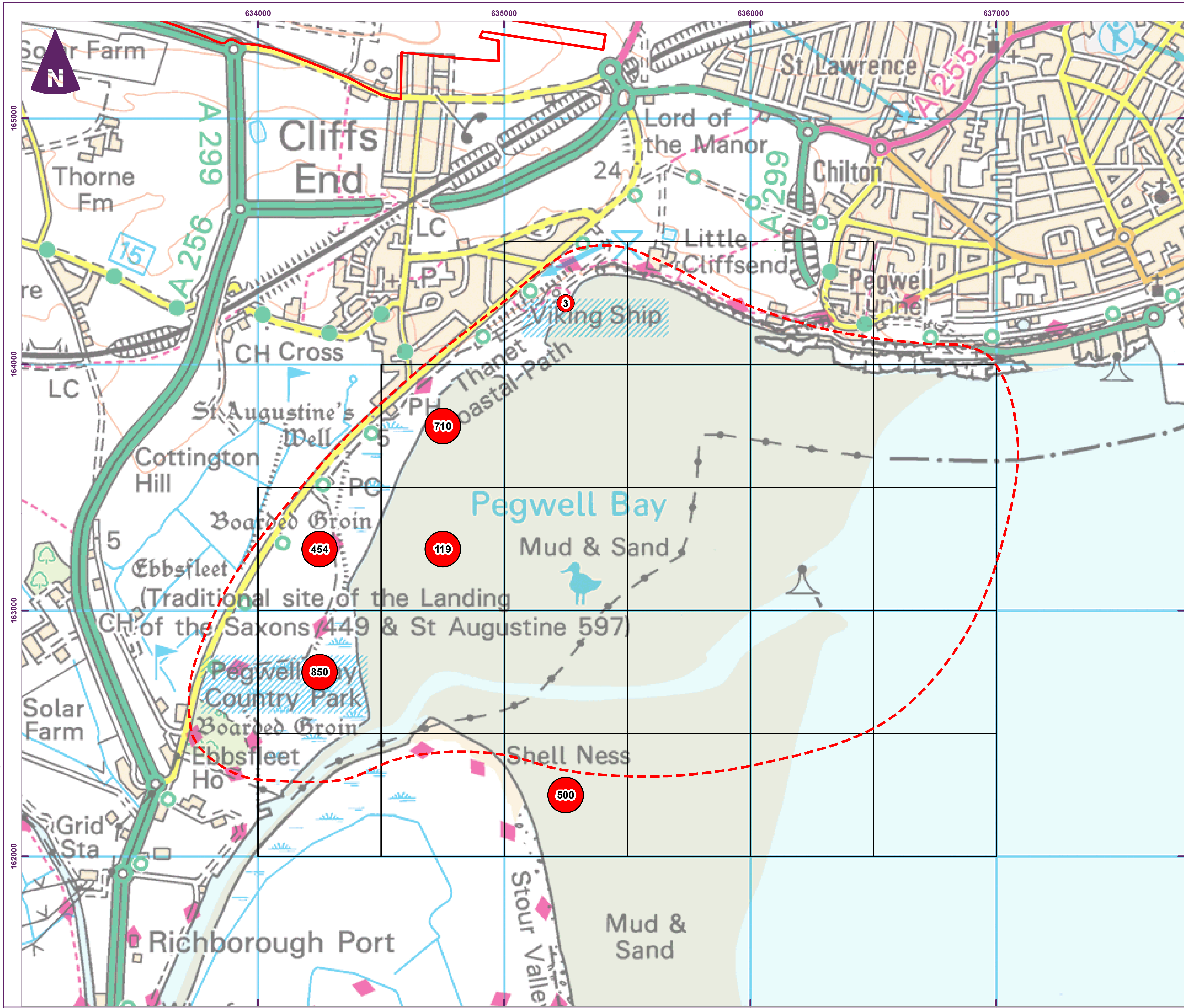

Key

- The Site
- Survey area
- 500 x 500 m recording grid

Golden Plover Peak Count

- 1-20 individuals
- 21-99 individuals
- 100+ individuals

0 0.25 0.5 0.75 km

Scale at A3: 1:15,000

Client

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Figure 3.4
Pegwell Bay Distribution Survey: Peak counts of Golden Plover in each 500m grid square

June 2017 38199-Lon93.mxd squij

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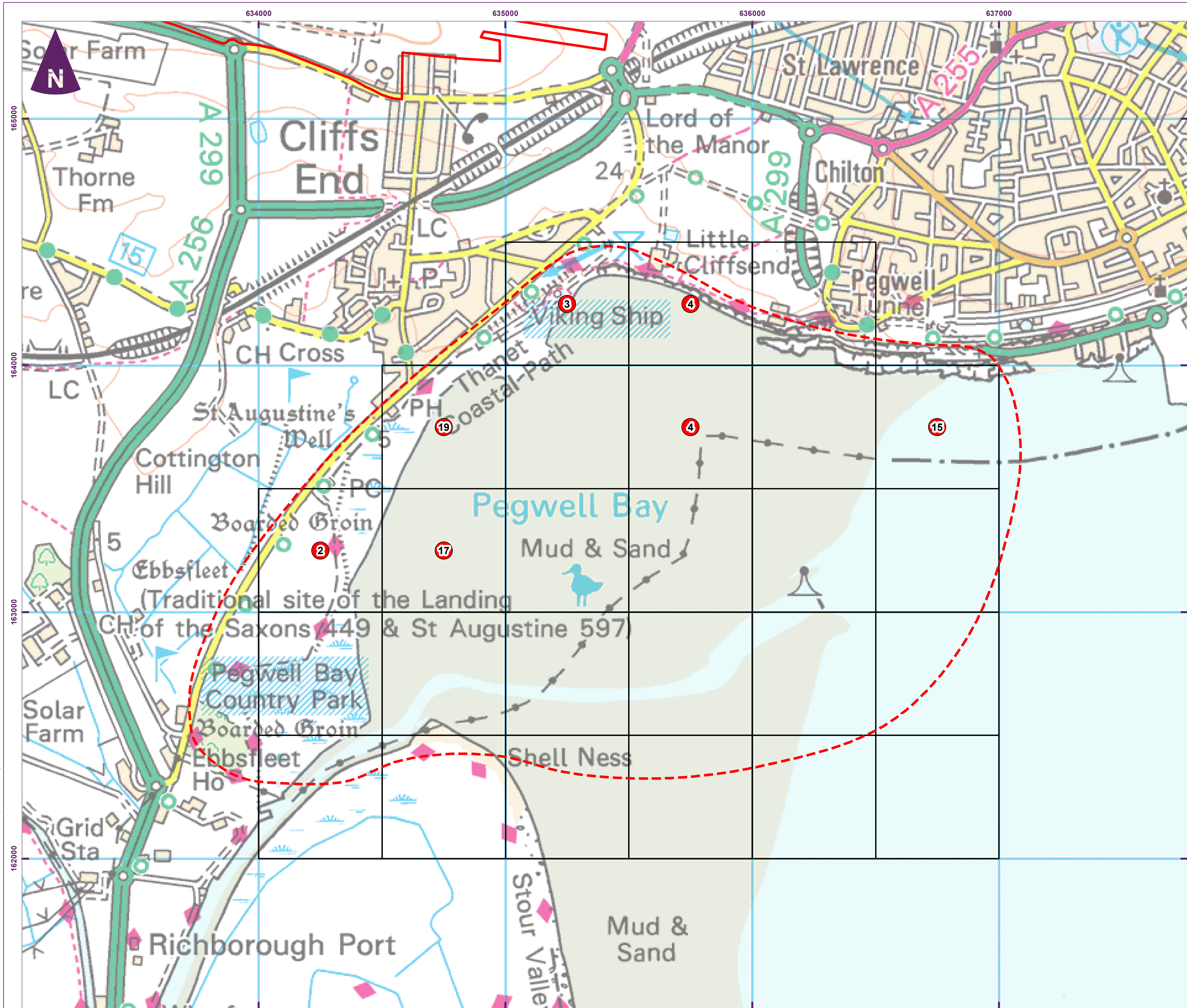

Key

- The Site
- Survey area
- 500 x 500 m recording grid

Grey Plover Peak Count

- 1-20 individuals
- 21-99 individuals
- 100+ individuals

0 0.25 0.5 0.75 km

Scale at A3: 1:15,000

Client

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Figure 3.5
Pegwell Bay Distribution Survey: Peak counts of Grey Plover in each 500m grid square

June 2017

38199-Lon94.mxd squij

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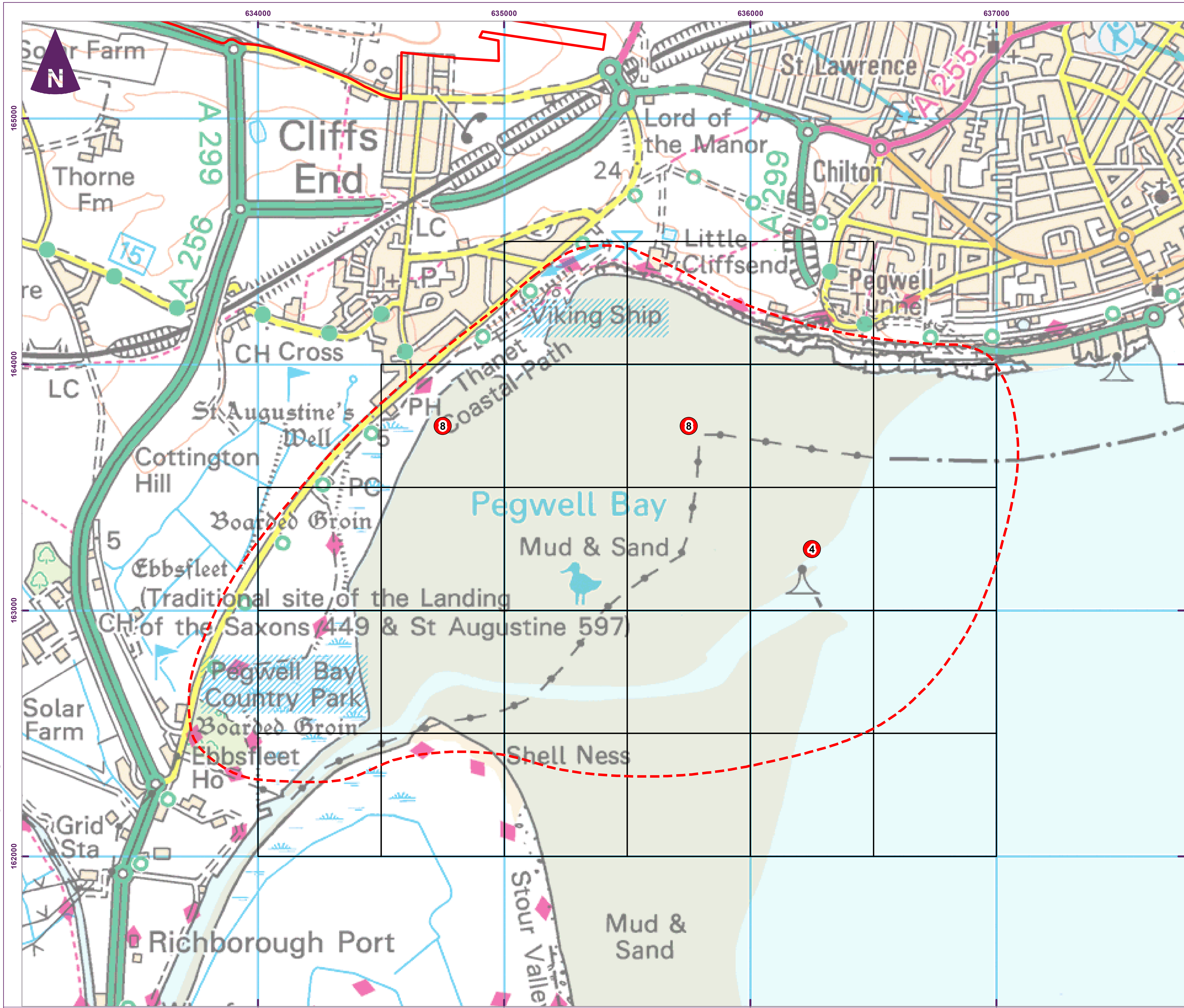

Key

The Site

Survey area

500 x 500 m recording grid

Sanderling Peak Count

1-20 individuals

21-99 individuals

100+ individuals

0 0.25 0.5 0.75 km

Scale at A3: 1:15,000

Client

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amec foster wheeler

Figure 3.6
Pegwell Bay Distribution Survey: Peak counts of Sanderling in each 500m grid square

June 2017 38199-Lon95.mxd squij

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4. Discussion

4.1 Functional Habitat Survey

Results from the Functional Habitat Survey indicate that the farmland immediately surrounding the Site is not used on a regular basis by potentially important numbers of foraging or resting golden plover and lapwing. Neither species was recorded within the Site, and the habitat within the Site was considered largely unsuitable. Of the other species which form the non-breeding qualifying interest of the Thanet Coast and Sandwich Bay SPA/Ramsar Site, or notified interest of their constituent SSSIs, ringed plover, grey plover, turnstone and sanderling were not recorded during the survey. The importance of the survey area to golden plover and lapwing is discussed further, as follows:

Golden Plover

The Thanet Coast & Sandwich Bay SPA was originally designated in part for the internationally important non-breeding population of golden plover that it supports. Nationally important numbers of non-breeding golden plover are also notified features of the Sandwich Bay to Hacklinge Marshes SSSI and Thanet Coast SSSI. However, as part of the third JNCC SPA review (Stroud *et al*., 2016), golden plover was removed as a designated species from the SPA (likely due to declining numbers), although this change is still unratified. The UK population of golden plover was estimated to be 420,000 birds in winter (Musgrove *et al*., 2013).

The original qualifying population for golden plover for the Thanet Coast and Sandwich Bay SPA was 411 individuals (five-year peak mean for 1991/92-95/96). A much larger golden plover population of 4,190 birds (five-year peak mean count for 1998/99-2002/03) is given as being of national importance in the Thanet Coast and Sandwich Bay Ramsar description. More recent data are available from Henderson & Sutherland (2017) who undertook surveys of golden plover (and lapwing) in Pegwell Bay and in the surrounding farmland in winter 2016/17, from which a peak count of 1,536 birds was obtained, in January 2017. During their surveys, which covered a large expanse of potentially suitable farmland for golden plover, stretching from the north coast of Thanet, south to Sandwich Bay, total counts of golden plover ranged from 500-750 birds in November and early December 2016, increasing to 1,200 in January, and 700 in February and March 2017. The most favoured area for the species was the low-lying farmland in the east of the Ash Levels, 3.5 km south of the Site. These numbers contrast with those found during the previous survey of a similar area of farmland in 2002/03 (Griffiths, 2004), when a maximum of 9,578 golden plover was recorded. Henderson & Sutherland (2017) also noted that numbers were relatively low from winter 1978/79 until the late 1990s (averaging 1,853 birds) but then rose sharply to reach 10,000-12,000 birds during 2000/01-2004/05.

The peak count of 530 golden plover recorded during the Functional Habitat Survey in 2016/17 (in a field adjacent to the southwest of the Site) exceeds the SPA qualifying population of 411 birds, and represents 35% of the peak count recorded by Henderson & Sutherland (2017), which covered a much wider area of farmland in the Thanet / Sandwich Bay area. However, the peak count was exceptional during the Functional Habitat Survey, with the next largest flock being of 33 birds, and the remaining records involving just 1-6 birds.

The evidence from the Functional Habitat Survey and previous surveys indicates that the SPA population of golden plover (which utilises both Pegwell Bay and the surrounding farmland) has varied greatly in numbers over the years, and is currently at another low ebb. Potential reasons for this decline include: climate change (the species is tending to winter further north); more local changes to weather conditions both in Kent and abroad, and the loss of suitable foraging habitat, locally and elsewhere.

Lapwing

Lapwing does not form part of the qualifying interest of the Thanet Coast and Sandwich Bay SPA / Ramsar site or its constituent SSSIs. However, lapwing is a species of principal importance to conservation in England as listed on Section 41 of NERC, and is BoCC Red listed (Eaton *et al*., 2015) due to a long-term decline in the breeding population. The UK winter population of lapwing is estimated to be 650,000 birds

(Musgrove *et al*., 2013) and a five-year peak mean count of 11,890 lapwing was recorded in Pegwell Bay for the period 2008/09-2012/13, as obtained from Wetland Bird Survey (WeBS)[7] core count data.

Results from the surveys by Henderson & Sutherland (2017) undertaken in 2016/17 indicate that a moderate decline in lapwing numbers has occurred recently in the Thanet area, with a peak count of 6,171 birds recorded in November 2016, and a distribution that corresponded broadly to that of golden plover. The numbers of lapwing recorded by Henderson & Sutherland (2017) during November 2016 to mid-February 2017 were in the range of 2,377 to 6,171 birds, after which they fell sharply to fewer than 400 late in February and 133 in March. The areas holding the largest numbers of lapwing were: Worth Marshes east, 8 km south of the Site (and holding 11% of the total lapwing recorded), Sandwich Marshes, 2.5 km south of the Site (10%); Ash Levels east, 3.5 km south (11%); Goshall Valley, 5 km south (17%); Pegwell Bay, 1 km south-east (12%); and the Wantsum Channel, 5 km west of the Site (11%).

Data obtained from the KOS website (www.kentos.org.uk/) shows that lapwing occur year-round within Pegwell Bay (1.8 km south-east of the Site), with a peak count of 22,000 birds recorded there on the 5 January 2013. The peak count of 128 lapwing recorded during the Functional Habitat Survey in 2016/17 represents 2.1% of the total recorded by Henderson & Sutherland (2017), and only a very small proportion of the national total.

4.2 Pegwell Bay Distribution Survey

Results from the Pegwell Bay Distribution survey indicate that a diverse range of duck and wader species use the mudflats of Pegwell Bay to forage in. The most regular site for roosting wildfowl and waders at high tide was in the saltmarsh in Square D and to a lesser extent in adjacent Square I, which attracted groups of shelduck, oystercatcher, lapwing, golden plover, curlew, redshank and dunlin. However, if disturbed (which was a reasonably frequent event in this area), these birds would fly south onto the less disturbed sand banks in Squares V and W (outside the survey area), where very large congregations of oystercatcher and dunlin were observed roosting. The only regular roost site for turnstone was along the shoreline in Square B along the northern edge of Pegwell Bay. For golden plover and lapwing, the survey data indicates that Pegwell Bay continues to provide an important roosting/resting site, though virtually no foraging was observed within the Pegwell Bay survey area.

Of the peak counts of each species recorded during the survey, only the peak count of cormorant (2,500 birds) exceeds the national threshold of importance for a site[8] (350 birds) and the international threshold (1,200). None of the other peak counts approach or exceed their respective national thresholds. The peak count of 860 golden plover (recorded during the Pegwell Bay Distribution Survey in 2016/17) exceeds the qualifying population for the Thanet Coast & Sandwich Bay SPA (of 411 individuals, five-year peak mean 1991/92-1995/96). The peak count of 54 turnstone represents 5.7% of the SPA qualifying population of turnstone (940 individuals, five-year peak mean 1991/92-1995/96). Evidence from the survey indicates that Pegwell Bay continues to support an important proportion of the SPA population of golden plover, primarily as a roost site. The numbers of turnstone in Pegwell Bay however, form a relatively small proportion of the SPA population. This supports the findings presented in Hodgson (2016) in that much of the SPA population of turnstone occurs along the northern shores of the Thanet coastline, with relatively low numbers utilising Pegwell Bay, for roosting or foraging.

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[7] The WeBS core counts survey is a monthly survey of waterbirds (organised by the British Trust for Ornithology) undertaken by primarily volunteer recorders across UK and Ireland.

[88] The national thresholds are provided by the British Trust for Ornithology (BTO) in https://www.bto.org/volunteer-surveys/webs/data/species-threshold-levels, and represent the level beyond which a site is considered to support a nationally important non-breeding population of a species of waterfowl / wader / gull.

5. References

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Appendix A
Scientific names of species referred to in this report

Common/ English name	Scientific name
Brent goose	*Branta bernicla*
Shelduck	*Tadorna tadorna*
Wigeon	*Anas penelope*
Gadwall	*Anas strepera*
Teal	*Anas crecca*
Mallard	*Anas platyrhynchos*
Pintail	*Anas acuta*
Shoveler	*Anas clypeata*
Grey partridge	*Perdix perdix*
Red-throated diver	*Gavia stellata*
Great crested grebe	*Podiceps cristatus*
Cormorant	*Phalacrocorax carbo*
Little egret	*Egretta garzetta*
Hen harrier	*Circus cyaneus*
Sparrowhawk	*Accipiter nisus*
Buzzard	*Buteo buteo*
Rough-legged buzzard	*Buteo lagopus*
Kestrel	*Falco tinnunculus*
Merlin	*Falco columbarius*
Peregrine	*Falco peregrinus*
Oystercatcher	*Haematopus ostralegus*
Ringed plover	*Charadrius hiaticula*
Golden plover	*Pluvialis apricaria*
Grey plover	*Pluvialis squatarola*
Lapwing	*Vanellus vanellus*
Knot	*Calidris canutus*
Sanderling	*Calidris alba*
Dunlin	*Calidris alpina*
Snipe	*Gallinago gallinago*
Black-tailed godwit	*Limosa limosa*
Bar-tailed godwit	*Limosa lapponica*
Curlew	*Numenius arquata*

Common/ English name	Scientific name
Redshank	*Tringa totanus*
Turnstone	*Arenaria interpres*
Black-headed gull	*Chroicocephalus ridibundus*
Mediterranean gull	*Larus melanocephalus*
Common gull	*Larus canus*
Lesser black-backed gull	*Larus fuscus*
Herring gull	*Larus argentatus*
Caspian gull	*Larus cachinnans*
Great black-backed gull	*Larus marinus*
Stock dove	*Columba oenas*
Woodpigeon	*Columba palumbus*
Collared dove	*Streptopelia decaocto*
Ring-necked parakeet	*Psittacula krameri*
Short-eared owl	*Asio flammeus*
Green woodpecker	*Picus viridis*
Great spotted woodpecker	*Dendrocopos major*
Skylark	*Alauda arvensis*
Swallow	*Hirundo rustica*
House martin	*Delichon urbicum*
Meadow pipit	*Anthus pratensis*
Yellow wagtail	*Motacilla flava*
Grey wagtail	*Motacilla cinerea*
Pied wagtail	*Motacilla alba*
Wren	*Troglodytes troglodytes*
Dunnock	*Prunella modularis*
Robin	*Erithacus rubecula*
Whinchat	*Saxicola rubetra*
Stonechat	*Saxicola torquatus*
Wheatear	*Oenanthe oenanthe*
Blackbird	*Turdus merula*
Fieldfare	*Turdus pilaris*
Song thrush	*Turdus philomelos*

Common/ English name	Scientific name
Redwing	*Turdus iliacus*
Mistle thrush	*Turdus viscivorus*
Cetti's warbler	*Cettia cetti*
Chiffchaff	*Phylloscopus collybita*
Goldcrest	*Regulus regulus*
Firecrest	*Regulus ignicapilla*
Long-tailed tit	*Aegithalos caudatus*
Blue tit	*Cyanistes caeruleus*
Great tit	*Parus major*
Treecreeper	*Certhia familiaris*
Jay	*Garrulus glandarius*
Magpie	*Pica pica*
Jackdaw	*Corvus monedula*
Rook	*Corvus frugilegus*
Carrion crow	*Corvus corone*
Starling	*Sturnus vulgaris*
House sparrow	*Passer domesticus*
Chaffinch	*Fringilla coelebs*
Greenfinch	*Chloris chloris*
Goldfinch	*Carduelis carduelis*
Siskin	*Carduelis spinus*
Linnet	*Carduelis cannabina*
Twite	*Carduelis flavirostris*
Lesser redpoll	*Carduelis cabaret*
Reed bunting	*Emberiza schoeniclus*
Corn bunting	*Miliaria calandra*

Appendix B
Legislation

Wildlife and Countryside Act 1981

With certain exceptions[9], all wild birds, their nests and eggs are protected by section 1 of the *Wildlife and Countryside Act 1981* (as amended). Therefore, it is an offence, *inter alia*, to:

- intentionally kill, injure or take any wild bird;
- intentionally take, damage or destroy the nest of any wild bird while it is in use or being built; or
- intentionally take or destroy the egg of any wild bird.

These offences do not apply to hunting of birds listed in Schedule 2 of the Act subject to various controls.

Bird species listed on Schedule 1 of the Act receive further protection, thus for these species it is also an offence to:

- intentionally or recklessly disturb any bird while it is nest building, or is at a nest containing eggs or young; or
- intentionally or recklessly disturb the dependent young of any such bird.

For golden eagle, white-tailed eagle and osprey, it is also an offence to:

- take, damage or destroy the nest of these species (this applies at any time, not only when the nest is in use or being built).

Directive 2009/147/EC (The Wild Birds Directive), 2009

Certain bird species receive protection at a European level due to appearing on Annex I of the Directive 2009/147/EC of The European Parliament and of The Council of 30 November 2009 on the conservation of wild birds (codified version).

Certain endangered, rare, or vulnerable bird species, which warrant special protection, are included on Annex I of the Directive 2009/147/EC of The European Parliament and of The Council of 30 November 2009 on the conservation of wild birds (codified version); also referred to as the *Wild Birds Directive*.

The *Wild Birds Directive* recognises that habitat loss and degradation are the most serious threats to the conservation of wild birds. It therefore places great emphasis on the protection of habitats for endangered as well as migratory species (listed in Annex I), especially through the establishment of a coherent network of Special Protection Areas (SPAs) comprising all the most suitable territories for these species. Together with Special Areas of Conservation (SACs) designated under *Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora ('Habitats Directive')*, SPAs form a network of pan-European protected areas known as Natura 2000.

Ramsar Sites

Ramsar sites are wetlands of international importance designated under the Ramsar Convention. Sites proposed for selection are advised by the UK statutory nature conservation agencies, or the relevant administration in the case of Overseas Territories and Crown Dependencies, co-ordinated through JNCC. In selecting sites, the relevant authorities are guided by the Criteria set out in the Convention. The Criteria pertaining specifically to birds are as follows:

- Criterion 5: A wetland should be considered internationally important if it regularly supports 20,000 or more waterbirds; and
- Criterion 6: A wetland should be considered internationally important if it regularly supports 1% of the individuals in a population of one species or subspecies of waterbird.

In the UK, the first Ramsar sites were designated in 1976 since which, many more have been designated. The initial emphasis was on selecting sites of importance to waterbirds within the UK, and consequently

[9] Some species, such as game birds, are exempt in certain circumstances.

many Ramsar sites are also Special Protection Areas (SPAs) classified under the Birds Directive. However, greater attention is now being directed towards non-bird features which are increasingly being taken into account, both in the selection of new sites and when reviewing existing sites.

Natural Environment and Rural Communities Act 2006

Section 40 of the *Natural Environment and Rural Communities (NERC) Act 2006* places duties on public bodies to have regard to the conservation of biodiversity in the exercise of their normal functions. In particular, Section 41 of the NERC Act requires the Secretary of State to publish a list of species which are of Principal Importance for conservation in the UK. This list is largely derived from the 'Priority Species' listed under the former UK Biodiversity Action Plan (BAP), which continue to be regarded as Priority Species under the subsequent country-level biodiversity strategies. The Section 41 list replaces the list published by Defra in 2002 under Section 74 of the *Countryside and Rights of Way (CRoW) Act 2000*.

Birds of Conservation Concern: Red List birds

Red and Amber list bird are those listed as being of high or medium conservation concern (respectively) in Birds of Conservation Concern (BoCC) 4: the population status of birds in the United Kingdom, Channel Islands and Isle of Man (Eaton *et al*., 2015). Red list species are those that are Globally Threatened according to IUCN criteria; and/or those whose population or range has declined rapidly in recent years; and/or those that have declined historically and not shown a substantial recent recovery.

Appendix C
Survey Visit Details

Table C1 Functional Habitat Survey, Visit Details

Visit Number	Date	Start time	End time	Cloud (Oktas)	Wind direction	Wind force (Beaufort Scale)	Visibility	Temperature (°C)	Precipitation
1	26-Sep-16	07:30	13:00	8	East	2-4	Very good (3km+)	12 to 18	None
1	27-Sep-16	09:00	13:00	5	Southwest	3-4	Very good (3km+)	15 to 20	None
2	10-Oct-16	07:30	13:30	4	North	3-5	Very good (3km+)	10 to 13	None
2	11-Oct-16	08:00	12:00	4	Northeast	2-4	2km	8 to 13	None
3	08-Nov-16	09:00	14:30	8	Northwest	15	Very good (3km+)	3 to 6	None
3	09-Nov-16	10:00	14:00	8	Southeast	10	Very good (3km+)	7 to 8	Light rain
4	07-Dec-16	07:45	14:40	4	Southeast	3-4	Very good (3km+)	9 to 12	None
5	04-Jan-17	09:00	14:30	8	Northeast	3-4	Very good (3km+)	5 to 7	Rain 0900-1100
5	06-Jan-17	09:30	13:00	8	Southeast	2-3	Very good (3km+)	2 to 5	None
6	09-Feb-17	08:00	13:00	8	Northeast	2-3	2km	2 to 3	None
7	07-Mar-17	08:00	16:00	2	West	3-5	Very good (3km+)	5 to 9	None

Table C2 Pegwell Bay Distribution Survey, Visit Details

Date	Visit No.	Count No.	Start time	End time	Nearest High Tide	Cloud (Oktas)	Wind direction	Wind force (Beaufort Scale)	Visibility	Temperature (°C)	Precipitation	Tidal state code
13-Oct-16	1	1	09:00	10:00	09:50	5	E	3-4	Good	12	None	HT
13-Oct-16	1	2	11:00	12:00	09:50	4	E	3-4	Good	13	None	MT (E)
13-Oct-16	1	3	13:00	14:00	09:50	3	E	3-4	Good	14	None	LT
17-Nov-16	2	1	10:30	11:30	12:50	4	WSW	1-2	Very good (3km+)	9	None	MT (R)
17-Nov-16	2	2	12:30	13:30	12:50	5	W	2-4	Very good (3km+)	11	None	HT
17-Nov-16	2	3	14:30	15:30	12:50	8	SW	2-4	Very good (3km+)	12-13	Heavy shower at 1530	MT (E)
20-Dec-16	3	1	08:30	09:30	03:32	7	NE	1-2	Very good (3km+)	3-4	None	LT
20-Dec-16	3	2	10:30	11:30	16:02	8	NE	2	Very good (3km+)	4	None	LT
20-Dec-16	3	3	12:30	13:30	16:02	8	NE	2	Very good (3km+)	4-5	None	MT (R)
19-Jan-17	4	1	11:00	12:00	16:18	0	NE	3	Very good (3km+)	4-5	None	LT
19-Jan-17	4	2	13:00	14:00	16:18	0	NE	2-3	Very good (3km+)	4-5	None	MT (R)
19-Jan-17	4	3	15:00	16:00	16:18	0	NE	1-2	Very good (3km+)	3-4	None	HT
14-Feb-17	5	1	09:30	10:30	13:43	7-1	E	1-2	Very good (3km+)	5	None	MT (R)
14-Feb-17	5	2	11:30	12:30	13:43	0	E	2	Very good (3km+)	7	None	MT (R)
14-Feb-17	5	3	13:30	14:30	13:43	2	E	1-2	Very good (3km+)	7	None	HT

Date	Visit No.	Count No.	Start time	End time	Nearest High Tide	Cloud (Oktas)	Wind direction	Wind force (Beaufort Scale)	Visibility	Temperature (°C)	Precipitation	Tidal state code
14-Mar-17	6	1	09:20	10:20	12:50	1	W	1-2	Very good (3km+)	9	None	MT (R)
14-Mar-17	6	2	11:20	12:20	12:50	8	W	1-2	Very good (3km+)	10-11	None	MT (R)
14-Mar-17	6	3	13:20	14:20	12:50	8	W	1	Very good (3km+)	11-12	None	HT

NB: HT = High Tide; LT = Low Tide; MT (R) = Mid tide rising; MT (E) = Mid tide, ebbing

Appendix D
Survey Results

Table D1 Functional Habitat Survey: Totals during each monthly (Sept-Mar) visit (1-7)

Species	1	2	3	4	5	6	7
Brent goose						110	
Grey partridge		12	4	7	8		
Hen harrier					1		
Sparrowhawk		1					1
Buzzard	3	4	1	4	2	2	3
Rough-legged buzzard		1					
Kestrel	7	5			2	2	1
Merlin	1		1				
Golden plover			577	6		5	
Lapwing		9	338	14	61	68	
Curlew						12	
Black-headed gull	127	31	P	110	P	146	60
Mediterranean gull							1
Common gull	3	3				103	
Lesser black-backed gull	4						
Caspian Gull						1	
Herring gull	245	111	37	8		63	390
Stock dove	18	10	14		5		6
Woodpigeon	221	98	P	P	14	390	59
Collared dove	2	6	P	P	P	P	4
Ring-necked parakeet		4					
Short-eared owl							1
Green woodpecker	1	1			1		1
Great spotted woodpecker					1		

Species	1	2	3	4	5	6	7
Skylark	6	63	44	141		6	38
Swallow	8	19					
House martin	3						
Meadow pipit	109	32	35	100	10	1	3
Yellow wagtail	1						
Grey wagtail	1						
Pied wagtail	8	5		8	2		
Wren	P	2	2	P	2	3	4
Dunnock	P	8	P	5	1	5	10
Robin	P	5	4	P	4	3	5
Whinchat		1					
Stonechat		1					
Wheatear		4					
Blackbird		6	11	4	5	1	3
Fieldfare		1	38	10		93	16
Song thrush	1	29	4	10	11	7	3
Redwing		49	9	7		64	3
Mistle thrush	2	1					1
Cetti's warbler	1						
Chiffchaff		1					
Goldcrest		4					
Firecrest		1	1				
Long-tailed tit	P	P	P	P	P	P	P
Blue tit	P	6	P	P	3	P	3
Great tit	P	P	P	P	P	P	2

Species	1	2	3	4	5	6	7
Treecreeper		1					
Jay	1	2					
Magpie	5	P	P	P	P	P	P
Jackdaw	47	P	P	P	P	P	P
Rook	19	43	18	34	P	38	P
Carrion crow	59	P	P	7	P	P	P
Starling	82	175	304	20	71	84	78
House sparrow	15	40	20	13	22		26
Chaffinch	P	9	6	3	2	2	6
Greenfinch		4					
Goldfinch	P	19	12	P	P	2	7
Siskin		10	10				
Linnet	13	20	1	5		2	1
Twite			7				
Lesser redpoll			6				
Reed bunting		6					
Corn bunting		24	26	2			7

Table D2 Functional Habitat Survey: Records of golden plover and lapwing

Visit No.	Date	Time	Field code	Count	Comments
Golden plover					
3	08-Nov-16	09:17	1A2	2	Flushed
3	08-Nov-16	09:17	1A2	2	Commuting northwest
3	08-Nov-16	09:17	1A2	1	Heard only
3	08-Nov-16	09:17	1A2	1	Commuting north
3	08-Nov-16	10:10	1B3	4	Commuting south
3	08-Nov-16	10:15	1B3	3	Commuting north
3	08-Nov-16	10:20	1C1	2	Commuting northwest
3	08-Nov-16	10:40	1A1	6	Flushed from stubble
3	08-Nov-16	12:00		33	Foraging in a field of short grass, north of field 2B2
3	09-Nov-16	11:50	5E1	530	Flushed/moved from fields as tidal flats exposed
4	07-Dec-16	07:55	1A1	1	Flight call heard distantly
4	07-Dec-16	08:00	1A2	1	Foraging in winter wheat
4	07-Dec-16	11:52	5E1	2	Foraging on ploughed land
4	07-Dec-16	12:49	1D1	2	Heard only, west of 1D1
4	07-Dec-16	12:52	1D1	1	Heard only, South of 1D1
6	09-Feb-17	08:15	1A2	5	Flushed, then flew low, South
Lapwing					
2	10-Oct-16	07:30	1A1	9	Flushed, then flew northwest, high
3	08-Nov-16	10:10	1B3	14	Commuting south
3	08-Nov-16	12:00		134	Foraging in a field of short grass, north of 2B2
3	09-Nov-16	10:00	1D2	7	Commuting south
3	09-Nov-16	11:50	5E1	14	Foraging on bare soil
3	09-Nov-16	12:00		147	Loafing in field south of 5D4

Visit No.	Date	Time	Field code	Count	Comments
3	09-Nov-16	13:18	3B4	22	Commuting north
4	07-Dec-16	09:37	2B1	1	Flushed
4	07-Dec-16	09:41	2B2	6	Flushed
4	07-Dec-16	11:57	5E1	1	Foraging on ploughed land
4	07-Dec-16	13:40		6	Foraging in winter wheat in a field south of 5D4
5	04-Jan-17	10:30	2B2	61	Loafing in oilseed rape
6	09-Feb-17	09:35	2B2	128	Loafing in oilseed rape

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