Thames Estuary Airport

May 2014

Medway Council
Serving You

Contents

Foreword

Dear Sir Howard and fellow Commissioners,

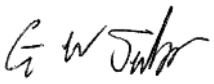
We have been fighting against a Thames Estuary Airport since 1943. After 71 years we believe it is time to say enough is enough. The people of Medway, Kent and Essex deserve to be allowed to live their lives without the continual threat of pie in the sky ideas promoting location in the **wrong place**, at the **wrong time** and at an **absurd cost.**

We have been elected to do what is best for our area and preserve what is great about living and working in the Garden of England. We are not NIMBYs. We do believe in the need to plan for aviation growth. We believe the future lies in the development of our existing airports, whether that is the major airports such as Heathrow and Gatwick, the better utilisation of airports such as Stansted (only half full at present) or the development of our regional airports. In Kent we support Lydd which has now been given the green light to play its small part in providing extra airport capacity.

Airports and aviation are emotive issues. They often divide opinion. However we have had a united front in Kent and Medway for 71 years. We continue to have the public and politicians on our side. Without general support a Thames Estuary airport is doomed to fail. Any future Government unwise enough to propose an airport here, at such an unacceptable financial and environmental cost, will pay the ultimate price. We have won judicial reviews on similar proposals here in the recent past.

We say yes to aviation planning for the future. We say no to any idea of a Thames Estuary airport. We have sustainable regeneration plans for 58,000 new jobs and over 50,000 new homes for local people in North Kent. We are well on our way with delivering on our promises. We do not need the continual distraction of fighting against this airport. We wish you well with your work and sincerely hope that, once and for all, the people of Medway and Kent can be allowed to get on with their lives.

With our best regards,



Cllr Rodney Chambers OBE
Leader of Medway Council

Cllr Vince Maple
Leader of the Labour Group, Medway Council

Cllr Geoff Juby
Leader of the Liberal Democrat Group, Medway Council

£148 billion cost of an estuary airport

1. Background

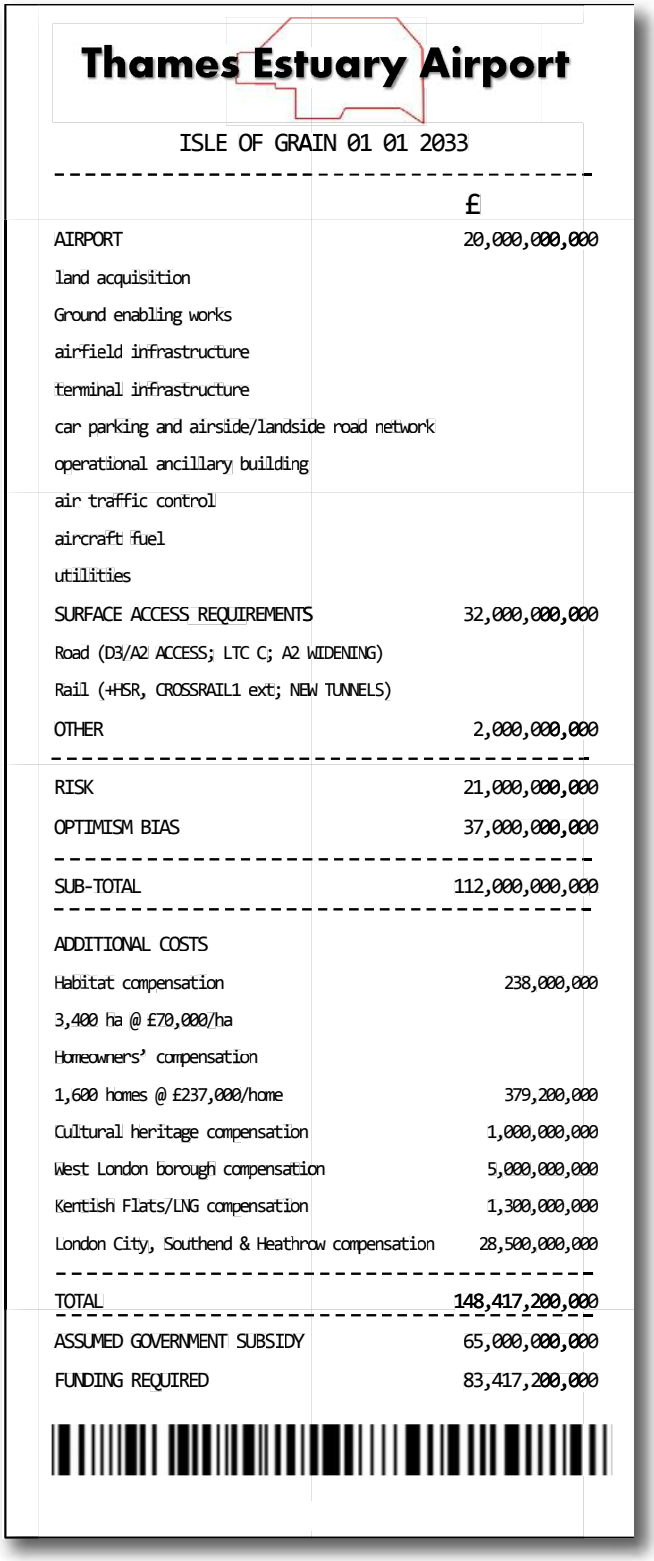
The Airports Commission has received responses requesting a further feasibility study "on the financeability of, and costs associated with, a new airport", including consideration of "how a private sector funding model could be implemented for a new airport".

Against that background, Medway Council and Kent County Council, organised a round table discussion, hosted by Mark Reckless, Member of Parliament for Rochester and Strood, to explore both cost and financing of an Inner Thames Estuary Airport. Attendees included representatives from local government and leading financial institutions.

Whilst members of the Airports Commission Secretariat attended the round table discussion in an observer capacity, Medway Council and Kent County Council wish formally to submit the arguments made, issues raised and conclusions reached during the discussions, so as to inform the Airports Commission's further work, in particular in relation to Studies 2 (operational feasibility) and 3 (socio-economic impact).

As the discussions were held under Chatham House Rules, contributions are non-attributable.

As a result of the discussion, we are also submitting a revised cost estimate itemising the costs of an Inner Estuary Airport in the format of the attached receipt. As you will see, the resulting cost estimate adds an extra £30 billion to the Airports Commission's higher estimate. **It stands at £148bn.**



Thames Estuary Airport

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	£
AIRPORT	20,000,000,000
land acquisition	
Ground enabling works	
airfield infrastructure	
terminal infrastructure	
car parking and airside/landside road network	
operational ancillary building	
air traffic control	
aircraft fuel	
utilities	
SURFACE ACCESS REQUIREMENTS	32,000,000,000
Road (D3/A2 ACCESS; LTC C; A2 WIDENING)	
Rail (+HSR, CROSSRAIL1 ext; NEW TUNNELS)	
OTHER	2,000,000,000
RISK	21,000,000,000
OPTIMISM BIAS	37,000,000,000
SUB-TOTAL	112,000,000,000
ADDITIONAL COSTS	
Habitat compensation	238,000,000
3,400 ha @ £70,000/ha	
Homeowners' compensation	
1,600 homes @ £237,000/home	379,200,000
Cultural heritage compensation	1,000,000,000
West London borough compensation	5,000,000,000
Kentish Flats/LNG compensation	1,300,000,000
London City, Southend & Heathrow compensation	28,500,000,000
TOTAL	148,417,200,000
ASSUMED GOVERNMENT SUBSIDY	65,000,000,000
FUNDING REQUIRED	83,417,200,000

Explanation of costs

It has been argued that the estimated airport costs are too low, and should be at least £30,000,000,000 - £35,000,000,000 though it was acknowledged that this is offset by the £37,000,000,000 optimism bias.

The additional costs provide an estimate of expenditure associated with the construction of an Inner Estuary Airport that, as we understand it, have not been included in the Airports Commission's cost estimate of £80,000,000,000 – £112,000,000,000 that was published in the Interim Report. Where appropriate, sources for these estimated are provided below.

Homeowners compensation based on the habitat loss assumed in Airports Commission document '67 Isle of Grain Sift 3 FINAL.pdf', and research by the British Trust for Ornithology whose "Habitats Directive guidance suggests that the area of compensatory habitat provided should be at least twice the area lost" and that "the cost of creating compensatory habitat is likely to be over £70,000 per hectare."

West London compensation based on properties lost assumed in Airports Commission document '67 Isle of Grain Sift 3 FINAL.pdf' and property compensation suggested by HS2 Ltd, on the basis of average property prices on the Isle of Grain.

Based on current GVA data as outlined in Optimal Economics's report ' Heathrow Related Employment', September 2011.

Kentish flats and LNG compensation based on investment Vattenfall and National Grid have undertaken into both energy infrastructure facilities,

Airport compensation based on RAB and debt figures, assuming all three airports would have to close to render an Inner Estuary Airport operationally feasible.

2. The cost

It is widely accepted that Heathrow Airport would have to close should an Inner Estuary Airport be built. The amount of compensation that would have therefore to be paid to the current airport operators and those relying on it for business prosperity at present now makes up a significant part of the final cost of an Inner Estuary Airport. Predicting this cost becomes all the more difficult as there is a tremendous amount of uncertainty with regard to the valuation methods, cost assessment and regulatory regime applicable.

Generally speaking, airports are seen as corporate entities with perpetual life meaning that it would be inefficient to repay debt by trapping cash 20 years in advance. Any compensation payment would be used by equity holders to repay debt holders.

Over the past 10 years, Heathrow Airport Ltd has invested around £11 billion into the existing airport, including into the T5 and T2 terminal infrastructure. Heathrow's current investment plans anticipate at least a further £3bn future investment.

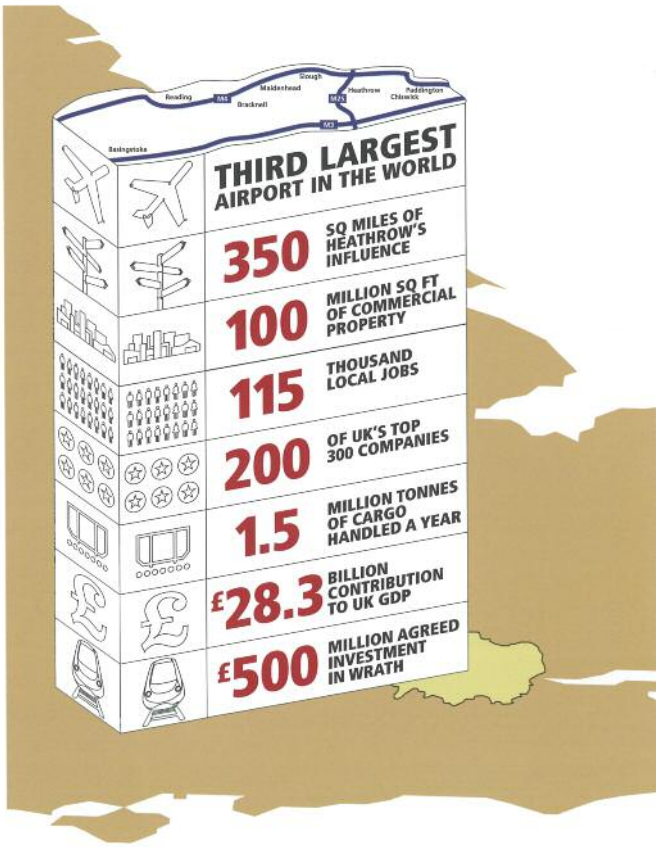
It is argued that Heathrow's regulatory asset base (RAB), currently valued at £15bn, should form the starting point for any compensation payment. However, seeing as the closure of the airport would require Heathrow's owners to give up any future opportunities and income, they are expected to seek premium pricing from any asset valuation. In other words they would expect compensation for lost profits.

In addition to the compensation of Heathrow Airport Ltd, compensation to airlines will need to be considered. British Airways, amongst others, has invested billions into the airport infrastructure.

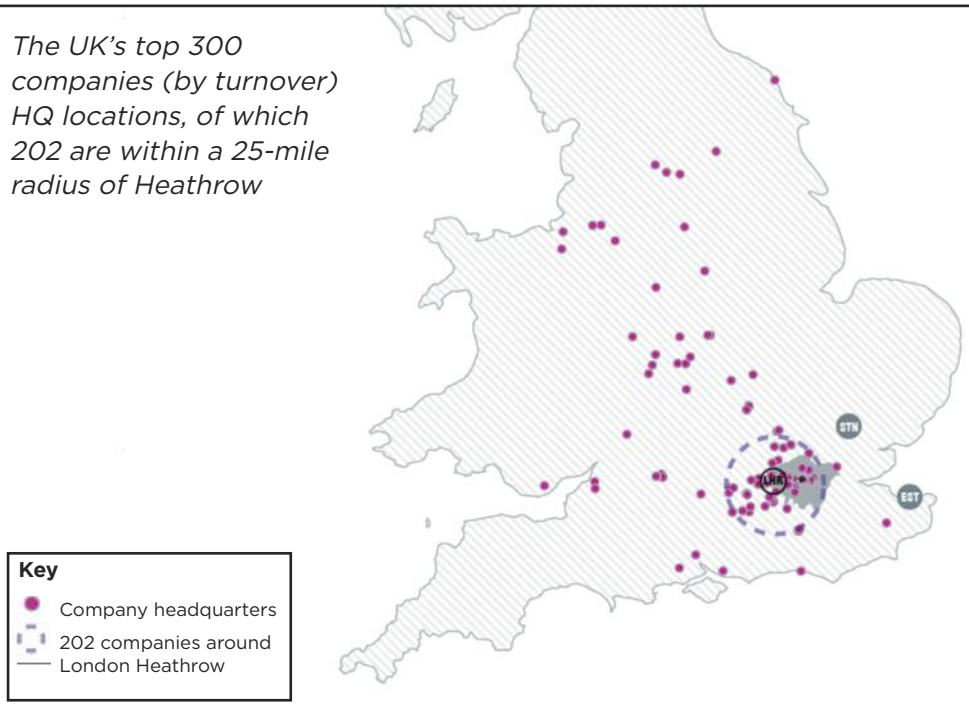
A further item of 'sunk investment' would be the funding that has already been secured and invested into current infrastructure upgrades that predominantly rely for their business case upon the future efficient functioning of Heathrow Airport. These include the Piccadilly line upgrade and the Western Rail Access to Heathrow.

Moreover, the closure of Heathrow Airport will adversely affect the business community that has developed in the airport's proximity.

Surveys of the large companies (those with more than 250 employees) in West London suggest that about half of them would relocate, should Heathrow close. It is hugely difficult to estimate any compensation requirements arising from this.



The UK's top 300 companies (by turnover) HQ locations, of which 202 are within a 25-mile radius of Heathrow



Businesses in the proximity of Heathrow, not least industrial estate developers, have invested hugely in the infrastructure in and around the airport. While it is not certain, if individual firms would have to be compensated, it is also unclear on what basis such payments would be calculated as factors could include their current asset value, loss of future revenue or number of redundancies. Should compensation be paid, the eligibility criteria will be enormously difficult to define; businesses located in the 20-30 mile radius of Heathrow still rely on their proximity to the airport for their business. As the Government would need to nationalise Heathrow Airport to close it, i.e. compulsorily purchase it, businesses will be looking to Government for compensation.

Irrespective of whether compensation will be paid to businesses, local authorities in West London will suffer significantly from the loss of business rates as a result of business relocations in the wake of the closure of Heathrow: companies based in West London currently generate up to £37bn for the local economy.

Finally, further to the difficulty in assessing compensatory amounts, there is huge uncertainty as to the framework under which any compensation would be regulated. While there are legal and statutory compensation rules, it is highly likely that the Government would have to add to any payments that are being provided by developers as it will be the Government promoting the new airport.

A breakfast seminar held at the House of Commons concluded a Thames Estaury Airport will cost over £148bn. Robin Cooper, Director, Regeneration, Community and Culture Medway Council; Cllr Rodney Chambers, Leader, Medway Council; Mark Reckless, MP for Rochester and Strood; Chris Irvine, Office Manager for Mark Reckless.

3. Funding and financing

The construction of a new airport, independent of existing infrastructure, on a greenfield site and by a company not currently operating, is a project of an unprecedented magnitude in the UK with a risk profile that differs vastly from any existing infrastructure projects.

While it is consequently difficult to see how the project could indeed be significantly privately funded, any attempt to secure private financing for an Inner Estuary Airport would most likely look to the bank and debt capital markets.

That said, it is unlikely that there would be sufficient capacity within the bank market requiring funding to be provided by a group of banks. Given the long timescales involved in the construction of the airport and thus the time it would take before any debt could be serviced, the terms offered by private financiers would be challenging.

Further adding to the project's risk profile is the current lack of public and political support for an Inner Estuary Airport. Local authorities and environmental groups in Medway and Kent are committed to a judicial review process, injecting delays and uncertainties into the planning process, hence increasing investor risk. An airport would take four or five parliamentary 'cycles' to be built and the difficulty in keeping the project alive for that long significantly increases risk to private investors.

As a result, it is highly plausible that a large amount of public subsidy would be required to finance the Inner Estuary Airport. This, however, will require State Aid clearance at the European level with countries hosting competing hubs (such as Schiphol Airport in the Netherlands, Frankfurt and Paris) likely to raise objections.

Moreover, when discussing finance, the sequencing and deliverability of the project needs to be taken into account. In simple terms: the revenue that a redeveloped Heathrow site is expected to generate would not be realised until the Inner Estuary Airport is built and opened so there is little potential to re-invest any Heathrow proceeds into the construction of the new airport. In all likelihood the Heathrow site would probably take over 20 years to be developed out.

While the redevelopment of Heathrow is being promoted by the Mayor of London, significant flaws exist with regard to the concept, not least because the plans envisage the building of 70,000 new homes without taking account up to 30,000 properties left vacant as a result of the unemployment resulting from the closure of Heathrow.

In addition, despite Hong Kong Airport being hailed as a successful example of airport relocation and redevelopment, the Kai Tak site continues to be wasteland, even though it would offer prime land for regeneration in one of the world's most crowded areas.

By comparison, Heathrow Airport Ltd is a private company whose shareholders are committed to backing a third runway; they have an appetite to invest because they are certain of the return on investment they will receive.

Gatwick Airport's shareholders, too are willing to invest in the airport's expansion, but even the comparatively low £2 billion risk is considered by some as a 'risky project'.

4. Additional considerations

To provide the local transport infrastructure in Medway and Kent to a standard equivalent to that currently available in and around Heathrow would require enormous investment. At present, the local infrastructure is by no means equipped for feeding into a new hub airport. By way of example, any road capacity arising from a new Lower Thames Crossing would quickly be absorbed; and any rail capacity would not be delivered by the current HS1 infrastructure.

Given the estimated cost of an Inner Estuary Airport the anticipated landing charges make it questionable that the airport would be affordable to use for passengers or airlines and hence leave in doubt its international competitiveness.

Heathrow Airport is already one of the most expensive hub airports internationally. An expected trebling of landing charges at an Inner Estuary Airport would leave the new hub less attractive compared to Frankfurt, Schiphol and airports in the Gulf.

A new Inner Estuary Airport would require the necessary workforce. As Heathrow Airport's support services staff are largely low wage workers, it is inconceivable that they would relocate or commute to a new hub airport to the East of London when the round trip is around 136 miles. The new airport would therefore require an additional 79,000 workers – with the required housing to be located and built in the Estuary area.

5. Conclusion

In light of the significant uncertainty regarding cost and financing and therefore the significant risk for deliverability, Medway Council and Kent County Council call for the exclusion of the Inner Estuary option from further consideration by the Airports Commission, especially at a price tag of £148 billion.

The people don't support an Estuary Airport

1. Public views

Just one in six British adults (16%) would support the building of an Estuary Airport in the Thames at the expense of closing existing facilities at Heathrow, City and Southend, according to new research.

Any increase in travel or air fares to fund infrastructure is not acceptable to at least two in five British adults.

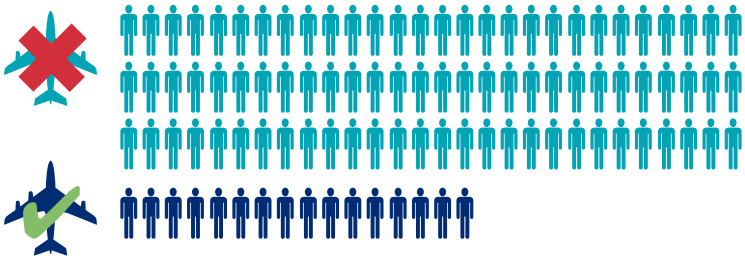
A public opinion survey (April 2014), carried out by ComRes[1] and commissioned by Medway Council and Kent County Council, asked more than 2,000 British adults if they supported plans for a new airport in the Thames Estuary. Just over a third (38%) say that they would support an estuary airport. **However, this figure plummets to just 16% when people are told that existing major facilities would have to close as a result.**

Cllr Rodney Chambers, Leader of Medway Council, which with Kent County Council and the RSPB has consistently opposed plans for an estuary airport, said: "No one disputes the need to invest more in aviation in order to ensure the UK keeps pace with demand and matches competition from abroad. However, we strongly believe that plans to site a hub airport in the Thames Estuary is financially, geographically and environmentally wrong. It will waste tens of billions of pounds of taxpayer's money for a project which is on the wrong side of London for the majority of passengers.

"This survey highlights the chronic lack of public support for the project. Most people will not back a scheme which closes other key airports, including Heathrow and City and Southend Airports. It's time we explore other, more sensible options. This should include how Stansted can be upgraded alongside improvements at the network of excellent regional airports which serve the UK and are not being used to their full capacity."

The public polling also revealed a lack of support for additional travel and ticket fare increases as a result of the infrastructure costs required to fund a new hub airport. Nearly half (49%) said it was not acceptable to increase airline ticket costs in order to fund a new airport.

Just one in six (16%) support Mayor's plans for estuary airport



1 • *ComRes interviewed 2,034 GB adults online between 4th and 6th April 2014. Data were weighted to be demographically representative of all British adults aged 18+.*
• *ComRes is a member of the British Polling Council and abides by its rules (www.britishpollingcouncil.org). This commits ComRes to the highest standards of transparency.*
• *Data tables are available on the ComRes website, www.comres.co.uk*

Cllr Chambers added: “The mayor’s vision for a new hub airport in the Thames estuary is misguided on several levels. Not only are the economics wrong but it would lead to a huge population shift with the need for a new city the size of Manchester being built. The fact that anyone would seek to do this on an area of global scientific and environmental significance, which is home to 300,000 migrating wildfowl, simply beggars belief.”

Paul Carter, Leader of Kent County Council, said: “The estuary airport is simply in the wrong place and on the wrong side of London. It is in a place that is difficult to access, would require billions of pounds thrown at it, is particularly prone to bad weather, high winds and fog, and also on one of the most significant bird migratory paths in the country. Birds and aeroplanes are not a good mix.”

2. The London Assembly

The London Assembly announced in 2012 it was calling on the Mayor to abandon his plans for a new airport in the Thames Estuary, describing them as a simplistic and ill-conceived vanity project.

A motion agreed by Assembly Members urged the Mayor to abandon proposals which they warned would have a devastating effect on the west London economy, with up to 100,000 jobs at risk should Heathrow be forced to close.

They also warned that a major new airport in the estuary would create huge environmental damage to protected areas used by thousands of migrating birds as well as increased noise, congestion and pollution for millions of people in south east London.

Murad Qureshi AM, who proposed the motion, said: “With up to 100,000 jobs on the line at Heathrow it is incredible that the Mayor persists in promoting plans for a rival hub airport in the Thames Estuary. Such an airport would have a devastating effect on the west London economy as well as a serious impact on local wildlife in the estuary and a legacy of noise, congestion and pollution for millions of people in south-east London.

“The message from industry, the airlines and conservationists is simple – the Mayor must drop this ridiculous vanity project.”

The London Assembly in their investigation into airport options concluded “the majority of the Committee believe that building a new airport in the Thames Estuary is not an option. Existing airports should be used more”.

3. Transport Select Committee

The Transport Select Committee came out on 10 May 2012 with the statement: "MPs on the Transport Committee have rejected calls for a new hub airport east of London, and urges the Government to permit the expansion of Heathrow where a third runway is long overdue. We looked closely at the three main options by which the UK could increase its hub airport capacity. Research we commissioned made plain that building an entirely new hub airport east of London could not be done without huge public investment in new ground transport infrastructure. Evidence to our inquiry also showed a substantial potential impact on wildlife habitat. The viability of an estuary hub airport would also require the closure of Heathrow – a course of action that would have unacceptable consequences for individuals, businesses in the vicinity of the existing airport and the local economy".

4. Lack of political support

We have seen no evidence of any mainstream political support for an Estuary Airport.

The Prime Minister is on record at Prime Minister's Question time as stating: "the Department for Transport has no plans to build an airport in the Thames Estuary, Medway or Kent" (PMQ's 27/10/10).

The Liberal Democrats statement (15/08/12) states "Lib Dems firmly reject a Thames Estuary airport and are pushing for better use of existing capacity in the South East and at regional airports".

The Labour Party are on record as stating: "the idea of a massive 4 runway airport on land reclaimed from the estuary is a complete non-starter. The LEP report makes a convincing case and supports the Labour Party's clear position of opposing any Thames Estuary Airport" (Shadow Transport Secretary). The last Labour Government abandoned any plans for an Estuary airport at Cliffe.

Other parties such as UKIP state: "Boris Island is simply insane - in the middle of nowhere as well as taking decades to build. It would damage the local environment and it is very expensive" (Nigel Farage).

The Green's stance is "our solution would be to make sure we look at alternatives to aviation" (Caroline Lucas).

5. Lack of business support

The Local Enterprise Partnership, set up by Government and made up of Councils and businesses in Essex, Southend, Thurrock, Kent, Medway and East Sussex and representing around 4 million people is very firm in its view. In its submission to Government (Growth Deal and Strategic Economic Plan 2014) it states:

"We ask Government to remove the current blight on private investment at Thamesport and on the Isle of Grain and throughout Medway **by conclusively ruling out a Thames Estuary airport"**.

The LEP employed aviation experts Parsons Brinkerhoff to look at airport capacity and future aviation needs (Report to SELEP Board 22 June 2012).

The report was endorsed by the LEP and concluded: "We believe a new hub airport could only be located in the SE, probably within the Thames Estuary, however, whilst this is a grand and ambitious scheme we **DO NOT** believe that it is a viable solution to the capacity issue facing the South East…. At present, with the range of arguments against a hub airport… we cannot see how this would **EVER** be delivered".

The conclusion from all this is that a Thames Estuary airport is rejected by the public, by politicians and by business. It therefore lacks any meaningful level of support which would be essential to see it through the next 20 to 30 years.

Is it legal?

1. Habitats directive

The development of an airport on the Hoo Peninsula/Isle of Grain is a plan or project that would plainly have a significant effect on the integrity of the European sites being the Thames Estuary and Marshes SPA and the Medway Estuary and Marshes SPA. Any airport development is likely to be a Nationally Significant Infrastructure Project to be determined by the Secretary of State under the Planning Act 2008.

As the Competent Authority, it will fall to the Secretary of State to determine whether the airport is likely to have a significant effect and to make an Appropriate Assessment of the implications of the airport in view of the conservation objectives of the site (reg 21, Habitats Regulation 2010). A Development Consent Order may not be granted unless it has been ascertained that the airport development will not affect the integrity of the site. Where the evidence shows or where there is doubt that the plan or project adversely affects the site, including its ability to evolve in a way favourable to nature conservation, the competent authority will have to refuse authorisation *(Landelijke Vereninging tot Behoud van de Waddensee and others v Staatssecertaris Van Landbouw and another [2005] Env LR 14 (ECJ) para 57).*

Derogation may be allowed in the circumstances set out in the Habitats Directive (92/43/EEC) at Article 6(4) which permits a development which has adverse implications for European sites **where there is an absence of alternatives, imperative reasons of overriding public interest (IROPI) and all necessary compensatory measures are secured to** ensure that the overall coherence of the network of European sites is protected.

Brent Goose

Avocet

Shoveler

Ringed Plover

Whilst the British Trust for Ornithology report for Kent and Medway Council's (May 2014) does not include an analysis of alternatives or IROPI, its findings are very clear that mitigation and compensation measures will be required to provide alternative habitats for displaced birds from the European sites. The conclusions, particularly in relation to intertidal habitat creation, are that there is considerable uncertainty as to whether providing compensatory habitat at a distance from the European sites would be effective in supporting displaced bird populations. These conclusions cast doubt at this stage (and setting aside alternative and IROPI considerations) that suitable compensation measures could be provided for consent to be granted.

Unless these legal obstacles can be overcome it is difficult to see how the project can continue. No investor would want to proceed knowing of the uncertainty of lengthy legal proceedings with a very low level of success. Judicial review proceedings are highly likely from local Councils and environmental groups who would see this, because of the size of the bird population, as a 'cause célèbre' both here and across Europe and indeed the world. Other airports, particularly in Europe who would not want the Estuary airport taking business competition from them, would also likely join in with such legal action. Alternative locations clearly do exist and have already been articulated by the Commission themselves and have far fewer environmental constraints so it is difficult to see how a Government or developer could win a legal argument as to why the Habitats Directive could, or should, be overridden.

Grey Plover

Oyster Catcher

Knot

Black-tailed godwit

2. State aid

Applicability of state aid regime

The construction of airport infrastructure is an economic activity. Public funding of infrastructure necessary for the operation of the airport alleviates the costs that the airport operator would normally have to bear, and therefore constitutes State aid (ruling of EU General Court in 2011: cases T-443/08 and T-455/08).

Public support for such activities will therefore constitute state aid within the meaning of Article 107 of the Treaty on the Functioning of the EU (TFEU).

European Commission Memo 14/121 states that public funding granted to an airport manager would only be considered free of state aid if in similar circumstances a private operator would have granted the same funding, having had regard to the foreseeability of obtaining a return and leaving aside all social, regional policy and sectoral considerations, (the so-called "Market Economy Operator Principle", MEOP). It is doubtful that compliance with the MEOP principle could be demonstrated in relation to the current airport proposals, particularly as the Oxera report commissioned by the Parliamentary Transport Committee stated “all the scenarios have a negative value at a rate of return that a private investor would require” (Source: Would a new hub airport be commercially viable? Oxera 24 January 2013).

State aid guidelines on airport funding

The latest state aid guidelines published in the Official Journal of the European Union on 4 April 2014 set out the circumstances in which investment aid to airports could be considered compatible with the internal market pursuant to Article 107 of the Treaty on the Functioning of the EU. Paragraph 17(b) states that:

> “For large airports with a passenger volume of over 5 million per annum, investment aid [ie aid to finance fixed capital assets] should in principle not be declared compatible with the internal market pursuant to Article 107(3)(c) of the Treaty, except in very exceptional circumstances, such as relocation of an existing airport, where the need for State intervention is characterised by a clear market failure, taking into account the exceptional circumstances, the magnitude of the investment and the limited competition distortions”

Paragraph 79 of the guidelines states that state aid will only be considered compatible with the internal market pursuant to Article 107(3) of the Treaty if the following cumulative conditions are met:

(a) contribution to a well-defined objective of common interest: a State aid measure must have an objective of common interest in accordance with Article 107(3) of the Treaty;

(b) need for State intervention: a State aid measure must be targeted towards a situation where aid can bring about a material improvement that the market cannot deliver itself, for example by remedying a market failure or addressing an equity or cohesion concern;
(c) appropriateness of the aid measure: the aid measure must be an appropriate policy instrument to address the objective of common interest;
(d) incentive effect: the aid must change the behaviour of the undertakings concerned in such a way that they engage in additional activity which they would not carry out without the aid or they would carry out in a restricted or different manner or location;
(e) proportionality of the aid (aid limited to the minimum): the aid amount must be limited to the minimum needed to induce the additional investment or activity in the area concerned;
(f) avoidance of undue negative effects on competition and trade between Member States: the negative effects of the aid must be sufficiently limited, so that the overall balance of the measure is positive;
(g) transparency of aid: Member States, the Commission, economic operators, and the interested public, must have easy access to all relevant acts and to pertinent information about the aid awarded.

As these are cumulative tests, they will all need to be satisfied in relation to any state aid associated with the proposed airport, both in relation to the construction and operation of a new airport and the closure and decommissioning of Heathrow. This requirement is likely to present a serious hurdle to the current proposals.

In particular, with regard to criterion (b) (need for state intervention) it is clear from paragraph 89(e) of the guidelines that for large airports with a passenger volume in excess of five million a year, investment aid will not be deemed compatible with the internal market, except in 'very exceptional circumstances'. The Mayor of London himself has recognised that this would be potentially fatal to his proposals: "London Mayor Boris Johnson said European Union proposals barring the use of state aid for the construction of airports serving more than five million people a year would undermine plans to grow the U.K.'s aviation capacity. Government subsidies for large airport projects, currently assessed on a case-by-case basis, would be outlawed, whether for new infrastructure or upgrades of existing facilities, according to the draft EU blueprint.
"There are unintended and potentially catastrophic consequences," Johnson said in a Sept. 20 letter to EU Competition Commissioner Joaquin Almunia".

(Source:http://www.bloomberg.com/news/2013-09-26/london-mayor-slams-eu-aid-cap-threat-to-new-london-airport-1-.html)

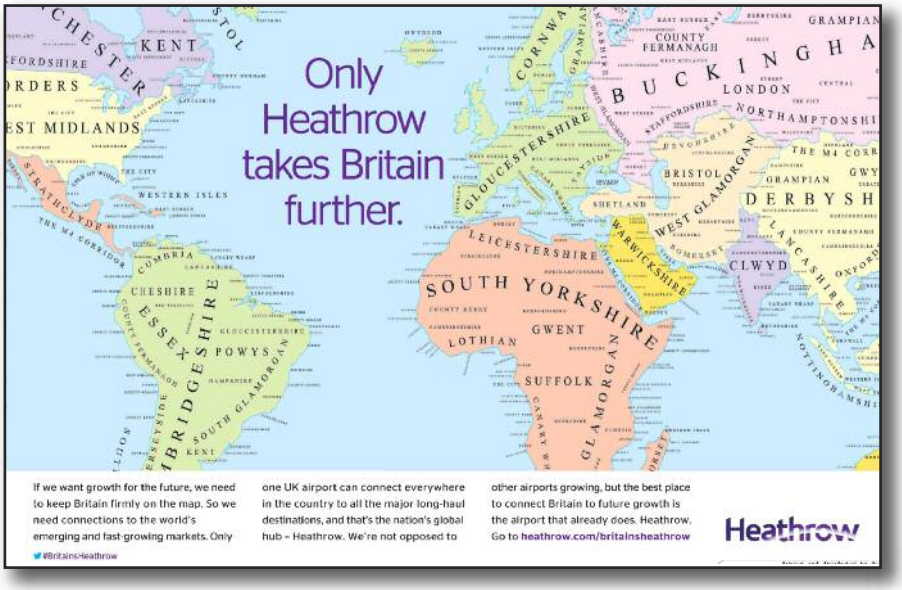
With regard to criterion (e) (proportionality of aid), paragraph 104 of the guidance stipulates that on the relocation of an airport, and cessation of airport activities at an existing site the Commission will need to assess thoroughly the proportionality, the necessity and the maximum aid intensity of the State aid granted on the basis of the funding gap analysis or the counterfactual scenario of each specific case.

Service of General Economic Interest

The proposed airport would not be situated in an isolated, remote or peripheral region of the EU and so would not qualify for state aid to discharge a Service of General Economic Interest (SGEI) (Guidelines, paragraph 72).

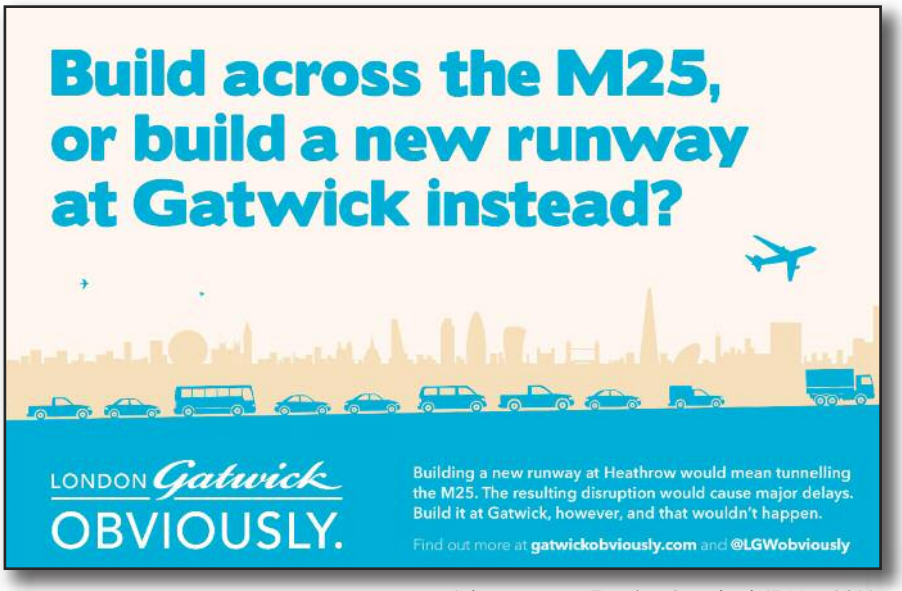
We cannot see how state aid issues can be successfully overcome especially as alternatives do exist, amongst them Heathrow and Gatwick.

London Heathrow



Advert source: Evening Standard, 13 May 2014

London Gatwick



Advert source: Evening Standard, 13 May 2014

Transport and the Estuary Airport

1. Introduction to concerns surrounding surface access

The transport infrastructure that is currently in place is wholly inadequate for both passengers and staff travelling to an airport in the Thames Estuary. Poor transport links into the most extreme south eastern corner of the UK, and the extensive investment that would be required to address this, is one of the many good reasons why North Kent is not a suitable location for a national hub airport. The Airports Commission's own analysis concludes that an Isle of Grain airport would be 33 miles from central London (compared to 15 for Heathrow and 25 for Gatwick) and its easterly location makes it less convenient for the majority of UK air passengers.

2. High Speed Rail services

The outline plans for an Isle of Grain airport places significant reliance on High Speed One (HS1). However, there is no room for expansion at St Pancras International station in terms of platform capacity, and there is little scope for a greater number of services on the existing line. The expectation to run increased services on the line does appear to overlook the fact that it is a high-speed service, and cannot function to metro service frequencies of a train every two to three minutes.

There are capacity restrictions on HS1 which make it inadequate for serving a new hub airport. The capacity of HS1 is 18 trains per hour (tph); in the peaks there are six domestic tph and three Eurostar tph, therefore spare capacity for nine tph. Foster and Partners'

proposal stated that 15 tph in each direction are needed to cope with demand from the airport (possibly rising to 20tph); however there is not the capacity on HS1 for this level of service given that there is only spare capacity for a further Nine tph after domestic commuter trains and Eurostar services have been taken into account. The restriction is, in part, due to the fact that the HS1 platform capacity at St Pancras for domestic trains is currently limited to 6tph. A number of the estuary airport proposals have stated that the ability of the HS1 service to increase its frequency was demonstrated during the 2012 London Olympics. This is contrary to our correspondence with Southeastern, who advised us that the higher frequency Javelin service operated during this time is unsustainable in the long term as it required modifications to the Eurostar timetable and was only delivered by providing a limited service to other Kent stations during the games and did not operate over a return journey distance of 66 miles.

HS1 does not have the ability to meet the passenger capacity demands presented by a new hub airport. As presented to the Airports Commission on their visit to Medway on 13 June 2013, a basic calculation of the rail demand from a new hub airport demonstrates that there is insufficient passenger capacity on HS1. Demand will exceed capacity by 78% just from air passengers using HS1 to travel to the airport before existing or future commuting passengers have been taken into account. This demand can be estimated at: a 140 million passenger per annum (mppa) airport equates to 384,614 passengers per day which, with a 70% mode share by public transport, means 269,230 passengers arriving or departing by rail per day[1]. Assuming they are evenly spread over an 18 hour operating day[2], this equates to 14,957 passengers per hour or 7,479 in each direction. With the current six trains per hour, a 12 car Class 395 with 698 seats would provide capacity for 4,188 passengers per hour which provides only just over half (56%) of the demand (7,479). With a peak in demand by time of year, day of the week or time of day, the capacity shortfall would be even more pronounced, especially given that commuter trains at peak times are already full.

Considering all the limitations of the current HS1 infrastructure, at least a doubling of the capacity of HS1 is required; that being four tracking of the line and a doubling of the platform capacity at St Pancras or use of a new London terminus station.

3. Mode share expectations

It would appear that the promoter's expectation to have 65% of airport passengers and staff travelling by rail is unrealistic. Schiphol Airport, Amsterdam, has a reputation as an airport with good public transport connections to the Dutch and trans-European rail network and a journey time to the centre of Amsterdam of around only 15 minutes, yet only 38.2% of air passengers arrived by rail in 2012[3].

4. Airport staff, rail journey times and operating hours

Staff travelling to the airport are likely to also need to use mainline rail services (rather than high speed services), where there are already operational capacity constraints. Also, assuming many journey origins for airport staff will be in Kent and Medway, the journey is likely to be convoluted (possibly to Ashford, Ebbsfleet or even London) and therefore more time consuming than necessary. It is also important to consider that some staff may have transferred employment from Heathrow airport, and therefore will have excessive journey times from the West London area.

Travel by mainline rail services or an extended Crossrail to an Estuary airport would have unattractive journey time for both passengers and staff. Rail services from central London are slow – Gravesend 57 minutes and Rochester 73 minutes from Charing Cross. Foster and Partners' and TfL's proposals for the Isle of Grain include access by an extension of Crossrail from Abbey Wood. The estimated journey time from Central London (Bond Street) to Abbey Wood using Crossrail is 25 minutes; with Abbey Wood to the Isle of Grain a further 30 miles, journey times from Central London on Crossrail would be far in excess of an hour. The journey from West London, for staff transferring from Heathrow, would be even longer.

According to a recent survey conducted by ComRes[4], the average acceptable journey time to an airport from central London is under an hour at 59 minutes. 44% of people would expect to be able to travel to an airport near London in 45 minutes or less. Based on the estimated potential journey time from central London to an Isle of Grain airport, it can be inferred that the Thames Estuary would not be a suitable location for a new hub airport due to journey times exceeding that which is acceptable to the travelling public.

It is equally important to note that rail services will not provide a 24hour service. This means that it will not be suitable for all shift patterns of workers at the airport, especially those with particularly early starts. From central London, the earliest train to Heathrow leaves at 4.42am and the latest arrives at the airport at 11.47pm. However, as the airport does not operate continuously over the 24hour period, it would be unnecessary to have trains throughout the night. Conversely, it is possible to leave central London and arrive at Gatwick airport throughout the night. The 24hour service runs regularly and offers as many as eleven trains per hour in peak daytime periods. However, it is important to note that, although this service runs from central London, connecting services from areas outside of London do not run throughout the night, and therefore public transport is not truly available to all passengers 24hours a day. For example, the earliest a traveller can arrive at Gatwick airport if travelling from Maidstone in Kent, is 7.05am, after a journey of nearly two hours, three changes and a 32 minute wait at Tonbridge rail station[5].

5. Increased rail fares

In a recent survey by ComRes[6], 43% of people said that no additional travel costs would be acceptable if travelling to a new airport. It is important to have a clear understanding of how much tickets to the proposed airport from popular destinations are likely to cost, in order to assess public response. Currently, a ticket from central London to Heathrow Airport ranges from £9.90-£21 each way, while a return from London to Gatwick rages from £15.10-£26.50. As with travel times, it is also important to remember the extra cost associated with connecting onward travel, as these services only provide access from central London.

Of the people surveyed by ComRes[7], the average acceptable increase in travel costs is less than £10, with, as already stated, 43% stating that no additional cost for travel to a new airport would acceptable. Therefore the challenge for an Estuary airport is to provide rail access at a cost that is comparable to the level of rail fares to London's existing airports. Given the high costs of providing new rail infrastructure and the need to recoup that significant investment to reduce the burden on the taxpayer in relation to rail travel, it is unlikely that rail fares to the airport could be priced low enough to be attractive to air passengers, unless there is further public subsidy. The result of higher rail fares is an increase in the attractiveness of accessing the airport by car, unless car parking is also priced high, in which case the cost of accessing an Isle of Grain airport by all modes will be unattractive compared to existing airports.

6. Airport passengers and rail services

As noted for staff requirements, the lack of a 24hour rail service will mean some air passengers will not be able to arrive by rail for late night and early morning flights.

It is important to consider the rail provisions and the changes that will need to occur in order to provide a suitable service for passengers to and from the proposed hub airport. Current commuter rail carriages only have a limited amount of luggage storage capacity. However, it can be assumed that with a significant number of airport passengers using the rail services to access the airport there will be a lot of suitcases and large items of luggage aboard the trains. This could incur costs related to making carriages more suitable, or loss of ticket revenue due to the lower number of passengers able to travel when carriage space is taken up by luggage; or uncomfortable journeys due to crowding. It is also important to realise that these trains already run at capacity with commuters.

Air passengers may have to make a convoluted surface journey to reach their final destination. The proposed site on the Isle of Grain, as previously noted, is only 33miles from London, but it is likely that multi-modal transport network will be needed to reach destinations other than London. The feasibility of the associated infrastructure for onward travel also needs to be considered.

7. Access by car – Strategic Road Network

Due to apparent restrictions with providing surface access by rail, it can be expected that many journeys to the airport will be made by private car or taxi. Passengers and staff commuting by road from the wider South East catchment would likely travel around London on the M25, the capacity of which is already reached in many sections. The southern section of the M25 has been upgraded as a managed or smart motorway with permanent hard shoulder running between junctions five and seven in order to alleviate the congestion that already exists. Less than 60% of journeys on this section of the M25 were 'on time' according to DfT statistics[8].

There would also be capacity issues when considering access from north of the Thames, due to the current issues associated with the Dartford crossing. Many of the proposals for an Estuary airport rely on the new Lower Thames Crossing facilitating road access into the airport from north of the Thames. However, a new Lower Thames Crossing would not provide sufficient capacity for the new demand generated by the airport as the new crossing is being proposed as only a two lane all purpose dual carriageway. In addition to the impacts on Kent and Medway, an airport in the Estuary will have implications for areas to the north of the Thames, i.e. Essex, Thurrock and Southend, with passengers and workers needing to access the airport.

Access to Kent from north of the Thames is severely restricted due to the strategic bottleneck of the Dartford Crossing and this is a key inhibitor of commuting from Essex and Thurrock into Kent. The recent Department for Transport (DfT) consultation on corridor options for a new Lower Thames Crossing identified that a new crossing is needed now in order to deal with current and forecast traffic growth and did not assume traffic demand from a new national hub airport. The existing crossing operates above its design capacity for an average five days in every seven and the average delay for 50% of vehicle journeys is in excess of 9 minutes. The DfT forecasts traffic growth of 41% by 2035[9], which on top of existing congestion levels demonstrates the need for extra capacity before traffic

growth associated with accessing an airport is even considered. Therefore a new Lower Thames Crossing is needed now to alleviate current and forecast traffic growth and would not be sufficient to provide road access to a Thames Estuary airport.

Recent and planned upgrades to roads in Kent and the area surrounding the proposed airport site, such as the work on the M25 and A2, are to tackle current capacity issues and planned housing and employment growth in the area. Some Estuary airport proposals have incorrectly assumed that the recent upgrades to the A2 will 'be sufficient for the initial stages of the airport's development'. Although it is true that the A2 has been upgraded in recent years, this is to provide capacity for the planned housing and employment growth in the Thames Gateway, for which significant upgrades to key junctions are still needed (Bean and Ebbsfleet junctions). It is therefore not sufficient for the initial stages of the airport's development.

The M2, east of Gillingham from Junction 4, has had no capacity improvements and is still the original two lane motorway. Significant investment is needed to upgrade Junction 5 (Sittingbourne), a new Junction 5a (Kent Science Park), Junction 7 (Brenley Corner) and complete the dualling of the A2 around Lydden on approach to Dover. This work is needed to accommodate the forecast increase in cross channel traffic and prevent congestion on the A20 and M20, resulting from the port's expansion with the Western Docks revival. This is without consideration of a new hub airport in this part of the country.

The Mayor of London has warned that building a third runway at Heathrow would result in the demand for widening the M4, the western sections of the M25 and the A4 through Chiswick and Hammersmith with knock on effects for the M3 and M40. The Mayor estimates the cost of these works at £12 billion[10]. Applying the Mayor of London's approach to the strategic highway network in Kent serving an estuary airport, then the M2 and the A2 (between the M25 and M2) and potentially sections of the M20 are likely to require widening. The table below details the potential cost of motorway widening across Kent and Medway as a result of an Estuary airport by simply applying a rough cost of £30m per mile[11] to the current estimated mileage. The total cost of strategic road widening across Kent and Medway could be in the region of £2.5 billion.

	Total length (miles)	Cost per mile	Cost
A2 (from M25 to M2)	9	£30m	£270m
M2	25	£30m	£750m
M20	50	£30m	£1,500m
Total cost			**£2,520m**

8. Access by car – local road network

It is likely that a high proportion of airport staff will commute from Medway and Kent to an Estuary airport by private car, with a significant proportion of these trips crossing the River Medway using existing crossings on the local road network at A289 Medway Tunnel and A2 Rochester Bridge, indeed they are the only two local crossings.

The A289 Medway Tunnel is a two-lane dual carriageway and the route becomes significantly congested during peak times. Medway Council is pursuing funding opportunities to increase network capacity as a result of planned development served by the route; however, this is simply to accommodate planned housing and employment developments in the area, not an airport. The A289 (including the Medway Tunnel) is also the diversion route when the M2 is closed.

Traffic flows through the A289 Medway Tunnel are detailed in the table below[12].

	East bound	West bound	Total
AM peak hour 08:00 to 09:00	2,174	1,805	3,979
PM peak hour 17:00 to 18:00	1,892	1,811	3,703
12 hour 07:00 to 19:00	18,202	17,584	35,786
24 hour	22,103	22,408	44,511

The A2 Rochester Bridge comprises two structures; one carrying east bound traffic and the other carrying west bound traffic. 2 lanes are provided in each direction. The route becomes significantly congested during peak times. The Rochester Bridge Trust maintains both structures. Traffic flows across the A2 Rochester Bridge are detailed in the table below[13].

	East bound	West bound	Total
AM peak hour 08:00 to 09:00	1,487	1,645	3,132
PM peak hour 17:00 to 18:00	1,652	1,273	2,925
12 hour	15,283	14,774	30,057

The calculation below details the impact on these existing river crossings if an assumed percentage of staff drive through these crossings over a 12 hour day on their way to and from employment at an estuary airport:

Estimated level of staff employed:	120,000
Total number of two way trips per day:	240,000
Assume 6% of trips pass through Medway Tunnel	14,400
Assume 3% of trips cross Rochester Bridge	7,200

This approximate calculation demonstrates the scale of predicted traffic growth of:

40% through the Medway Tunnel
24% across Rochester Bridge

These crossings will be experiencing high levels of congestion even with this small percentage of employment trips associated with an estuary airport passing through these crossings. This will significantly impact on the economic viability of the area. As a result additional highway capacity will be essential to mitigate the impact of an estuary airport on the local highway network in Medway for which funding does not exist.

Medway Council's provisional estimate for new crossings at today's prices amounts to £160m; this includes £100m for an additional Medway Tunnel and £60m for an additional Rochester Bridge. Applying RPI at 3% for 20 years to time when the additional capacity would be needed, then total cost amounts to in excess of £260m. In addition, significant additional capacity will be required on the local highway network through Medway in particular along the A289 and A2.

9. Car parking

Upon arrival at the airport, it can be assumed that long-stay parking facilities will be available. As previously noted, the ComRes[14] survey concluded that more than two in five of the British public (43%) would be unwilling to pay a higher cost to travel to a new airport. However, with the target for a high public transport mode share, it is likely that car

parking facilities would be priced in such a way as to incentivise the use of public transport; therefore resulting in higher costs for accessing the airport by car.

10. Environmental impacts

Environmental impacts linked to the surface access to the proposed Estuary Airport have not been assessed and it is unlikely that a full assessment could take place until firm plans are in place for infrastructure developments to support the airport.

The proposed site on the Isle of Grain is an area vulnerable to sea level rise and flooding. This will be important for associated development, such as railway tracks and roads, as the flood risk will need to be mitigated and managed. There is a great deal of marshland in the area, which will pose its own challenges when developing the supporting infrastructure in addition to the airport site. This needs to be fully assessed, with consideration of the full range of impacts from the proposed airport development.

Environmental considerations such as noise and air pollution also need to be considered. Assessment of noise from surface access is relevant from the road traffic and the operating times of the extended rail services, if implemented, in order to provide for a greater number of staff and early morning flight passengers.

11. Financial considerations

Many of the cost estimates for the proposed airport have not fully assessed the costs associated with infrastructure development. It is apparent that that HM Treasury would need to be prepared to finance around £100 billion to establish a Thames Estuary airport. Without such a commitment, it simply cannot happen and, to date, unlike HS2 which has a financial allocation of £42.6 billion, there is no indication the Government (or indeed the opposition parties) are contemplating putting any finance aside for a Thames Estuary option[15].

12. Conclusion

The ComRes[16] survey in April 2014, on behalf of Medway Council, was commissioned to understand the views of the general population regarding the proposed hub airport on the Isle of Grain. There was a particular focus on the residents of London and the South East, as the population most likely to be affected by the proposed airport. Their findings included 'strong opposition to such an airport once British adults learn of the other airport closures required' and that 'an airport that is out-of-the-way or expensive to reach is likely to struggle to attract passengers'[17]. When this is considered alongside the surface access concerns described in this submission, it is clear that a considerable level of investment in surface transport infrastructure is needed in the area, should the proposed airport go ahead as neither the current or planned road and rail infrastructure would provide the capacity to accommodate the demand from a new airport on the Isle Grain. The ComRes[18] survey shows that an airport is not likely to be attractive if accessibility proves difficult, time consuming and expensive.

References

1 *Based on TfL's previously stated modal share target of 70% from public transport (now 65% in the TfL submissions to the Airports Commission, July 2013). Assumes: high speed rail is the only viable public transport option given the long journey times on other mainline rail or bus services; an even flow of passengers throughout the year, week and day (although highly unrealistic that there would be no peaks); and no passengers on Christmas day when there are no rail services.*

2 *Assumption of limited flights between 00:00 and 06:00 and few rail services.*

3 *Schiphol Group Annual Report, 2012*

4 *ComRes: Headline Findings, Airport Expansion in the South East, April 2014, on behalf of Medway Council – ComRes interviewed 2,034 GB adults online between 4 and 6 April 2014. Data were weighted to be demographically representative of all British adults aged 18+. Data tables are available on the ComRes website, www.comres.co.uk*

5 *All rail times and prices were found at www.nationalrail.co.uk 2 May 2014*

6 *ComRes: Headline Findings, Airport Expansion in the South East, April 2014, on behalf of Medway Council - ComRes interviewed 2,034 GB adults online between 4 and 6 April 2014. Data were weighted to be demographically representative of all British adults aged 18+. Data tables are available on the ComRes website, www.comres.co.uk*

7 *ComRes: Headline Findings, Airport Expansion in the South East, April 2014, on behalf of Medway Council - ComRes interviewed 2,034 GB adults online between 4th and 6th April 2014. Data were weighted to be demographically representative of all British adults aged 18+. Data tables are available on the ComRes website, www.comres.co.uk*

8 *DfT, Reliability of journeys on Highways Agency's motorway and 'A' road network, England: April to June 2013, Department for Transport Statistical Release, 8 August 2013.*

9 *DfT Road Traffic Forecasts, 2011*

10 *Mayor of London's press release 30 September 2013*

11 *Cost from Highway Authority website*

12 *Automatic count measured on 17 October 2012*

13 *Manual count measured on 16 October 2012*

14 *ComRes: Headline Findings, Airport Expansion in the South East, April 2014, on behalf of Medway Council - ComRes interviewed 2,034 GB adults online between 4 and 6 April 2014. Data were weighted to be demographically representative of all British adults aged 18+. Data tables are available on the ComRes website, www.comres.co.uk*

15 *Financial considerations calculated and presented by Medway Council within their additional response to the Airports Commission on the long term airport capacity proposals, October 2013*

16 *ComRes: Headline Findings, Airport Expansion in the South East, April 2014, on behalf of Medway Council - ComRes interviewed 2,034 GB adults online between 4 and 6 April 2014. Data were weighted to be demographically representative of all British adults aged 18+. Data tables are available on the ComRes website, www.comres.co.uk*

17 *ComRes: Headline Findings, Airport Expansion in the South East, April 2014, on behalf of Medway Council - ComRes interviewed 2,034 GB adults online between 4 and 6 April 2014. Data were weighted to be demographically representative of all British adults aged 18+. Data tables are available on the ComRes website, www.comres.co.uk*

18 *ComRes: Headline Findings, Airport Expansion in the South East, April 2014, on behalf of Medway Council - ComRes interviewed 2,034 GB adults online between 4 and 6 April 2014. Data were weighted to be demographically representative of all British adults aged 18+. Data tables are available on the ComRes website, www.comres.co.uk*

What about the weather?

A new hub airport in the Thames Estuary would be three times more likely to be affected by fog than Heathrow Airport, according to the Met Office.

Research commissioned by Medway Council and sent to the Commission was carried out over a five-year period. It clearly shows that an estuary airport is most undesirable in weather terms. Data was analysed from two weather stations – one at Heathrow and another in Shoeburyness, Essex, which is on the Thames Estuary.

Between January 2007 and December 2011 there were 762 hours of fog in the estuary compared to 247 at Heathrow. It is particularly a problem when planes are landing, but not such a problem when they're taking off.

There are a number of days at Heathrow when it is closed and Gatwick as well. That would certainly be the case at Thames Estuary because it's all controlled by national air traffic control but on far more days.

Even proponents of an Estuary airport concede "When there's water there's more fog, so that's logical" (Dai Liyanage – DRINK)

The devastating effects of fog can be seen in the appalling crash at the Sheppey crossing almost at the end of the proposed estuary airport runway in 2013.

Richard Deakin, Chief Executive Officer of NATS is on record as saying 'the very worst spot you could put an airport is just about here. For 70% of the time aircraft would be flying over densly populated areas'.

Near zero visibility was blamed for a multi-vehicle accident at the Sheppey Crossing in September 2013.

Birds

Medway and Kent County Council asked the British Trust for Ornithology to examine the issue of the impact on the bird life of an Estuary airport. Their full report has been sent to the Airports Commission.

The proposal to build an airport on the Hoo Peninsula/Isle of Grain would cause a significant loss of both freshwater and intertidal coastal wetland habitat, largely within the Thames Estuary and Marshes Special Protection Area (SPA). It would also cause some loss of habitat from within the Medway Estuary and Marshes SPA. These areas are protected under international law for their internationally important bird populations.

Coastal wetland habitat loss of this type has been widely demonstrated to have significant impacts on the bird populations that the habitat supports. We can therefore be confident that habitat loss due to airport development would have significant negative impacts on the bird populations that depend on the areas lost. The Thames Estuary and Medway Marshes SPAs are designated because together they support populations of 140,515 birds or indirectly (e.g. through disturbance or habitat change to areas close to the airport). Over 21,000 waterbirds currently use the area proposed for development – around 25% of the total bird population on the two affected SPAs.

Should an airport in the Thames Estuary be taken forward, there would need to be an appropriate assessment (under the 2010 Habitats Directive (92/43/EEC)) to determine any 'likely significant effects' to these SPAs following any proposed mitigation.

- If 'likely significant effects' following mitigation are identified in the appropriate assessment, article 6(4) of the EC Habitats Directive allows plans or projects which may have an adverse effect on the integrity of a European site or European marine site (such as an SPA) to go ahead on grounds of 'imperative reasons of overriding public interest' (IROPI) when there are no alternative solutions, but only if compensatory measures have been secured.

Therefore, should an airport development in the Thames Estuary be constructed it is highly likely that mitigation and compensation would be required to provide alternative habitat for displaced birds.

Habitats Directive guidance suggests the area of compensatory habitat provided should be at least twice the area lost, meaning that replacing the habitats lost by the construction of the proposed airport (estimated as 1700 hectares) would require a new site or sites of at least 3400 hectares to be created. Finding suitable areas for such large-scale habitat creation will be challenging given the many competing demands for coastal land use in south-east England.

Creating compensatory habitat should an airport be built is further complicated by the types of habitat that would be destroyed, especially intertidal habitat. We currently have limited understanding of how best to engineer and successfully retain the exact sorts of habitats the birds require and therefore uncertainty about the density of each bird species that would be supported on newly created habitat. It is therefore realistic to anticipate the

need to create new areas of inter-tidal land that were larger than those lost to maximise the chance of suitable habitat developing to support the number of birds lost.

As well as the physical challenges of compensation there is also significant financial cost to add to the construction costs of the airport. The cost of creating compensatory habitat is likely to be over £70,000 per hectare and may well be considerably more than this, depending on the sites chosen and site-specific considerations.

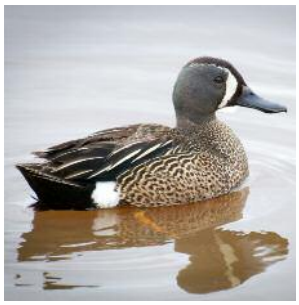
The challenges caused by the development of an airport in the Thames Estuary vary among the bird species present in the area; for example, many of the bird species affected are site-faithful, and therefore colonisation of new habitat provided some distance away would only occur over a period of many years through the recruitment of juvenile birds to the new sites. Adult birds of site-faithful species displaced from the development area would be likely to remain in the Thames and Medway Estuaries and would suffer increased mortality over several years following development due to the reduced habitat (and therefore food) availability. Compensatory habitat provided at a distance would therefore not provide direct compensation for displaced individuals of these site-faithful species, but may eventually support equivalent population sizes of these species following several years of recruitment to the new site. However, the long-term consequences of this for bird populations are highly uncertain.

There is no precedent for the creation of compensatory habitat at a distance from the area affected by development (for example in Essex or elsewhere in East Anglia as suggested by Foster and partners) and there is considerable uncertainty as to whether providing compensatory habitat at a distance from the Thames and Medway Estuaries would be effective in supporting displaced bird populations, or whether it would be legally viable. The creation of new habitats at a distance from the Thames Estuary and Marshes and Medway Estuary and Marshes SPAs either through managed realignment, topographic modification, or the creation of freshwater wetlands, is likely to be less effective than providing such habitats locally, although it could still be partially effective for several species guilds.

The provision of replacement habitat within or adjacent to the Thames and Medway Estuaries is likely to be the most effective option to compensate for the effects of the development on bird populations, although it should be noted that it may be challenging to find suitable sites for this, especially given there are already existing commitments to recreate intertidal habitat in the area to compensate for that lost through coastal squeeze.

Limitations of the study: This study has been limited to reviewing the likely impact on birds of habitat loss due to the footprint of the airport development, and not any impacts caused by wider infrastructure requirements, such as surface access or housing, on the ability to provide local replacement habitats. The study has not reviewed any wider non-habitat related issues, such as disturbance to birds in areas surrounding the proposed airport. Such impacts are likely to be smaller than the direct habitat loss caused by the airport development, but it will be important to take them into account in an Environmental Impact Assessment should the airport proposal be taken forward.

Teal



Dunlin

Little Egret

Redshank

Pintail

Golden Plover

Lapwing

The RSPBs view is that the wider estuarine complex is a hub for over 300,000 migrant birds that rely on the area for feeding and roosting during winter. Many thousands use it for stopovers as they fly south for winter, before returning again for the rich feeding grounds of the Arctic.

There are a number of internationally important species:
• Brent geese
• Teal
• Shoveler
• Oystercatcher
• Avocet
• Ringed Plover
• Grey Plover
• Knot
• Dunlin
• Black-tailed Godwit
• Redshank

In addition, the Swale (the tidal channel between the Isle of Sheppey and the Kent coast) adds pintail and golden plover.

The North Kent marshes are a vital area for red-listed nesting lapwings and the Thames and Medway estuary is the most important place in the UK for little egrets.

The UK's coastal wetlands (including the Thames) are truly a global heritage held in trust by the UK. Within the Greater Thames there are a number of sites that are recognised at both European and global scales.

The significance of the Thames estuary for migrating and wintering waterfowl (ducks, geese and wading birds) is recognised in designations such as Ramsar sites (under the terms of the Ramsar Convention on Wetlands of International Importance) and Special Protection Areas (SPAs). Other parts for the wider estuary are designated as Special Areas for Conservation, under the terms of EU Habitats Directive. Both designations are regulated under the Habitats Regulations.

These designations put a profound legal requirement on the UK to protect these precious sites. There are a series of tests that any development within an SPA or SAC must go through to show that there will be no damage to the wildlife.

The internationally recognised sites that fall wholly or in part with the Greater Thames are:
• Special Protection Areas and Ramsar sites
• Benfleet and Southend Marshes
• Foulness
• Medway Estuary and Marshes
• Outer Thames Estuary (SPA only)
• Thames Estuary and Marshes
• The Swale
• Thanet Coast and Sandwich Bay

Special Areas for Conservation

- Essex Estuary SAC
- Margate and Long Sands SAC
- Thanet Coast SAC

If these birds can no longer stop at the estuary this first of all assumes that birds can be prevented from stopping. The RSPB believes that the size of the estuary and the numbers of birds makes this impossible.

If areas are destroyed by an airport, birds will try and redistribute both around areas remaining in the Thames and elsewhere. They will encounter other populations leading to competition and stress – this may lead to starvation, hunger or reduced breeding conditions later in the year – the outcome will be reduced numbers.

Published studies on the barraging of Cardiff Bay showed conclusively that redshank numbers fell as a result of the loss of inter-tidal feeding areas. In other parts of the world (for example Asia) the loss of inter-tidal wetlands to development is having serious consequences for water birds contributing to the risk of extinction for some.

In summary we can see no realistic chance of successfully relocating and mitigating for the effects of an international airport in populations of up to 300,000 birds.

Every year around 300,000 migratory waterbirds will return to the estuary. Many thousands more pass through on migration in the autumn and in the spring on their way to other sites.

Even with an aggressive bird hazard management programme (i.e. shooting or scaring the birds away), the risk of bird strike would be up to twelve times higher than at any other major UK airport, according to a report produced by the Central Science Laboratory and the British Trust for Ornithology as part of the SERAS review in 2003.

Summary

We believe that at a cost of £148 billion the value for money of an Estuary airport is simply not proved when alternatives which are significantly cheaper, more deliverable and with a predominance of private sector financing exist. It is clear that support from the public, politicians and business does not exist in any great number to support a 20 to 30 year period of planning and construction of, probably the riskiest project the UK Government will have been involved with since rebuilding Britain after the second world war.

To set it in context the cost of HS2, the delivery of the Olympics and the construction of Terminal 5 at Heathrow is about ONE THIRD of the cost of the Estuary Airport. We have seen no signs that any political party is prepared to set aside a significant sum as the public sector share of such a project. It simply will not happen.

The legal issues around State Aid and overcoming the Habitats Directive seem insurmountable.

We have demonstrated that transport issues are significant and much greater than capitalising on existing airports where a large quantum of the infrastructure already exists and can be developed rather than at an estuary airport where it will be starting from scratch at enormous cost.

Questions around the weather and what to do with around 300,000 birds are issues which remain to be solved by the proponents. We feel they are unlikely to be able to. What is beyond dispute is that birds and planes do not mix. The risk of bird strike here is around 12 times the size of any other UK airport – a figure which was recognised by the last Government.

We ask the Commission to finally dismiss the Estuary Airport as many other Commissions and Governments have done when the site has been considered previously over the last 71 years.

The Hudson River plane crash, 2013.

Instinctif Partners / Medway Council – Airport expansion in the South East

METHODOLOGY NOTE

ComRes interviewed 2,034 British adults online between 4th and 6th April 2014. Data were weighted to be representative of all GB adults aged 18+.

All press releases or other publications must be checked with ComRes before use. ComRes requires 48 hours to check a press release unless otherwise agreed.

To commission a voting intention poll or a public opinion survey please contact Katharine Peacock: katharine.peacock@comres.co.uk

To register for Pollwatch, a monthly newsletter update on the polls, please email: pollwatch@comres.co.uk

Airports Survey

ONLINE Fieldwork: 4th-6th April 2014

Absolutes/col percents

Table 1

Q.1 How many times, if at all, have you flown in the last twelve months for business or for leisure? Business
Base: All respondents

		Gender		Age						Social Grade				Employment Sector	
	Total	Male (a)	Female (b)	18-24 (c)	25-34 (d)	35-44 (e)	45-54 (f)	55-64 (g)	65+ (h)	AB (i)	C1 (j)	C2 (k)	DE (l)	Public (m)	Pri-vate (n)
Unweighted base	2034	924	1110	245	284	347	360	320	478	585	592	347	510	258	772
Weighted base	2034	997	1037	242	343	342	363	302	443	544	564	443	483	280	859
None	1873	895	978	211	277	304	348	294	438	475	514	411	472	250	749
	92%	90%	94%A	87%d	81%	89%D	96%CDE	97%CDE	99%CDEF	87%	91%i	93%I	98%IJK	89%	87%
NET: Any	161	102	59	30	66	38	14	8	5	68	50	32	11	31	110
	8%	10%B	6%	13%FGH	19%cEFGH	11%FGH	4%H	3%	1%	13%jKL	9%L	7%L	2%	11%	13%
1	59	41	18	13	16	17	8	3	2	18	22	13	7	5	45
	3%	4%B	2%	5%fGH	5%GH	5%fGH	2%H	1%	1%	3%l	4%L	3%	1%	2%	5%m
2	50	32	17	10	22	11	2	2	2	25	14	9	1	12	33
	2%	3%b	2%	4%FGH	6%FGH	3%FGH	1%	1%	*	5%jkL	3%L	2%L	*	4%	4%
3	17	11	5	*	10	4	2	-	-	6	8	2	-	2	13
	1%	1%	1%	*	3%CFGH	1%gH	*	-	-	1%L	2%L	*	-	1%	2%
4-5	21	10	11	4	13	-	2	1	1	11	5	5	1	6	10
	1%	1%	1%	2%Eh	4%EFGH	-	1%	*	*	2%L	1%	1%	*	2%	1%
6-10	9	3	6	1	5	2	-	2	-	3	1	4	2	5	4
	*	*	1%	1%	1%fH	1%	-	1%	-	1%	*	1%	*	2%n	*
11+	4	4	1	1	-	4	-	-	-	4	-	-	-	-	4
	*	*	*	*	-	1%dfgH	-	-	-	1%Jl	-	-	-	-	*
Mean	0.22	0.26	0.18	0.35FGH	0.54FGH	0.35FGH	0.07h	0.09	0.02	0.42JkL	0.19L	0.20L	0.06	0.37	0.33
Standard deviation	1.16	1.20	1.12	1.84	1.32	1.68	0.44	0.76	0.24	1.85	0.73	0.91	0.61	1.33	1.30
Standard error	0.03	0.04	0.03	0.12	0.08	0.09	0.02	0.04	0.01	0.08	0.03	0.05	0.03	0.08	0.05

Proportions/Means: Columns Tested (5%, 10% risk level) - a/b - c/d/e/f/g/h - i/j/k/l - m/n
Overlap formulae used.

Prepared by ComRes

Airports Survey

ONLINE Fieldwork: 4th-6th April 2014

Absolutes/col percents

Table 2

Q.1 How many times, if at all, have you flown in the last twelve months for business or for leisure? Business
Base: All respondents

		Region				Have you taken a foreign holiday in the last 3 years?		Most frequent airport	
	Total	London (a)	South East (b)	London /South East (c)	Rest of GB (d)	Yes (e)	No (f)	Heath-row/ South-end/ City (g)	Other (h)
Unweighted base	2034	229	314	543	1491	1178	856	184	737
Weighted base	2034	264	285	549	1485	1241	793	200	771
None	1873	216	271	487	1386	1104	769	139	672
	92%	82%	95%AC	89%A	93%AC	89%	97%E	70%	87%G
NET: Any	161	48	14	62	99	137	24	61	99
	8%	18%BCD	5%	11%BD	7%	11%F	3%	30%H	13%
1	59	12	4	16	43	51	8	16	42
	3%	4%b	2%	3%B	3%	4%F	1%	8%	5%
2	50	18	5	23	27	41	9	23	26
	2%	7%BCD	2%	4%BD	2%	3%F	1%	12%H	3%
3	17	2	2	4	13	13	4	4	13
	1%	1%	1%	1%	1%	1%	*	2%	2%
4-5	21	8	3	10	11	19	2	6	16
	1%	3%D	1%	2%bd	1%	2%F	*	3%	2%
6-10	9	6	-	6	4	8	1	8	2
	*	2%BcD	-	1%d	*	1%	*	4%H	*
11+	4	3	-	3	2	4	-	4	1
	*	1%D	-	1%	*	*	-	2%H	*
Mean	0.22	0.61BCD	0.11	0.35BD	0.17	0.32F	0.07	1.04H	0.31
Standard deviation	1.16	1.79	0.56	1.33	1.09	1.43	0.46	2.50	1.30
Standard error	0.03	0.12	0.03	0.06	0.03	0.04	0.02	0.18	0.05

Proportions/Means: Columns Tested (5%, 10% risk level) - a/b/c/d - e/f - g/h
Overlap formulae used.

Prepared by ComRes

Airports Survey
ONLINE Fieldwork: 4th-6th April 2014

Absolutes/col percents

Table 3
Q.1 How many times, if at all, have you flown in the last twelve months for business or for leisure? Leisure
Base: All respondents

		Gender		Age						Social Grade				Employment Sector	
	Total	Male (a)	Female (b)	18-24 (c)	25-34 (d)	35-44 (e)	45-54 (f)	55-64 (g)	65+ (h)	AB (i)	C1 (j)	C2 (k)	DE (l)	Public (m)	Pri-vate (n)
Unweighted base	2034	924	1110	245	284	347	360	320	478	585	592	347	510	258	772
Weighted base	2034	997	1037	242	343	342	363	302	443	544	564	443	483	280	859
None	1019	508	511	94	141	184	205	174	220	194	279	234	312	130	373
	50%	51%	49%	39%	41%	54%CD	57%CDh	58%CDh	50%CD	36%	49%I	53%I	64%IJK	46%	43%
NET: Any	1015	489	526	148	202	158	157	128	222	349	285	209	172	150	486
	50%	49%	51%	61%EFGH	59%EFGH	46%	43%	42%	50%fg	64%JKL	51%L	47%L	36%	54%	57%
1	493	223	270	67	95	80	78	68	104	141	138	105	109	71	242
	24%	22%	26%a	28%	28%	23%	22%	23%	23%	26%	25%	24%	23%	25%	28%
2	264	138	126	35	55	42	49	34	50	99	72	49	44	44	123
	13%	14%	12%	14%	16%h	12%	13%	11%	11%	18%JKL	13%l	11%	9%	16%	14%
3	92	43	50	18	13	15	15	10	21	42	25	21	5	13	45
	5%	4%	5%	7%g	4%	4%	4%	3%	5%	8%JkL	4%L	5%L	1%	5%	5%
4-5	108	56	52	13	33	11	10	7	34	38	38	21	11	11	54
	5%	6%	5%	5%g	10%EFG	3%	3%	2%	8%EFG	7%L	7%L	5%l	2%	4%	6%
6-10	42	26	16	9	1	7	5	6	13	21	9	10	3	4	16
	2%	3%	2%	4%Df	*	2%d	1%	2%d	3%D	4%JL	2%	2%l	1%	1%	2%
11+	16	3	13	6	4	3	-	3	-	8	3	4	-	8	7
	1%	*	1%A	2%FH	1%fH	1%h	-	1%fh	-	2%L	1%	1%l	-	3%N	1%
Mean	1.31	1.11	1.49	1.63EFGH	2.41	1.03	0.82	0.92	1.14F	1.65JL	1.09L	1.95	0.58	1.31	1.67
Standard deviation	9.79	1.77	13.60	2.81	23.47	1.91	1.26	1.81	1.67	2.45	1.66	20.67	1.04	2.37	14.89
Standard error	0.22	0.06	0.41	0.18	1.39	0.10	0.07	0.10	0.08	0.10	0.07	1.11	0.05	0.15	0.54

Proportions/Means: Columns Tested (5%, 10% risk level) - a/b - c/d/e/f/g/h - i/j/k/l - m/n
Overlap formulae used.

Prepared by ComRes

Airports Survey

ONLINE Fieldwork: 4th-6th April 2014

Absolutes/col percents

Table 4

Q.1 How many times, if at all, have you flown in the last twelve months for business or for leisure? Leisure
Base: All respondents

		Region				Have you taken a foreign holiday in the last 3 years?		Most frequent airport	
	Total	London (a)	South East (b)	London /South East (c)	Rest of GB (d)	Yes (e)	No (f)	Heath-row/ South-end/ City (g)	Other (h)
Unweighted base	2034	229	314	543	1491	1178	856	184	737
Weighted base	2034	264	285	549	1485	1241	793	200	771
None	1019	94	143	237	782	276	743	3	6
	50%	36%	50%AC	43%A	53%AC	22%	94%E	2%	1%
NET: Any	1015	170	142	312	703	965	50	197	765
	50%	64%BCD	50%	57%BD	47%	78%F	6%	98%	99%
1	493	71	56	127	365	471	22	80	374
	24%	27%b	20%	23%B	25%	38%F	3%	40%	49%g
2	264	43	44	87	177	249	15	56	203
	13%	16%d	15%	16%D	12%	20%F	2%	28%	26%
3	92	14	16	30	62	86	7	19	72
	5%	5%	6%	5%	4%	7%F	1%	10%	9%
4-5	108	23	21	45	64	103	5	25	80
	5%	9%D	8%D	8%D	4%	8%F	1%	12%	10%
6-10	42	9	4	13	29	42	-	10	28
	2%	3%	1%	2%	2%	3%F	-	5%	4%
11+	16	9	*	10	6	15	1	8	8
	1%	4%BCD	*	2%BD	*	1%F	*	4%H	1%
Mean	1.31	3.23D	1.12	2.14D	1.00	1.76F	0.59	4.49h	2.16
Standard deviation	9.79	26.74	1.59	18.60	1.75	2.18	15.41	30.63	2.04
Standard error	0.22	1.77	0.09	0.80	0.05	0.06	0.53	2.26	0.08

Proportions/Means: Columns Tested (5%, 10% risk level) - a/b/c/d - e/f - g/h
Overlap formulae used.

Prepared by ComRes

Airports Survey

ONLINE Fieldwork: 4th-6th April 2014

Absolutes/col percents

Table 5

Q.2 Which of the following UK airports, if any, do you fly from most frequently?
Base: All who have flown in the last 12 months

		Gender		Age						Social Grade				Employment Sector	
	Total	Male (a)	Female (b)	18-24 (c)	25-34 (d)	35-44 (e)	45-54 (f)	55-64 (g)	65+ (h)	AB (i)	C1 (j)	C2 (k)	DE (l)	Public (m)	Pri-vate (n)
Unweighted base	971	448	523	145	164	149	153	130	230	357	288	157	169	133	424
Weighted base	1024	497	527	149	203	161	158	131*	223	354	289	210	172	152	492
London Heathrow	191	100	91	30	55	28	25	21	32	72	53	44	23	24	104
	19%	20%	17%	20%	27%eFGH	18%	16%	16%	14%	20%l	18%	21%	13%	16%	21%
London Gatwick	177	82	96	27	18	19	30	32	52	60	55	36	26	23	65
	17%	16%	18%	18%D	9%	12%	19%D	24%DE	23%DE	17%	19%	17%	15%	15%	13%
Manchester	162	82	79	23	20	34	29	27	28	68	42	34	19	28	84
	16%	17%	15%	16%	10%	21%DH	18%d	21%Dh	13%	19%L	14%	16%	11%	18%	17%
Birmingham	86	36	50	12	24	12	17	7	14	27	32	13	14	16	41
	8%	7%	9%	8%	12%	7%	11%	5%	6%	8%	11%	6%	8%	11%	8%
London Stansted	58	20	38	9	12	11	7	3	17	24	9	9	16	7	29
	6%	4%	7%a	6%	6%	7%	4%	2%	7%g	7%j	3%	4%	10%Jk	5%	6%
Newcastle	54	34	20	10	8	11	3	6	15	18	12	17	7	7	30
	5%	7%b	4%	7%f	4%	7%F	2%	4%	7%F	5%	4%	8%	4%	5%	6%
Glasgow International	51	30	21	1	20	6	4	6	13	11	20	5	15	6	22
	5%	6%	4%	1%	10%CeF	4%	3%	5%	6%C	3%	7%lk	3%	9%lK	4%	4%
Bristol	50	25	25	7	6	8	10	10	11	22	8	10	10	9	23
	5%	5%	5%	4%	3%	5%	6%	7%	5%	6%j	3%	5%	6%	6%	5%
East Midlands	47	30	17	4	7	9	8	3	15	14	11	11	11	4	24
	5%	6%b	3%	3%	3%	6%	5%	3%	7%	4%	4%	5%	6%	2%	5%
London Luton	41	11	31	8	13	8	4	1	6	12	13	8	7	4	27
	4%	2%	6%A	6%g	7%Gh	5%g	3%	1%	3%	3%	5%	4%	4%	3%	5%
Edinburgh	27	10	18	4	7	5	4	4	4	6	12	6	4	8	8
	3%	2%	3%	2%	4%	3%	3%	3%	2%	2%	4%	3%	2%	5%N	2%
Liverpool	17	8	10	1	3	3	5	1	4	4	4	6	4	2	8
	2%	2%	2%	1%	1%	2%	3%	1%	2%	1%	1%	3%	2%	1%	2%
London City	6	2	4	3	-	-	2	*	*	4	2	1	-	*	6
	1%	*	1%	2%	-	-	2%	*	*	1%	1%	*	-	*	1%

Proportions/Means: Columns Tested (5%, 10% risk level) - a/b - c/d/e/f/g/h - i/j/k/l - m/n
Overlap formulae used. * small base

Prepared by ComRes

Airports Survey

ONLINE Fieldwork: 4th-6th April 2014

Absolutes/col percents

Table 5

Q.2 Which of the following UK airports, if any, do you fly from most frequently?
Base: All who have flown in the last 12 months

		Gender		Age						Social Grade				Employment Sector	
	Total	Male (a)	Female (b)	18-24 (c)	25-34 (d)	35-44 (e)	45-54 (f)	55-64 (g)	65+ (h)	AB (i)	C1 (j)	C2 (k)	DE (l)	Public (m)	Pri-vate (n)
Weighted base	1024	497	527	149	203	161	158	131*	223	354	289	210	172	152	492
Southend	3	3	1	-	-	-	2	-	1	3	-	1	-	-	2
	*	1%	*	-	-	-	1%	-	1%	1%	-	*	-	-	*
None of the above	53	25	28	10	9	6	8	10	11	10	16	11	16	14	19
	5%	5%	5%	7%	4%	4%	5%	7%	5%	3%	6%	5%	9%l	9%N	4%

Proportions/Means: Columns Tested (5%, 10% risk level) - a/b - c/d/e/f/g/h - i/j/k/l - m/n
Overlap formulae used. * small base

Prepared by ComRes

Airports Survey
ONLINE Fieldwork: 4th-6th April 2014

Absolutes/col percents

Table 6
Q.2 Which of the following UK airports, if any, do you fly from most frequently?
Base: All who have flown in the last 12 months

		Region				Have you taken a foreign holiday in the last 3 years?		Most frequent airport	
	Total	London (a)	South East (b)	London /South East (c)	Rest of GB (d)	Yes (e)	No (f)	Heath-row/ South-end/ City (g)	Other (h)
Unweighted base	971	146	150	296	675	916	55	184	737
Weighted base	1024	171	143	314	710	969	55*	200	771
London Heathrow	191	90	32	123	68	176	15	191	-
	19%	53%BCD	23%D	39%BD	10%	18%	28%	95%H	-
London Gatwick	177	47	90	137	40	175	2	-	177
	17%	28%D	63%ACD	44%AD	6%	18%F	4%	-	23%G
Manchester	162	-	1	1	161	156	6	-	162
	16%	-	*	*	23%ABC	16%	10%	-	21%G
Birmingham	86	1	3	4	81	81	5	-	86
	8%	*	2%	1%	11%ABC	8%	9%	-	11%G
London Stansted	58	13	7	20	38	53	6	-	58
	6%	8%	5%	6%	5%	5%	10%	-	8%G
Newcastle	54	-	1	1	52	49	5	-	54
	5%	-	1%	*	7%ABC	5%	9%	-	7%G
Glasgow International	51	-	-	-	51	50	1	-	51
	5%	-	-	-	7%ABC	5%	2%	-	7%G
Bristol	50	-	-	-	50	50	*	-	50
	5%	-	-	-	7%ABC	5%	1%	-	7%G
East Midlands	47	-	-	-	47	46	1	-	47
	5%	-	-	-	7%ABC	5%	1%	-	6%G
London Luton	41	16	7	22	19	39	3	-	41
	4%	9%D	5%	7%D	3%	4%	5%	-	5%G
Edinburgh	27	-	-	-	27	25	3	-	27
	3%	-	-	-	4%ABC	3%	5%	-	4%G

Proportions/Means: Columns Tested (5%, 10% risk level) - a/b/c/d - e/f - g/h
Overlap formulae used. * small base

Prepared by ComRes

Airports Survey
ONLINE Fieldwork: 4th-6th April 2014

Absolutes/col percents

Table 6
Q.2 Which of the following UK airports, if any, do you fly from most frequently?
Base: All who have flown in the last 12 months

		Region				Have you taken a foreign holiday in the last 3 years?		Most frequent airport	
	Total	London (a)	South East (b)	London /South East (c)	Rest of GB (d)	Yes (e)	No (f)	Heath-row/ South-end/ City (g)	Other (h)
Weighted base	1024	171	143	314	710	969	55*	200	771
Liverpool	17	-	-	-	17	16	2	-	17
	2%	-	-	-	2%abC	2%	3%	-	2%g
London City	6	4	*	5	1	4	2	6	-
	1%	3%D	*	2%bD	*	*	4%E	3%H	-
Southend	3	-	-	-	3	3	-	3	-
	*	-	-	-	*	*	-	2%H	-
None of the above	53	-	1	1	52	48	5	-	-
	5%	-	1%	*	7%ABC	5%	9%	-	-

Proportions/Means: Columns Tested (5%, 10% risk level) - a/b/c/d - e/f - g/h
Overlap formulae used. * small base

Prepared by ComRes

Airports Survey

ONLINE Fieldwork: 4th-6th April 2014

Absolutes/col percents

Table 7

Q.3 Which of the following reasons, if any, explain why you use <airport> the most often?
Base: All who have flown in the last 12 months

		Gender		Age						Social Grade				Employment Sector	
	Total	Male (a)	Female (b)	18-24 (c)	25-34 (d)	35-44 (e)	45-54 (f)	55-64 (g)	65+ (h)	AB (i)	C1 (j)	C2 (k)	DE (l)	Public (m)	Pri-vate (n)
Unweighted base	971	448	523	145	164	149	153	130	230	357	288	157	169	133	424
Weighted base	1024	497	527	149	203	161	158	131*	223	354	289	210	172	152	492
It is the most convenient for me to get to	463 45%	234 47%	229 43%	64 43%	77 38%	54 34%	75 47%E	63 48%E	131 59%CDEfg	173 49%k	124 43%	82 39%	84 49%	64 42%	199 41%
It is the nearest airport to me	442 43%	197 40%	244 46%a	57 38%	83 41%	63 39%	73 46%	49 38%	116 52%CdEG	145 41%	126 44%	86 41%	85 49%	66 44%	198 40%
It provides flights to the destinations I want to go to	420 41%	208 42%	212 40%	56 38%d	56 27%	68 42%D	68 43%D	58 44%D	115 51%CD	144 41%	126 44%	76 36%	74 43%	53 35%	185 38%
It is the cheapest for me to get to	256 25%	128 26%	128 24%	45 30%E	48 24%e	24 15%	36 23%	31 24%e	72 32%Ef	85 24%	64 22%	55 26%	52 31%j	34 22%	118 24%
The airline I prefer to fly with flies from there	182 18%	102 21%b	80 15%	16 11%	45 22%Cf	36 23%Cf	21 13%	20 16%	44 20%c	65 18%	51 18%	35 17%	31 18%	30 20%	90 18%
It is quick to check-in and get through security	122 12%	71 14%B	50 10%	17 11%	16 8%	19 12%	16 10%	9 7%	45 20%cDeFG	44 12%	31 11%	24 11%	23 13%	14 9%	53 11%
It provides a better quality experience than other airports	85 8%	54 11%B	31 6%	14 9%	19 10%	13 8%	11 7%	7 5%	20 9%	32 9%	19 7%	22 11%	12 7%	18 12%	38 8%
Other	36 3%	20 4%	16 3%	1 1%	2 1%	3 2%	4 3%	8 6%CD	17 8%CDEf	14 4%	12 4%	4 2%	5 3%	2 1%	14 3%
Don't know	26 2%	16 3%	9 2%	9 6%FGH	9 4%FGH	7 4%FGH	- -	- -	1 *	7 2%	5 2%	10 5%	3 2%	4 2%	10 2%

Proportions/Means: Columns Tested (5%, 10% risk level) - a/b - c/d/e/f/g/h - i/j/k/l - m/n
Overlap formulae used. * small base

Prepared by ComRes

Airports Survey

ONLINE Fieldwork: 4th-6th April 2014

Absolutes/col percents

Table 8

Q.3 Which of the following reasons, if any, explain why you use <airport> the most often?
Base: All who have flown in the last 12 months

		Region				Have you taken a foreign holiday in the last 3 years?		Most frequent airport	
	Total	London (a)	South East (b)	London /South East (c)	Rest of GB (d)	Yes (e)	No (f)	Heath-row/ South-end/ City (g)	Other (h)
Unweighted base	971	146	150	296	675	916	55	184	737
Weighted base	1024	171	143	314	710	969	55*	200	771
It is the most convenient for me to get to	463 45%	62 36%	68 48%ac	130 41%	333 47%A	450 46%F	13 24%	68 34%	370 48%G
It is the nearest airport to me	442 43%	50 29%	66 46%AC	116 37%A	326 46%AC	424 44%	18 33%	54 27%	356 46%G
It provides flights to the destinations I want to go to	420 41%	68 40%	72 50%cD	139 44%	281 40%	407 42%F	13 24%	84 42%	318 41%
It is the cheapest for me to get to	256 25%	38 22%	32 22%	70 22%	186 26%	236 24%	19 35%	41 21%	201 26%
The airline I prefer to fly with flies from there	182 18%	45 27%D	30 21%	75 24%D	107 15%	165 17%	17 31%E	67 33%H	107 14%
It is quick to check-in and get through security	122 12%	17 10%	14 10%	31 10%	91 13%	115 12%	7 13%	19 9%	88 11%
It provides a better quality experience than other airports	85 8%	25 15%D	12 8%	37 12%bD	49 7%	76 8%	9 17%E	30 15%H	47 6%
Other	36 3%	8 5%	6 4%	14 4%	22 3%	35 4%	1 2%	7 3%	26 3%
Don't know	26 2%	9 5%Bc	- -	9 3%b	17 2%	21 2%	5 8%E	9 4%H	9 1%

Proportions/Means: Columns Tested (5%, 10% risk level) - a/b/c/d - e/f - g/h
Overlap formulae used. * small base

Prepared by ComRes

Airports Survey

ONLINE Fieldwork: 4th-6th April 2014

Absolutes/col percents

Table 9

Q.4 You may or may not be aware that the Airports Commission is considering a proposal to construct a new airport in the Thames Estuary, as an alternative to expanding existing airports in the South East. This, and similar proposals, have been known variously as the Thames Estuary Airport,'Boris Island', and the Thames Hub Airport. The proposal currently being considered is referred to as the Thames Hub Airport, and would be a four-runway airport in the Thames Estuary. Before now, were you or were you not aware of this proposal?
Base: All respondents

		Gender		Age						Social Grade				Employment Sector	
	Total	Male (a)	Female (b)	18-24 (c)	25-34 (d)	35-44 (e)	45-54 (f)	55-64 (g)	65+ (h)	AB (i)	C1 (j)	C2 (k)	DE (l)	Public (m)	Pri-vate (n)
Unweighted base	2034	924	1110	245	284	347	360	320	478	585	592	347	510	258	772
Weighted base	2034	997	1037	242	343	342	363	302	443	544	564	443	483	280	859
No, I was not aware	973 48%	370 37%	603 58%A	168 70%dEFGH	207 60%GH	186 54%GH	194 53%GH	128 42%H	90 20%	210 39%	262 46%I	226 51%I	275 57%IJ	133 47%	465 54%
NET: Yes	1061 52%	627 63%B	434 42%	73 30%	136 40%c	156 46%C	169 47%C	174 58%CDEF	353 80%CDEFG	334 61%JKL	302 54%L	217 49%	208 43%	148 53%	394 46%
Yes, I was aware of a proposal for a new airport in the Thames Estuary in general, but not specifically about the Thames Hub Airport proposal	695 34%	384 39%B	310 30%	43 18%	81 24%	107 31%Cd	119 33%CD	114 38%CD	229 52%CDEFG	190 35%	198 35%	153 35%	154 32%	97 34%	251 29%
Yes, I was aware of a proposal for the Thames Hub Airport in particular	367 18%	243 24%B	124 12%	30 13%	55 16%	49 14%	50 14%	60 20%Cef	124 28%CDEFG	143 26%JKL	105 19%L	64 14%	55 11%	51 18%	143 17%

Proportions/Means: Columns Tested (5%, 10% risk level) - a/b - c/d/e/f/g/h - i/j/k/l - m/n
Overlap formulae used.

Prepared by ComRes

Airports Survey

ONLINE Fieldwork: 4th-6th April 2014

Absolutes/col percents

Table 10

Q.4 You may or may not be aware that the Airports Commission is considering a proposal to construct a new airport in the Thames Estuary, as an alternative to expanding existing airports in the South East. This, and similar proposals, have been known variously as the Thames Estuary Airport,'Boris Island', and the Thames Hub Airport. The proposal currently being considered is referred to as the Thames Hub Airport, and would be a four-runway airport in the Thames Estuary. Before now, were you or were you not aware of this proposal?
Base: All respondents

		Region				Have you taken a foreign holiday in the last 3 years?		Most frequent airport	
	Total	London (a)	South East (b)	London /South East (c)	Rest of GB (d)	Yes (e)	No (f)	Heath-row/ South-end/ City (g)	Other (h)
Unweighted base	2034	229	314	543	1491	1178	856	184	737
Weighted base	2034	264	285	549	1485	1241	793	200	771
No, I was not aware	973 48%	103 39%	98 35%	202 37%	771 52%ABC	566 46%	407 51%E	92 46%	355 46%
NET: Yes	1061 52%	161 61%D	186 65%D	348 63%D	714 48%	675 54%F	386 49%	109 54%	415 54%
Yes, I was aware of a proposal for a new airport in the Thames Estuary in general, but not specifically about the Thames Hub Airport proposal	695 34%	95 36%	107 38%	202 37%	493 33%	426 34%	269 34%	63 31%	260 34%
Yes, I was aware of a proposal for the Thames Hub Airport in particular	367 18%	67 25%D	79 28%D	146 27%D	221 15%	249 20%F	117 15%	46 23%	155 20%

Proportions/Means: Columns Tested (5%, 10% risk level) - a/b/c/d - e/f - g/h
Overlap formulae used.

Prepared by ComRes

Airports Survey
ONLINE Fieldwork: 4th-6th April 2014

Absolutes/col percents

Table 11
Q.5 To what extent would you support or oppose the proposal for the Thames Hub Airport?
Base: All respondents

		Gender		Age						Social Grade				Employment Sector	
	Total	Male (a)	Female (b)	18-24 (c)	25-34 (d)	35-44 (e)	45-54 (f)	55-64 (g)	65+ (h)	AB (i)	C1 (j)	C2 (k)	DE (l)	Public (m)	Pri-vate (n)
Unweighted base	2034	924	1110	245	284	347	360	320	478	585	592	347	510	258	772
Weighted base	2034	997	1037	242	343	342	363	302	443	544	564	443	483	280	859
NET: Support	771	462	309	92	146	120	123	110	179	239	206	174	152	113	343
	38%	46%B	30%	38%	43%ef	35%	34%	37%	40%f	44%JL	36%	39%L	31%	40%	40%
Strongly support	176	120	56	16	33	23	31	28	44	64	39	34	38	31	76
	9%	12%B	5%	7%	10%	7%	8%	9%	10%	12%Jkl	7%	8%	8%	11%	9%
Tend to support	595	342	253	76	113	97	93	82	134	174	167	140	114	81	267
	29%	34%B	24%	32%	33%f	28%	26%	27%	30%	32%L	30%L	32%L	24%	29%	31%
Tend to oppose	197	102	95	24	33	31	34	29	46	53	73	35	35	39	72
	10%	10%	9%	10%	10%	9%	9%	10%	10%	10%	13%KL	8%	7%	14%N	8%
Strongly oppose	148	91	57	6	13	17	30	31	51	44	41	28	37	17	57
	7%	9%B	6%	2%	4%	5%	8%CD	10%CDE	12%CDE	8%	7%	6%	8%	6%	7%
NET: Oppose	345	193	152	30	46	48	65	60	97	97	114	63	72	56	129
	17%	19%B	15%	12%	13%	14%	18%	20%Cde	22%CDE	18%	20%KL	14%	15%	20%	15%
Don't know	918	342	577	119	151	174	175	132	167	208	245	206	260	112	387
	45%	34%	56%A	49%H	44%	51%gH	48%H	44%	38%	38%	43%	47%I	54%IJk	40%	45%

Proportions/Means: Columns Tested (5%, 10% risk level) - a/b - c/d/e/f/g/h - i/j/k/l - m/n
Overlap formulae used.

Prepared by ComRes

Airports Survey

ONLINE Fieldwork: 4th-6th April 2014

Absolutes/col percents

Table 12

Q.5 To what extent would you support or oppose the proposal for the Thames Hub Airport?
Base: All respondents

		Region				Have you taken a foreign holiday in the last 3 years?		Most frequent airport	
	Total	London (a)	South East (b)	London /South East (c)	Rest of GB (d)	Yes (e)	No (f)	Heath-row/ South-end/ City (g)	Other (h)
Unweighted base	2034	229	314	543	1491	1178	856	184	737
Weighted base	2034	264	285	549	1485	1241	793	200	771
NET: Support	771	122	128	250	520	519	252	115	318
	38%	46%D	45%D	46%D	35%	42%F	32%	57%H	41%
Strongly support	176	20	30	49	126	122	53	27	82
	9%	7%	10%	9%	9%	10%F	7%	14%	11%
Tend to support	595	102	99	201	394	396	199	87	236
	29%	39%D	35%D	37%D	27%	32%F	25%	44%H	31%
Tend to oppose	197	23	33	56	140	122	74	14	85
	10%	9%	12%	10%	9%	10%	9%	7%	11%
Strongly oppose	148	32	32	65	84	90	58	16	50
	7%	12%D	11%D	12%D	6%	7%	7%	8%	6%
NET: Oppose	345	55	66	121	224	212	133	30	134
	17%	21%D	23%D	22%D	15%	17%	17%	15%	17%
Don't know	918	87	91	178	740	510	408	56	318
	45%	33%	32%	32%	50%ABC	41%	51%E	28%	41%G

Proportions/Means: Columns Tested (5%, 10% risk level) - a/b/c/d - e/f - g/h
Overlap formulae used.

Prepared by ComRes

Airports Survey

ONLINE Fieldwork: 4th-6th April 2014

Absolutes/col percents

Table 13

Q.6 Before now, were you or were you not aware the Airports Commission has reported that, if the Thames Hub Airport were to be constructed, this would require the closure of Heathrow Airport, London City Airport and Southend Airport? Heathrow Airport would need to close to avoid competition with the Thames Hub Airport, while London City Airport and Southend Airport would need to close to avoid a clash of flight paths.
Base: All respondents

		Gender		Age						Social Grade				Employment Sector	
	Total	Male (a)	Female (b)	18-24 (c)	25-34 (d)	35-44 (e)	45-54 (f)	55-64 (g)	65+ (h)	AB (i)	C1 (j)	C2 (k)	DE (l)	Public (m)	Pri-vate (n)
Unweighted base	2034	924	1110	245	284	347	360	320	478	585	592	347	510	258	772
Weighted base	2034	997	1037	242	343	342	363	302	443	544	564	443	483	280	859
NET: Yes	282	173	109	29	72	47	35	28	70	89	73	69	51	45	125
	14%	17%B	11%	12%	21%CEFG	14%	10%	9%	16%FG	16%L	13%	16%l	11%	16%	14%
Yes, I was aware that all three airports would have to close	89	53	35	12	31	22	8	7	8	27	26	21	15	15	53
	4%	5%b	3%	5%fH	9%FGH	6%FGH	2%	2%	2%	5%	5%	5%	3%	5%	6%
Yes, I was aware that some of these airports would have to close, but not all three	193	119	74	17	41	25	27	21	61	62	47	48	36	30	72
	9%	12%B	7%	7%	12%eg	7%	8%	7%	14%CEFG	11%l	8%	11%	7%	11%	8%
No, I was not aware	1752	824	928	212	271	295	327	274	373	455	491	374	432	235	734
	86%	83%	89%A	88%D	79%	86%D	90%DH	91%DH	84%	84%	87%	84%	89%lk	84%	86%

Proportions/Means: Columns Tested (5%, 10% risk level) - a/b - c/d/e/f/g/h - i/j/k/l - m/n
Overlap formulae used.

Prepared by ComRes

Airports Survey
ONLINE Fieldwork: 4th-6th April 2014

Absolutes/col percents

Table 14

Q.6 Before now, were you or were you not aware the Airports Commission has reported that, if the Thames Hub Airport were to be constructed, this would require the closure of Heathrow Airport, London City Airport and Southend Airport? Heathrow Airport would need to close to avoid competition with the Thames Hub Airport, while London City Airport and Southend Airport would need to close to avoid a clash of flight paths.
Base: All respondents

		Region				Have you taken a foreign holiday in the last 3 years?		Most frequent airport	
	Total	London (a)	South East (b)	London /South East (c)	Rest of GB (d)	Yes (e)	No (f)	Heath-row/ South-end/ City (g)	Other (h)
Unweighted base	2034	229	314	543	1491	1178	856	184	737
Weighted base	2034	264	285	549	1485	1241	793	200	771
NET: Yes	282	59	50	109	173	194	87	51	129
	14%	22%D	18%D	20%D	12%	16%F	11%	26%H	17%
Yes, I was aware that all three airports would have to close	89	24	15	39	50	63	26	22	49
	4%	9%D	5%	7%bD	3%	5%f	3%	11%h	6%
Yes, I was aware that some of these airports would have to close, but not all three	193	35	35	70	123	132	61	29	79
	9%	13%D	12%d	13%D	8%	11%f	8%	15%	10%
No, I was not aware	1752	206	235	440	1312	1047	706	149	642
	86%	78%	82%	80%	88%ABC	84%	89%E	74%	83%G

Proportions/Means: Columns Tested (5%, 10% risk level) - a/b/c/d - e/f - g/h
Overlap formulae used.

Prepared by ComRes

Airports Survey

ONLINE Fieldwork: 4th-6th April 2014

Absolutes/col percents

Table 15

Q.7 Now that you are aware that the construction of the Thames Hub Airport would require the closure of Heathrow Airport, London City Airport and Southend Airport, to what extent would you support or oppose this proposal?
Base: All who were not aware that all three airports would close

		Gender		Age						Social Grade				Employment Sector	
	Total	Male (a)	Female (b)	18-24 (c)	25-34 (d)	35-44 (e)	45-54 (f)	55-64 (g)	65+ (h)	AB (i)	C1 (j)	C2 (k)	DE (l)	Public (m)	Pri-vate (n)
Unweighted base	1950	875	1075	231	261	326	351	312	469	558	567	330	495	243	725
Weighted base	1945	943	1002	229	311	321	355	295	434	517	538	422	468	265	806
NET: Support	258	179	79	18	59	39	29	47	65	100	46	62	49	42	105
	13%	19%B	8%	8%	19%CEF	12%	8%	16%CF	15%CF	19%JL	9%	15%J	11%	16%	13%
Strongly support	61	42	19	2	12	6	6	19	18	28	11	12	10	7	27
	3%	4%B	2%	1%	4%c	2%	2%	6%CEF	4%Cef	5%JL	2%	3%	2%	3%	3%
Tend to support	196	137	59	17	48	33	23	29	47	71	35	50	40	34	78
	10%	15%B	6%	7%	15%CFg	10%	6%	10%	11%f	14%JL	7%	12%J	8%	13%	10%
Tend to oppose	509	233	275	68	84	86	86	72	113	140	172	92	104	79	197
	26%	25%	27%	30%	27%	27%	24%	24%	26%	27%l	32%KL	22%	22%	30%	24%
Strongly oppose	607	277	329	72	90	82	115	91	156	152	177	130	148	71	255
	31%	29%	33%	32%	29%	25%	32%e	31%	36%dE	29%	33%	31%	32%	27%	32%
NET: Oppose	1115	511	605	140	174	167	201	163	269	292	349	222	252	149	452
	57%	54%	60%A	61%e	56%	52%	57%	55%	62%E	56%	65%IKL	53%	54%	56%	56%
Don't know	572	254	318	71	78	114	125	84	101	125	143	138	167	75	249
	29%	27%	32%A	31%h	25%	36%DgH	35%DH	29%	23%	24%	27%	33%lj	36%lJ	28%	31%

Proportions/Means: Columns Tested (5%, 10% risk level) - a/b - c/d/e/f/g/h - i/j/k/l - m/n
Overlap formulae used.

Prepared by ComRes

Airports Survey

ONLINE Fieldwork: 4th-6th April 2014

Absolutes/col percents

Table 16

Q.7 Now that you are aware that the construction of the Thames Hub Airport would require the closure of Heathrow Airport, London City Airport and Southend Airport, to what extent would you support or oppose this proposal?
Base: All who were not aware that all three airports would close

		Region				Have you taken a foreign holiday in the last 3 years?		Most frequent airport	
	Total	London (a)	South East (b)	London /South East (c)	Rest of GB (d)	Yes (e)	No (f)	Heath-row/ South-end/ City (g)	Other (h)
Unweighted base	1950	209	299	508	1442	1119	831	163	694
Weighted base	1945	240	269	510	1435	1178	767	179	721
NET: Support	258	50	33	83	175	179	79	44	109
	13%	21%BCD	12%	16%BD	12%	15%F	10%	25%H	15%
Strongly support	61	10	10	20	41	36	25	8	21
	3%	4%	4%	4%	3%	3%	3%	5%	3%
Tend to support	196	39	23	62	134	143	53	36	88
	10%	16%BCD	8%	12%B	9%	12%F	7%	20%H	12%
Tend to oppose	509	44	84	129	380	321	188	30	193
	26%	18%	31%AC	25%A	26%A	27%	25%	17%	27%G
Strongly oppose	607	90	103	193	414	375	232	69	220
	31%	37%D	38%D	38%D	29%	32%	30%	39%h	30%
NET: Oppose	1115	134	188	322	794	696	420	99	413
	57%	56%	70%ACD	63%AD	55%	59%f	55%	56%	57%
Don't know	572	57	49	106	466	303	269	35	199
	29%	24%	18%	21%	33%ABC	26%	35%E	19%	28%g

Proportions/Means: Columns Tested (5%, 10% risk level) - a/b/c/d - e/f - g/h
Overlap formulae used.

Airports Survey

ONLINE Fieldwork: 4th-6th April 2014

Absolutes/col percents

Table 17

Q.7 Now that you are aware that the construction of the Thames Hub Airport would require the closure of Heathrow Airport, London City Airport and Southend Airport, to what extent would you support or oppose this proposal?
Base: All respondents

		Gender		Age						Social Grade				Employment Sector	
	Total	Male (a)	Female (b)	18-24 (c)	25-34 (d)	35-44 (e)	45-54 (f)	55-64 (g)	65+ (h)	AB (i)	C1 (j)	C2 (k)	DE (l)	Public (m)	Pri-vate (n)
Unweighted base	2034	924	1110	245	284	347	360	320	478	585	592	347	510	258	772
Weighted base	2034	997	1037	242	343	342	363	302	443	544	564	443	483	280	859
NET: Support	317	217	100	28	80	56	34	51	68	120	62	78	57	55	140
	16%	22%B	10%	12%	23%CeFgH	16%F	9%	17%F	15%F	22%JL	11%	18%JL	12%	20%	16%
Strongly support	86	61	26	6	18	15	9	20	18	39	19	16	13	17	41
	4%	6%B	2%	3%	5%	4%	2%	7%cF	4%	7%JkL	3%	4%	3%	6%	5%
Tend to support	231	157	74	21	62	41	25	31	50	81	43	62	44	38	100
	11%	16%B	7%	9%	18%CeFGH	12%F	7%	10%	11%F	15%JL	8%	14%Jl	9%	13%	12%
Tend to oppose	519	241	278	68	90	89	87	72	113	141	178	94	106	79	206
	26%	24%	27%	28%	26%	26%	24%	24%	25%	26%	32%iKL	21%	22%	28%	24%
Strongly oppose	623	284	339	74	94	83	116	95	161	157	180	133	153	72	261
	31%	28%	33%a	31%	27%	24%	32%E	31%e	36%DE	29%	32%	30%	32%	26%	30%
NET: Oppose	1142	525	617	142	184	172	203	167	273	298	358	226	260	151	468
	56%	53%	59%A	59%e	54%	50%	56%	55%	62%dE	55%	63%IKL	51%	54%	54%	54%
Don't know	575	255	320	72	78	114	126	84	101	126	144	139	167	75	250
	28%	26%	31%A	30%h	23%	33%DH	35%DgH	28%	23%	23%	26%	31%I	34%IJ	27%	29%

Proportions/Means: Columns Tested (5%, 10% risk level) - a/b - c/d/e/f/g/h - i/j/k/l - m/n
Overlap formulae used.

Prepared by ComRes

Airports Survey
ONLINE Fieldwork: 4th-6th April 2014

Absolutes/col percents

Table 18

Q.7 Now that you are aware that the construction of the Thames Hub Airport would require the closure of Heathrow Airport, London City Airport and Southend Airport, to what extent would you support or oppose this proposal?
Base: All respondents

		Region				Have you taken a foreign holiday in the last 3 years?		Most frequent airport	
	Total	London (a)	South East (b)	London /South East (c)	Rest of GB (d)	Yes (e)	No (f)	Heath-row/ South-end/ City (g)	Other (h)
Unweighted base	2034	229	314	543	1491	1178	856	184	737
Weighted base	2034	264	285	549	1485	1241	793	200	771
NET: Support	317	64	46	110	207	219	98	62	141
	16%	24%BcD	16%	20%BD	14%	18%F	12%	31%H	18%
Strongly support	86	14	15	29	57	54	33	16	34
	4%	5%	5%	5%	4%	4%	4%	8%h	4%
Tend to support	231	50	31	81	150	166	65	46	107
	11%	19%BCD	11%	15%BD	10%	13%F	8%	23%H	14%
Tend to oppose	519	44	84	129	390	326	192	30	203
	26%	17%	30%AC	23%A	26%A	26%	24%	15%	26%G
Strongly oppose	623	98	106	203	419	389	234	72	227
	31%	37%D	37%D	37%D	28%	31%	30%	36%	29%
NET: Oppose	1142	142	190	332	810	715	427	103	430
	56%	54%	67%ACD	60%AD	55%	58%	54%	51%	56%
Don't know	575	58	49	107	468	306	269	36	200
	28%	22%	17%	19%	32%ABC	25%	34%E	18%	26%G

Proportions/Means: Columns Tested (5%, 10% risk level) - a/b/c/d - e/f - g/h
Overlap formulae used.

Prepared by ComRes

Airports Survey

ONLINE Fieldwork: 4th-6th April 2014

Absolutes/col percents

Table 19

Q.8 If you were travelling to the Thames Hub Airport from where you live, which of the following modes of transport would you be most likely to use? If you would use multiple forms of transport, please select the one you would spend the most time on.
Base: All respondents

		Gender		Age						Social Grade				Employment Sector	
	Total	Male (a)	Female (b)	18-24 (c)	25-34 (d)	35-44 (e)	45-54 (f)	55-64 (g)	65+ (h)	AB (i)	C1 (j)	C2 (k)	DE (l)	Public (m)	Pri-vate (n)
Unweighted base	2034	924	1110	245	284	347	360	320	478	585	592	347	510	258	772
Weighted base	2034	997	1037	242	343	342	363	302	443	544	564	443	483	280	859
Rail	726	375	351	92	106	125	139	113	150	191	208	157	170	100	305
	36%	38%	34%	38%	31%	36%	38%d	38%	34%	35%	37%	35%	35%	36%	35%
Car	693	334	359	93	121	112	131	94	141	204	184	158	147	97	314
	34%	34%	35%	39%	35%	33%	36%	31%	32%	37%L	33%	36%	31%	35%	37%
Coach	136	71	65	12	22	22	24	14	41	24	41	29	42	19	53
	7%	7%	6%	5%	7%	6%	7%	5%	9%cG	4%	7%i	7%	9%l	7%	6%
Bus	55	34	21	4	18	11	7	10	5	17	11	19	9	10	34
	3%	3%b	2%	2%	5%CFH	3%h	2%	3%H	1%	3%	2%	4%jl	2%	3%	4%
Other	68	33	36	6	10	7	6	17	22	23	25	11	9	12	18
	3%	3%	3%	3%	3%	2%	2%	6%EF	5%eF	4%L	4%L	3%	2%	4%n	2%
Don't know	357	151	206	34	65	66	55	54	84	85	96	69	106	44	135
	18%	15%	20%A	14%	19%	19%	15%	18%	19%	16%	17%	16%	22%IjK	16%	16%

Proportions/Means: Columns Tested (5%, 10% risk level) - a/b - c/d/e/f/g/h - i/j/k/l - m/n
Overlap formulae used.

Prepared by ComRes

Airports Survey

ONLINE Fieldwork: 4th-6th April 2014

Absolutes/col percents

Table 20

Q.8 If you were travelling to the Thames Hub Airport from where you live, which of the following modes of transport would you be most likely to use? If you would use multiple forms of transport, please select the one you would spend the most time on.
Base: All respondents

		Region				Have you taken a foreign holiday in the last 3 years?		Most frequent airport	
	Total	London (a)	South East (b)	London /South East (c)	Rest of GB (d)	Yes (e)	No (f)	Heath-row/ South-end/ City (g)	Other (h)
Unweighted base	2034	229	314	543	1491	1178	856	184	737
Weighted base	2034	264	285	549	1485	1241	793	200	771
Rail	726	91	85	176	550	433	293	55	271
	36%	35%	30%	32%	37%Bc	35%	37%	28%	35%g
Car	693	79	109	188	505	460	233	89	279
	34%	30%	38%aC	34%a	34%	37%F	29%	45%h	36%
Coach	136	10	21	31	104	83	53	17	42
	7%	4%	7%	6%	7%	7%	7%	9%	5%
Bus	55	20	13	34	21	41	14	15	27
	3%	8%D	5%D	6%D	1%	3%f	2%	7%H	3%
Other	68	10	5	15	53	49	20	8	31
	3%	4%	2%	3%	4%	4%	2%	4%	4%
Don't know	357	54	51	105	252	175	181	17	120
	18%	20%	18%	19%	17%	14%	23%E	8%	16%G

Proportions/Means: Columns Tested (5%, 10% risk level) - a/b/c/d - e/f - g/h
Overlap formulae used.

Airports Survey
ONLINE Fieldwork: 4th-6th April 2014

Absolutes/col percents

Table 21

Q.9 If you chose to travel to an airport near London (e.g. the Thames Hub Airport, Heathrow, Gatwick), via central London, what would be the maximum acceptable travel time to reach the airport from central London on public transport?
Base: All respondents

		Gender		Age						Social Grade				Employment Sector	
	Total	Male (a)	Female (b)	18-24 (c)	25-34 (d)	35-44 (e)	45-54 (f)	55-64 (g)	65+ (h)	AB (i)	C1 (j)	C2 (k)	DE (l)	Public (m)	Pri-vate (n)
Unweighted base	2034	924	1110	245	284	347	360	320	478	585	592	347	510	258	772
Weighted base	2034	997	1037	242	343	342	363	302	443	544	564	443	483	280	859
Less than 15 min- (10) utes	26	15	11	2	10	5	4	1	3	10	8	3	5	4	13
	1%	2%	1%	1%	3%gh	2%	1%	*	1%	2%	1%	1%	1%	1%	2%
15 minutes	83	33	50	13	21	12	17	8	11	15	16	30	23	15	35
	4%	3%	5%	6%h	6%gH	4%	5%	3%	3%	3%	3%	7%IJ	5%	5%	4%
30 minutes	444	248	195	57	75	75	71	58	108	141	129	87	87	45	209
	22%	25%B	19%	23%	22%	22%	20%	19%	24%	26%KL	23%I	20%	18%	16%	24%M
45 minutes	334	200	134	32	52	63	52	44	91	107	105	52	69	46	140
	16%	20%B	13%	13%	15%	18%	14%	14%	21%CFG	20%KL	19%KI	12%	14%	17%	16%
One hour	335	167	168	35	52	61	69	51	66	89	100	77	70	50	151
	16%	17%	16%	15%	15%	18%	19%	17%	15%	16%	18%	17%	14%	18%	18%
One and a half hours	148	61	87	23	32	20	27	14	32	45	31	37	36	24	62
	7%	6%	8%a	10%G	9%G	6%	7%	5%	7%	8%j	5%	8%	7%	8%	7%
Two hours	81	39	42	11	7	14	21	15	13	12	27	20	21	13	33
	4%	4%	4%	5%	2%	4%	6%Dh	5%d	3%	2%	5%I	5%i	4%i	5%	4%
More than two (150) hours	140	59	81	11	27	20	31	20	31	41	32	28	38	23	51
	7%	6%	8%	5%	8%	6%	8%	6%	7%	8%	6%	6%	8%	8%	6%
Don't know	444	175	269	56	66	72	71	92	87	83	117	110	134	62	166
	22%	18%	26%A	23%	19%	21%	20%	30%DEFH	20%	15%	21%I	25%I	28%IJ	22%	19%
Mean	59.06	56.01	62.32A	57.27	57.77	57.11	63.15e	61.05	57.94	57.46	57.43	59.83	62.51ij	62.82n	56.84
Standard deviation	37.72	35.44	39.78	36.16	38.97	35.95	39.98	38.23	36.59	36.80	35.80	38.39	40.49	39.47	36.08
Standard error	0.95	1.28	1.39	2.62	2.60	2.16	2.37	2.54	1.87	1.66	1.67	2.37	2.10	2.76	1.45
NET: 45 minutes or less	887	497	389	105	157	156	144	111	214	273	258	172	184	110	397
	44%	50%B	38%	43%	46%g	45%G	40%	37%	48%FG	50%KL	46%kL	39%	38%	39%	46%m
NET: One hour or more	704	325	379	81	119	115	148	99	142	188	189	161	165	109	296
	35%	33%	36%	34%	35%	34%	41%egH	33%	32%	35%	34%	36%	34%	39%	35%

Proportions/Means: Columns Tested (5%, 10% risk level) - a/b - c/d/e/f/g/h - i/j/k/l - m/n
Overlap formulae used.

Prepared by ComRes

Airports Survey

ONLINE Fieldwork: 4th-6th April 2014

Absolutes/col percents

Table 22

Q.9 If you chose to travel to an airport near London (e.g. the Thames Hub Airport, Heathrow, Gatwick), via central London, what would be the maximum acceptable travel time to reach the airport from central London on public transport?
Base: All respondents

			Region				Have you taken a foreign holiday in the last 3 years?		Most frequent airport	
		Total	London (a)	South East (b)	London /South East (c)	Rest of GB (d)	Yes (e)	No (f)	Heath-row/ South-end/ City (g)	Other (h)
Unweighted base		2034	229	314	543	1491	1178	856	184	737
Weighted base		2034	264	285	549	1485	1241	793	200	771
Less than 15 min-utes	(10)	26 1%	2 1%	2 1%	5 1%	21 1%	13 1%	13 2%	1 1%	11 1%
15 minutes		83 4%	10 4%	6 2%	16 3%	67 5%b	41 3%	42 5%E	12 6%h	23 3%
30 minutes		444 22%	47 18%	62 22%	109 20%	335 23%	290 23%f	154 19%	42 21%	195 25%
45 minutes		334 16%	68 26%bcD	52 18%	120 22%BD	214 14%	221 18%f	113 14%	53 26%H	125 16%
One hour		335 16%	63 24%D	55 19%d	118 21%D	217 15%	209 17%	126 16%	29 15%	137 18%
One and a half hours		148 7%	32 12%D	43 15%D	75 14%D	73 5%	105 8%F	43 5%	29 14%H	58 8%
Two hours		81 4%	13 5%	17 6%d	30 5%d	51 3%	54 4%	27 3%	6 3%	32 4%
More than two hours	(150)	140 7%	2 1%	9 3%ac	11 2%A	129 9%ABC	90 7%	50 6%	10 5%	56 7%
Don't know		444 22%	27 10%	39 14%	66 12%	378 25%ABC	219 18%	225 28%E	19 9%	135 17%G
Mean		59.06	55.30	60.56ac	57.98	59.53	59.96	57.44	57.06	59.02
Standard deviation		37.72	26.68	32.57	29.91	40.67	37.57	37.98	33.45	37.52
Standard error		0.95	1.87	1.97	1.37	1.22	1.21	1.53	2.59	1.53

Proportions/Means: Columns Tested (5%, 10% risk level) - a/b/c/d - e/f - g/h
Overlap formulae used.

Prepared by ComRes

Airports Survey

ONLINE Fieldwork: 4th-6th April 2014

Absolutes/col percents

Table 22

Q.9 If you chose to travel to an airport near London (e.g. the Thames Hub Airport, Heathrow, Gatwick), via central London, what would be the maximum acceptable travel time to reach the airport from central London on public transport?
Base: All respondents

		Region				Have you taken a foreign holiday in the last 3 years?		Most frequent airport	
	Total	London (a)	South East (b)	London /South East (c)	Rest of GB (d)	Yes (e)	No (f)	Heath-row/ South-end/ City (g)	Other (h)
Weighted base	2034	264	285	549	1485	1241	793	200	771
NET: 45 minutes or less	887	128	122	249	637	564	322	108	353
	44%	48%	43%	45%	43%	45%f	41%	54%h	46%
NET: One hour or more	704	110	124	234	470	457	246	74	283
	35%	41%D	44%D	43%D	32%	37%F	31%	37%	37%

Proportions/Means: Columns Tested (5%, 10% risk level) - a/b/c/d - e/f - g/h
Overlap formulae used.

Prepared by ComRes

Airports Survey
ONLINE Fieldwork: 4th-6th April 2014

Absolutes/col percents

Table 23

Q.10 Investing in additional airport capacity is likely to require building additional infrastructure, such as road and rail lines, to allow more people to access airports where investment has taken place. As a result, the cost of travelling to and from these airports is likely to rise. If you were using a new or existing airport near London where there was investment in additional airport capacity, what would be the maximum acceptable additional cost to your journey to get to and from the airport, as a result of this investment?
Summary Table
Base: All respondents

		Option	
		An existing airport (e.g. Heathrow, Gatwick)	A new airport (e.g. the Thames Hub Airport)
Unweighted base		2034	2034
Weighted base		2034	2034
No additional cost would be acceptable	(0)	962 47%	879 43%
£10		313 15%	335 16%
£20		152 7%	168 8%
£40		61 3%	81 4%
£80		17 1%	10 *
More than £80	(100)	8 *	10 *
Don't know		521 26%	551 27%
Mean		7.13	7.92
Standard deviation		14.16	14.26
Standard error		0.37	0.37
NET: £10 - £20		465 23%	503 25%
NET: £0 - £20		1426 70%	1382 68%
NET: £40+		86 4%	101 5%

Airports Survey

ONLINE Fieldwork: 4th-6th April 2014

Absolutes/col percents

Table 24

Q.10 Investing in additional airport capacity is likely to require building additional infrastructure, such as road and rail lines, to allow more people to access airports where investment has taken place. As a result, the cost of travelling to and from these airports is likely to rise. If you were using a new or existing airport near London where there was investment in additional airport capacity, what would be the maximum acceptable additional cost to your journey to get to and from the airport, as a result of this investment?
An existing airport (e.g. Heathrow, Gatwick)
Base: All respondents

			Gender		Age						Social Grade				Employment Sector	
		Total	Male (a)	Female (b)	18-24 (c)	25-34 (d)	35-44 (e)	45-54 (f)	55-64 (g)	65+ (h)	AB (i)	C1 (j)	C2 (k)	DE (l)	Public (m)	Pri-vate (n)
Unweighted base		2034	924	1110	245	284	347	360	320	478	585	592	347	510	258	772
Weighted base		2034	997	1037	242	343	342	363	302	443	544	564	443	483	280	859
No additional cost would be acceptable	(0)	962 47%	479 48%	483 47%	86 36%	127 37%	151 44%c	174 48%CD	168 56%CDEf	256 58%CDEF	282 52%K	266 47%	190 43%	224 46%	123 44%	383 45%
£10		313 15%	157 16%	156 15%	54 22%EFGH	72 21%EfGH	45 13%	53 15%	34 11%	56 13%	90 17%	85 15%	72 16%	66 14%	50 18%	131 15%
£20		152 7%	94 9%B	58 6%	18 8%	40 12%FGH	34 10%fGH	22 6%	14 5%	24 5%	45 8%	34 6%	41 9%	31 6%	32 11%	76 9%
£40		61 3%	31 3%	30 3%	10 4%g	19 6%FGH	12 4%g	7 2%	4 1%	9 2%	25 5%jL	14 3%	12 3%	10 2%	11 4%	31 4%
£80		17 1%	11 1%	5 *	4 2%g	8 2%efGh	1 *	2 1%	- -	2 *	6 1%l	6 1%l	3 1%	1 *	2 1%	11 1%
More than £80	(100)	8 *	3 *	6 1%	2 1%	1 *	3 1%	* *	- -	2 *	3 1%	* *	1 *	4 1%j	* *	5 1%
Don't know		521 26%	221 22%	300 29%A	68 28%h	76 22%	95 28%h	105 29%H	83 27%h	95 21%	93 17%	157 28%l	124 28%l	147 30%l	62 22%	221 26%
Mean		7.13	7.62	6.61	10.49FGH	11.25eFGH	8.23fGH	5.60G	3.50	4.92	7.93	6.58	7.34	6.51	8.24	8.55
Standard deviation Standard error		14.16 0.37	14.39 0.54	13.91 0.50	17.93 1.36	17.26 1.18	15.70 0.99	11.50 0.72	7.56 0.49	11.96 0.62	15.44 0.71	13.48 0.65	12.77 0.82	14.45 0.77	13.36 0.94	16.20 0.68
NET: £10 - £20		465 23%	251 25%B	214 21%	72 30%FGH	111 33%EFGH	79 23%Gh	75 21%	47 16%	79 18%	135 25%l	120 21%	114 26%l	97 20%	82 29%	207 24%
NET: £0 - £20		1426 70%	730 73%B	696 67%	158 65%	238 70%	231 67%	249 69%	215 71%	335 76%CEF	417 77%JKL	386 68%	303 68%	321 66%	205 73%	591 69%
NET: £40+		86 4%	46 5%	41 4%	16 7%FGH	28 8%FGH	17 5%G	9 3%	4 1%	13 3%	34 6%jL	21 4%	16 4%	15 3%	14 5%	47 5%

Proportions/Means: Columns Tested (5%, 10% risk level) - a/b - c/d/e/f/g/h - i/j/k/l - m/n
Overlap formulae used.

Prepared by ComRes

Airports Survey

ONLINE Fieldwork: 4th-6th April 2014

Absolutes/col percents

Table 25

Q.10 Investing in additional airport capacity is likely to require building additional infrastructure, such as road and rail lines, to allow more people to access airports where investment has taken place. As a result, the cost of travelling to and from these airports is likely to rise. If you were using a new or existing airport near London where there was investment in additional airport capacity, what would be the maximum acceptable additional cost to your journey to get to and from the airport, as a result of this investment?
An existing airport (e.g. Heathrow, Gatwick)
Base: All respondents

			Region				Have you taken a foreign holiday in the last 3 years?		Most frequent airport	
		Total	London (a)	South East (b)	London /South East (c)	Rest of GB (d)	Yes (e)	No (f)	Heath-row/ South-end/ City (g)	Other (h)
Unweighted base		2034	229	314	543	1491	1178	856	184	737
Weighted base		2034	264	285	549	1485	1241	793	200	771
No additional cost would be acceptable	(0)	962 47%	131 50%	146 51%	277 50%	685 46%	616 50%F	345 44%	87 43%	374 49%
£10		313 15%	49 18%	41 14%	90 16%	223 15%	214 17%F	99 13%	46 23%	131 17%
£20		152 7%	20 8%	24 8%	44 8%	107 7%	100 8%	51 6%	24 12%h	59 8%
£40		61 3%	12 5%d	15 5%D	27 5%D	34 2%	43 3%	18 2%	11 6%	28 4%
£80		17 1%	1 1%	5 2%	6 1%	11 1%	11 1%	6 1%	2 1%	12 2%
More than £80	(100)	8 *	4 1%D	1 *	4 1%	4 *	7 1%	1 *	3 1%H	1 *
Don't know		521 26%	47 18%	54 19%	101 18%	420 28%ABC	250 20%	271 34%E	27 14%	164 21%G
Mean		7.13	8.55	8.34	8.44D	6.57	7.49	6.44	10.81h	7.80
Standard deviation		14.16	16.97	15.93	16.42	13.07	14.68	13.11	18.06	15.01
Standard error		0.37	1.24	0.99	0.78	0.40	0.48	0.55	1.43	0.63
NET: £10 - £20		465 23%	69 26%	65 23%	134 24%	331 22%	314 25%F	151 19%	70 35%H	191 25%

Proportions/Means: Columns Tested (5%, 10% risk level) - a/b/c/d - e/f - g/h
Overlap formulae used.

Prepared by ComRes

Airports Survey
ONLINE Fieldwork: 4th-6th April 2014

Absolutes/col percents

Table 25

Q.10 Investing in additional airport capacity is likely to require building additional infrastructure, such as road and rail lines, to allow more people to access airports where investment has taken place. As a result, the cost of travelling to and from these airports is likely to rise. If you were using a new or existing airport near London where there was investment in additional airport capacity, what would be the maximum acceptable additional cost to your journey to get to and from the airport, as a result of this investment?
An existing airport (e.g. Heathrow, Gatwick)
Base: All respondents

		Region				Have you taken a foreign holiday in the last 3 years?		Most frequent airport	
	Total	London (a)	South East (b)	London /South East (c)	Rest of GB (d)	Yes (e)	No (f)	Heath-row/ South-end/ City (g)	Other (h)
Weighted base	2034	264	285	549	1485	1241	793	200	771
NET: £0 - £20	1426	200	211	411	1016	930	496	157	565
	70%	76%D	74%d	75%D	68%	75%F	63%	78%	73%
NET: £40+	86	17	20	38	49	61	26	16	42
	4%	7%D	7%D	7%D	3%	5%	3%	8%	5%

Proportions/Means: Columns Tested (5%, 10% risk level) - a/b/c/d - e/f - g/h
Overlap formulae used.

Airports Survey

ONLINE Fieldwork: 4th-6th April 2014

Absolutes/col percents

Table 26

Q.10 Investing in additional airport capacity is likely to require building additional infrastructure, such as road and rail lines, to allow more people to access airports where investment has taken place. As a result, the cost of travelling to and from these airports is likely to rise. If you were using a new or existing airport near London where there was investment in additional airport capacity, what would be the maximum acceptable additional cost to your journey to get to and from the airport, as a result of this investment?
A new airport (e.g. the Thames Hub Airport)
Base: All respondents

			Gender		Age						Social Grade				Employment Sector	
		Total	Male (a)	Female (b)	18-24 (c)	25-34 (d)	35-44 (e)	45-54 (f)	55-64 (g)	65+ (h)	AB (i)	C1 (j)	C2 (k)	DE (l)	Public (m)	Pri-vate (n)
Unweighted base		2034	924	1110	245	284	347	360	320	478	585	592	347	510	258	772
Weighted base		2034	997	1037	242	343	342	363	302	443	544	564	443	483	280	859
No additional cost would be acceptable	(0)	879 43%	413 41%	466 45%	87 36%	121 35%	136 40%	165 45%CD	150 50%CDE	221 50%CDE	255 47%L	244 43%	186 42%	194 40%	119 42%	356 41%
£10		335 16%	178 18%	157 15%	50 21%gh	67 20%	52 15%	58 16%	43 14%	64 14%	101 19%	91 16%	65 15%	78 16%	51 18%	140 16%
£20		168 8%	119 12%B	49 5%	22 9%	37 11%G	33 10%g	27 7%	16 5%	33 7%	48 9%	44 8%	42 9%	34 7%	30 11%	81 9%
£40		81 4%	46 5%	35 3%	6 2%	34 10%CeFGH	19 6%cFGh	4 1%	6 2%	12 3%	37 7%JL	13 2%	18 4%	13 3%	15 5%	41 5%
£80		10 *	5 *	6 1%	2 1%	2 1%	1 *	2 1%	1 *	1 *	2 *	3 *	2 *	4 1%	3 1%	4 *
More than £80	(100)	10 *	4 *	6 1%	2 1%	1 *	3 1%	* *	- -	3 1%	3 1%	* *	2 *	4 1%j	* *	6 1%
Don't know		551 27%	233 23%	318 31%A	72 30%	79 23%	98 29%	106 29%	86 29%	109 25%	98 18%	169 30%I	128 29%I	156 32%I	63 22%	230 27%
Mean		7.92	8.83B	6.96	9.33FGh	11.73FGH	9.79FGH	5.88	4.86	6.37	8.77J	6.51	8.08	8.33	9.18	8.87
Standard deviation		14.26	13.93	14.55	16.36	16.03	16.82	11.37	9.63	13.21	14.84	11.56	14.03	16.40	14.88	15.31
Standard error		0.37	0.52	0.53	1.25	1.10	1.06	0.71	0.64	0.70	0.68	0.57	0.91	0.89	1.05	0.65
NET: £10 - £20		503 25%	297 30%B	206 20%	72 30%GH	105 31%fGH	84 25%	85 23%	60 20%	97 22%	149 27%	135 24%	107 24%	112 23%	81 29%	221 26%
NET: £0 - £20		1382 68%	710 71%B	672 65%	160 66%	226 66%	220 64%	250 69%	209 69%	318 72%E	404 74%JKL	379 67%	293 66%	306 63%	199 71%	577 67%
NET: £40+		101 5%	54 5%	47 5%	10 4%	37 11%CFGH	24 7%FGH	7 2%	6 2%	16 4%	42 8%JL	16 3%	22 5%	21 4%	18 7%	51 6%

Proportions/Means: Columns Tested (5%, 10% risk level) - a/b - c/d/e/f/g/h - i/j/k/l - m/n
Overlap formulae used.

Prepared by ComRes

Airports Survey

ONLINE Fieldwork: 4th-6th April 2014

Absolutes/col percents

Table 27

Q.10 Investing in additional airport capacity is likely to require building additional infrastructure, such as road and rail lines, to allow more people to access airports where investment has taken place. As a result, the cost of travelling to and from these airports is likely to rise. If you were using a new or existing airport near London where there was investment in additional airport capacity, what would be the maximum acceptable additional cost to your journey to get to and from the airport, as a result of this investment?
A new airport (e.g. the Thames Hub Airport)
Base: All respondents

			Region				Have you taken a foreign holiday in the last 3 years?		Most frequent airport	
		Total	London (a)	South East (b)	London /South East (c)	Rest of GB (d)	Yes (e)	No (f)	Heath-row/ South-end/ City (g)	Other (h)
Unweighted base		2034	229	314	543	1491	1178	856	184	737
Weighted base		2034	264	285	549	1485	1241	793	200	771
No additional cost would be acceptable	(0)	879 43%	118 44%	129 45%	247 45%	632 43%	554 45%	326 41%	70 35%	344 45%G
£10		335 16%	49 19%	48 17%	98 18%	238 16%	236 19%F	99 13%	46 23%	137 18%
£20		168 8%	22 8%	23 8%	45 8%	123 8%	106 9%	62 8%	24 12%	66 9%
£40		81 4%	19 7%D	16 6%d	35 6%D	46 3%	63 5%F	17 2%	21 10%H	39 5%
£80		10 *	1 *	2 1%	3 1%	7 *	7 1%	3 *	3 2%	5 1%
More than £80	(100)	10 *	4 1%d	1 *	4 1%	5 *	7 1%	3 *	3 1%H	1 *
Don't know		551 27%	52 20%	65 23%	117 21%	434 29%ABC	268 22%	283 36%E	34 17%	178 23%
Mean		7.92	9.98D	8.44	9.20d	7.40	8.51F	6.80	13.91H	8.10
Standard deviation		14.26	17.46	14.75	16.14	13.38	14.79	13.12	19.69	13.61
Standard error		0.37	1.29	0.94	0.78	0.42	0.49	0.56	1.59	0.58
NET: £10 - £20		503 25%	71 27%	71 25%	142 26%	361 24%	341 28%F	162 20%	70 35%H	204 26%

Proportions/Means: Columns Tested (5%, 10% risk level) - a/b/c/d - e/f - g/h
Overlap formulae used.

Prepared by ComRes

Airports Survey

ONLINE Fieldwork: 4th-6th April 2014

Absolutes/col percents

Table 27

Q.10 Investing in additional airport capacity is likely to require building additional infrastructure, such as road and rail lines, to allow more people to access airports where investment has taken place. As a result, the cost of travelling to and from these airports is likely to rise. If you were using a new or existing airport near London where there was investment in additional airport capacity, what would be the maximum acceptable additional cost to your journey to get to and from the airport, as a result of this investment?
A new airport (e.g. the Thames Hub Airport)
Base: All respondents

		Region				Have you taken a foreign holiday in the last 3 years?		Most frequent airport	
	Total	London (a)	South East (b)	London /South East (c)	Rest of GB (d)	Yes (e)	No (f)	Heath-row/ South-end/ City (g)	Other (h)
Weighted base	2034	264	285	549	1485	1241	793	200	771
NET: £0 - £20	1382	189	200	389	993	895	487	140	547
	68%	71%	70%	71%	67%	72%F	61%	70%	71%
NET: £40+	101	23	19	43	58	78	23	27	45
	5%	9%D	7%d	8%D	4%	6%F	3%	13%H	6%

Proportions/Means: Columns Tested (5%, 10% risk level) - a/b/c/d - e/f - g/h
Overlap formulae used.

Airports Survey
ONLINE Fieldwork: 4th-6th April 2014

Absolutes/col percents

Table 28

Q.11 Investing in additional airport capacity is likely to make it more expensive for airlines to use the airports where investment has taken place. This will increase the cost of flying to and from these airports in the form of higher ticket prices. If you were using a new or existing airport near London where there was investment in additional airport capacity, what would be the maximum acceptable additional cost to your flights, as a result of this investment?
Summary Table
Base: All respondents

		Option	
		An existing airport (e.g. Heathrow, Gatwick)	A new airport (e.g. the Thames Hub Airport)
Unweighted base		2034	2034
Weighted base		2034	2034
No additional cost would be acceptable	(0)	1058 52%	994 49%
£10		251 12%	272 13%
£20		152 7%	156 8%
£40		62 3%	77 4%
£80		11 1%	18 1%
More than £80	(100)	10 1%	11 1%
Don't know		490 24%	506 25%
Mean		6.43	7.45
Standard deviation Standard error		13.81 0.35	15.05 0.39
NET: £10 - £20		403 20%	429 21%
NET: £0 - £20		1461 72%	1423 70%
NET: £40+		83 4%	105 5%

Airports Survey
ONLINE Fieldwork: 4th-6th April 2014

Absolutes/col percents

Table 29

Q.11 Investing in additional airport capacity is likely to make it more expensive for airlines to use the airports where investment has taken place. This will increase the cost of flying to and from these airports in the form of higher ticket prices. If you were using a new or existing airport near London where there was investment in additional airport capacity, what would be the maximum acceptable additional cost to your flights, as a result of this investment?
An existing airport (e.g. Heathrow, Gatwick)
Base: All respondents

			Gender		Age						Social Grade				Employment Sector	
		Total	Male (a)	Female (b)	18-24 (c)	25-34 (d)	35-44 (e)	45-54 (f)	55-64 (g)	65+ (h)	AB (i)	C1 (j)	C2 (k)	DE (l)	Public (m)	Pri-vate (n)
Unweighted base		2034	924	1110	245	284	347	360	320	478	585	592	347	510	258	772
Weighted base		2034	997	1037	242	343	342	363	302	443	544	564	443	483	280	859
No additional cost would be acceptable	(0)	1058 52%	517 52%	541 52%	103 43%	148 43%	165 48%	190 52%CD	177 59%CDE	274 62%CDEF	310 57%K	301 53%K	198 45%	249 51%k	132 47%	440 51%
£10		251 12%	142 14%B	109 11%	36 15%H	52 15%H	42 12%	42 12%	41 14%h	39 9%	67 12%	69 12%	69 16%L	46 10%	52 18%N	101 12%
£20		152 7%	90 9%B	62 6%	22 9%Gh	44 13%FGH	29 9%Gh	26 7%G	8 3%	23 5%	35 6%	46 8%	40 9%	31 6%	30 11%	75 9%
£40		62 3%	33 3%	29 3%	8 3%	20 6%GH	10 3%	12 3%	4 1%	8 2%	33 6%JKL	5 1%	12 3%j	11 2%	4 1%	38 4%m
£80		11 1%	3 *	8 1%	3 1%	5 1%g	2 1%	* *	- -	1 *	2 *	4 1%	3 1%	2 *	2 1%	5 1%
More than £80	(100)	10 1%	5 1%	5 *	* *	3 1%	3 1%	1 *	1 *	2 *	4 1%	1 *	2 1%	3 1%	2 1%	4 1%
Don't know		490 24%	207 21%	283 27%A	71 29%dH	71 21%	91 27%	90 25%	71 24%	95 21%	92 17%	138 25%I	118 27%I	141 29%I	58 21%	196 23%
Mean		6.43	6.71	6.14	7.87GH	10.57eFGH	7.53GH	5.76G	3.34	4.27	7.32J	5.16	7.60J	5.73	7.49	7.25
Standard deviation		13.81	13.25	14.37	14.33	17.63	15.93	11.73	8.43	11.86	15.41	11.30	14.42	13.69	14.30	14.41
Standard error		0.35	0.49	0.51	1.09	1.19	1.00	0.72	0.54	0.62	0.70	0.54	0.91	0.73	1.00	0.59
NET: £10 - £20		403 20%	232 23%B	171 17%	57 24%gH	96 28%eFGH	71 21%H	68 19%h	49 16%	62 14%	102 19%	115 20%I	109 25%iL	77 16%	82 29%N	176 20%
NET: £0 - £20		1461 72%	749 75%B	712 69%	161 66%	244 71%	236 69%	258 71%	226 75%c	336 76%Ce	412 76%kL	416 74%L	308 69%	326 67%	214 76%	616 72%
NET: £40+		83 4%	41 4%	42 4%	11 4%g	27 8%fGH	15 4%G	14 4%g	4 1%	12 3%	40 7%JkL	10 2%	18 4%j	16 3%	8 3%	46 5%

Proportions/Means: Columns Tested (5%, 10% risk level) - a/b - c/d/e/f/g/h - i/j/k/l - m/n
Overlap formulae used.

Prepared by ComRes

Airports Survey
ONLINE Fieldwork: 4th-6th April 2014

Absolutes/col percents

Table 30

Q.11 Investing in additional airport capacity is likely to make it more expensive for airlines to use the airports where investment has taken place. This will increase the cost of flying to and from these airports in the form of higher ticket prices. If you were using a new or existing airport near London where there was investment in additional airport capacity, what would be the maximum acceptable additional cost to your flights, as a result of this investment?
An existing airport (e.g. Heathrow, Gatwick)
Base: All respondents

			Region				Have you taken a foreign holiday in the last 3 years?		Most frequent airport	
		Total	London (a)	South East (b)	London /South East (c)	Rest of GB (d)	Yes (e)	No (f)	Heath-row/ South-end/ City (g)	Other (h)
Unweighted base		2034	229	314	543	1491	1178	856	184	737
Weighted base		2034	264	285	549	1485	1241	793	200	771
No additional cost would be acceptable	(0)	1058 52%	130 49%	162 57%c	293 53%	765 52%	687 55%F	371 47%	87 43%	442 57%G
£10		251 12%	36 14%	31 11%	67 12%	184 12%	162 13%	89 11%	36 18%h	92 12%
£20		152 7%	24 9%	24 9%	49 9%	103 7%	101 8%	51 6%	27 13%H	61 8%
£40		62 3%	11 4%	11 4%	23 4%	39 3%	44 4%	17 2%	15 7%H	24 3%
£80		11 1%	1 *	2 1%	3 1%	8 1%	9 1%	2 *	3 1%	7 1%
More than £80	(100)	10 1%	4 1%D	2 1%	6 1%d	5 *	6 1%	4 *	3 1%	4 1%
Don't know		490 24%	58 22%	52 18%	110 20%	380 26%BC	231 19%	259 33%E	30 15%	140 18%
Mean		6.43	8.43D	6.86	7.60d	5.97	6.68	5.95	11.66H	6.49
Standard deviation		13.81	17.04	14.91	15.95	12.84	14.18	13.07	18.88	14.56
Standard error		0.35	1.27	0.93	0.76	0.39	0.46	0.55	1.51	0.60
NET: £10 - £20		403 20%	60 23%	55 19%	116 21%	288 19%	263 21%f	140 18%	63 31%H	153 20%

Proportions/Means: Columns Tested (5%, 10% risk level) - a/b/c/d - e/f - g/h
Overlap formulae used.

Prepared by ComRes

Airports Survey
ONLINE Fieldwork: 4th-6th April 2014

Absolutes/col percents

Table 30

Q.11 Investing in additional airport capacity is likely to make it more expensive for airlines to use the airports where investment has taken place. This will increase the cost of flying to and from these airports in the form of higher ticket prices. If you were using a new or existing airport near London where there was investment in additional airport capacity, what would be the maximum acceptable additional cost to your flights, as a result of this investment?
An existing airport (e.g. Heathrow, Gatwick)
Base: All respondents

		Region				Have you taken a foreign holiday in the last 3 years?		Most frequent airport	
	Total	London (a)	South East (b)	London /South East (c)	Rest of GB (d)	Yes (e)	No (f)	Heath-row/ South-end/ City (g)	Other (h)
Weighted base	2034	264	285	549	1485	1241	793	200	771
NET: £0 - £20	1461	191	218	408	1053	950	511	150	595
	72%	72%	76%d	74%	71%	77%F	64%	75%	77%
NET: £40+	83	16	15	31	52	59	24	20	35
	4%	6%	5%	6%d	3%	5%f	3%	10%H	5%

Proportions/Means: Columns Tested (5%, 10% risk level) - a/b/c/d - e/f - g/h
Overlap formulae used.

Prepared by ComRes

Airports Survey

ONLINE Fieldwork: 4th-6th April 2014

Absolutes/col percents

Table 31

Q.11 Investing in additional airport capacity is likely to make it more expensive for airlines to use the airports where investment has taken place. This will increase the cost of flying to and from these airports in the form of higher ticket prices. If you were using a new or existing airport near London where there was investment in additional airport capacity, what would be the maximum acceptable additional cost to your flights, as a result of this investment?
A new airport (e.g. the Thames Hub Airport)
Base: All respondents

			Gender		Age						Social Grade				Employment Sector	
		Total	Male (a)	Female (b)	18-24 (c)	25-34 (d)	35-44 (e)	45-54 (f)	55-64 (g)	65+ (h)	AB (i)	C1 (j)	C2 (k)	DE (l)	Public (m)	Pri-vate (n)
Unweighted base		2034	924	1110	245	284	347	360	320	478	585	592	347	510	258	772
Weighted base		2034	997	1037	242	343	342	363	302	443	544	564	443	483	280	859
No additional cost would be acceptable	(0)	994 49%	470 47%	525 51%	103 43%	140 41%	156 46%	183 50%D	164 54%CDE	248 56%CDE	274 50%	292 52%k	199 45%	229 47%	128 46%	416 48%
£10		272 13%	151 15%B	121 12%	36 15%	53 16%	41 12%	46 13%	45 15%	52 12%	88 16%JL	66 12%	69 15%l	50 10%	48 17%	110 13%
£20		156 8%	100 10%B	57 5%	22 9%g	37 11%Gh	28 8%g	29 8%	14 4%	27 6%	43 8%	40 7%	35 8%	38 8%	27 10%	73 9%
£40		77 4%	40 4%	36 4%	7 3%	27 8%CFGH	19 6%GH	12 3%	4 1%	7 2%	29 5%jL	16 3%	18 4%	13 3%	14 5%	45 5%
£80		18 1%	11 1%	6 1%	3 1%	9 2%efGh	2 1%	2 1%	- -	2 1%	6 1%	3 1%	6 1%	3 1%	2 1%	9 1%
More than £80	(100)	11 1%	5 1%	6 1%	2 1%	1 *	3 1%	2 *	1 *	2 *	5 1%	1 *	1 *	3 1%	2 1%	3 *
Don't know		506 25%	220 22%	286 28%A	70 29%	76 22%	93 27%	90 25%	75 25%	103 23%	99 18%	145 26%l	115 26%l	147 30%l	60 21%	203 24%
Mean		7.45	8.40B	6.47	8.76GH	11.72FGH	9.02GH	6.59G	4.08	5.22	8.69J	5.97	8.19j	6.94	8.62	8.21
Standard deviation		15.05	15.54	14.47	16.93	18.43	17.19	13.53	8.90	12.78	16.86	12.67	15.09	15.09	15.40	15.46
Standard error		0.39	0.58	0.51	1.29	1.25	1.08	0.83	0.57	0.68	0.78	0.61	0.95	0.81	1.08	0.64
NET: £10 - £20		429 21%	251 25%B	178 17%	57 24%	90 26%gH	69 20%	75 21%	58 19%	80 18%	131 24%JL	106 19%	104 23%	88 18%	75 27%	183 21%
NET: £0 - £20		1423 70%	720 72%b	703 68%	160 66%	230 67%	225 66%	257 71%	223 74%cE	328 74%cdE	405 75%kL	398 71%	303 68%	317 66%	203 72%	599 70%
NET: £40+		105 5%	57 6%	48 5%	12 5%G	37 11%CFGH	25 7%GH	15 4%g	4 1%	12 3%	40 7%JL	21 4%	25 6%	19 4%	17 6%	57 7%

Proportions/Means: Columns Tested (5%, 10% risk level) - a/b - c/d/e/f/g/h - i/j/k/l - m/n
Overlap formulae used.

Prepared by ComRes

Airports Survey

ONLINE Fieldwork: 4th-6th April 2014

Absolutes/col percents

Table 32

Q.11 Investing in additional airport capacity is likely to make it more expensive for airlines to use the airports where investment has taken place. This will increase the cost of flying to and from these airports in the form of higher ticket prices. If you were using a new or existing airport near London where there was investment in additional airport capacity, what would be the maximum acceptable additional cost to your flights, as a result of this investment?
A new airport (e.g. the Thames Hub Airport)
Base: All respondents

			Region				Have you taken a foreign holiday in the last 3 years?		Most frequent airport	
		Total	London (a)	South East (b)	London /South East (c)	Rest of GB (d)	Yes (e)	No (f)	Heath-row/ South-end/ City (g)	Other (h)
Unweighted base		2034	229	314	543	1491	1178	856	184	737
Weighted base		2034	264	285	549	1485	1241	793	200	771
No additional cost would be acceptable	(0)	994 49%	123 46%	151 53%	273 50%	721 49%	648 52%F	346 44%	77 39%	417 54%G
£10		272 13%	36 14%	37 13%	73 13%	200 13%	171 14%	101 13%	33 16%	102 13%
£20		156 8%	20 8%	27 10%	48 9%	109 7%	107 9%f	49 6%	29 14%H	56 7%
£40		77 4%	17 6%D	12 4%	29 5%d	48 3%	51 4%	26 3%	21 10%H	29 4%
£80		18 1%	3 1%	1 *	4 1%	14 1%	12 1%	5 1%	1 1%	12 2%
More than £80	(100)	11 1%	4 2%D	1 *	6 1%d	5 *	8 1%	3 *	4 2%H	3 *
Don't know		506 25%	61 23%	56 20%	117 21%	389 26%BC	244 20%	263 33%E	35 18%	151 20%
Mean		7.45	10.41bD	6.95	8.58B	7.01	7.67	7.03	13.74H	7.35
Standard deviation		15.05	19.77	13.46	16.80	14.29	15.48	14.21	20.44	15.60
Standard error		0.39	1.48	0.84	0.81	0.44	0.51	0.60	1.65	0.65
NET: £10 - £20		429 21%	57 21%	64 22%	121 22%	308 21%	278 22%f	150 19%	62 31%H	159 21%

Proportions/Means: Columns Tested (5%, 10% risk level) - a/b/c/d - e/f - g/h
Overlap formulae used.

Prepared by ComRes

Airports Survey
ONLINE Fieldwork: 4th-6th April 2014

Absolutes/col percents

Table 32

Q.11 Investing in additional airport capacity is likely to make it more expensive for airlines to use the airports where investment has taken place. This will increase the cost of flying to and from these airports in the form of higher ticket prices. If you were using a new or existing airport near London where there was investment in additional airport capacity, what would be the maximum acceptable additional cost to your flights, as a result of this investment?
A new airport (e.g. the Thames Hub Airport)
Base: All respondents

		Region				Have you taken a foreign holiday in the last 3 years?		Most frequent airport	
	Total	London (a)	South East (b)	London /South East (c)	Rest of GB (d)	Yes (e)	No (f)	Heath-row/ South-end/ City (g)	Other (h)
Weighted base	2034	264	285	549	1485	1241	793	200	771
NET: £0 - £20	1423	179	215	394	1029	926	497	139	576
	70%	68%	75%acd	72%	69%	75%F	63%	69%	75%
NET: £40+	105	24	14	38	66	71	34	26	44
	5%	9%bD	5%	7%BD	4%	6%	4%	13%H	6%

Proportions/Means: Columns Tested (5%, 10% risk level) - a/b/c/d - e/f - g/h
Overlap formulae used.

Prepared by ComRes

Submission to the Airports Commission: Cost and financing of an Inner Estuary Airport

1. Background

1.1. In its response to the consultation on the terms of reference for the Inner Thames Estuary Feasibility Studies, published on 25 Mach 2014, the Airports Commission explained that it had received responses requesting a further feasibility study "on the 'financeability' of, and costs associated with, a new airport", including consideration of "how a private sector funding model could be implemented for a new airport". The Commission considered "that this level of detailed work would be more appropriate if the option were short-listed in September".

1.2. Against that background, Medway Council and Kent County Council, organised a roundtable discussion, hosted by Mark Reckless, Member of Parliament for Rochester & Strood, to explore both cost and financeability of an Inner Thames Estuary Airport. Attendees included representatives from local government and financial institutions.

1.3. Whilst members of the Airports Commission Secretariat attended the roundtable discussion in an observer capacity, Medway Council and Kent County Council wish formally to submit the arguments made, issues raised and conclusions reached during the discussions, so as to inform the Airports Commission's further work, in particular in relation to Studies 2 (operational feasibility) and 3 (socio-economic impact).

1.4. As the discussions were held under the Chatham House Rule, contributions are non-attributable.

1.5. As a result of the discussion, we are also submitting a revised cost estimate which could inflate the total cost estimate to as high as £148billion. (Table 1).

Table 1: Revised total cost estimate for an Inner Estuary Airport

Airport Land acquisition; Ground enabling works; airfield and terminal infrastructure; car parking and airside/landside road network; operational ancillary building; air traffic control; aircraft fuel; utilities	20,000,000,000[1]
Surface access requirements	32,000,000,000
Other	
Risk	21,000,000,000
Optimism Bias	37,000,000,000
Sub-Total	112,000,000,000
Additional Costs[2]	
Habitat compensation [3,400ha at £70,000/ha)	238,000,000[3]
Homeowners' compensation [1,600 homes at £237,000/home]	379,200,000[4]
Cultural heritage compensation	1,000,000,000
West London Boroughs compensation	5,000,000,000[5]
Kentish Flats/LNG terminal compensation	1,300,000,000[6]
London City, Southend & Heathrow Airports compensation	28,500,000,000[7]
Total	**148,417,200,000**
Assumed Government Subsidy	65,000,000,000
Funding Required	77,417,200,000

[1] It has been argued that the estimated airport costs are too low, and should be at least £30,000,000,000 - £35,000,000,000 though it was acknowledged that this is offset by the £37,000,000,000 optimism bias.
[2] The additional costs presented in Table 1 provide an estimate of expenditure associated with the construction of an Inner Estuary Airport that, as we understand it, have not at present been included in the Airports Commission's cost estimate of £80,000,000,000 - £112,000,000,000 that was published in the Interim Report. Where appropriate, sources for these estimated are provided below.
[3] Based on the habitat loss assumed in Airports Commission document '67 Isle of Grain Sift 3 FINAL.pdf', and research by the British Trust for Ornithology that suggests that "Habitats Directive guidance suggests that the area of compensatory habitat provided should be at least twice the area lost" and that "the cost of creating compensatory habitat is likely to be over £70,000 per hectare".
[4] Based on properties lost assumed in Airports Commission document '67 Isle of Grain Sift 3 FINAL.pdf' and property compensation suggested by HS2 Ltd, on the basis of average property prices on the Isle of Grain.
[5] Based on current GVA data as outlined in Optimal Economics's report ' Heathrow Related Employment', September 2011. For difficulties in identifying adequate compensatory payment though, please refer to paragraph 2.1.9.
[6] Based on investment Vattenfall and National Grid have undertaken into both energy infrastructure facilities,
[7] Based on RAB, 2013 EBITDA and sales price speculation figures, informal conversations held with airport representatives as to their minimum acceptable compensation payment and assumed premium pricing as a result of compulsory purchases. For further discussion regarding airports compensation, please refer to paragraphs 2.1.1. – 2.1.4.

2. Cost and 'financeability' of an Inner Estuary Airport: considerations

2.1. Estimating the final cost

2.1.1. Seeing as it is widely accepted that Heathrow Airport would have to close should an Inner Estuary Airport be built, the amount of compensation that would have to be paid to the current hub operators and those relying on it for business prosperity at present makes up a significant cost item when seeking to predict the final cost of an Inner Estuary Airport. This becomes all the more difficult as there is a tremendous amount of uncertainty with regard to the valuation methods, cost assessment and regulatory regime applicable.

2.1.2. Generally speaking, airports are seen as corporate entities with perpetual life meaning that it would be inefficient to repay debt by trapping cash 20 years in advance. Any compensation payment would be used by equity holders to repay debt holders.

2.1.3. Over the past ten years, Heathrow Airport Ltd has invested around £11bn into the existing airport, including into the T5 and T2 terminal infrastructure. Heathrow's current investment plans anticipate at least a further £3bn future investment.

2.1.4. It is argued that Heathrow's regulatory asset base (RAB), currently valued at £15bn, should form the starting point for any compensation payment. However, seeing as the closure of the airport would require Heathrow's owners to give up any future opportunities and income, they are expected to seek premium pricing from any asset valuation.

2.1.5. In addition to the compensation of Heathrow Airport Ltd, compensation to airlines will need to be considered. British Airways, amongst others, has invested billions into the airport infrastructure over the past years.

2.1.6. A further item of 'sunk investment' would be the funding that has already been secured and invested into current infrastructure upgrades that predominantly rely for their business case upon the future efficient functioning of Heathrow Airport. These include the Piccadilly line upgrade and the Western Rail Access to Heathrow.

2.1.7. Moreover, the closure of Heathrow Airport will adversely affect the business community that has developed in the airport's proximity.

2.1.8. Surveys of the large companies (those with more than 250 employees) in West London suggest that about half of them would relocate, should Heathrow close. It is hugely difficult to estimate any compensation requirements arising.

2.1.9. Businesses in the proximity of Heathrow, not least including industrial estate developers, have invested hugely in the infrastructure in and around the airport. While it is not certain, if individual businesses would have to be compensated, it is also unclear on what basis such payments would be calculated as factors could include their current asset value, loss of future revenue or number of redundancies. Should compensation be paid, the eligibility criteria will be enormously difficult to define: businesses located in the 20-30 mile radius of Heathrow still rely on their proximity to the airport for their business. As the Government would need to nationalise Heathrow Airport to close it, i.e. compulsorily purchase it, businesses will be looking to Government for compensation.

2.1.10. Irrespective of whether compensation will be paid to businesses, local authorities in West London will suffer significantly from the loss of business rates as a result of business relocations in the wake of the closure of Heathrow: the companies in West London currently generate up to £37bn for the local economy.

2.1.11. Finally, further to the difficulty in assessing compensatory amounts, there is huge uncertainty as to the framework under which any compensation would be regulated. While there are legal and statutory compensation rules, it is highly likely that the Government would have to add to any payments that are being provided by developers.

2.2. Funding and financing

2.2.1. The construction of a new airport, independent of existing infrastructure, on a greenfield site and by a company not currently operating, is a project of an unprecedented magnitude with a risk profile that differs vastly from any existing infrastructure projects.

2.2.2. While it is consequently difficult to see how the project could indeed be privately funded, any attempt to secure private financing for an Inner Estuary Airport would most likely look to the bank and debt capital markets.

2.2.3. Pension funds are unlikely to be interested because of the high risk and no return on investment during the lengthy period of construction. Sovereign wealth funds are also more interested in equity financing (rather than debt financing) due to its guaranteed rate of return over shorter timescales. The airport's long construction time before any income is received represents a risky investment. Even if equity financing is obtained (from pension and/or sovereign wealth funds), it is still likely to need 80% debt financing from banks.

2.2.4. That said, it is unlikely that there would be sufficient capacity within the bank market requiring funding to be provided by a group of banks. Given the long timescales involved in the construction of the airport and thus the time it would take before any debt could be serviced, the terms offered by private financiers would be challenging.

2.2.5. Further adding to the project's risk profile is the current lack of public and political support for an Inner Estuary Airport. The local authorities in Medway and Kent are committed to a judicial review process, injecting delays and uncertainties into the planning process, hence increasing investor risk.

2.2.6. As a result, it is highly plausible that a large amount of public subsidy would be required to finance the Inner Estuary Airport. This, however, will require State Aid clearance at the European level, and objections from the countries hosting competing hubs (such as Schiphol Airport in the Netherlands) are anticipated to raise objections.

2.2.7. Moreover, when discussing finance, the sequencing and deliverability of the project needs to be taken into account. In simple terms: The revenue that a redeveloped Heathrow site is expected to generate would not be realised until the Inner Estuary Airport had been built and opened so there is little potential to re-invest the Heathrow proceeds into the construction of the new airport.

2.2.8. While the redevelopment of Heathrow is being promoted by the Mayor of London, significant flaws exist with regard to the concept, not least because the plans envisage the building of 70,000 new homes without taking account of up to 30,000 vacant properties as a result of the unemployment resulting from the closure of Heathrow.

2.2.9. In addition, despite Hong Kong Airport being hailed as a successful example of airport relocation and redevelopment, the current Kai Tak site continues to be wasteland, even though it would offer prime land for regeneration in one of the world's most crowded areas.

2.2.10. By comparison, Heathrow Airport Ltd is a private company whose shareholders are committed to backing a third runway; they have an appetite to invest because they are certain of the return on investment they will receive.

2.2.11. Gatwick Airport's shareholders, too, are willing to invest in the airport's expansion, at £2billion risk.

2.3. Additional considerations

2.3.1. To provide the local transport infrastructure in Medway and Kent to a standard equivalent to that currently available in and around Heathrow would require enormous investment. At present, the local infrastructure is by no means equipped for feeding into a new hub airport. By way of example, any road capacity arising from a new Lower Thames Crossing would quickly be absorbed; and any rail capacity would not be delivered by the current HS1 infrastructure.

2.3.2. Given the estimated cost of an Inner Estuary Airport, the anticipated landing charges make it questionable that the airport would be affordable to use for passengers and airlines, and hence leave in doubt its international competitiveness.

2.3.3. Heathrow Airport is already one of the most expensive hub airports internationally. An expected trebling of landing charges at an Inner Estuary Airport would leave the new hub less attractive against Frankfurt and Schiphol Airports, and particularly airports in the Gulf.

2.3.4. With closure of Heathrow and high charges at a Thames Estuary Airport, other airports such as Gatwick and Stansted (with lower charges) become more attractive. Airlines might relocate to these other existing airports rather than the new airport on the Isle of Grain. This would result in the commercial failure of the new airport and create pressure on the other existing airports (Gatwick and Stansted) to expand in order to meet growing demand.

2.3.5. A new Inner Estuary Airport would require the necessary work force. As Heathrow Airport's support services staff are largely low wage workers, it is inconceivable that they would relocate or commute to a new hub airport to the East of London. The new airport would therefore require an additional 79,000 workers – with the required housing to be located and built in the Estuary area.

2.3.6. These essential airport workers need to be at the new airport from day one, therefore there needs to be sufficient housing in place for workers before the airport can become operational. Workers and their families will also need schools, community facilities and supporting infrastructure to be in place. It is questionable if there is sufficient finance available in the property development sector to deliver development on this scale in one area and at the same time.

2.3.7. The logistics of moving to new terminals within a single airport site is difficult enough; however, the challenge of relocating an entire airport to a new site on the other side of London is immense and unprecedented. It represents a huge risk to the aviation industry.

3. Conclusion

3.1. In light of the significant uncertainty regarding cost and financing and therefore the significant risk for deliverability, Medway Council and Kent County Council call for the exclusion of the Inner Estuary option from further consideration by the Airports Commission, especially at a price tag that could be as high as £148billion.

Submission to the Airports Commission: European stakeholders' views on airspace issues arising from an Inner Estuary Airport

1. Background

1.1. It is widely acknowledged that the airspace over London and the south east of England is already vastly congested and complex. Moreover, the UK's National Air Traffic Service (NATS) previously acknowledged that an Inner Thames Estuary Airport could conflict with the airspace of major European airports, requiring airspace renegotiation at European level.

1.2. While supporters of an Inner Estuary Airport repeatedly assert that any airspace conflict will be easily addressed, there has been very little evidence to that effect.

1.3. As a result, Medway Council and Kent County Council have sought European airspace authorities' and airports' views on the issue so as to gain greater clarity as to the extent of initial conversations that have been held on potential airspace renegotiations and their feasibility.

1.4. In speaking to representatives of the French, German, Belgian and EU airspace authorities and representatives of Frankfurt Airport, Medway and Kent County Council sought to explore the following:

- Awareness of the UK airport capacity debate and individual proposals, in particular regarding proposals for an Inner Thames Estuary Airport;
- Awareness of arguments put forward regarding an Inner Thames Estuary Airport's interference with existing European airspace arrangements;
- Contact with UK Government, Airports Commission, Transport for London or airport developers to discuss airspace implications of an Inner Thames Estuary Airport;
- Views and challenges regarding potential European airspace renegotiations to accommodate an Inner Thames Estuary Airport.

2. Results

Feedback from [redacted]*, Deutsche Flugsicherung (DFS)*

- The DFS have not yet been approached about the construction of a Thames Estuary Airport though the representative was aware of it after reading about it in the media.
- Their view is that the discussion is currently very hypothetical; and that real assessments and decisions could be made and taken only once there is greater clarity on the proposal.
- The DFS's view is that the proposed new airport would not impact on German airspace but emphasised that French flight routes would likely be affected. Any impact on Germany would result only from potential requirements completely to restructure European airspace to accommodate a Thames Estuary Airport.
- Should there be any conflict arising with German airspace and routes, this would be addressed by Eurocontrol.

Feedback from [redacted] *Fraport AG (operator of Frankfurt Airport)*

- Fraport are well aware of the UK's airport capacity debate, including Heathrow Airport's plans for a third runway, and the discussion around constructing a new airport in the Thames Estuary.
- Both UK Government and Parliament have contacted Frankfurt Airport (with the Airports Commission having visited Frankfurt Airport two years ago) though there is no recollection of any contact being made by the Mayor of London's office.
- Fraport takes the view that airport capacity in Europe as a whole is insufficient at present which presents a problem that will need to be addressed by Member States individually.
- Fraport takes the view that any new airport in the UK would not create "new competition" but rather maintain the current degree of competitiveness that Frankfurt Airport and Heathrow Airport have.

Feedback from [redacted] *Direction Générale de l'Aviation Civile, DGAC (Ministry for the Environment) / Chief of Single Sky Project & Regulation of Air Travel*

- According to DGAC, the matter related to the closing of Heathrow airport has been a long-

standing debate, which has come up occasionally but there are no serious discussions on their side for now; closing Heathrow airport is not conceivable for the time being.
- The UK authorities' plan would indeed require negotiations with neighbouring airspaces; from a procedural point of view, the UK authorities should bring their plan to the attention of all the Member States before going any further; a first contact should be made between Member States for preliminary discussions within Eurocontrol.

Feedback from [redacted]*, Belgocontrol*

- There is awareness within Belgocontrol of the political discussions taking place in the UK but no approach has been made by British counterparts.
- In terms of impact on surrounding airspaces, it would depend on the orientation of the runway. If the runway was oriented under an East-West axis (24/09), this could impact the Belgian airspace. With a South-North route, the impact would be less problematic for Belgium.
- In case of renegotiations of air traffic regulations, an official demand needs to be made by the UK Government which will then be examined by the Belgian authorities and Eurocontrol. Potential difficulties would be: identifying the type of aircrafts that would take off/land from the new airport; modifying the new procedure rules/new flight schedules; and training air traffic controllers.

Feedback from [redacted] *Eurocontrol*

- Eurocontrol are aware of the London Airspace Management Programme (LAMP) but have not been approached by the UK on the closing of Heathrow and the opening of a new airport around London.
- They are of the opinion that, should it be discussed with national authorities and Eurocontrol, a demand should first come from the UK.
- The course of action will ultimately depend on how national authorities might want to deal with a UK request. Bilateral discussions, possibly within an ad hoc committee might be preferably to using Eurocontrol as the primary venue.

3. Summary of findings

3.1. In general, Eurocontrol and the surrounding national authorities are aware of the UK discussions regarding the congestion of London airspace but have not been approached by the UK Government, or any architects or developers on the specific plan to close Heathrow and open a new airport in a different location.

3.2. The overwhelming feedback considered the Thames Estuary Airport discussions to be too hypothetical properly to assess airspace impact and implications.

3.3. Nevertheless, Eurocontrol and surrounding national authorities are likely to have to be consulted regarding the airspace implications of a Thames Estuary Airport though the exact format remains to be clarified, with there seemingly being potential for bilateral as well as European-level discussions to be held.

3.4. Any request for airspace renegotiations, however, would have to be initiated by the UK Government.

4. Conclusions

4.1. Given the complete lack of discussions that were held with European airspace authorities on the impact of an Inner Estuary Airport on European airspace management, it appears premature for developers and proponents of the project to assume the manageability of any arising conflicts.

4.2. Medway Council and Kent County Council therefore take the view that any operational feasibility assessment of an Inner Estuary Airport will require a thorough review of airspace implications with neighbouring countries' aviation authorities before any definitive decision can be made.

BTO Research Report No. 657

Review of knowledge regarding the effect of major estuarine developments on bird populations with reference to proposals for an airport in the Thames Estuary

Authors

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Report of work carried out by the British Trust for Ornithology

May 2014

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Registered Charity No. 216652

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EXECUTIVE SUMMARY

1. The proposal to build an airport on the Hoo Peninsula / Isle of Grain would cause a significant loss of both freshwater and intertidal coastal wetland habitat, largely within the Thames Estuary and Marshes Special Protection Area (SPA). It would also cause some loss of habitat from within the Medway Estuary and Marshes SPA. These areas are protected under international law for their internationally important bird populations.
2. Coastal wetland habitat loss of this type has been widely demonstrated to have significant impacts on the bird populations that the habitat supports. We can therefore be confident that habitat loss due to airport development would have significant negative impacts on the bird populations that depend on the areas lost. The Thames Estuary and Medway Marshes SPAs are designated because together they support populations of 140,515 birds or indirectly (e.g. through disturbance or habitat change to areas close to the airport). Over 21,000 waterbirds currently use the area proposed for development – around 25% of the total bird population on the two affected SPAs.
3. Should an airport in the Thames Estuary be taken forward, there would need to be:
    - An appropriate assessment (under the 2010 Habitats Directive (92/43/EEC)) to determine any 'likely significant effects' to these SPAs following any proposed mitigation.
    - If 'likely significant effects' following mitigation are identified in the appropriate assessment, article 6(4) of the EC Habitats Directive allows plans or projects which may have an adverse effect on the integrity of a European site or European marine site (such as an SPA) to go ahead on grounds of 'imperative reasons of overriding public interest' (IROPI) when there are no alternative solutions, but only if compensatory measures have been secured.

   Therefore, should an airport development in the Thames Estuary be constructed it is highly likely that mitigation and compensation would be required to provide alternative habitat for displaced birds.
4. Habitats Directive guidance suggests the area of compensatory habitat provided should be at least twice the area lost, meaning that replacing the habitats lost by the construction of the proposed airport (estimated as 1700 hectares) would require a new site or sites of at least 3400 hectares to be created. Finding suitable areas for such large-scale habitat creation will be challenging given the many competing demands for coastal land use in south-east England.
5. Creating compensatory habitat should an airport be built is further complicated by the types of habitat that would be destroyed, especially intertidal habitat. We currently have limited understanding of how best to engineer and successfully retain the exact sorts of habitats the birds require and therefore uncertainty about the density of each bird species that would be supported on newly created habitat. It is therefore realistic to anticipate the need to create new areas of inter-tidal that were larger than those lost to maximise the chance of suitable habitat developing to support the number of birds lost.
6. As well as the physical challenges of compensation there is also significant financial cost to add to the construction costs of the airport. The cost of creating compensatory habitat is likely to be over £70,000 per hectare and may well be considerably more than this, depending on the sites chosen and site-specific considerations.
7. The challenges caused by the development of an airport in the Thames Estuary vary among the bird species present in the area; for example, many of the bird species affected are site-faithful, and therefore colonisation of new habitat provided some distance away would only occur over a period of many years through the recruitment of juvenile birds to the new sites. Adult birds of site-faithful species displaced from the development area would be likely to remain in the Thames and Medway Estuaries and would suffer increased mortality over several years following development due to the reduced habitat (and therefore food) availability.

Compensatory habitat provided at a distance would therefore not provide direct compensation for displaced individuals of these site-faithful species, but may eventually support equivalent population sizes of these species following several years of recruitment to the new site. However, the long-term consequences of this for bird populations are highly uncertain.

8. There is no precedent for the creation of compensatory habitat at a distance from the area affected by development (for example in Essex or elsewhere in East Anglia as suggested by Foster and partners) and there is considerable uncertainty as to whether providing compensatory habitat at a distance from the Thames and Medway Estuaries would be effective in supporting displaced bird populations, or whether it would be legally viable. The creation of new habitats at a distance from the Thames Estuary and Marshes and Medway Estuary and Marshes SPAs either through managed realignment, topographic modification, or the creation of freshwater wetlands, is likely to be less effective than providing such habitats locally, although it could still be partially effective for several species guilds.
9. The provision of replacement habitat within or adjacent to the Thames and Medway Estuaries is likely to be the most effective option to compensate for the effects of the development on bird populations, although it should be noted that it may be challenging to find suitable sites for this, especially given there are already existing commitments to recreate intertidal habitat in the area to compensate for that lost through coastal squeeze.
10. *Limitations of the study*: This study has been limited to reviewing the likely impact on birds of habitat loss due to the footprint of the airport development, and not any impacts caused by wider infrastructure requirements, such as surface access or housing, on the ability to provide local replacement habitats. The study has not reviewed any wider non-habitat related issues, such as disturbance to birds in areas surrounding the proposed airport. Such impacts are likely to be smaller than the direct habitat loss caused by the airport development, but it will be important to take them into account in an Environmental Impact Assessment should the airport proposal be taken forward.

1. INTRODUCTION

1.1 Background

There has been considerable debate over many years about the need for increased airport capacity in the South East of England and this has led to a number of proposals for a new London Airport in the greater Thames Estuary. The focus of this work is on the recent proposal for a Thames Hub Airport (Foster and Partners), but many of the general issues raised here will also be applicable to other recent proposals including the Goodwin Sands Airport (Beckett Rankine), London Britannia Airport (Gensler), London Jubilee International Airport (Trestad), and Cliffe Airport (John Olsen) although the precise impact of each of these proposals on the internationally important bird populations would vary.

The Thames Estuary is the fifth most important for waterbirds in the UK (Austin *et al*. 2014) and this and adjoining sites such as the Medway Estuary and Swale Estuary are covered by a number of national and international designations which mean that the bird populations are legally protected, and any residual adverse impacts of a development (after mitigation) would have to be compensated for. To date most of the environmental work relating to proposed airports in the greater Thames Estuary has focused on the bird strike risk rather than the effect on the bird populations that depend on the area.

This work aims to address this gap by producing a review of the science behind the prediction of the impacts on bird populations of such developments and empirical evidence from a number of case studies around the world where the impacts of developments have been monitored.

It will also review the mitigation or compensation approaches that have been used and their feasibility and effectiveness to enable likely implementation issues and costs to be broadly understood.

1.2 Project Objectives

The work aims to cover the following areas:

1. Assessment of the importance of the Thames Estuary and Marshes Special Protection Area (SPA), the Medway Estuary and Marshes SPA and relevant adjoining sites for bird populations from published sources;
2. Assessment of the key species and potential numbers that may be impacted by the proposed Thames Hub (note this can only be very approximate as detailed designs are not yet produced);
3. A review of the ability of bird populations to respond to the loss of habitat associated with large scale developments, using examples taken from around the world;
4. A high-level review of potential habitat creation mitigation / compensation measures available and associated issues, and the approximate costs per unit area or bird of such mitigation measures.

Points 3 and 4 will be the core of this work as they will help to inform the debate about what is achievable and what does not work. This part of the project will be produced in the form of a scientific paper that will be submitted to a scientific journal as we believe that a published paper will be helpful in informing the debate.

2. IMPORTANCE OF THE THAMES ESTUARY AND ADJOINING SITES FOR BIRDS

2.1 Importance of the Greater Thames Estuary

The Greater Thames Estuary is a highly important area for birds, and is covered by a number of national and international designations, including six SPAs (Figure 1). It is also a wetland of international importance under the Ramsar Convention. Within Europe there have been extensive long-term historical losses of coastal wetland habitats, such as mudflats, saltmarshes and coastal grazing marsh, due to land reclamation and drainage, flood defences and coastal infrastructure development. More recently, sea-level rise as a result of climate change has also led to loss of these habitats. This means that capacity for remaining habitat to maintain the biodiversity, in particular the internationally important populations of migratory birds that rely on these coastal wetland habitats, is increasingly under pressure. Due to the importance of these sites for migratory birds, a very large proportion of the remaining coastal wetlands around Europe are now protected under international legislation, through the Natura 2000 network which, under the EC Directive on the Conservation of Wild Birds (Directive 2009/147/EC - the codified version of Council Directive 79/409/EEC as amended – the 'Birds Directive'; http://jncc.defra.gov.uk/page-162), includes the designation of Special Protection Areas for birds. The UK is particularly important for migratory waterbird species, with its large areas of coastline, critical position on the migratory flyways of many species, and relatively mild winter climate.

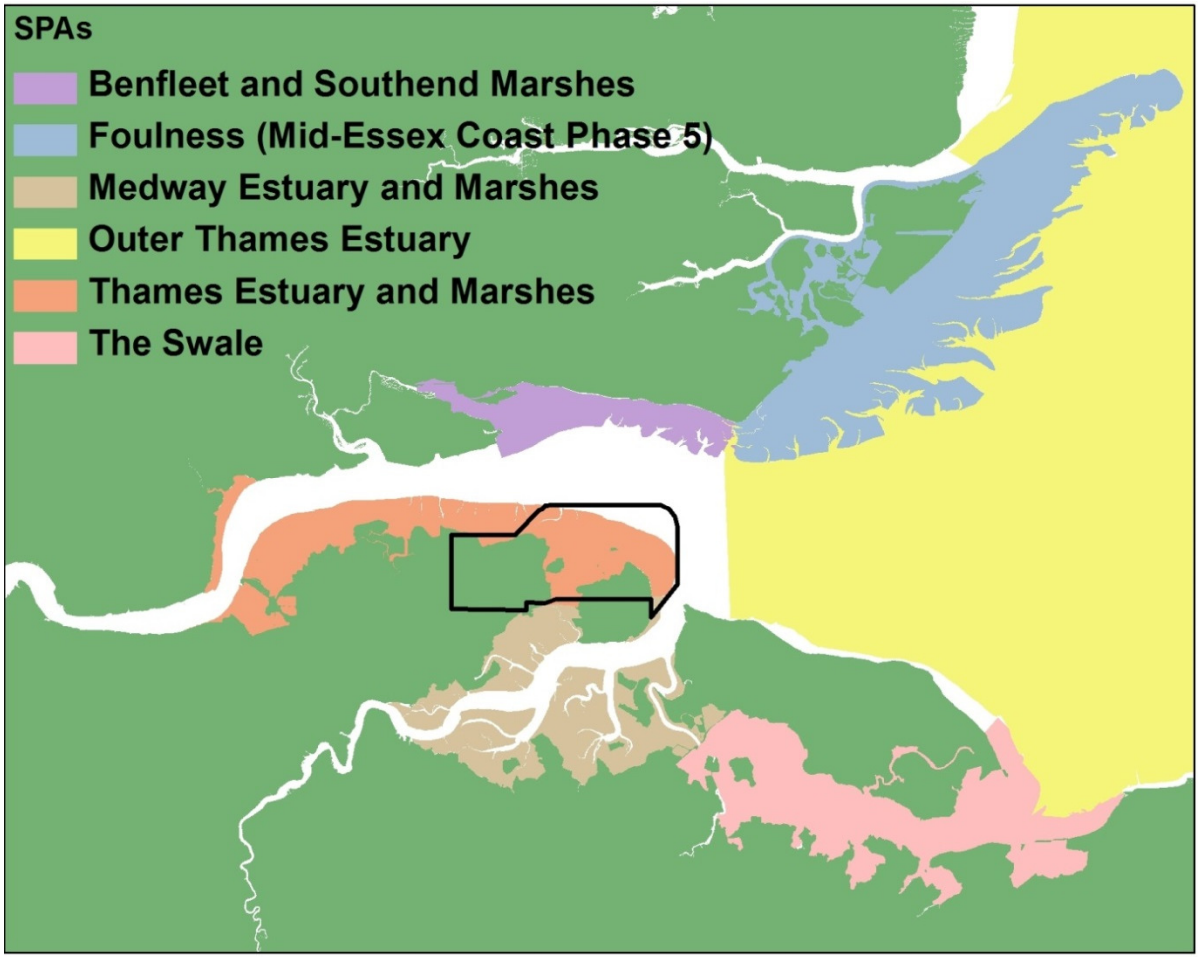

Figure 1. The Greater Thames Estuary, showing the locations of six local Special Protection Areas (SPAs) where birds are protected under EC legislation. The approximate location of a potential airport on the Isle of Grain is outlined in black.

While an airport development on the Isle of Grain would only cause direct habitat loss on parts of the Thames Estuary and Marshes SPA, and possibly some parts of the Medway Estuary and Marshes SPA, there are also potential impacts (for example due to disturbance from air traffic) on bird populations on the other local SPA sites shown in Figure 1. However, for the purposes of this high-level review of potential mitigation and compensation measures, we focus on the impacts of habitat loss, and therefore focus on key issues for those species listed in the SPA designations for the Thames Estuary and Marshes SPA and the Medway Estuary and Marshes SPA (Table 1).

Table 1. Population sizes of each species protected under the designations* for the Thames Estuary and Marshes SPA and the Medway Estuary and Marshes SPA. Figures are usually given as the number of individual birds of each species that the SPA supports, except for species protected during the breeding season where figures are the number of breeding pairs – these are denoted by a letter P after the number. The season during which the species occurs in important numbers is denoted in brackets after the population size figure (B = breeding season, P = on passage (during migration in spring or autumn), W = winter). Some species are not listed individually (with population sizes) on the SPA designation, but are named as part of the species assemblage present on site during either the winter or the breeding season. Such species are denoted with BA = part of the breeding assemblage or WA = part of the wintering assemblage.

Species	**Thames Estuary and Marshes**	**Medway Estuary and Marshes**
Bewick's swan *Cygnus columbianus*		16 (W)
Dark-bellied brent goose *Branta bernicla bernicla*		3,205 (W)
Common shelduck *Tadorna tadorna*		4,465 (W)
Eurasian wigeon *Anas penelope*		4,346 (W)
Eurasian teal *Anas crecca*		1,824 (W)
Mallard *Anas platyrhynchos*		BA, WA
Northern pintail *Anas acuta*		697 (W)
Northern shoveler *Anas clypeata*		76 (W)
Common pochard *Aythya ferina*		BA, WA
Red-throated diver *Gavia stellata*		BA, WA
Great cormorant *Phalacrocorax carbo*		BA, WA
Great crested grebe *Podiceps cristatus*		67 (W)
Hen harrier *Circus cyaneus*	7 (W)	BA
Pied avocet *Recurvirostra avosetta*	283 (W)	28 P (B), 314 (W)
Eurasian oystercatcher *Haematopus ostralegus*		3,672 (W)
Grey plover *Pluvialis squatarola*	2,593 (W)	3,406 (W)
Northern lapwing *Vanellus vanellus*		BA, WA
Common ringed plover *Charadrius hiaticula*	1,324 (P)	768 (W)
Eurasian curlew *Numenius arquata*		1,900 (W)
Black-tailed godwit *Limosa limosa islandica*	1,699 (W)	957 (W)
Ruddy turnstone *Arenaria interpres*		561 (W)
Red knot *Calidris canutus*	4,848 (W)	541 (W)
Dunlin *Calidris alpina alpina*	29,646 (W)	25,936 (W)
Common greenshank *Tringa nebularia*		10 (W)
Common redshank *Tringa totanus*	3,251 (W)	3,690 (W)
Little tern *Sternula albifrons*		28 P (B)
Common tern *Sterna hirundo*		77 P (B)
Short-eared owl *Asio flammeus*		BA
Common kingfisher *Alcedo atthis*		BA
Merlin *Falco columbarius*		BA
Winter assemblage size	75,019	65,496

* Note that the figures given here are for the species and population sizes listed on the Natura 2000 data form, which is the information sent to the EU as part of the SPA designation process. Additional figures for the species occurring in important numbers on these SPAs are available from the SPA Review (Stroud *et al*. 2001); these do not always match the figures in the Natura 2000 form as the

assessment was carried out at a different time. Were an airport development to be taken forward it may be necessary to also consider, as part of the EIA process, any additional species listed as occurring in important numbers on these sites in the SPA review. For these sites, this would add greater white-fronted goose *Anser albifrons*, common shelduck, gadwall *Anas strepera*, northern pintail, northern shoveler, little grebe *Tachybaptus ruficollis*, northern lapwing and whimbrel *Numenius phaeopus* to the list of species named as part of the wintering assemblage on the Thames Estuary and Marshes SPA, and little grebe and whimbrel to the species named as part of the wintering assemblage on the Medway Estuary and Marshes SPA. It would also make it necessary to consider both passage and wintering populations of common ringed plover on both sites.

2.2 Importance of the proposed airport site

Bird numbers on the airport site itself can be assessed using data from the Wetland Bird Survey (WeBS). WeBS is the scheme which monitors non-breeding waterbirds in the UK. The principal aims of WeBS are to identify population sizes, determine trends in numbers and distribution and to identify important sites for waterbirds (Austin *et al*. 2014). The data from the scheme have been used to inform SPA and Ramsar site designations and allow statutory agencies to assess the status of bird populations in SPAs and SSSIs (Cook *et al*. 2013), and the scheme is therefore widely recognised as a reliable reference source for bird population information. WeBS data are collected by many different volunteers counting bird numbers on small sub-sections of the estuary known as count sectors. We can therefore use the data from the count sectors that overlap the likely airport site to assess the numbers of birds that might be affected by habitat loss if an airport development were to go ahead (Figure 2).

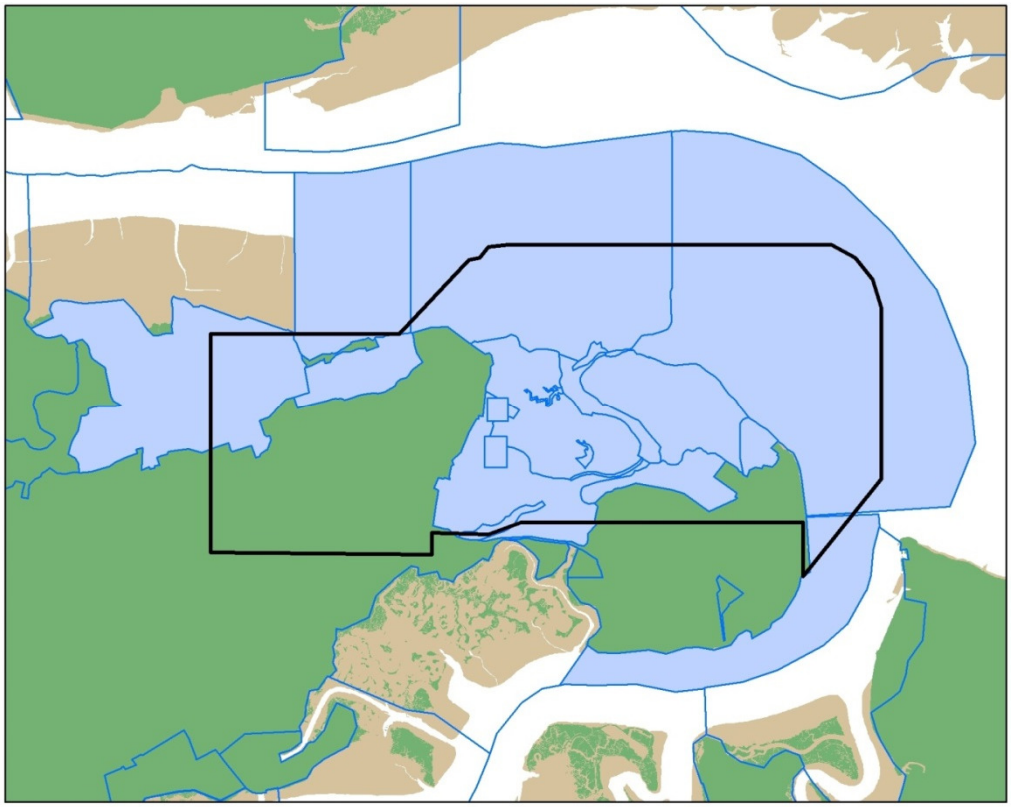

Figure 2. The Isle of Grain, showing the possible location of an airport development (black outline) with WeBS count sectors (blue outlines). Count sectors that overlap the likely location of an airport development, and have been used for the purposes of this assessment, are shaded in blue.

Table 2. The numbers of waterbirds of each species supported in the potential airport development area (blue shaded count sectors in Figure 2) and therefore potentially affected by habitat loss should a development go ahead. Numbers are presented as the most recent five-year peak mean from WeBS. We also show the percentage of the current population of each species on the combined Thames Estuary and Marshes and Medway Estuary and Marshes SPAs that occurs within the potential airport site. Only those species that are listed under the Thames Estuary and Marshes or Medway Estuary and Marshes SPA designations are shown, though other species also occur.

Species	**Numbers in sectors that overlap potential airport (WeBS 5 year peak mean)**	**Percentage of current Thames and Medway SPA populations on the potential airport site**
Bewick's swan	7	70
Dark-bellied brent goose	973	33
Common shelduck	587	13
Eurasian wigeon	290	4
Eurasian teal	4245	85
Mallard	1239	80
Northern pintail	28	3
Northern shoveler	74	9
Common pochard	137	7
Red-throated diver	4	67
Great cormorant	115	28
Great crested grebe	17	8
Hen harrier	No current data	No current data
Pied avocet	24	1
Eurasian oystercatcher	4302	35
Grey plover	767	14
Northern lapwing	1000	7
Common ringed plover	289	34
Eurasian curlew	1969	53
Black-tailed godwit	4486	50
Ruddy turnstone	188	27
Red knot	5770	18
Dunlin	4090	12
Common greenshank	53	43
Common redshank	1035	26
Little tern	5	18
Common tern	41	15
Short-eared owl	No current data	No current data
Common kingfisher	1	14
Merlin	No current data	No current data
All species combined (including non-SPA species)	21,681	25

2.3 Bird species guilds

Within this review, for simplicity and for the purposes of drawing general conclusions bird species have been divided into five guilds with similar traits including feeding habitat and method, habitat dependence, site dependence, site fidelity and lifespan. The guilds are as follows:

- Primarily intertidal invertebrate feeders (except bivalve specialists)
- Primarily intertidal bivalve specialists
- Piscivores
- Generalist wetland species
- Birds of prey

Generalist wetland species are those that use both freshwater and estuarine habitats; some of these species may have specific habitat requirements, and therefore they are not true generalists, but they will all use both freshwater and estuarine habitats. It is important to note that many species may fall into more than one of the categories. In these cases, species have been assigned to their primary guild (Table 3). However such species may benefit from measures that are beneficial for other guilds with which their niche overlaps. For example, black-tailed godwits (a generalist wetland species) tend to feed on bivalves when using intertidal habitat, so they would be likely to benefit from any measures that are beneficial to intertidal bivalve specialists. Other waders, including whimbrel and Eurasian curlew, which have been assigned to the generalist wetland species guild, tend to feed on intertidal invertebrates when using estuarine habitats, so are likely to benefit from any measures that are beneficial to intertidal invertebrate feeders. Within some guilds it is possible to further subdivide the constituent species into families, for example wildfowl *Anatidae* (ducks, geese and swans) and waders *Charadriiformes*.

Table 3. Species guilds, and traits of species within each guild. Only species that are named on the designation for the Thames Estuary and Marshes or Medway Estuary and Marshes SPA designations are included.

Species	Population Status[1]	Habitat Dependence[3]	Site Dependence[4]	Site Fidelity[5]	Typical Lifespan (years)[6]	Migration Distance[7]	Migration Direction[7]
Primarily intertidal mudflat invertebrate feeders (except bivalve specialists)							
Common shelduck	Declining	High	High	Low	10	Short	E
Grey plover	Declining	High	High	High	9	Long	NE
Common ringed plover	Declining	High	Low	High	5	Long	Passage: NE (some NW) Wintering: UK & NE
Ruddy turnstone	Declining[2]	High	Low	High	9	Long	NW
Dunlin	Declining	High	High	High	5	Long	Passage: NW Wintering: NE
Common greenshank	Increasing[2]	High	Low	High[4]	No data	Long	NE
Common redshank	Declining	High	Low	High	4	Long / Short	NW (some NE)
Primarily intertidal mudflat bivalve specialists							
Eurasian oystercatcher	Stable	High	High	High	12	Short	NE
Red knot	Declining	High	High	Low	7	Long	NW
Piscivores							
Great cormorant	Declining	Low	Low	High	11	Short	UK (some E)
Red-throated diver	No data	High	Low	No data	9	Short	NE (NW)
Great crested grebe	Declining	Low	Low	High	No data	Short	UK (some E)
Little tern	No data	High	Low	No data	12	Long	S
Common tern	No data	High	Low	No data	12	Long	S
Common kingfisher	No data	Low	Low	No data	2	Short	UK (few E)
Generalist wetland species							
Bewick's swan	Declining[2]	High	High	Low	9	Long	NE
Dark-bellied brent goose	Declining	High	High	High	11	Long	NE
Eurasian wigeon	Increasing	High	Low	Low	3	Long (short)	E
Eurasian teal	Increasing	High	Low	Low	3	Long (short)	E (some NW)
Mallard	Declining[2]	Low	Low	Low	3	Long / Short	E & UK

Species	Population Status[1]	Habitat Dependence[3]	Site Dependence[4]	Site Fidelity[5]	Typical Lifespan (years)[6]	Migration Distance[7]	Migration Direction[7]
Generalist wetland species (continued from previous page)							
Northern pintail	Declining	High	High	Low	3	Long (short)	E (some NW)
Northern shoveler	Declining	High	Low	Low	3	Long	E
Common pochard	Declining[2]	Low	Low	Low	3	Long (short)	E
Pied avocet	Increasing	High	High	High	No data	No data	No data
Northern lapwing	Declining	Low	Low	High	No data	Long	UK & E
Eurasian curlew	Declining	High	Low	High	5	Long (short)	UK & E
Black-tailed godwit	Increasing	Low	High	High	18	Long	NW
Birds of prey							
Hen harrier	No data	Low	No data	No data	7	Short	UK (some E/NE)
Short-eared owl	No data	Low	No data	No data	No data	Short	UK (some E/NE)
Merlin	No data	Low	No data	No data	3	Short (long)	UK (some NW)

[1] Whether the species has undergone a >25% decline (or >33% increase) over a 5-, 10- or 25-year period either on the Thames Estuary and Marshes SPA, Medway Estuary and Marshes SPA, or nationally (Cook *et al*. 2013).

[2] Species for which trends were only available at the national level.

[3] Qualitative assessment based on BTO expert judgement.

[4] Assessed using 2011/12 WeBS data: species for which 50% of the Great Britain population was found on 10 or fewer sites are classified as having High site dependence.

[5] Based on the 'WeBS Alerts Biological Filter' (Austin *et al*. 2003) in which a scoring system is used to assess the natural fluctuations in species' numbers between winters. Species with scores of five or below (for which a filter would be applied to 'High Alerts' in this system) are classified as typically exhibiting low site-fidelity, those with scores of 6-8 as typically exhibiting high site-fidelity. This method of defining site fidelity is a standard approach used in the WeBS Alerts system which monitors changes in the populations of designated waterbird species on SPAs and SSSIs (Austin *et al*. 2003).

[6] Longevity figures from "BirdFacts" (Robinson 2005).

[7] Migration distances and directions are taken from the Migration Atlas (Wernham *et al*. 2002) in conjunction with expert knowledge. Where two migration distances are stated, the first is the migration distance of the wintering population, with the second (in brackets) the breeding population. In most cases wintering populations are considerably larger than breeding populations, for example for many duck species. Migration direction is the direction the species moves from the greater Thames area in the breeding season. Species that move NW mostly breed in Greenland or Iceland, those that move NE breed in Fennoscandia or Russia, those that move E breed in Eurasia, UK indicates the species breeds elsewhere in the UK and winters in the greater Thames area.

3. REVIEW OF THE ABILITY OF BIRD POPULATIONS TO RESPOND TO THE LOSS OF HABITAT ASSOCIATED WITH LARGE SCALE DEVELOPMENTS, USING EXAMPLES TAKEN FROM AROUND THE WORLD

3.1 Introduction

Habitat loss and degradation are undoubtedly amongst the most important processes driving the declines of bird species. These processes are widespread due to different anthropogenic pressures across the world and affect a wide range of habitats and the species that rely on them. Coastal wetlands support large numbers of waterbirds particularly during the non-breeding season, providing them with the type and amount of resources needed to survive the winter months and/or refuel during migration (van de Kam *et al*. 2004). In fact, these habitats are crucial for the survival of many wetland bird species as very high proportions of their populations are reliant on them. As a consequence of the waterbirds and other wildlife that they support, many wetlands across the world have protected status, for example, under the Ramsar Convention on Wetlands of International Importance (http://www.ramsar.org/cda/ramsar/display/main/main.jsp?zn=ramsar&cp=1_4000_0__) and, in Europe, as Special Protection Areas under the EC Directive on the Conservation of Wild Birds (Directive 2009/147/EC – the codified version of Council Directive 79/409/EEC as amended – the 'Birds Directive'; http://jncc.defra.gov.uk/page-162).

However, despite their ecological importance, extensive areas of coastal wetlands have been and are being lost globally, through conversion into land for agriculture, industry, harbours, housing and other developments, as well as tidal power and amenity barrage schemes (Davidson *et al*. 1991, Boere *et al*. 2007). For example, over 146,000 ha of wetlands were lost in the Atlantic coast of United States between 1998 and 2004 (Stedman and Dahl 2008) and approximately 45,000 ha of offshore habitats, of which 21,800 ha was intertidal mudflat, were claimed between 1994 and 2010 in Bohai Bay, north-western Yellow Sea (Yang *et al*. 2011). In Europe, much intertidal habitat has also been lost through such processes historically, although development pressures remain (e.g. Hurley 2003, http://webarchive.nationalarchives.gov.uk/+/http:/www.dft.gov.uk/pgr/shippingports/ports/dl/associatedbritishportsimming4915?page=3).

In addition to causing direct loss of habitat, such developments may also impact the quality of remaining coastal wetland habitat through changes to water and sediment flow and changes in nutrient inputs and water quality. Further to such land claim pressures, wetland habitat is also currently threatened by the effects of climate change, particularly by sea-level rise, which will most probably cause significant habitat loss (Watkinson *et al*. 2004, Jones *et al*. 2009). These habitat losses have put pressure on migrating and wintering waterbird populations and led to population declines of many species worldwide (International Wader Study Group 2003). As a consequence, a significant number of both theoretical and empirical studies have been carried out to understand the processes through which habitat loss may impact waterbird populations.

The impacts of habitat loss of local bird populations will be dependent on a number of factors, principally the availability and proximity of suitable habitat. Should alternative sites be limited in quantity or quality and already at or near capacity, increased densities may lead to intense competition for available resources (Goss-Custard 1985, Goss-Custard *et al.* 2002). Such increased competition may lead to a reduction in body condition for poorer competitors and consequently lead to impacts on an individual's 'fitness', most notably a decrease in survival rates. Local populations may also be impacted through emigration from the site, if resources for displaced birds are limited. Habitat loss may also impact the breeding success of waterbird species, either through the direct reduction in the extent of habitat or through changes in its quality.

Through impacts on survival rates and breeding success, and potentially increased emigration, habitat loss may thus directly lead to local population declines. Furthermore, for migratory species, the conditions experienced at one point of the annual cycle can be carried over into subsequent stages, reduced breeding success and survival, potentially therefore impacting populations both locally during one season and further afield in another.

Here, we provide a summary of theoretical studies of the impacts of habitat loss on waterbird populations, review empirical case studies of the impacts of the loss of intertidal habitat and roost sites on waterbirds, and discuss other potential impacts.

3.2 Modelling the impacts of habitat loss

Different models have been developed to estimate the population size that can be supported on sites and thus, assess changes in population abundance due to changes in environmental conditions. The most straightforward are habitat association models that predict bird numbers or density from habitat characteristics, such as prey density (e.g. Goss-Custard *et al*. 1991), habitat area (e.g. Rehfisch *et al.* 1997) or other variables that are good predictors of food availability (e.g. Goss-Custard & Yates 1992). However, despite the ease of predicting population abundance under new environmental conditions (e.g. reduction of area), these models may overestimate the effect of habitat loss on population size at local and global scale as they fail to predict the effect on fitness and demographic rates and individuals compensatory behaviour (e.g. individuals moving to another site after habitat loss) (Goss-Custard 2003).

Spatial depletion models have been also applied to predict the likely impact of habitat changes on the number of individuals that can be supported by the food available in a given area (i.e. carrying capacity) by changing the food abundance parameters. This approach has been widely used for wintering populations of wildfowl in the UK. For example, Percival *et al*. (1998) used depletion model to predict the effects of food loss due to intertidal habitat loss on the abundance of wildfowl and showed that the impact was dependent on the location of the loss, with greater impacts when food was lost from upper shore mudflats compared with an equivalent food loss from the lower shore, as a result of the longer exposure and thus accessibility of upper shore habitats. However, the results generated from another type of depletion model – a daily ration model, where the total amount of consumable food is divided by the daily food requirement of an individual bird – by Goss-Custard *et al*. (2003) for the same wildfowl species suggested that habitat loss reduces the total amount of prey available and thus the carrying capacity of the site, irrespective of prey location. Nevertheless, both studies predicted a general loss of the site's carrying capacity. Depletion models have been also applied to predict the abundance of black-tailed godwit at a range of spatial scales and, by incorporating different levels of prey density in the model, the effects on godwits' abundance of processes altering prey density, such as habitat loss and degradation, have been investigated (Gill *et al*. 2001b). However, depletion models assume all individuals to be identical and not to compete for food and, as with habitat association models, impacts on fitness and demographic rates (survival, breeding success) due to changes in environmental conditions cannot be predicted.

Individual-based models (IBMs) have been developed to predict how changes in the quality, quantity and accessibility of food resources will impact the fitness of the individuals, through density-dependent processes. The models using a theoretical framework that follows the fitness-maximising decisions of individuals and information on food resources to predict impacts on demographic rates that determine population size (Stillman 2003, 2008, Stillman & Goss-Custard 2010, Stillman *et al.* 2007). For example, early work by Goss-Custard *et al*. (1994) predicted a mean increase in winter Eurasian oystercatcher mortality as a result of increased bird density and intensified competition following a reduction of feeding habitat available. Subsequently, IBMs have been developed for

several waterbird species at several European sites, and have been shown to predict accurately overwinter mortality, and the foraging behaviour from which predictions are derived. They have been used to predict the effect on survival in coastal birds of habitat loss, sea-level rise, wind farm development, shellfishing and human disturbance (Stillman & Goss-Custard 2010). For example, a mean increase in winter mortality was predicted for common redshank following the loss of intertidal feeding habitat at Cardiff Bay, UK (Goss-Custard *et al*. 2006), where competition due to depletion or interference or both was suggested as the main causes of the increased observed mortality. Likewise, a study on the Humber Estuary using the IBM approach, accurately predicted the observed distributions of nine species of wader, and predicted decreased survival rates in five species (common redshank, grey plover, black-tailed godwit, bar-tailed godwit and Eurasian curlew) due to potential reductions in intertidal area of 2-8% that might be expected through sea level rise and industrial developments (Stillman *et al.* 2005).

3.3 Case studies

Case studies of the impacts of the loss of intertidal habitat and roost sites on waterbirds are reviewed below and summarised in Table 4, highlighting the species concerned and observed impacts.

3.3.1 Loss of intertidal feeding habitat

The case studies outlined below primarily concern the loss of habitat in the non-breeding seasons, i.e. sites used during the winter months or as staging sites on spring or autumn passage. Loss of habitat at these times, when birds need to spend much of their time feeding to meet energy demands (either because of winter weather or to store fat and increase muscle size for long-distance flights and, in spring, as insurance against food shortage on arrival at breeding grounds) (Evans *et al.* 1991), may directly impact birds' survival.

3.3.1.1. The East Atlantic Flyway

The impacts of historic losses of intertidal habitats in Europe on waterbird populations have been documented by Davidson *et al.* (1991), though knowledge is limited of the scale of these impacts is limited due to an absence of data from monitoring schemes (such as the Wetland Bird Survey). Nevertheless, there have been a number of applied studies in recent decades that have evaluated impacts in more detail. Typically, these, have been reliant on inferring impacts from count data alone, and only recently with the development of the theoretical frameworks described above have impacts on the mechanisms of population change, i.e. survival, breeding success, been investigated. However, most applied studies around the world have shown that observations are not far from model predictions and that the loss of waterbird habitats can lead to a decline in waterbird numbers.

In the UK, the impacts of a loss of 60% of an area of intertidal habitat on the Tees Estuary (previously much reduced historically through land claim) were studied by Evans (1978-79) and Evans *et al.* (1979). Critically in this case, not only was the extent of habitat reduced, but also the available feeding time across the tidal cycle. As a result, dunlin and common redshank on the estuary were forced to supplement their feeding in non-tidal areas over the high tide period, and when these areas became unavailable in cold winter weather, dunlin numbers fell (either due to increased mortality or emigration).

Similar impacts on local numbers of wintering waterbirds have been seen in other case studies in the UK and northwest Europe. For example, McLusky *et al.* (1992) recorded significant declines in the local populations of dunlin and bar-tailed godwit at Torry Bay on the Firth of Forth following loss of

20% of the intertidal habitat there in 1978-79. Similarly, in Denmark, Laursen *et al.* (1983) reported declines in the local populations of five wildfowl species and eight of 12 species of wader after a new dyke enclosed 11 km^2 of intertidal mudflats and saltmarsh. At Nordstrand Bay on the German Wadden Sea coast, following land claim of 33 km^2, numbers of wintering dark-bellied brent geese, shelduck and most waders (red knot, bar-tailed godwit, spotted redshank, common redshank and greenshank) all declined. In contrast, numbers of barnacle geese and Eurasian wigeon, that were able to use the embanked grassland habitat created, increased (Hötker 1997).

It is important to understand the mechanisms of behavioural responses and their causes and consequences to be able to improve our ability to predict the effects of human-induced environmental change on individuals and thus populations (Tuomainen & Candolin 2011). A major factor contributing largely to the declines of waterbirds is strong site fidelity within and between winters (Rehfisch *et al.* 1996, Burton *et al.* 1997, Burton 2000), a characteristic that is known to strongly influence patterns of occupancy (Jackson *et al*. 2004), particularly given the longevity of these birds. Individuals return to the same site every winter and, despite migrating long distances from breeding to wintering grounds, between year movements are limited as individuals benefit from the knowledge gained upon their return, in terms of territoriality, knowledge of spatial and temporal variation in resources, and improved ability to avoid predation (Rehfisch *et al*. 1996). Where birds show high levels of site fidelity the consequences of habitat loss are potentially more serious.

Depending on the strength of site fidelity of the species, individuals may change their behaviour in response to habitat loss and move into an alternative habitat. However, the ability to relocate into new sites depends on factors such as the proximity of new sites and whether these sites have enough resources to support the displaced birds (Goss-Custard *et al*. 2002), and prior knowledge and age (Burton & Armitage 2008). For example, following the loss of saltmarsh at Rodenäs Vorland, on the German Wadden Sea, long distance movements were more frequent amongst the displaced dark-bellied brent geese, and many of these birds moved to less preferred sites that were apparently below their carrying capacity and therefore able to support the increased densities without an apparent decline in survival (Ganter & Ebbinge 1997, Ganter et al. 1997).

Burton & Armitage (2008) showed that common redshank, a highly site faithful species (Rehfisch *et al*. 1996, Burton 2000), appeared to be reluctant to leave their wintering site following intertidal habitat loss from the construction of a barrage at Cardiff Bay, in the Severn Estuary. However, birds were forced to move from the bay in the winter following the loss of habitat and settled at the nearest alternative foraging sites, increasing the densities of birds at those sites. These processes were influenced by prior knowledge of the individuals, with young birds being less attached to the bay than older bids and so more plastic in their response to change.

Almost all the common shelduck, Eurasian oystercatcher, dunlin, Eurasian curlew and common redshank that formerly used the bay were displaced by its inundation (Burton 2006, Ferns & Reed 2008). Counts and observations of marked birds in the first winter following closure indicated that some displaced common shelduck, Eurasian oystercatcher, Eurasian curlew and common redshank settled at adjacent sites within 4 km. However, these increases were not sustained in following winters. It was not possible to determine whether displaced dunlin were able to settle elsewhere due to an ongoing decline of the local population.

The study at Cardiff Bay also evaluated the impacts of the displacement of common redshank on their fitness. Burton *et al*. (2006) showed that the loss of habitat in Cardiff Bay impacted the body condition and survival of the redshank wintering there before the loss. Displaced common redshank had difficulty maintaining their mass in the first winter post-barrage closure, with adults from Cardiff

Bay being significantly lighter than those from the recipient site, probably resulting from the combination of increased competition for food at the recipient site, as there was higher bird densities, and the lack of experience of displaced birds, as they were highly faithful to the bay and had less knowledge about the new site. Additionally, the survival rates of adult redshank displaced from the bay declined, whereas the survival of common redshank from the recipient site did not change, suggesting that the increased mortality resulted from their displacement. Without an increase in recruitment of juveniles into the local population, such increases in mortality rate will reduce the local population size.

Extensive study has also been made of the impacts of intertidal habitat loss on the waterbirds in the Dutch Delta region, notably that associated with the construction of a storm surge barrier on the Oosterschelde (Lambeck, Sandee & de Wolf 1989; Meire 1991, 1996; Schekkerman, Meininger & Meire 1994). Eurasian oystercatchers displaced by this loss of mudflats were significantly lighter than those originally ringed at other neighbouring sites (Lambeck 1991). The impact of this habitat loss on the survival of Eurasian oystercatcher was evaluated through an analysis of ringing data by Duriez *et al.* (2009). During mild winters, survival rates were very high, and similar to before the closure in both changed and unchanged sectors of the Oosterschelde. However, the combined effect of habitat loss with severe winters decreased the survival of birds from changed sectors and induced emigration.

These two case studies provide the best evidence to date for impacts on the mechanisms of population change, thereby clearly linking population changes to the recorded loss of habitat.

3.3.1.2 The East Asian-Australasian Flyway

In the present day, the most significant loss of intertidal habitat is occurring in the East Asian-Australasian Flyway, most notably in the Yellow Sea, where extensive areas of intertidal flat are being claimed for development each year.

At Saemangeum in the Republic of Korea, Moores *et al.* (2008) recorded a decline of 100,000 waders in their main study site, including 15 out of the most numerous 24 species, from 2006-2008 following conversion of two free-flowing estuaries and 40,100 ha of tidal-flats and sea-shallows into a vast reservoir and land, through the construction of a 33-km long seawall. This included 90,000 great knot; nine other species showed declines of 30% or more, including the spoon-billed sandpiper (listed as Critically Endangered under the IUCN Red list: http://www.iucnredlist.org/). The survey found no evidence that shorebirds lost to Saemangeum had relocated elsewhere within the Republic of Korea. Further, the MYSMA data reveal a large decline in Great Knot reaching Australian non-breeding grounds following closure of the Saemangeum sea-wall and analysis suggests that the global population of the great knot could already have declined by 20% due to this single land claim.

In Bohai Bay, China, there has been an increase of waterbird densities in the remaining intertidal mudflats following the loss of one third of the original area during 1994-2010 (Yang *et al*. 2011), which, as described earlier, is predicted to cause a decrease in the survival of birds forced to aggregate together or to relocate nearby.

3.3.2 Loss of roosting sites

Several other studies have linked local population declines with loss of high tide roosting sites. For example, in the Tagus estuary (Portugal) decreases of wintering populations of dunlin, grey plover and common redshank have been attributed to the loss and degradation of roost sites, as there were no changes in the quality of intertidal area that could explain such declines (Catry *et al*. 2011). In the

north-east cost of England, roosting numbers of purple sandpiper, turnstone and red knot declined following a harbour redevelopment, although here there was no evidence that this impacted local populations as a whole (Burton *et al*. 1996).

Roost fidelity and preferences are variable among waders (Rehfisch *et al*. 2003, Conklin *et al*. 2008) and thus, the loss of roosting sites will have a greater negative effect in species that show strong roost fidelity (e.g. Eurasian oystercatcher, common ringed plover, purple sandpiper, common redshank). Loss of roost sites will increase the probability of birds having to undertake energetically demanding flights between feeding and roosting areas and this may impact their body condition and thus decrease their probability of survival (Rehfisch *et al*. 2003). Furthermore, there is evidence that the location of roosting sites is very important for the distribution of foraging waders, with bird density declining with distance from their roost (Dias *et al*., 2006), probably as a result of strategies to minimise the energy expenditure spent between foraging and roosting sites (Luís *et al*., 2001, Rogers, 2003). In addition, the pattern of use of intertidal areas for some species can result from a trade-off between the distance from roosting sites and the quality of foraging locations (van Gils *et al*. 2006) or safe feeding grounds (Rehfisch *et al*. 1996, Rogers *et al*. 2006). Thus, the loss of high tide roosts may increase the inaccessibility to important intertidal areas to birds, and high quality areas may become too far away to be exploited (Dias *et al*. 2006, van Gils *et al*. 2006), which may force birds to feed in lower quality areas and ultimately influence their fitness and overwinter survival.

Table 4. Summary of the observed impacts on waterbirds due to habitat loss and degradation.

Study	Species	Observed impact
Loss of intertidal feeding habitat		
Evans (1978-79) Evans *et al.* (1979)	Common shelduck, grey plover, dunlin, bar-tailed godwit, Eurasian curlew, common redshank	Displacement and local population declines
McLusky *et al.* (1992)	Dunlin, bar-tailed godwit	Displacement and local population declines
Laursen *et al.* (1983)	Common shelduck, mallard, Eurasian teal, Eurasian wigeon, northern pintail, grey plover, golden plover, dunlin, bar-tailed godwit, Eurasian curlew, spotted redshank, common redshank, common greenshank	Displacement and local population declines
Hötker 1997)	Dark-bellied brent goose, shelduck, red knot, bar-tailed godwit, spotted redshank, common redshank, greenshank	Displacement and local population declines
	Barnacle goose, Eurasian wigeon	Local population increases (due to associated habitat creation)
Ganter & Ebbinge (1997) Ganter, Prokosch & Ebbinge (1997)	Dark-bellied brent goose	Displacement into less preferred sites, no apparent impact on survival
Burton & Armitage (2008) Burton *et al*. (2006) Ferns & Reed (2008)	Common shelduck, Eurasian oystercatcher, dunlin, Eurasian curlew and common redshank	Displacement and local population declines; for common redshank, decreased body condition & survival
Duriez *et al.* (2009), Lambeck (1991), Lambeck, Sandee & de Wolf (1989), Meire (1991, 1996), Schekkerman, Meininger & Meire (1994)	Eurasian oystercatcher and other wader species	Displacement and local population declines; for Eurasian oystercatcher, decreased body condition & survival
Moores *et al*. (2008)	Eurasian oystercatcher, Kentish plover, lesser sand plover, great knot, red knot, red-necked stint, dunlin, sharp-tailed sandpiper, spoon-billed sandpiper, black-tailed godwit, bar-tailed godwit, far eastern curlew, common greenshank, Nordmann's greenshank, ruddy turnstone	Local population declines; for great knot, global population decline
Yang *et al*. (2011)	Red knot, curlew sandpiper	Displacement and local population increases in the remaining habitat
Loss of roosting sites		
Catry *et al*. (2011)	Grey plover, dunlin, redshank	Local population declines
Burton *et al*. (1996)	Red knot, purple sandpiper, turnstone	Displacement

3.4 Other impacts

3.4.1 Loss of breeding habitat

Freshwater wetland habitats associated with estuaries are also crucial for many wintering and breeding waterbirds species, and have also historically been under significant pressure from both urban development and agricultural intensification (Wilson *et al.* 2004, 2005, Fuller & Ausden 2008, Sutherland *et al*. 2012).

Many breeding waders of lowland wet grasslands have undergone dramatic population declines. For instance, breeding northern lapwing, common snipe and common redshank have declined by 29, 38 and 61%, respectively over the last 20 years in England, and 64% of all grassland-breeding waders have become restricted into few key sites (Wilson *et al*. 2005). These declines are primarily driven by habitat loss and degradation through the conversion into arable land and agriculture intensification, such as re-seeding, use of artificial fertilizers, changes in water levels, cutting date and grazing, all decreasing the suitability of grassland for most breeding wader species (Sutherland *et al*. 2012 and references therein). For example, increased use of fertilizer combined with warmer temperatures allows earlier cutting and grazing dates for some grasslands (Kleijn *et al*. 2010), resulting on increases of nest loss and chick mortality and so, decreases in the overall productivity (Kruk *et al*. 1996). The advances on time of mowing and grazing can also affect chick-rearing habitat that may lead to a further reduction on chick survival (Schekkerman *et al*. 2008). Agricultural intensification is also normally accompanied with a decrease in invertebrate size and densities, which can decrease the intake rates and the profitability of prey items for chicks and therefore reducing chick survival (Beintema *et al*. 1991). The proportion of nest lost through trampling have also increased due to increase in domestic stock densities (Beintema & Muskens 1987), which also can alter the habitat structure, reducing the availability of tussocky grassland preferred by nesting species such as common redshank (Milsom *et al*. 2000).

Direct studies of lowland wet grassland habitat loss through urban development, rather than change due to agricultural intensification are lacking. However, direct habitat loss has the potential to impact the breeding success of waterbird species, either through the direct reduction in the extent of habitat or through changes in its quality, and the effects associated with agricultural intensification are, as such relevant.

3.4.2 Carry-over effects

Migratory species depend on multiple locations during their annual cycle that can spread over different continents and thereby encompass very different environmental conditions (Newton 2008). Large-scale variation in local weather conditions and in the quality and quantity of resources can result in different costs and benefits for individuals and have future implication for their fitness. The conditions experienced during one part of the annual cycle can carry over into subsequent stages (reviewed in Harrison *et al*. 2011). For example, variation in environmental conditions experienced in the winter can drive variation in individual survival and subsequent breeding success, or both, as shown for the black-tailed godwit. In Icelandic godwits, studies have shown that early arrival to the breeding grounds is positively related to breeding success (Gunnarsson *et al*. 2005, 2006). Individuals wintering in good quality habitats also tend to occupy good quality habitats at the breeding grounds, while individuals wintering in less favourable sites tend to occupy poor quality breeding habitats (Gill *et al*. 2001a, Gunnarsson *et al*. 2005), with males in poor quality breeding sites being more likely to be unpaired and experience lower breeding success than males in good quality sites (Gunnarsson *et al*. 2012). Furthermore, higher energy costs experienced in winter due to less favourable

environmental conditions are associated with lower survival (Alves *et al*. 2013), and delayed arrival in Iceland, thus lower probability of occupying good quality breeding habitat.

Inger *et al*. (2010) have studied carry over effects in light-bellied brent goose in relation to reproductive success. Adults with families use lower quality resources than non-breeders in wintering grounds, likely constrained by the low foraging efficiency of juveniles. So, parental adults end the winter in poorer body conditions than adult non-breeders, leading to a late arrival on the breeding grounds, and hence a reduced probability of successful breeding the following year. This suggests that the conditions that adults experience during the non-breeding season are carried over into the breeding season.

Thus, the consequences of habitat loss and degradation at any point of the species' migratory cycle can not only have negative consequences for the individual at that point but the effects can be carried over to the subsequent periods, and can therefore have far-reaching consequences for the entire population.

4. HIGH-LEVEL REVIEW OF POTENTIAL HABITAT CREATION MITIGATION AND COMPENSATION MEASURES AVAILABLE AND ASSOCIATED ISSUES, AND THE APPROXIMATE COSTS PER UNIT AREA OR BIRD OF SUCH MEASURES

4.1 The need for mitigation or compensation measures

Under the Planning Act (2008), when preparing an application for a nationally significant infrastructure project (NSIP), developers should consider the potential effects on protected sites. If a NSIP – such as an airport development on the Thames Estuary – is likely to affect a European site or European marine site – such as the Thames Estuary and Marshes SPA or Medway Estuary and Marshes SPA – the developer must (under the 2010 Habitats Directive: 92/43/EEC) undertake a Habitats Regulations Assessment (HRA) to enable the decision maker to make an appropriate assessment as to any 'likely significant effects' following any proposed mitigation (http://infrastructure.independent.gov.uk/wp-content/uploads/2011/04/Advice-note-10-HRA-web.pdf).

Mitigation measures could include changes to the design of the development to reduce the impacts on birds, or the creation of new habitat for birds in the local area (i.e. within the Thames Estuary and Marshes SPA or Medway Estuary and Marshes SPA).

Article 6(4) of the EC Habitats Directive allows plans or projects which may have an adverse effect on the integrity of a European site or European marine site to go ahead on grounds of 'imperative reasons of overriding public interest' (IROPI) when there are no alternative solutions and compensatory measures have been secured. Compensation is normally only considered where it is not possible to provide sufficient mitigation locally to account for the magnitude of the predicted impacts. In the case of an airport development on the Thames Estuary, compensation measures might involve the creation of new habitat further afield – either adjoining or at a distance from the Thames Estuary and Marshes SPA or Medway Estuary and Marshes SPA.

4.2 Potential habitat creation mitigation or compensation measures and their scope

The potential mitigation and compensation measures considered here involve habitat creation either within the Thames Estuary and Marshes SPA or Medway Estuary and Marshes SPA, close to these estuaries or at a distance.

Mitigation measures might include:

1. Intertidal habitat creation within the Thames Estuary and Marshes SPA or Medway Estuary and Marshes SPA to replace lost feeding habitat (e.g. through topographical modification);
2. Creation of roost sites where might be lost, e.g. due to loss of saltmarsh or coastal freshwater marsh.

Compensation measures might include:

1. Managed realignment adjoining the Thames Estuary and Marshes SPA or Medway Estuary and Marshes SPA to create intertidal habitat;
2. Managed realignment at a distance from the Thames Estuary and Marshes SPA or Medway Estuary and Marshes SPA to create intertidal habitat;
3. Creation of freshwater wetland habitat close to the Thames Estuary and Marshes SPA or Medway Estuary and Marshes SPA.

4.3 Factors that may limit the effectiveness of mitigation or compensation measures

A range of factors is likely to influence the effectiveness of mitigation or compensation measures. These include:

- Optimising the design of intertidal habitat creation for birds;
- The need for ecologically linked areas;
- Site-fidelity and habitat equivalency;
- Implications for flyway populations.

These issues are discussed in detail below.

4.3.1 Design criteria for optimising intertidal habitat creation for SPA birds

The science behind the restoration and creation of many terrestrial habitats is well advanced. However, intertidal habitats pose special problems for restoration because they are topographically and ecologically complex and they support many species of animals, some of which require specific habitats and linkages to other terrestrial or marine habitats. Moreover they exist and evolve within dynamic coastal settings, subject to changing tidal levels, salinities and long term mechanical processes that are associated with sea-level rise and climate change. Often these complexities are ignored and there has been a tendency for created coastal habitats to lack the diversity seen in natural areas and support only generalist species.

In northwest Europe, experience of creating new wetland habitat, especially mudflats, is fairly limited but expanding at a rapid rate. It has included the use of dredged material or managed realignment to create or restore areas. Until recently, relatively few studies had monitored the impact on waterbirds and the majority of published literature on managed realignment in the UK has concerned non-biological processes such as geo-chemical changes, tidal exchange, persistence of saltmarsh in unmanaged retreat sites and policy related to managed realignment (http://www.abpmer.net/omreg/). However some notable studies published in the last decade have assessed how biodiversity, including birds, respond to the creation of new intertidal habitat (e.g. Atkinson *et al*. 2004, Garbutt *et al*. 2006, Mander *et al*. 2007, Mossman *et al*. 2012, Spencer *et al*. 2012).

It is perhaps not surprising that relatively little has been published in the peer-reviewed literature on the long-term biological development of created intertidal habitat (though see Garbutt *et al*. 2006 and Mossman *et al*. 2012), as sites at which habitat creation or restoration has been practised in the UK are relatively young and generally less than 15 years old. Within this short timeframe, the potential for ecological communities to develop and change is relatively limited. Elsewhere in north-west Europe, large areas of man-made marshes and mudflats are found in the Wadden Sea. Although only a fraction of the area present prior to human intervention, these intertidal habitats are still the largest contiguous area of saltmarsh in Europe. In the Netherlands alone, there are over 17,000 ha of man-made saltmarshes, created specifically for flood defence purposes rather than for any other environmental benefit (Esselink 1998). This policy is changing and saltmarshes on the North Sea coasts of Germany, Belgium, the Netherlands and Denmark, which are of high conservation importance because of the large concentrations of wintering, passage and breeding waterbirds that they support, are now increasingly being managed for nature conservation purposes (Esselink 2000). Again little has been published in the peer-reviewed literature although the created marshes at Sieperda in the Netherlands are a notable exception (Castelijns *et al*. 1997, Eertmann *et al*. 2002).

Elsewhere in the world, Japan has led the way in creating tidal mudflats and, according to the Environment Agency of Japan, 37 areas covering approximately 900 ha were created between 1973

and 1998 (WAVE 2001a, 2001b). This is small compared to the loss of nearly 4,000 ha (42% to reclamation) over the same time period (WAVE 2001a, 2001b), and most of the sites are also relatively small in scale.

Research has therefore been geographically rather limited and focussed on particular habitats or ecosystems. One of the largest issues, rarely tackled, has been a detailed assessment of the physical, temporal and biological factors that determine the resulting habitats and communities and how these relate to the range of variation found in natural areas. Most studies have simply described the biological communities and the changes within them. Restoration schemes have also generally been small (both in extent and number) compared with surrounding 'natural' areas and their scale will affect the use made of such areas by birds in ways independent from the type and quality of habitat created. Where comparisons are made, differences in sampled attributes between created and restored sites are often masked by the high natural variability in these attributes between different. This means that results from many studies may not be applicable at a larger (i.e. regional rather than site) scale.

This makes the definition of a 'successful' restoration quite difficult, given that natural habitats are very varied and restoration sites have tended to be small. It may be that we can only create a subset of coastal wetland habitats. To be able to restore or create habitats for birds successfully, they should exhibit the functions and processes within the variation found in surrounding natural habitats at a range of spatial scales. In many cases, this will mean allowing dynamic change to take place, e.g. allowing habitats to shift upshore in relation to sea level rise. In estuaries, it means taking a strategic approach at the flood plain level, using the whole estuary as a functional unit rather than concentrating on particular vulnerable areas within the estuary. This type of approach has the advantage of allowing ephemeral habitats such as saline lagoons and fresh/brackish water transitional habitats, which are important for waterbirds, to remain.

4.3.1.1 Are created/restored saltmarshes equivalent to natural marshes?

Experience from the both the UK and United States has led to the conclusion that created saltmarshes provide an approximation of the habitat required by the target birds, but do not necessarily lead to the development of the same plant, invertebrate or bird species assemblage as is to be found on surrounding natural saltmarshes (Edwards & Proffitt 2003, Darnell & Smith 2004, Nottage & Robertson 2005, Mossman *et al*. 2012, Spencer *et al*. 2012). The reasons for these differences are often due to the nature of the sites. Created marshes tend to be on land that was previously used for agriculture. This land has tended to be smooth, flat or gently sloping, and microhabitats that are important for many bird species such as ephemeral pools and creeks were rare. Often restored/created marshes were at an overall higher elevation, had less edge habitat and where present, creeks or channels tended to be deep and steep-sided (Crooks *et al*. 2002, Garbutt *et al*. 2006).

Given the very different soil characteristics, one frequent difference between restored and natural marshes in both the UK and US, is the consolidated nature of the sediments in restored and created saltmarshes (soil structure collapses due to re-wetting with salt water), as well as their lack of natural creek systems, smooth topography and poor drainage (Crooks *et al*. 2002, Fearnley *et al*. 2008). Re-wetted sediments in the UK tend to be extremely hard and tabular in form and, thus, if sediment does not come in from the surrounding area and settle, these hard mud habitats are inhospitable environments for invertebrates and plants. This has led to reduced structural diversity and differences in vegetation communities on some of the naturally-regenerated marshes in SE England (Garbutt & Wolters 2009, Mossman *et al*. 2012).

Some kinds of saltmarsh can never be created. The ancient saltmarshes of North Norfolk, which may be 10,000 years old, feature a very intricate topography of pools and creeks. The pools are remnants of old creeks and as a result of this very varied topography these marshes are amongst the most species-rich in the UK. In contrast, marshes in higher energy, sandier, environments such as the Severn Estuary tend to be species-poor and dominated by species such as *Puccinellia*. This forms an important food source for many species of wildfowl. These marshes are probably easier to recreate in a suitable tidal environment.

4.3.1.2 Do created mudflats function in a similar manner to 'natural' ones?

Mudflat creation is most highly developed in Japan (WAVE 2001a, 2001b), but there are few accessible reports of bird usage from there and success has to be inferred from studies of benthic invertebrates. The best examples of how birds use areas of created or restored mudflats are from UK studies.

Much of the realignment in the UK has been in low energy environments on the east coast. At two of the most intensively studied managed realignment sites in the UK (Tollesbury and Orplands on the Blackwater Estuary in Essex), the sediments became consolidated as re-wetting with saltwater occurred (Garbutt *et al*. 2006). However, accretion of soft sediments was quite rapid and benthic invertebrates colonized relatively quickly and shorebirds and wildfowl soon began to use the site. Common shelduck, dunlin, grey plover and common redshank probably exploited the polychaetes and *Hydrobia* that initially colonised the sites. In three to four years the bivalve *Macoma balthica* colonised and, particularly at Tollesbury, this coincided with increasing usage by red knot, a bivalve specialist. Other species such as Eurasian oystercatcher, which feed mainly on larger bivalves such as cockles and mussels, tended to show very low usage of the site (Atkinson *et al*. 2004). Studies of managed realignment sites on the Wash and the Humber Estuary also suggest that waterbirds colonise within about three years (Badley & Allcorn 2006; Mander *et al*. 2007).

Many more studies look at changes in invertebrate numbers. The speed with which invertebrates colonise these sites tends to be in line with what can be predicted through knowledge of life history traits. Mobile species, and those that have a planktonic larval phase, such as *Nereis* and other polychaetes, and *Hydrobia* colonise in the first year or two. Bivalves and other species that have no planktonic larval phase or take time to grow to a suitable size, such as oligochaetes and larger bivalves, either fail to colonise or take several years to appear (Evans *et al*. 1999,). This has implications for the rates of colonisation by particular guilds of birds, so that species that feed on small polychaetes are likely to colonise before those that feed on large bivalves, a feature observed at various UK realignment sites (Atkinson 2003, Atkinson *et al*. 2004, Mander *et al*. 2007).

Apart from realignment, another common way in which intertidal mudflats are created is through the use of dredged material. These mudflats have been created in a number of countries and invertebrates rapidly colonise these if they are in the correct position in the tidal frame. The exact nature of the invertebrate assemblage is determined by the make-up of the sediment used (sand/silt/mud content); often invertebrate assemblages are different to surrounding reference areas and both higher and lower densities of invertebrate prey have been reported (Bolam & Whomersley 2005, Widdows *et al*. 2006).

4.3.1.3 How can new habitat creation schemes maximise benefits to waterbirds?

Coastal intertidal habitats can be created or restored. The majority of cases where habitat has been recreated involved coastal sites that were created for reasons other than supporting wildlife and success, however it was measured, was often a very hit or miss affair. Most sites supported

populations of waterbirds, but often failed to capture the diversity observed on natural areas (Atkinson 2003).

Most studies looking at the processes underlying restoration/creation have been carried out at small scales in comparison with surrounding areas and often fail to capture the range of natural variation found at the larger scales at which migratory waterbirds usually operate. Successful restoration/creation may take time but, once the general roles of hydrodynamics, sediment dynamics and other forcing factors are understood, then wetland habitats can be created. An adequate supply of sediment is crucial to success. On the east coast of the UK, there is a plentiful supply of sediment and therefore it has been possible to recreate functioning mudflats that support waterbirds in three to five years. For example, at a managed realignment site at Paull Holme Strays on the Humber Estuary, a waterbird assemblage of similar composition to that of adjacent existing intertidal areas was supported within three years of creation (Mander *et al*. 2007). Despite this there are still many uncertainties surrounding the methods required to create habitats that will support specific waterbird species.

Studies of the beneficial use of dredged material have shown that as the sediments de-water and consolidate, invertebrates colonise and over time this may lead to the development of the varied assemblages found on a natural mudflat (Bolam & Whomersley 2005, Widdows *et al*. 2006). In the Thames and Medway Estuaries, if dredged material was to be used to create mudflats, the success of this may well depend on the subsequent movement of sediment in the area through processes such as dredging, erosion or deposition – i.e. will new sediment be deposited and/or will existing sediment be re-suspended and deposited through tidal action. As sediments are deposited, they will de-water and consolidate and the makeup of the sediment as well as availability of soft sediment (through deposition, re-suspension and deposition or bio-turbation) is important in determining invertebrate assemblages and densities. If sediment is re-suspended or slumps lower in the tidal frame then these mudflats may not be viable in the long term. In managed realignment areas on the east coast of England, there has been a sufficient supply of new sediment being deposited in these newly-created areas through the sediment cells in the North Sea that bring new supplies of sediment down the east coast of the UK. Vertical accretion of these new areas has meant that there has been sufficient new soft sediment for invertebrates to colonise rapidly. Were an airport development to go ahead in the Thames Estuary, detailed sediment modelling will be required to predict the range and areas of different types of sediment that will result. Sediment is key to any creation/restoration attempts and an understanding of the resulting types will give more confidence to the prediction of the impacts on benthic invertebrates and birds. Changes to water currents and sediment transport as a result of building an airport in the Thames Estuary may lead to intertidal habitats that support different assemblages or different densities of invertebrates (either higher or lower densities than the present habitats, depending on how the sediments change) which are likely to support different relative densities of wetland bird species than they do now.

Engineering of any created mudflat or saltmarsh is also key to success; it is important that small-scale habitat diversity is recreated. Restored sites have often lacked this range of micro-habitats and tend not to show such habitat diversity at a fine-scale. More recent (and larger scale) realignments have undertaken such surface modifications and have shown that if environmental conditions are suitable and there is a varied topography, the outcome is one where there is a complex mix of microhabitats that support a wide range of waterbirds. A successful outcome is therefore largely a case of 'getting the recipe right'. Whatever the case, to maximise the likelihood of creating a fully functioning wetland encompassing the range of variation found in natural areas, it is thought that larger-scale projects with a varied topography are more likely to be successful (Atkinson *et al*. 2001, Atkinson *et al*. 2004). At present, our knowledge is limited and it is essential that new projects adopt an

experimental approach and ensure that adequate monitoring is carried out at appropriate timescales.

Generally, once habitats are created, benthic fauna and birds respond fairly quickly if conditions are suitable. This is because coastal wetlands are often high-energy environments, at low elevations, and with high soil-water tables. As such, they are likely to resemble the surrounding natural environment in a relatively short time-frame, i.e. years rather than centuries. For example, created marshes in the high energy sandy environments of the Severn Estuary are virtually indistinguishable from surrounding marshes (e.g. Cone Pill in Gloucestershire). However, marshes in the muddy, lower-energy environments of some estuaries in southeast England are often of a very different structure and support different vegetation types than surrounding natural marshes.

The track record in creating good quality habitats has, until recently, not been particularly good in terms of their biodiversity benefit, often because this has not been the primary reason for the work, as most realignment schemes have tended to be for flood protection purposes. In particular saltmarsh creation has not happened as predicted, often producing habitats of much lower quality and species diversity than surrounding natural marshes. This is because many early realignment schemes tended to make holes in sea walls without undertaking the engineering required to develop the creek systems that are needed to create habitats of high conservation value. In the longer term, a partnership is needed between ecologists, conservation bodies, governments and engineers. Only in this way will it be possible to set up the kind of large capital projects required to take the science forward and reach an understanding, not only of how to create coastal habitats, but also the impact they will have on waterbird populations. The ongoing RSPB project to create large areas of intertidal habitat of high conservation value at Wallasea Island is currently developing and testing coastal habitat creation methods (see http://www.rspb.org.uk/ourwork/casework/details.aspx?id=tcm:9-235089), though the long-term success of this project in creating high quality habitat is yet to be seen. However, it would be important to keep up-to-date with and learn from this experience, in addition to the existing evidence outlined here, in determining whether or not it will be feasible to find or create suitable sites, and the feasibility and cost of developing suitable habitat for birds, should managed realignment be part of any mitigation or compensation measures if the proposed airport goes ahead.

In summary, sediment is key to any restoration process. Having a good understanding of the sediment dynamics post-development will allow a much better prediction of the likely outcome of mudflat or saltmarsh creation in terms of its value to waterbirds and long-term persistence. There is sufficient knowledge to undertake the engineering to create habitats through managed realignment and some knowledge of how to modify them (for example including small scale topographic variation) but as this is a relatively new science taking an experimental approach and following up with longer-term monitoring is important if this science is to develop. In terms of the large-scale creation of mudflats in estuaries through use of dredged material there is less experience of this in northwest Europe and bringing in expertise from other parts of the world will be necessary (e.g. Japan).

4.3.2 The need for ecologically linked areas

For the purpose of this study, the ecological functional unit for SPA birds is taken to be the existing SPAs of the Thames Estuary and Marshes and Medway Estuary and Marshes together with areas that are adjacent or close and actually or potentially (through compensation measures) ecologically linked (e.g. the Swale SPA, the Benfleet and Southend Marshes SPA and the Foulness (Mid-Essex Coast Phase 5) SPA). Note that for each of the species guilds described below (and in Table 3) generalisations have been made based on available information. Were an airport development to be

taken forward it would be possible to provide more detailed information regarding the within-winter and through-the-tide movements of species from existing bird ringing and recovery data, and through detailed studies of waterbird movements on the Thames and Medway and elsewhere including colour-marking and resighting and using radio, satellite or GPS tracking techniques. Such a study would be key to optimising the design of mitigation or compensatory measures.

4.3.2.1 Primarily intertidal mudflat invertebrate feeders and intertidal mudflat bivalve specialists

Species in the guilds that primarily use intertidal habitat (intertidal invertebrate feeders and intertidal bivalve specialists) require areas of habitat to support their populations at all stages of the tidal cycle. This means that areas of intertidal feeding habitat that are exposed at low tide must be ecologically linked (i.e. in relatively close proximity, and preferably adjacent) to intertidal feeding sites that can be used by birds on the rising or falling tide. Birds also require relatively undisturbed high-tide roost sites either on saltmarsh, farmland or on other habitats adjacent to the intertidal feeding area. The creation of intertidal habitat that is exposed at low tide away from areas where there is intertidal habitat exposed on the rising and falling tide and suitable high-tide roost sites is therefore unlikely to provide satisfactory mitigation or compensation, particularly for species that are primarily intertidal invertebrate feeders or intertidal bivalve specialists.

4.3.2.2 Generalist wetland species

Generalist wetland species also use intertidal habitat at some stages of the tidal cycle. However, these species are likely to use freshwater habitats adjacent to (or within one or two kilometres of) the estuary at stages of the tidal cycle where intertidal habitat is not available. It is therefore more likely that the provision of freshwater habitats adjacent to intertidal areas as part of any mitigation or compensation package at sites either close to or far from the Thames Estuary and Marshes / Medway Estuary and Marshes SPAs could be of benefit for species in these guilds.

4.3.2.3 Piscivores

These species use a wide range of marine and freshwater habitats and are therefore less affected by intertidal loss as a result of development than other species. However, they may be affected by any loss of freshwater habitats in adjacent terrestrial areas, and local breeding species such as the terns would be affected by loss of any terrestrial breeding sites in the area.

4.3.3.4 Birds of prey

The birds of prey for which the Thames and Medway Estuaries are important use a wide range of coastal habitats, including foraging over both freshwater and intertidal habitats. However, individuals tend to have relatively large home-ranges and therefore need a large extent of habitat to be available to support them. These species would be affected by both terrestrial and intertidal habitat loss as a result of any development, but this could be compensated for by the creation of either new intertidal or freshwater marsh habitats, if the design of these sites allowed sufficient prey to be available and the sites were large enough to support the large home-ranges of these species.

4.3.3 Site-fidelity and habitat equivalency

In this report, site-fidelity has been assessed using the 'WeBS Alerts Biological Filter' (Maclean & Austin 2008). This scoring system is used to assess the natural fluctuations in species' numbers within and between winters, and is calculated using a combination of measures of population size fluctuation, longevity, between-winter movements of birds and within-winter movements of birds.

The score assigned reflects the typical behaviour of each species at a UK level. Species with the lowest scores are those that tend to have fluctuating population sizes, are short-lived and are highly mobile (i.e. large between- and within-winter movements). Conversely species with the highest scores are those that tend to have relatively stable populations, are long-lived and are site-faithful (i.e. small between- and within-winter movements). Species with scores of five or below are classified as typically exhibiting low site-fidelity, those with scores of 6-8 as typically exhibiting high site-fidelity (Table 3).

Populations of site-faithful bird species are likely to take longer than other species to respond to any compensatory measures provided away from the Thames Estuary and Marshes SPA or Medway Estuary and Marshes SPA. Birds that are not site-faithful are likely to move to other sites within or away from the Thames and Medway fairly quickly if habitat were lost as a result of an airport development, as it is thought that such species distribute themselves in response to food resources. However, it is uncertain how far birds would be likely to move or what differences there might be between species with differing migration strategies. Conversely, it is likely that individual birds of site-faithful species would not move far within the Thames and Medway Estuaries even if habitat were lost as a result of an airport development. Instead, colonisation of any new habitat provided away from the site would be most likely to occur through the recruitment of first-winter birds of these species, and the reduction of the populations on the Thames and Medway is likely to occur through increased mortality of adult birds. Such limited movements and increased mortality was observed in common redshank following the closure of the Cardiff Bay Barrage (Burton *et al*. 2006; Burton & Armitage 2008), and we assume that other site-faithful species would behave in a similar way, although this is uncertain. This also means that populations of relatively short-lived site-faithful species may develop at new sites more quickly than populations of longer-lived site-faithful species. It is likely that there would be an initial decline in the SPA and national (and possibly the flyway) populations of site-faithful species following the construction of an airport in the Thames Estuary, although it is possible that the populations may recover in the longer term as any new sites provided away from the Thames and Medway are colonised. In order to minimise the likelihood of such population declines it would be necessary to provide any mitigatory or compensatory habitat creation at sites far from the Thames Estuary several years in advance of option implementation. The typical lifespan of the bird species that the habitat is targeted to (given in Table 3) should provide a reasonable guide to the likely time for species with high site-fidelity to colonise a new site. However, it is important to note that in the case of newly created intertidal habitat, intertidal bivalve specialists would be likely to colonise several years after other intertidal invertebrate feeders as their bivalve prey have been shown to take several years to colonise such habitats; therefore, it may be several years before the habitat is suitable for specialist bivalve feeders.

Site-fidelity of each species is summarised in Table 3. At a guild level, almost all species that are primarily intertidal invertebrate feeders have high site-fidelity. Within the other species guilds there is a mixture of species with low and high site-fidelity, although in general waders tend to have high site-fidelity while wildfowl tend to have low site-fidelity. The exceptions to this general pattern are dark-bellied brent goose (which has high site-fidelity) and red knot (which has low site-fidelity). This guild-level pattern suggests that any compensatory intertidal habitat created at a distance from the Thames would only slowly be colonised by those species that most depend on intertidal habitat for feeding (intertidal invertebrate feeders and some intertidal bivalve specialists). Site-faithful birds that winter on the Thames and Medway Estuaries immediately prior to the construction of an airport would be likely to return to the site but experience increased mortality in the years following construction until a stable population size, which could be supported on the modified estuary following development, is reached.

Mitigation and compensation measures based on managed realignment and topographic modification aim to mitigate or compensate for the intertidal habitats lost as a result of option implementation. The relative functionality of managed realignment compared to natural intertidal areas is outlined in section 4.3.1 above. Topographic modification is untested at the scale that would be required to mitigate for an airport development therefore the likelihood of creating functional intertidal habitat using this method is unknown.

4.3.3.1 Freshwater wetland creation

One potential compensatory measure is the creation of freshwater wetland habitat at sites close to the Thames and Medway Estuaries. This measure was used as compensation for the impoundment of Cardiff Bay, through the creation of the Newport Wetlands Reserve, which does support important numbers of some generalist wetland species (Austin *et al*. 2006). The creation of freshwater wetlands could not compensate for the predicted losses of intertidal invertebrate feeders or intertidal bivalve specialists. It could potentially provide mitigation for some of the losses of coastal freshwater and brackish marsh habitat that would occur if an airport were built on the Isle of Grain and may also provide compensation for predicted losses of the generalist wetland species from intertidal areas (Austin *et al*. 2006).

The likely effectiveness of this measure as compensation for the loss of intertidal habitat (for the guilds that also use freshwater habitats) can be summarised by the proportions of UK sites supporting internationally or nationally important numbers of each species that are primarily freshwater habitat (Austin *et al*. 2014). Species in the generalist wetland species guild tend to be found in reasonable numbers at freshwater sites, with the proportion of nationally or internationally important sites that are freshwater ranging from 9% to 85% for these species. It is important to also note that even at estuarine sites some these species may be using freshwater wetlands adjacent to the estuary as well as tidal areas. Therefore the creation of freshwater wetlands close to the Thames and Medway Estuaries may be at least partially effective as a compensation measure for the following designated SPA species: Bewick's swan, dark-bellied brent goose, Eurasian wigeon, Eurasian teal, mallard, northern pintail, northern shoveler, common pochard, pied avocet, northern lapwing, Eurasian curlew and black-tailed godwit. If the creation of freshwater wetlands were considered as a compensatory measure once development proposals were at a later stage, it would be possible to conduct more detailed analyses of WeBS data to calculate the proportion of these species' populations that are recorded on freshwater sites, the size of freshwater sites supporting each species, and estimates of the average density of each species supported at freshwater and intertidal sites. This would reduce the uncertainty regarding the habitat equivalency of freshwater wetlands compared to intertidal sites for these species.

The majority of species in the two intertidal guilds (primarily intertidal invertebrate feeders and bivalve specialists) rarely use freshwater habitats; therefore there are no nationally or internationally important freshwater sites in the UK for these species. Although a number of the species in these guilds will use freshwater habitats at some times of the year, or at certain stages of the tidal cycle, they are only supported at very low densities on freshwater sites in comparison to intertidal habitat. The creation of freshwater wetlands would not provide equivalent habitat for species in these guilds to compensate for the intertidal habitat that would be lost as a result of and airport development. This means that for several key SPA species that feed on intertidal habitat (e.g. common shelduck, common ringed plover, grey plover, ruddy turnstone, dunlin, common greenshank, common redshank, Eurasian oystercatcher and red knot) the only habitat creation measures that are likely to provide effective mitigation/compensation are a combination of topographic modification and managed realignment within/adjoining the Thames and Medway Estuaries, or managed realignment at a distance from the site to create new mudflats.

4.3.4 Implications for flyway populations of delivering compensatory habitat elsewhere

If compensatory habitat were delivered at a distance from the Thames and Medway Estuaries (i.e. in other parts of the UK) then there is considerable uncertainty as to whether it would be colonised by the bird populations currently using the habitat that would be lost on the Thames and Medway Estuaries if an airport were built. Creating new sites at a distance from the site is arguably not within the scope of current guidance on compensation, therefore consideration would also need to be given as to the legal implications of providing compensatory habitat elsewhere and would probably need to be agreed at ministerial level.

Species that are site-faithful (those with high site-fidelity scores in Table 3) include most intertidal invertebrate feeders and some intertidal bivalve specialists. The generalist wetland waders also largely fall into this category. Site-faithful species currently supported on the Thames and Medway Estuaries include more than 1 % of the international populations of dark-bellied brent goose, common shelduck, northern pintail, common ringed plover, grey plover, dunlin, red knot, black-tailed godwit and common redshank, and more than 1 % of the national populations of Eurasian wigeon, Eurasian teal, hen harrier, pied avocet, Eurasian oystercatcher, Eurasian curlew, common greenshank and little tern.

All of these site-faithful species are likely to respond rather differently from the mobile species to habitat creation in other parts of the UK. It is thought that most site-faithful species colonise a site in their first winter based on a range of factors (e.g. food supply, winter temperature, and migration distance from the breeding grounds). There is some evidence from colour-ringing and resighting of black-tailed godwits that first-winter birds sample a range of sites before settling. Thereafter, most individuals will return to the site where they settled during their first winter in every subsequent year of life (Wernham *et al*. 2002). If there were significant loss of habitat, and therefore a reduction in the carrying capacity on the Thames and Medway as a result of airport development, it is likely that adults of site-faithful species would continue to spend winters in these estuaries. Reductions in food availability would most likely lead to increases in mortality rates of these individuals. The colonisation of any new habitat provided in other parts of the UK would most likely be driven by the recruitment of first-year birds. The first individuals to colonise such new sites may have relatively high survival rates due to high food abundance (assuming the site did not immediately reach carrying capacity). Because the redistribution of site-faithful species depends on demographic processes such as recruitment and survival, rather than simply individual birds moving to other sites, the colonisation rate of compensatory habitat provided at a distance from the Thames and Medway Estuaries is likely to be much slower for these site-faithful species than for more mobile species. There is, therefore, less certainty in the likelihood of success of such measures for site-faithful species (including dunlin, redshank, ringed plover, grey plover, whimbrel and curlew) and a higher risk associated with providing compensatory habitat for these species at a distance from the site.

One example of site-faithful species staying in the vicinity of a site rather than moving a great distance following habitat loss is redshank in Cardiff Bay. Following the closure of the barrage redshank were displaced to other nearby sites, but mortality rates increased for at least three years afterwards (Burton 2006; Burton *et al*. 2006; Burton & Armitage 2008).

Although most wader species are site-faithful, the distributions of several species have been shown to shift towards the north-east in response to climate change in recent decades (Austin & Rehfisch 2005; Maclean *et al*. 2008). The provision of compensatory intertidal habitat creation at sites to the east or north of the Thames and Medway Estuaries, may therefore be beneficial for these species, although it may several years for such sites to be colonised and achieve stable population sizes. If populations of some species continue to move east and north in response to further predicted

climate change (UKCP09 2009) then the potential benefit of newly created sites in these areas could increase in the future. However this is highly uncertain, not least because birds may continue to move east and north to sites outside the UK.

It is possible that the flyways of some species may not be supported by providing compensatory habitat at a distance from the Thames and Medway, for example further north on the east coast of England such as in Essex or elsewhere in East Anglia, as suggested by Foster and partners.

4.3.5 Compensation ratios

Habitats Directive guidance suggests that the area of compensatory habitat provided should be at least twice the area lost. However, the ratio of compensatory habitat compared to lost habitat that would need to be provided to compensate for waterbird losses (i.e. support the number of waterbirds predicted to be lost) depends on a range of factors and is therefore uncertain. As on any estuary there are considerably different densities of waterbirds in different parts of the estuary, and, further, each species tends to use particular parts of the estuary. This means that there are substantial areas of the estuary with few birds, and therefore compensation for the numbers of birds lost needs to provide habitat in an appropriate part of an estuary with the appropriate sediment type for the species in question. The density of birds on the area lost and the area created will determine the compensation ratio that is required. Necessarily, defining the ratio of compensatory habitat requires an understanding of the number of each species that needs to be supported and the likely density that would be supported on the habitat that will be created. Furthermore, the most crucial factor is likely to be our ability to engineer and successfully retain the exact sorts of habitats the individual species require. Understanding of how to achieve this is currently limited (see section 4.3.1 above) so the density of each bird species that would be supported on newly created habitat is highly uncertain. It is therefore realistic to anticipate that if an airport development were to go ahead in the Thames any compensatory habitat requirements would involve creating new areas of inter-tidal that were larger than those lost to maximise the chance of suitable habitat developing to support the number of birds lost.

4.3.6 Gaps in knowledge

There are a number of areas of uncertainty in this work, including:

- The numbers of birds of each species likely to be lost from the Thames and Medway Estuaries were an airport development to go ahead (a more detailed airport proposal and Environmental Impact Assessment (EIA) and HRA would be required to establish this);
- How to create optimal intertidal habitat for birds through managed realignment or topographic modification, and our ability to engineer the required types of intertidal habitat;
- The density of waterbirds of each species likely to be supported on created intertidal habitat, compared to natural intertidal habitat (and therefore the ratio of compensatory habitat that would need to be provided), and how long it would take to reach this density after creation;
- The density of waterbirds of each species likely to be supported on freshwater habitats, relative to intertidal habitats that would be lost (and therefore the ratio of compensatory habitat that would need to be provided if freshwater wetlands were used as mitigation for lost intertidal habitat);
- Through-the-tide movement distances of birds (for example from high-tide roosts to mid-tide feeding sites, to low-tide feeding sites). This limits our ability to define the distance within which all of these requirements need to be sited in any compensation packages;
- Within- and between-winter movements of birds between estuaries in the UK (and beyond). This is important in understanding the likelihood of new habitat created at a distance from

the Thames and Medway Estuaries being colonised by the same individual birds that currently use the site, and the rate at which this might happen;
- Colonisation rates of new sites by new birds, and demography of site-faithful species. This is important in understanding how long it might take for new populations of site-faithful species to build up on newly created habitat at a distance from the Thames and Medway Estuaries;
- The rate at which the wintering distributions of some bird species might change in response to future climate change.

Many of these uncertainties could be addressed through further research. Suggested methods to achieve this are given in the following sections.

4.3.6.1 Numbers of birds likely to be lost from the Thames and Medway due to the development

At this stage, while the precise airport proposals (and therefore area of habitat that would be lost) are uncertain, it is not possible to make precise predictions about the numbers of birds that would be lost from the area. A better estimate of these figures would be possible if a development goes forward and more detailed plans are developed, and EIA/HRA methods would allow this. As part of this, generating good predictions regarding the type of sediments in the estuaries following the construction of an airport, and predictions of the types and densities of invertebrates likely to occur in that sediment, would be extremely valuable in improving predictions for changes to waterbirds, for example through individual-based modelling. This is likely to require a collaborative approach involving experts in sediment transport modelling, and in benthic ecology.

4.3.6.2 How to create optimal intertidal mudflat habitat for waterbirds, and densities of waterbirds supported on created compared to natural intertidal habitat

Our understanding of the best areas and methods to create new intertidal mudflats for birds could be greatly improved through a detailed investigation and review of all situations where intertidal mudflat has been created either inadvertently or by design. Such a study could compare the densities of different waterbird species supported on created mudflats and on natural mudflats in nearby estuaries. The long-term development of created mudflats and their bird populations (over decades) could be studied in situations where new mudflat has been created inadvertently. This includes many east-coast estuaries where sea walls were breached in the 1953 floods and not rebuilt in the same places. For example, the Alde-Ore Estuary SPA has relatively new mudflats dating from this time. Studies of more recent managed realignment sites (where bird numbers have been monitored) could help to determine the time before a stable density of birds is achieved. Improving our understanding of the effects of changes to estuaries on birds would be very valuable in informing a wide range of future conservation management including managed realignment, not just in relation to airport development on the Thames.

Developing habitat association modelling to predict waterbird densities at a mudflat level (rather than the whole-estuary scale as has been done in previous studies (Severn Tidal Power 2010a) would improve our understanding of the within-estuary distribution of birds and may enable predictions of the capacity of topographic modification areas at given locations in the estuary. The advantage of this approach over individual-based models is that where it is difficult to predict future invertebrate densities, using estuary morphology as a proxy means that realistic predictions of future waterbird densities can still be generated. Habitat association models can also be used to predict the likely future densities of a wider range of waterbird species than individual-based models.

4.3.6.3 The density of waterbirds supported on freshwater wetlands compared to intertidal habitat

The creation of freshwater wetlands could potentially provide mitigation for some of the losses of coastal freshwater and brackish marsh habitat that would occur if an airport were built on the Isle of Grain and may also provide compensation for predicted losses of the generalist wetland species from intertidal areas. As outlined above it could not compensate for the predicted losses of intertidal invertebrate feeders or intertidal bivalve specialists. If the creation of freshwater wetlands were considered as a compensatory measure for the loss of intertidal habitat for generalist wetland species, it would be possible to conduct more detailed analyses of existing Wetland Bird Survey data to calculate the proportion of these species' populations that are recorded on freshwater sites, and estimates of the average density of each species supported at freshwater and intertidal sites. This would reduce the uncertainty regarding the habitat equivalency of freshwater wetlands compared to intertidal sites for this species guild and allow recommendations to be made regarding the ratio of the area of freshwater habitat creation compared to the area of intertidal habitat loss that would be required to support equivalent numbers of each species. Such a study would be relatively straightforward as the data required already exist.

4.3.6.4 Through-the-tide movement distances of birds

For intertidal feeding species (e.g. common shelduck, dunlin, common redshank, ringed plover, grey plover) in particular, it is important that a range of ecologically-linked sites that support the needs of the species at different stages of the tidal cycle are provided close together (within the distance that the birds would normally move during a tidal cycle). Were an airport development to be taken forward it would be possible to provide more detailed information regarding through-the-tide movement distances of birds through detailed studies of waterbird movements. GPS tracking techniques using tags that record almost continuously would be the best method to use for such a study because very regular information on the location of birds would be required to establish movement patterns within a single tidal cycle. However other techniques such as colour-ringing and resighting or radio-tracking could also provide useful (although less detailed) information. Ideally, movement patterns should be studied on a range of estuaries, including the Thames and Medway, to establish the range of distances that birds will move between roosting sites and feeding sites at different stages of the tidal cycle.

4.3.6.5 Within- and between-winter movements of waterbirds

If the creation of new intertidal habitats at a distance from the Thames and Medway Estuaries is to be considered, it would be valuable to investigate the within- and between-winter movements of the key waterbird species that the measure is targeted for. This analysis could be done using existing ringing data (although there may not be sufficient data for all species). This would help to determine the likelihood of birds of non-site-faithful species colonising compensatory habitat at a distance from the Thames and Medway Estuaries if they were displaced following airport construction. It would also reduce the uncertainty as to which of the more site-faithful species are unlikely to move to sites created at a distance.

4.3.6.6 Colonisation rates of new sites and demography of site-faithful species

The colonisation rates of new sites and the demography of site-faithful species in relation to changing distributions are uncertain as they depend on a range of factors. These include the rate of change of distributions in response to climate change, settlement patterns of first-winter birds and the typical lifespan of the species in question. Reducing uncertainty around some of these issues has been described elsewhere, but further reducing uncertainty regarding colonisation rates of new sites

could be undertaken through studies of changes in bird numbers on existing or planned (in the near future) habitat creation schemes such as managed realignment.

4.4 Costs of mitigation and compensation options

The cost of creating new coastal wetland habitat, for example through managed realignment, will vary depending on a variety of site-specific issues. However, a 2010 study examined the average costs across a number of managed realignment sites and suggested that although there was a wide variation in costs, the average cost was between £70,000 and £75,000 per hectare. This represents the average of 11 separate site studies at three locations covering a range of size of managed realignments between 500ha and 11,500ha. (5 sq km to 115 sq km) (Severn Tidal Power 2010).

In addition to the monetary cost of mitigation and compensation there is also a time cost to be considered. As stated above, newly created habitat such as managed realignment would take a few years to become established and provide the conditions that coastal birds require. It is therefore likely that statutory agencies may require new habitat to be provided in advance of airport construction, which may lead to delays with the project. In the event that new compensatory habitat is created at a distance from the development site (for example in Essex or elsewhere in East Anglia, as proposed by Foster and partners) it is likely that there would be further delays in the effectiveness of this compensation due to the time it would take for birds to colonise the new site(s) (see section 4.3.6.6 above).

5. DISCUSSION

5.1 Impacts of habitat loss were an airport to be built on the Isle of Grain

Were an airport development to go ahead in the Hoo Peninsula / Isle of Grain area it would cause a significant loss of both freshwater and intertidal coastal wetland habitat, largely within the Thames Estuary and Marshes SPA, though probably also with some habitat loss to the Medway Estuary and Marshes SPA. The area of habitat that would be lost has been estimated by Foster and partners to be around 1700 hectares, and the proposed location of the development currently supports over 21,000 birds, which is approximately 25% of the total waterbird population of the two SPAs combined (the Thames Estuary and Marshes SPA and Medway Estuary and Marshes SPA). Significant proportions of the designated SPA bird populations occur in this area; the proportion of each species population supported by the proposed development area varies, but is up to 85% of the total population of the two SPAs for some species (Table 2). Coastal wetland habitat loss of this type has been widely shown to have significant impacts on bird populations in various parts of the world, as demonstrated by the review in section 3 of this report. We can therefore be confident that the habitat loss due to airport development would have significant negative impacts on the bird populations that depend on the areas lost, and it is likely that most of the 21,000 waterbirds currently using the area would be displaced. Under the 2010 Habitats Directive (92/43/EEC), an appropriate assessment would be required to determine any 'likely significant effects' to the SPAs following any proposed mitigation. Article 6(4) of the EC Habitats Directive allows plans or projects which may have an adverse effect on the integrity of a European site or European marine site to go ahead on grounds of 'imperative reasons of overriding public interest' (IROPI) when there are no alternative solutions, but only if compensatory measures have been secured. This means that as part of any airport development it is highly likely that mitigation and compensation would be required to provide alternative habitat for displaced birds. Further details of potential mitigation and compensation options are provided below.

5.2 Mitigation and compensation

The likely effectiveness of each mitigation or compensation measure for the designated SPA species in each species guild is summarised in Table 5. It should be noted that we have not considered the availability of suitable sites within the Thames Estuary in the suggestions below, and this will be an important consideration that will need to be taken into account in determining which of the suggested mitigation and compensation measures are feasible.

Topographic modification to create intertidal habitat within the Thames and Medway Estuaries is likely to be partially effective in mitigating the effects of intertidal habitat loss for intertidal invertebrate feeders, intertidal bivalve specialists and generalist wetland species. It is unlikely to have any significant benefits for piscivores or birds of prey. This measure has only been used at a relatively small scale in the past. Therefore, the likely success of this measure is relatively uncertain.

The introduction of new refuges or roosting sites where roosting areas have been lost is an established method that has been used elsewhere for waterbirds with some success, for example in Cardiff Bay (Burton *et al*. 2003) and Teesmouth (Burton *et al*. 1996). Although this has not regularly been used as mitigation or compensation for SPAs, it is likely to be effective or partially effective in replacing lost roosting sites for all species.

Managed realignment at sites adjacent to the Thames and Medway Estuaries may be effective compensation for the loss of intertidal habitat, though depending on the sites chosen it is uncertain whether it would be possible to create largely saltmarsh, largely mudflat, or a combination of the

two, and it is important that any habitat created as compensation for an airport development should, as far as possible, aim to replicate the proportions of saltmarsh and mudflat that will be lost. Were saltmarsh created, this measure is likely to be effective or partially effective compensation only for generalist wetland species that feed on saltmarsh (for example Bewick's swan, Eurasian wigeon), or for intertidal mudflat feeding species that require such areas as high-tide roost sites. Birds of prey may also benefit, but piscivores are unlikely to be affected by this measure. Were mudflat habitats created by managed realignment, this could provide feeding opportunities for intertidal mudflat feeding species (e.g. common shelduck, common ringed plover, grey plover, ruddy turnstone, dunlin, common greenshank and common redshank). Managed realignment is an established method that can create good quality habitat (e.g. Badley & Allcorn 2006). However there are many examples where the habitat created has been of lower quality or diversity than natural intertidal habitat in the area, and thus supports lower densities of birds. It is therefore important to carefully design any areas of managed realignment to provide the best possible habitat quality. The web-based ABPmer managed realignment guide (http://www.abpmer.net/omreg/) provides useful information on techniques that can be used to achieve this. It is important to note that species in the intertidal bivalve specialist guild (Eurasian oystercatcher and red knot) are likely to colonise newly created intertidal habitat several years later than other intertidal invertebrate feeders. This is because the bivalve prey on which such species depend take several years to colonise newly created habitats, and thus these habitats are not suitable for bivalve feeding waterbirds in the early years. The same species guilds are likely to benefit from managed realignment at distance from the Thames and Medway Estuaries, however it is likely that this would only be partially effective, and would take longer to compensate for the loss of habitat due to the length of time required for colonisation (see below).

Creation of freshwater wetlands is an established practice for SPA compensation or mitigation and methods for creating high quality freshwater habitats are generally better established than those for creating intertidal areas. The creation of new freshwater wetland habitats adjacent to the Thames or Medway Estuary would be effective in providing compensation for the losses of coastal freshwater marsh that would occur on the Isle of Grain were an airport to be built. This is likely to be either completely or partially effective for generalist wetland species and birds of prey. If areas of open water were created it may also be partially effective for some species of piscivores. However, there would only be likely to be very low-level benefits for intertidal invertebrate feeders and intertidal bivalve specialists, as freshwater habitats generally only support low densities of these species. It would be important to consider the distance between such habitat creation and the remaining intertidal habitat in the area, to ensure a reasonable commuting distance for generalist wetland species which use both habitat types.

The creation of new habitats at distance from the Thames Estuary and Marshes and Medway Estuary and Marshes SPAs (for example in Essex and East Anglia, as proposed by Foster and partners), either through managed realignment, topographic modification, or the creation of freshwater wetlands, is likely to be less effective than providing such habitats locally, although it could still be partially effective for several species guilds. However, many of the intertidal invertebrate feeders, intertidal bivalve specialists and generalist wetland species that would benefit from these measures are very site-faithful. Thus the re-distribution of these species to new sites could take many years and, for site-faithful species, is likely to be driven by high mortality rates on the Thames Estuary and Marshes and Medway Estuary and Marshes SPAs, combined with recruitment of first-year birds to newly created sites elsewhere. Many of the intertidal invertebrate feeders and intertidal bivalve specialists also have high site dependence (50% or more of the Great Britain population is found on 10 or fewer sites). Populations of these species with high site dependence are likely to be affected more strongly by any negative effects of habitat loss due to an airport development than populations of species with more widespread distributions. Thus, it is likely that the recovery of species populations that are

site dependent would take longer than other species, and may further reduce the rate of colonisation of any new habitat created at a distance. However, despite these limitations it is likely that intertidal habitat creation at sites elsewhere in the UK could be partially effective for a range of species, but this conclusion is based on expert judgement only as there is absolutely no precedent for such measures. Therefore there is considerable uncertainty surrounding this conclusion and a risk that compensatory habitat provided at a distance may not be effective. The uncertainty and risk surrounding this measure could be reduced (but not eliminated) through the further studies described in section 4 above, and we suggest that such studies would be essential before this measure could be recommended.

Table 5. Summary of the effectiveness of proposed compensation measures for each SPA waterbird guild. "Established methods" are those that have been proven to be successful elsewhere in compensating for the effects of developments on waterbirds. "Established practice" refers to whether the measure is an established mitigation or compensation measure.

Measure	Guild	Effectiveness[1]	Established method?	Example(s)	Established practice?
Topographic modification (intertidal habitat creation) to prevent or reduce effects of intertidal loss.	Intertidal invertebrate feeders	2	Not at this scale (but some small scale projects)	Parkstone, Poole Harbour (see Topographic modification report)	NO
	Intertidal bivalve specialists	2			
	Piscivores	N/A			
	Generalist wetland species	2			
	Birds of prey	1			
Introduction of new refuges and/or bird roost sites within the estuary where roosting areas have been lost.	Intertidal invertebrate feeders	3	YES Has been used elsewhere with some success	Cardiff Bay (Burton *et al*. 2003) Teesmouth (Burton *et al*. 1996)	NO (not regularly used)
	Intertidal bivalve specialists	3			
	Piscivores	2			
	Generalist wetland species	3			
	Birds of prey	2			
Managed re-alignment adjoining the Thames Estuary and Marshes and Medway Estuary and Marshes SPAs to create intertidal habitat	Intertidal invertebrate feeders	2	YES	Freiston Shore on the Wash - 66 ha intertidal habitat created (Badley & Allcorn 2006)	YES
	Intertidal bivalve specialists	2			
	Piscivores	1			
	Generalist wetland species	3			
	Birds of prey	3			
Managed re-alignment at distance from the Thames Estuary and Marshes and Medway Estuary and Marshes SPAs to create intertidal habitat	Intertidal invertebrate feeders	2	YES	Freiston Shore on the Wash - 66 ha intertidal habitat created (Badley & Allcorn 2006)	NO
	Intertidal bivalve specialists	2			
	Piscivores	1			
	Generalist wetland species	2			
	Birds of prey	2			
Creation of freshwater wetland habitat close to the Thames Estuary and Marshes and Medway Estuary and Marshes SPAs	Intertidal invertebrate feeders	1	YES	Newport Wetlands Reserve (compensation for Cardiff Bay barrage)	YES
	Intertidal bivalve specialists	1			
	Piscivores	2			
	Generalist wetland species	3			
	Birds of prey	3			

[1] Effectiveness is scored on a five-point scale where:
0 = ineffective
1 = effective at a very low level (e.g. new habitat that may support a low density of some SPA species)
2 = partially effective for some SPA species in the guild
3 = effective for some SPA species in the guild, partially effective for other SPA species in the guild
4 = completely effective for all SPA species in the guild

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