

THAMES ESTUARY AIRPORT FEASIBILITY REVIEW



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PART ONE:

THE INTRODUCTION AND EXECUTIVE SUMMARY

1.00 INTRODUCTION

In November 2008 the Mayor requested that I should consider the feasibility of building and operating an International Hub Airport within the Thames Estuary capable of 24 hours operation. He expected it might be similar to The Hong Kong International Airport at Chek Lap Kok for which I was responsible during the planning, construction and commissioning stages. Further he

anticipated that the platform should be designed to permit incremental expansion to accommodate possibly up to six runways depending upon demand.

The Mayor also requested that the review took cognisance of the proposals for the review of the London Plan which is now underway.

A New Plan for London, April 2009, p63

Extract

In reviewing the London Plan the Mayor proposes to:

support strategic rail services – international, inter-regional, domestic for commuters, services within London – and high-speed rail hubs; and support improved public transport access to ports, rail termini and airports; and

recognise that further runway capacity will be needed in the South East to meet London's needs; emphasise sustainable airport operations; resist the provision of further capacity at Heathrow; refer to work being carried out to evaluate alternatives elsewhere in the south east, including exploring the possibility of a Thames Estuary airport; and continue the current policy approach to heliports

Although the main focus of the review was therefore to examine the technical feasibility of such a project, it proved difficult to confine the study and research to this specific area. It soon became apparent that The Thames Estuary formed part of several other plans aimed at ensuring a sustainable future for London and the South East of England with the main driver being climate change. Therefore the scope of this review had to be expanded to take a more holistic approach to examine the full potential of the Thames Estuary ensuring that no one scheme precluded another. The significance of this change in direction will hopefully become apparent in the body of the report.

The widening of the field of studies has taken me beyond my professional boundaries and hence I have welcomed the assistance and advice from other professionals who have contributed to my researches freely and on a pro bono basis for which I am most grateful. These individuals and organisations have been duly acknowledged later in this report. Despite these valuable contributions there still remains parts of this report which are based on anecdotal evidence and limited research and thus to the more expert reader may appear

superficial for which I apologise. If a Thames Estuary Development Study is permitted to follow this brief review, as has been recommended, any shortcomings should be remedied through detailed investigation and proper consultation.

Most of the work on this project was undertaken between June and August 2009, after my retirement as Executive Chairman of Crossrail Limited. The first draft of the report was submitted for the Mayor's consideration on 7th August 2009.

On the 15th July 2009 a debate was held at the Institution of Civil Engineers amongst an invited group of interested professionals and key stakeholders in the Thames Estuary and was aimed at promoting a balanced discussion on my preliminary findings and prior to the finalisation of this report. To ensure the debate was not skewed in any specific direction through political or commercial interests nobody from the BAA, the airlines or having a political affiliation was invited. The debate was conducted under Chatham House rules with Sir David King in the Chair. The ensuing debate proved to be both robust and constructive and the

key outcomes have been incorporated into this report.

1.20 EXECUTIVE SUMMARY

The key to any decision-making process on the feasibility of new airport development in the Thames Estuary lies in wider decisions about:-

- a) the need for London as a global city to continue to develop its infrastructure in its widest sense;
- b) given London and UK legacies from our industrial/economic past, the need to “retro-fit” infrastructure improvements;
- c) how the Thames Estuary area can best be developed in an integrated way to meet the above needs.

The infrastructure schemes produced by leading groups over many years for the Thames Estuary area have been considered in this report. They have included a wide range of airport development projects ranging from Canvey Island to the Maplin Sands and beyond and including “Marinair”, the Hoo Peninsula, Thames Reach and

Cliffe. Most of these schemes involve airport development either at their heart or as an additional important element.

But, more importantly, they also involve, to varying degrees, holistic schemes addressing the need to provide better road and rail transport links, to harness tidal and wind energy, to provide better infrastructure for future Thames Gateway development, port development and to work with the environmental sector to ensure that environmental factors have their place. Any new infrastructure built in the Thames Estuary must also take full account of Government commitments on renewable energy sources and the impact of climate change in the Estuary and beyond.

Within this holistic context, the report identifies the potential benefits and effects that off-shore airport options would have in this complex area. It looks at possible incremental development to relieve London Heathrow Airport and meet

additional demand, upgrading existing passenger and freight transport links north and south of the Estuary and the complex issues of air traffic control management in what NATS advise is the busiest piece of air space in Europe. Without expanding London's existing airports a shortfall of 70 million passenger movements is forecast, meaning an additional major two-runway airport is required by 2030.

It is noted that most experts talk of the costs of such a new airport being in the region of £40 billion including transport links. A properly integrated infrastructure approach, e.g. involving additional estuary crossings and renewable energy sources, could nevertheless produce substantial savings over all.

The report at this stage does not favour any specific location. It does, however, note that the area of the Thames Estuary does not present any insoluble issues regarding weather, geology, hydrography, shipping lanes, fishing activities, leisure services or other physical obstructions.

The report establishes that to decide on any particular location

there would need to be very thorough and careful studies with key parties and stakeholders. This would particularly apply to those involved with the delicate ecology of the area and with expertise as to the very large bird populations. However it is recognised that some of this has already taken place in the context of work on Wind Farms and Thames Crossing schemes.

Major studies are required on technical, environmental and economic benefits of the airport before any decision can be finalised. More generally, further work will be needed to look at the economic development of the whole Estuary area.

Even with three new runways being built at the existing airports current Government predictions make clear that further airport capacity is required by or before 2030 and, if this be the case, work on the Thames Estuary Development Study, which would embrace all of the above planning and reports, needs to commence no later than the summer of 2010.

Given that this exercise requires the involvement of a large number of Government Departments and their Agencies, Local Government,

Network Rail, HS2 and Crossrail, TfL, Thames Gateway Partnership, the RSPB, Port of London Authority and many other stakeholders it is recommended that an organisation be established to consider and manage this huge undertaking. There are various forms this could

take, from a high level steering group to a Provisional Development Company, depending on the scope of works which is preferred.

PART TWO:

OTHER SCHEMES AND REPORTS

2.10 ALTERNATIVE THAMES ESTUARY AIRPORT SCHEMES

Following the original announcement that I was to undertake this study several organisations emerged to advise me that they had schemes to provide an airport and transport links across the Estuary.

It became clear that since the Department of Transport published the Future Developments of Air Transport in the United Kingdom, or more particularly the South East and East of England Regional Air Service Study (SERAS) in 2002 that these same organisations have continued to develop their own

schemes. Further the views of these organisations are not in accord with Government's present view that London's existing airports at Heathrow, Gatwick and Stansted should be the focus of expansion, rather than an airport in the Estuary.

I therefore start by reviewing each of these schemes to establish a threshold against which the merits of this further review may be judged. The schemes are as follows: -

2.20 THE SAHARA GROUP'S SCHEME

This scheme is ambitious and it is claimed that the promoters have the funds available to undertake this huge programme of works without resorting to public funding. Neither evidence supporting this

claim nor the terms and conditions associated with the offer have been provided nor sought at this preliminary stage.

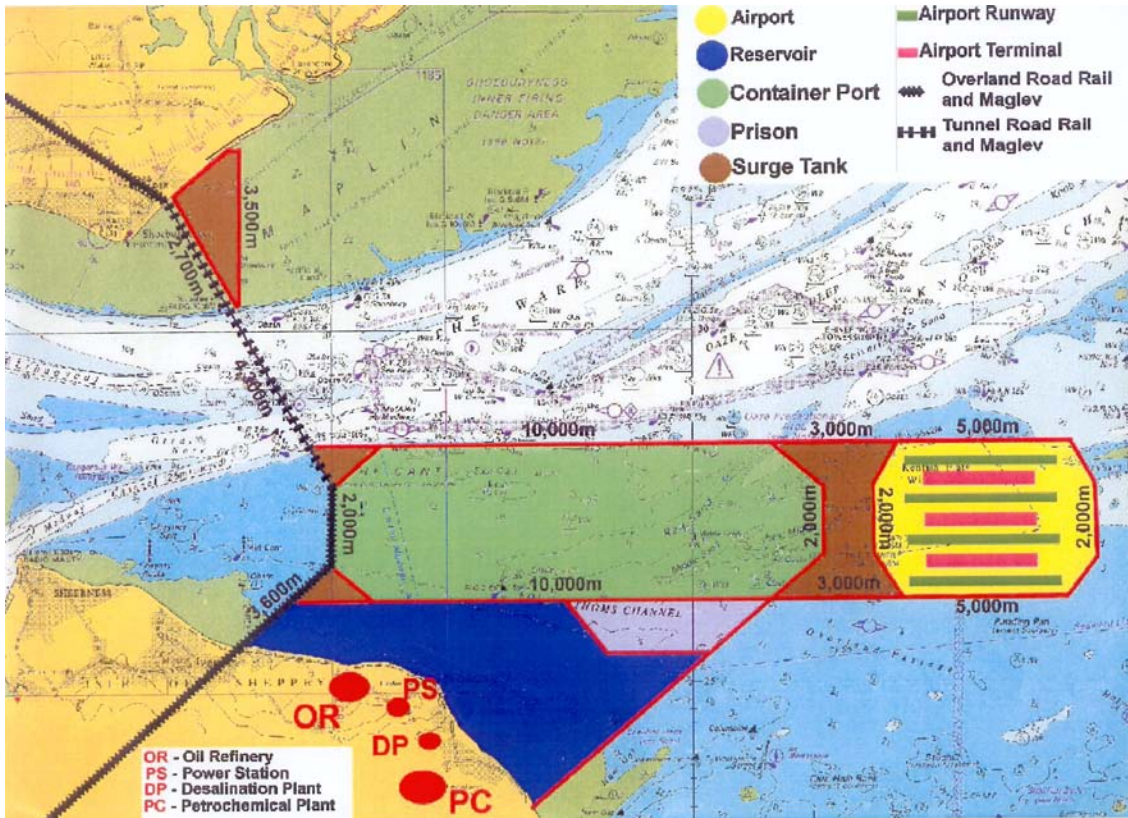


Figure 1

Whilst this scheme would appear to resolve many of the problems we face in terms of energy, cross-river links and an airport it could, without detailed examination, prove to have an intrusive impact on the environment and hydrology of the Estuary. Further it appears to overlook the Government's approval of other ports in the region namely, London Gateway

Port, Thames Port, Felixstowe South and Harwich Bathside Bay. If these ports were to be developed to their full potential then it is difficult to see the level of demand that would warrant another port of this magnitude.

From an airport perspective the width of the platform is inadequate to accommodate four runways and

would not accord with the International Civil Aviation Organization (ICAO) standards. At best there could only be approx. 600m from centre to centre of each runway allowing for the runway width and a reasonable margin to the edge of the platform on either

side. In order to operate each runway independently ICAO currently require a minimum of 1525m between runway centres, although it is thought that this distance may be reduced to nearer 1050m in the near future.

2.30 THE INDEPENDENT AVIATION ADVISORY GROUP (IAAG)

LONDON GATEWAY AIRPORT

This group has done a considerable amount of work planning for a 4-runway Airport on the Hoo Peninsula, which lies between the Medway and Thames Estuaries. To mitigate the environmental damage they propose to create an imaginative

series of nature theme parks and educational facilities.

Whilst they have shown their scheme to me they are not prepared to share the scheme to a wider audience or allow it to be included in this report

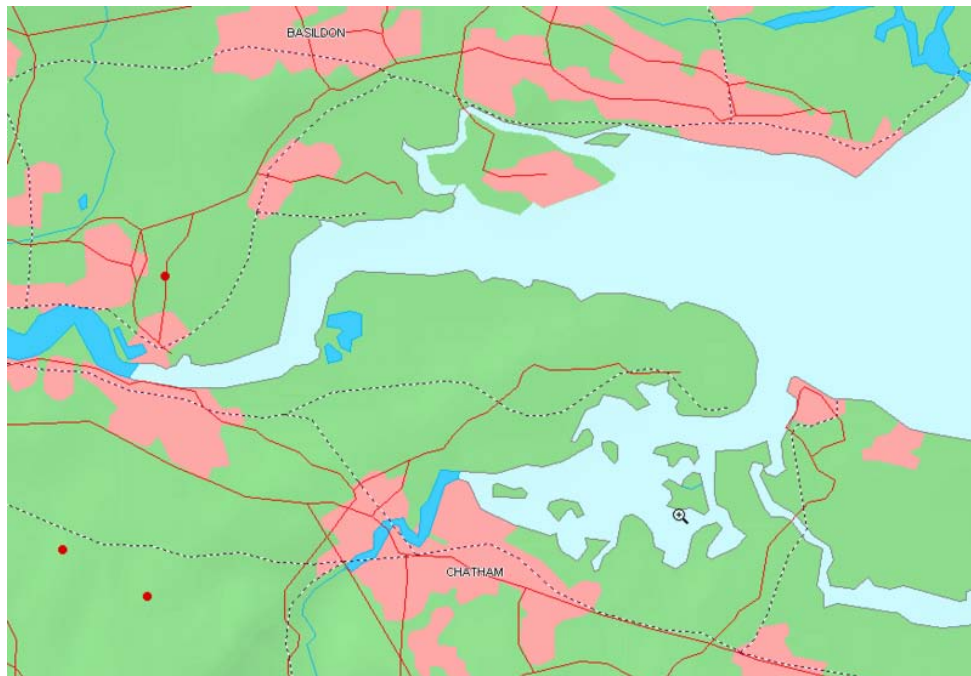


Figure 2: The Hoo Peninsula location

2.40 THAMES ESTUARY AIRPORT COMPANY

THE MARINAIR CONCEPT

The Marinair concept has been developed by the Thames Estuary Airport Company and is one of the earliest schemes to be promoted. It promotes an offshore platform with an above sea area of 2190 hectares. It is located some 7 kilometres north of Whitstable and 80 kilometres east of Charing Cross. Although a considerable distance from London they anticipate the journey time to be between 30 to 40 minutes by high speed train.

It is proposed to have 4 runways each of 4200 metres in length with all facilities expected today of an international hub airport.

Considerable work has been done on this scheme and it has much to commend it. Again it is understood that funding is available for this scheme.

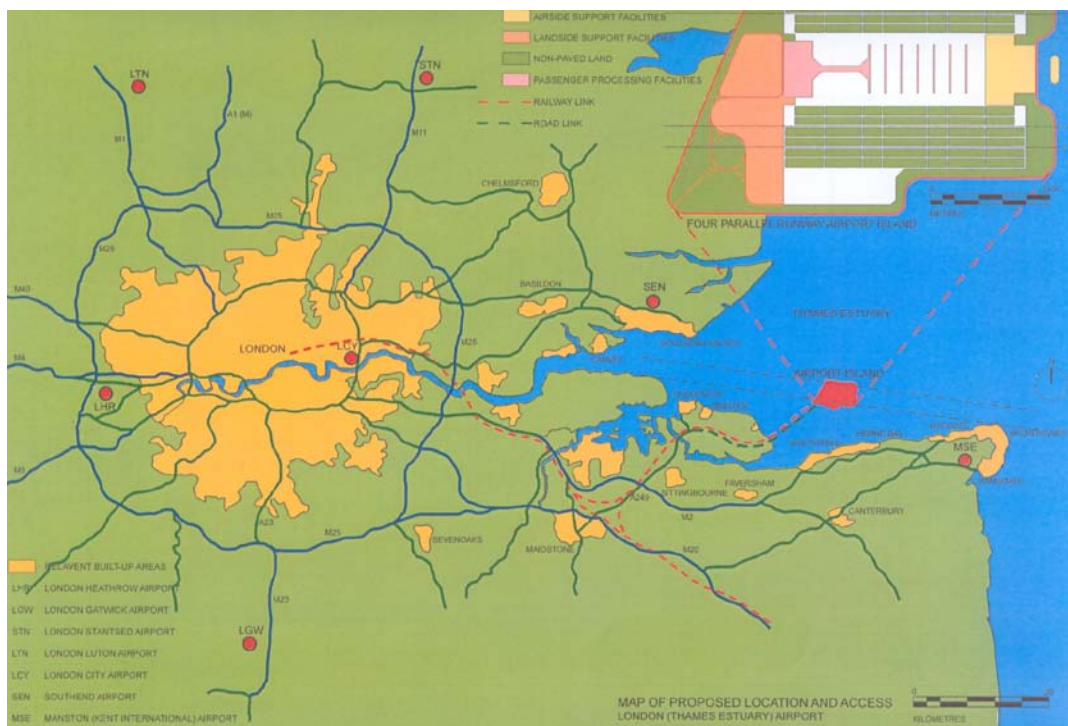


Figure 3

2.50 THAMES REACH AIRPORT LIMITED AND METROTIDAL LIMITED

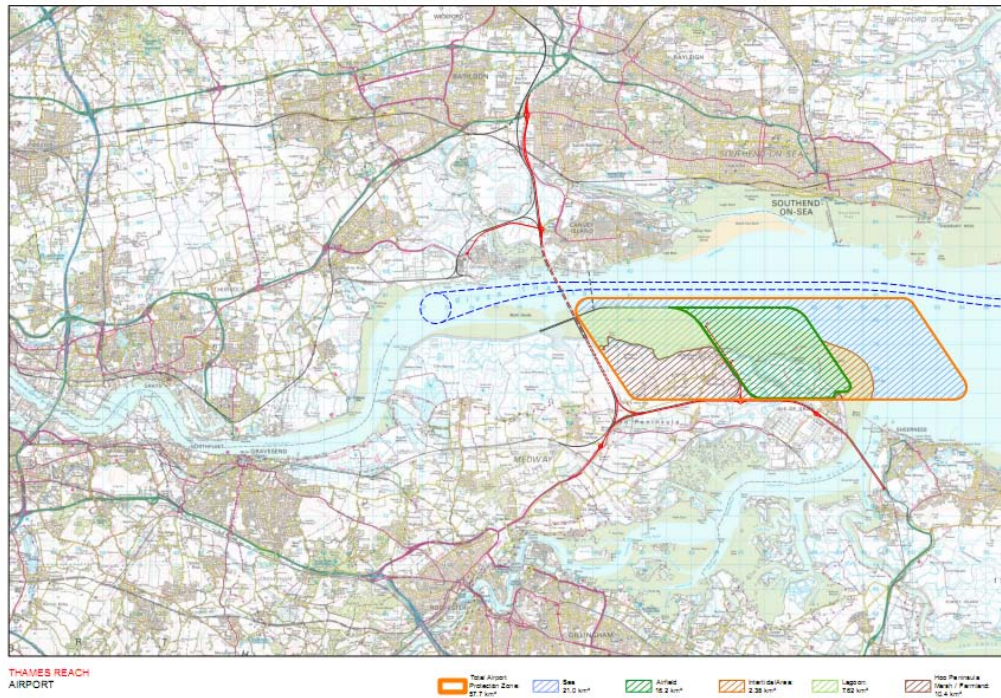


Figure 4

This scheme is near the Cliffe Airport which itself was rejected by Government's White Paper. The area shaded in green represents the area within which the airport is to be sited.

The Metrotidal scheme provides an additional road and rail crossing of the Thames and has subsequently been expanded to incorporate both tidal lagoons for power generation and a Thames Barrier as well as an airport.

The advantage of this scheme is that it is approx 45 kilometres from Charing Cross, that is to say some 35 kilometres closer than the Marinair Scheme. However the principal disadvantage to this scheme is that it conflicts with major conservation areas. These include Special Protection Areas (SPA) under an EU Directive, Sites of Special Scientific Interest (SSSI) and RSPB Reserves. The likelihood of having the designation of these areas changed would be remote and the risk of bird strike may be a high risk.

2.60 SIR TERRY FARRELL & SCOTT WILSON OUTER ISLANDS SCHEME

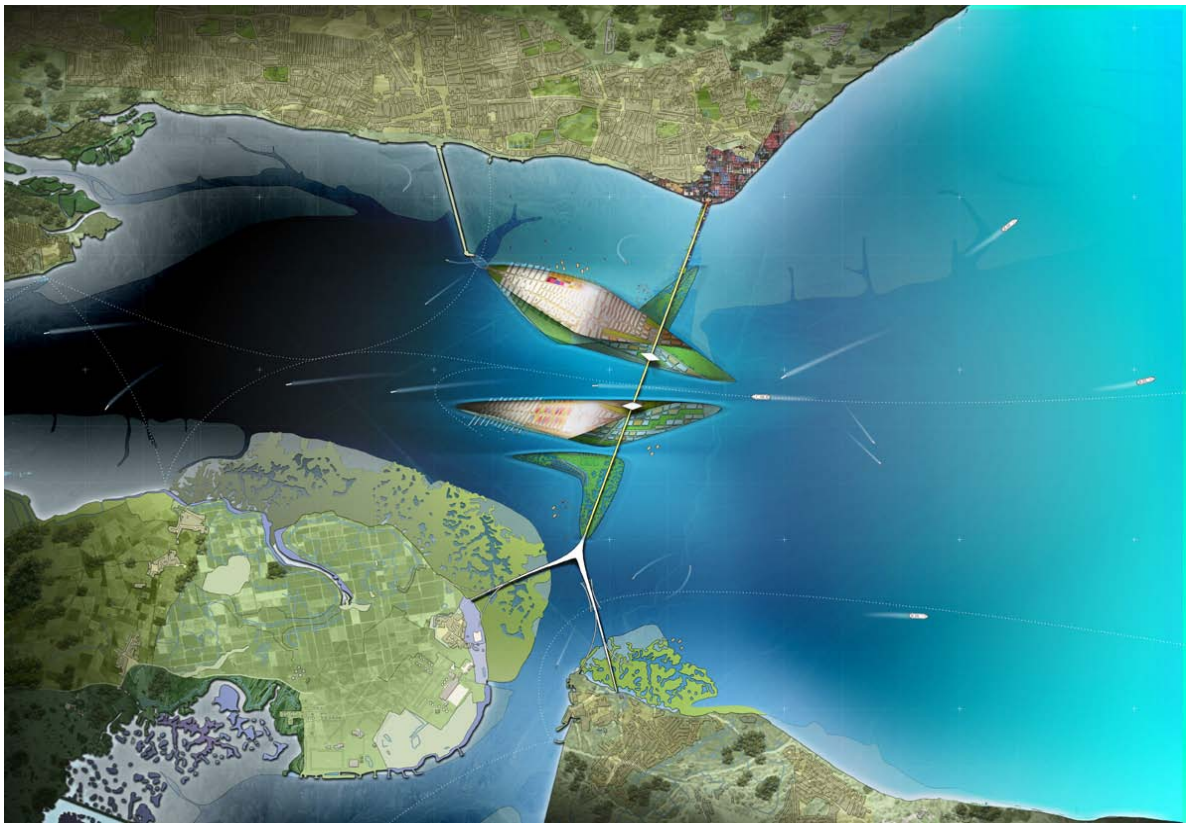


Figure 5

This scheme does not embrace an airport but rather a road crossing of the Thames between Sheerness in Essex and the Isle of Grain and the Isle of Sheppey in Kent. It was also considered feasible to incorporate an outer Thames barrier. The islands reduce the distances to be spanned and have the further advantage of providing wildlife sanctuaries and leisure areas.

This scheme could easily be adapted to incorporate an airport

as can be seen from the next scheme.

2.70 ELEANOR ATKINSON OUTER ISLANDS AIRPORT SCHEME

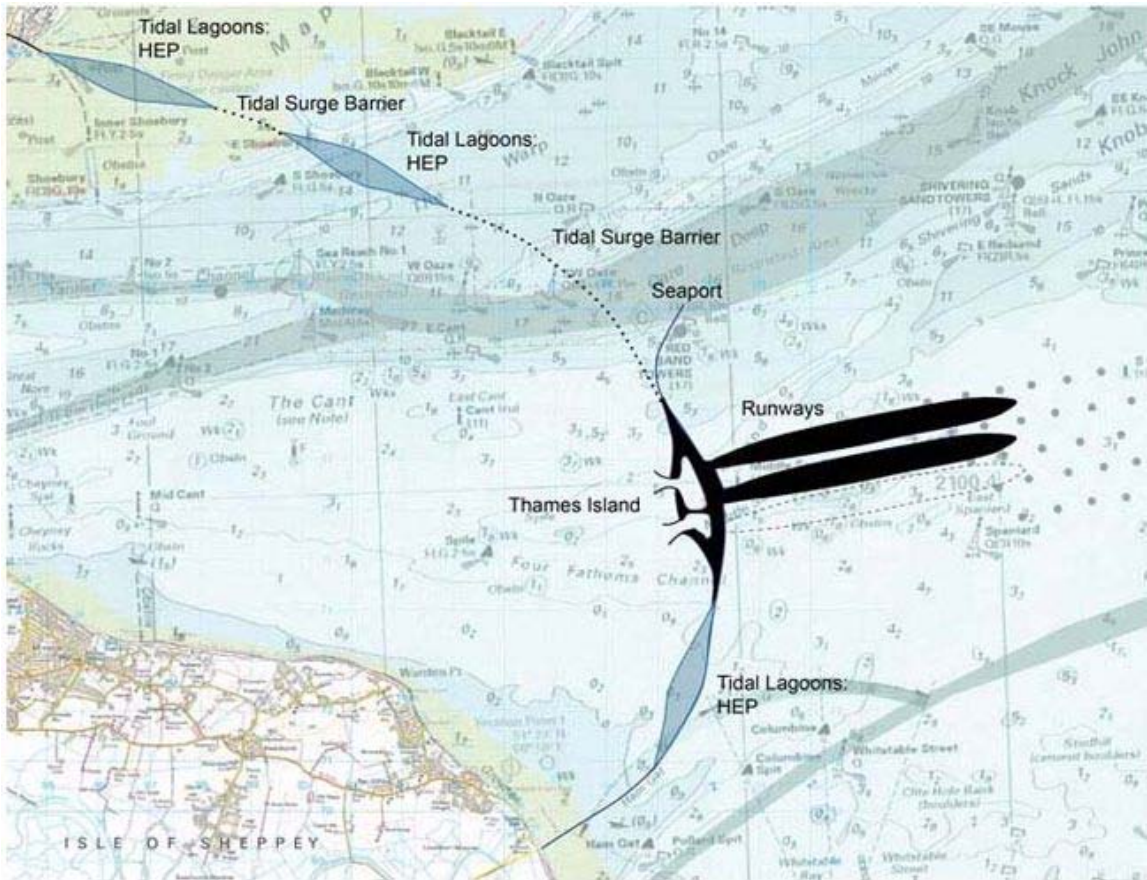


Figure 6

As can be seen this scheme has imagination yet bears some similarity to Sir Terry Farrell’s Outer islands Scheme, although it is located further to the east on the Isle of Sheppey. The scheme as outlined also includes other

features including lagoons for the production of tidal energy and a tidal surge barrier and reflects a more holistic understanding of future needs.

2.80 UNIVERSITY OF BRIGHTON

SCHOOL OF ENVIRONMENT AND TECHNOLOGY, FACULTY OF SCIENCE & ENGINEERING

THAMES ESTUARY DEVELOPMENTS

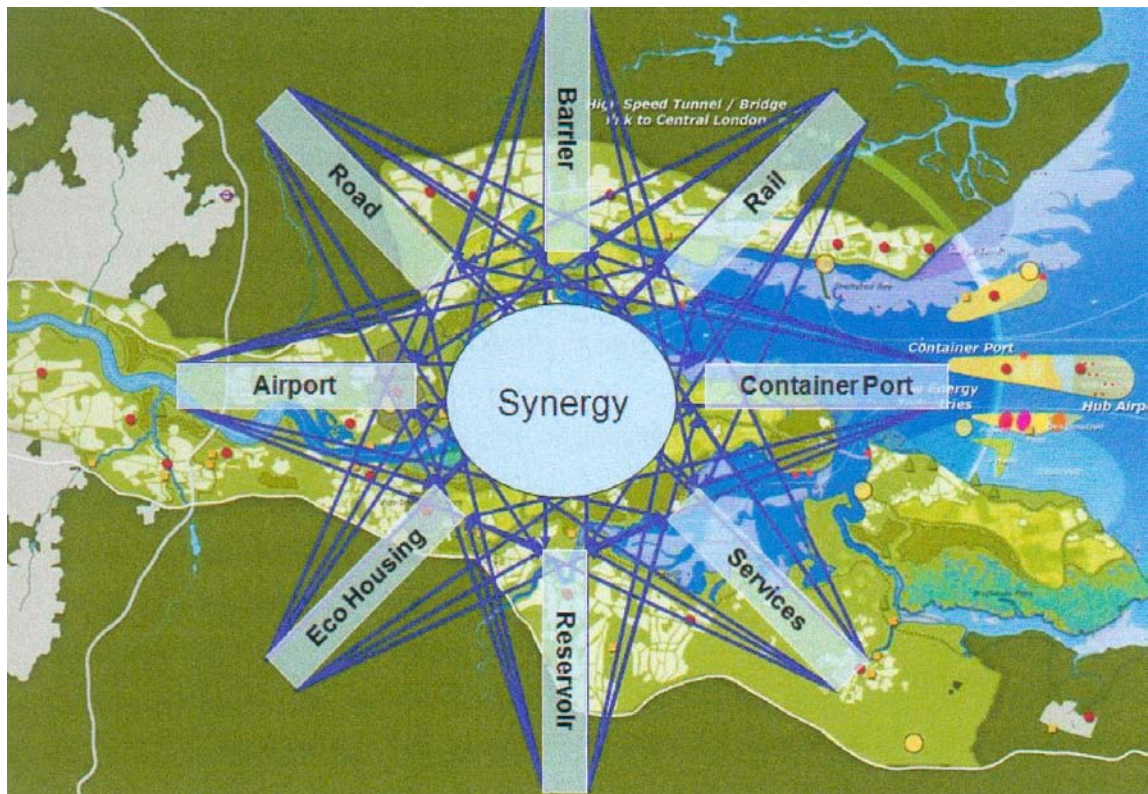


Figure 7

This work comprises a series of reports based on all aspects of the various developments under consideration in the Thames Estuary. In particular they focus on the synergy that exists between the various needs for each of the developments. Although this work may not be wholly agreed by all parties it is comprehensive and provides an holistic review of the many schemes put forward by different groups. Hence its content has been studied during the course

of this review and considered worthy of mention.

As will be seen most of the schemes reviewed envisage infrastructure other than just the airport and its transport links. This reinforces my own conclusion that an holistic study of the Thames estuary and the needs of London and the South East of England are required. The principal drivers of such a study should include Climate

change and the spatial development of London.

For decades there has been a plethora of schemes put forward for an airport to be located in the Thames Estuary of which the foregoing examples are but a few. The Department of Transport has examined many more in the course of preparation and consultation for the SERAS Review and the resultant White Paper - "The Future of Air Transport". Government found in favour of a third runway at Heathrow. The primary reasons for this decision would appear to be expedience, capital cost, economics, the environment, demographics, and no disruption to

the successful businesses that have grown around Heathrow. Although these represent valid considerations, many organisations have argued that this decision is misguided and short-sighted. The challenges include the need for more emphasis to be placed on the health and safety of those living beneath the flight path of the busiest International airport in the world, and on the number (up to 480,000) of air transport movements over the city each year, which is regarded by many to represent a serious threat to the safety and security of London. Other issues raised include airport access and the need for a longer term view.

2.90 EXISTING REPORTS AND STUDIES

Over recent decades examination of the Thames Estuary and the possibility of an airport have produced numerous reports commissioned by a host of interested parties. Unfortunately I have not yet had the opportunity to discover or read all that must have been written. Although the SERAS Report and subsequent Government White Paper reflects the Department of Transport's high standards, to my mind it has not considered how the various proposed schemes could be integrated with the demands of other government departments, agencies and the sustainability of each scheme.

The report prepared by Mott McDonald for Kent County Council for their response to Government's SERAS consultation provides some very interesting observations but totally condemns the proposal to construct an airport at Cliffe. Obviously Government took note of this conclusion and it assisted them in reaching their conclusion to rule out an airport on the Hoo Peninsula.

Despite the negative approach to an estuary airport, the report has a considerable amount of factual

information about the aviation industry and realistic predictions regarding the future growth of the industry. Some of these same predictions have been employed in this report

The final draft Thames Estuary 2100 Report (TE2100) was launched earlier this year for consultation and this process has now drawn to a close. This report deals in detail with the flood management and water management of the River Thames and the problems we may face in the future as a result of rising sea levels and extremes in weather conditions largely brought about by climate change.

In the process of preparing the TE2100 report The Environmental Department has gathered vast amounts of information in relation to the Thames Estuary and has offered to share this with me. However I have not yet had the opportunity to take advantage of this generous offer but it would form an essential part of any Thames Estuary Development Study that is commissioned.

PART THREE: THE ESTUARY AND ITS QUESTIONS

3.00 WHAT ARE WE TRYING TO ACHIEVE?

It is clear from the many schemes that have been produced and the reports that have been written that we have many solutions but what I would challenge is whether we understand the question. This is a view I closely share with the eminent architect Sir Terry Farrell.

The way in which this country and society is structured in terms

of politics, governance and the relationship with the professional bodies encourages us to look at issues and problems within silos ignoring the bigger picture. The approach invariably misses the opportunity to create an holistic solution that avoids duplication and would prove more beneficial to the community and provide real value for money.

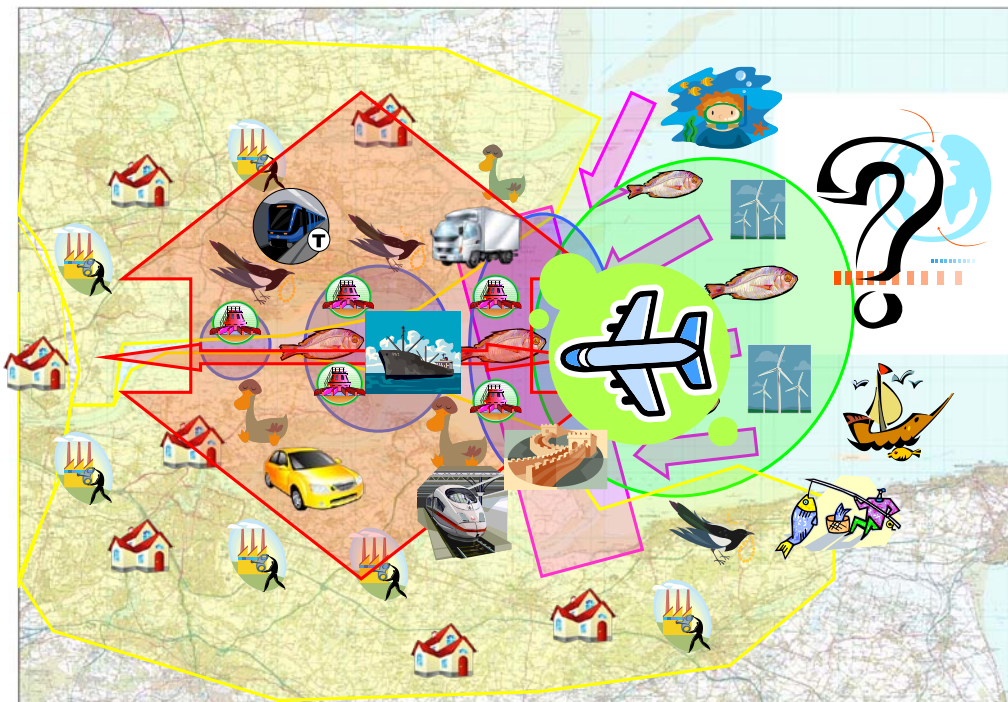


Figure 8

When reviewing the Thames Estuary and the creation of a

sustainable future for London and the South East of England in terms

of flood management, water management, creating sources of renewable energy, improving our land, sea and air transport as well as commerce, we must recognise the sensitivity of the environment and safeguard it to the best of our ability.

The challenges we face in the Thames Estuary are complex and the approach needs to be rethought if we are to avoid leaving future generations an even bigger challenge with an even bigger price tag.

Are individual solutions the answer or do we need an holistic review?

- Climate Change
- Thames Barrier
- Renewable Energy
- The Environment and the Ecology
- Regeneration and the People
- Road & Rail Transport Links
- Shipping and Ports
- Airport

Figure 9

We must also understand that in this country we do not often have a green field site in which we can create modern wonders to compete with those in the developing and emerging world. Instead we must think carefully to determine whether our aging infrastructure and the facilities which in their time were the most advanced in the world, should undergo a

retrofit or a replacement. A classic example of this issue is the London Underground which cannot be abandoned and replaced. In the short term airports and other infrastructure may have to be considered in a similar light enabling a phased redevelopment of the Estuary over the next 30 years.

3.10 CLIMATE CHANGE

In February 2007 Dr. Rajendra K Pachauri, Chairman of the Intergovernmental Panel on Climate Change stated:

“If you see the extent to which human activities are influencing the climate system then the mitigation should be seen in a totally different light....We are doing things that have not happened in 650,000 years, based on scientific evidence.”

Whilst groups may continue to debate the correctness of scientific evidence and the assumptions on which it is based, it is clear that we are suffering from the effects of climate change whatever the reason. Fortunately the United Kingdom sees the reality of the situation and is one of the world leaders in addressing climate change.

Recent revisions to government policy with respect to climate change and the requirement for an 80% reduction in carbon emissions by 2050 must be the driving force behind many major decisions and how we live in the years to come. Climate change will require both developed and developing countries to make significant changes to the way of life and to cultures. In terms of the world economy this monumental challenge is linked to the requirement to ensure a sustainable and adequate supply of food and potable water to meet the needs of the world population.

Not all the definitions relating to carbon are clear but what is becoming obvious to engineers, architects and planners is that they need to estimate the cost of the work in carbon as well as money if we are to meet the ever demanding requirements on CO₂ emissions. These will be a principal driver in assessing our future needs and life styles.

3.20 A NEW THAMES BARRIER

In November 2007 the whole of the East of England and the Thames Estuary came perilously close to a repeat of one of Britain’s worst

natural disasters. This occurred on 31st January 1953 when the North Sea flooded these same areas, killing over 300 people. The

Thames Barrier was raised twice in November 2007 to prevent such floods and indeed was a response, if belated, to the events of 1953. This same surge of the North Sea flooded the Netherlands killing more than 2000 people and resulted in the Dutch building the largest flood defence system in the world. Had the November storms coincided with a high tide, even the Barrier could have been overwhelmed.

The TE2100 report clearly recognises this near miss but nonetheless indicates that it would be sufficient to only implement upgrades to the existing Thames Barrier plus tidal management measures downstream costing £3 to £7 billion. The need for an outer estuary barrier is considered unlikely this century by the Environmental Agency.

The effects of climate change in the past have frequently been underestimated and even now the seriousness of the problem is still being realised. Therefore the decision to defer the construction

of an outer barrier for several generations may expose London and the South East of England to a higher level of risk than necessary. It is believed that this decision is driven by the high capital cost of building a stand alone outer estuary barrier but this is less than ideal if these adverse weather and climatic conditions accelerate beyond the current predictions.

This position is thought untenable by some whose concern is the safety and sustainability of the growing conurbation spreading eastward from London. Not surprisingly therefore during the TE2100 consultation process a frequent suggestion has been that a multifunctional barrier embracing both transport links and tidal energy generation would provide a more cost effective and sustainable solution. To my mind this proposition would be further improved if provision for an estuary airport was made and the platform on which the airport would be built could form a major part of the whole scheme.

Assets and people at risk on the tidal Thames floodplains

- 350 km² land area
- 55 km² designated habitat sites
- 1.25 million residents (plus commuters, tourists and other visitors)
- 500,000 homes
- 40,000 commercial and industrial properties
- £160 billion property value
- Key Government buildings including the Houses of Parliament
- 400 schools, 16 hospitals
- City Airport
- The Olympics site
- 4 World Heritage sites (Greenwich, Tower of London, Westminster, Kew Gardens)
- Heritage and cultural sites including the Tate Modern and Tate Britain
- 1,100 km of railway lines, 30 mainline railway and 70 underground stations
- 1,300 km of main roads

Figure 10

3.30 RENEWABLE ENERGY

For more than a decade the outer estuary and the North Sea has been selected as a potential area suitable for wind farms. The 30 turbines on the Kentish Flats have been in operation since August 2005 with a total output of 90MW. Construction of the more ambitious scheme, the London Array, situated some 20 Km from

the Essex and Kent coasts is expected to commence in the near future. When complete it is expected to produce 1000MW with 341 turbines. Several other schemes are currently being considered within this general area.

Location	Max. Power Generated MW	Number of Turbines
Inner Gabbard and Galloper	500	140
Gunfleet Sands (Round 1&2)	172	50
Kentish Flats (Operational since 2005)	90	30
London Array	1000	341
Maximum Power likely to be generated in total	1762	561

Table 1: Wind Farms in the Estuary

The United Kingdom will struggle to meet the Government's target to source 15% of its electricity from renewable sources by the year 2020 even with its ambitious programme for the private sector to build wind farms both inland and offshore. The plan to install 7000 turbines by 2020, 4000 of which are offshore and many the height of the Blackpool Tower means manufacturing and erecting at the rate of two turbines per day from the date of the Government's announcement. In addition both nuclear and tidal power stations are expected to come on stream near to this target date. It is doubtful whether the country has the capacity to achieve this goal.

As we can see from Table 1, the wind farms in the estuary will make a valuable contribution albeit minor in the overall equation.

On the other hand, tidal energy is one of the oldest forms of energy, with tide mills in use on the Spanish, French and British coasts dating back to 787AD

The Estuary presents a unique opportunity for tidal energy to the extent that it is thought possible to generate sufficient power to make a meaningful contribution to the overall needs of the region, even though the estuary was not identified by Government as one of the preferred locations in the UK for this purpose. The Severn, Dee, Solway and Humber estuaries were among the eight main sites around Britain where Tidal power stations could usefully be built. In respect of the Thames estuary this decision was almost certainly taken without consideration of the potential for integrating a tidal power scheme with the other infrastructure being

considered and especially an outer flood defence barrier

Care will need to be taken in the selection of any tidal generation system in order to minimise any adverse impact on the rich inter-tidal mud flats in the estuary on which vast numbers of migratory birds feed. If tidal lagoons were employed they would not be as efficient as those sites selected by government due to the reduced tidal range within the Thames Estuary. However the efficiency could be greatly improved if the hydrostatic head within the lagoons was increased using pumps powered by the unpredictable and intermittent energy source from the adjacent wind farms.

Metrotidal Limited are at the conceptual planning stage in this field by integrating tidal lagoons with a road and rail crossing of the River Thames that they are

proposing near to Canvey Island. Others I am aware have considered similar opportunities but Metrotidal would appear the most advanced. However whether their scheme is sited at the most appropriate location would need further examination and research.

Although any scheme within the Thames Estuary would only be a fraction of the size of the Barrage proposed for the Severn Estuary some measure of scale can be deduced from the energy anticipated to be produced by the latter. It is expected to have over 200 large turbines, and provide over 8,000 Megawatts of power (over 12 Nuclear power stations worth). It is expected to take 7 years to build at a cost of £15Bn but could provide 7% of the energy needs for England and Wales.

3.40 THE ENVIRONMENT AND THE ECOLOGY.

The Thames Estuary is one of the most important ecological sites in Europe and forms a key part of the huge ecosystem surrounding the North Sea together with the coastal lowlands of the Continent and the East of England. The Estuary in particular provides rich inter-tidal feeding grounds which attract vast numbers of migratory birds each year.

In July 2009 the RSPB and the Port of London Authority became partners to monitor the behaviour of the diverse range of species to be found in the Thames and all its habitats. The wildlife includes dolphins, seals, fish, marine invertebrates and populations of internationally important water birds. This audit will determine how wildlife is affected by the commercial activities conducted on the Thames. It will also provide information on the status of the migratory birds and the pressures they face not only at local sites here in the UK but also about changing conditions on distant breeding grounds in the arctic. The latter currently threatened by climate change.

Equally important is the need to establish the reason for any

reduction of these visitors. Whether due to reduced breeding patterns caused by the above, a sudden change to the feeding grounds due to man's interference or merely wintering closer to their breeding grounds as a consequence of global warming.

Not only are birds protected by stringent EU and UK legislation but so too are certain species of fish, molluscs and crustaceans to ensure safe and secure breeding grounds

It takes little imagination to appreciate that if any of the proposals or schemes under consideration were introduced without appropriate amelioration measures then the impact on this precious ecological reserve could be disastrous and in this day and age almost certainly unacceptable. Nonetheless, this has to be brought into balance if we are to succeed in finding effective means to deal with the many and complex issues surrounding climate change, as well as the needs and demands of a growing population.

Obviously to effectively address the question of balance the partnership formed between the

RSPB and The PLA will provide a helpful model on which to build. It will then be necessary to pioneer mitigation measures to create

equal habitats to maximise the survival potential of all.

3.50 REGENERATION AND THE PEOPLE

The regeneration of North Kent from the M25 through the Medway Towns and on to Margate and Ramsgate in the east has been a concern and ambition for many years. In a similar way South Essex has also had plans for regeneration. Both have benefited to different degrees from the

Thames Gateway Programme but have fallen short of their targets. Circumstances in some of the areas within these regions have been exacerbated by industry scaling back its activities with some repercussions throughout the supply chain.

Regeneration

- The Boroughs and Local Authorities governing the towns and villages of North Kent and South Essex all have plans for regeneration. e.g. North Kent and Medway has the potential for 80,000 new jobs and 50,000 new homes over a 20 year period.
- The Thames Gateway Partnerships have made some progress.
- Without a catalyst, infrastructure and transport links the full potential of these important goals will not be reached.

Figure 11

Map of deprivation in the Thames Estuary

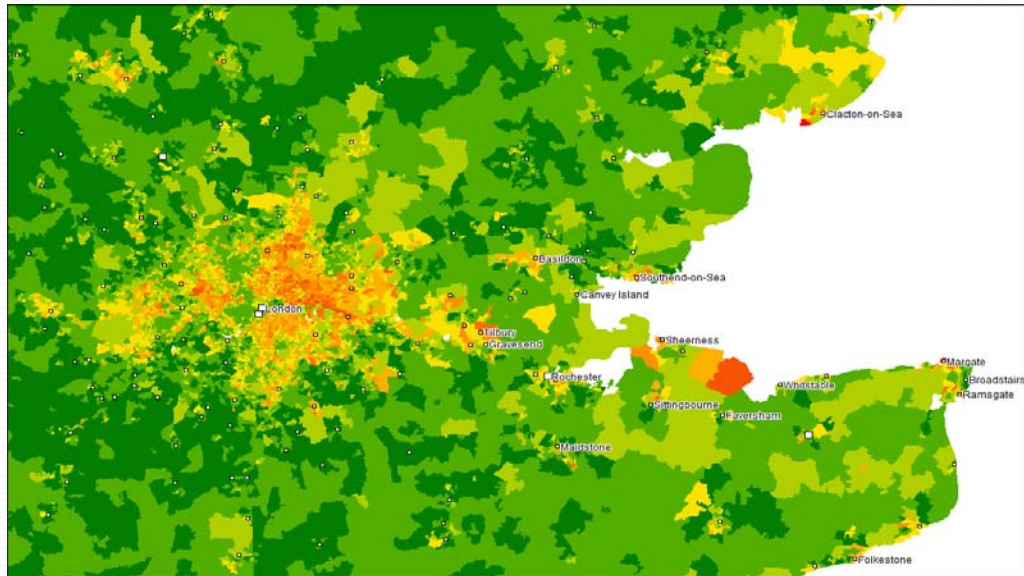


Figure 12

The various infrastructure schemes under consideration would provide the catalyst to bring about the change sought by all the local authorities involved. In the initial stage much of the regeneration would be as a result of construction followed by the operation of the completed facilities and the support and satellite industry that would result. Although the statistics are wide ranging it is clear that the population growth levels would be significant. Furthermore, if the transport improvements already proposed for the regions were provided then the rate of development would begin to improve.

Each of the foregoing items if considered in isolation and without being part of a bigger programme is unlikely to demonstrate value for money. Therefore it is important to ensure that they are considered holistically within a single programme.

Much valuable work has been undertaken by the Thames Gateway Partnership in conjunction with the County Councils and Boroughs involved and Sir Terry Farrell has also reviewed the same areas in his Parkland and subsequent studies. Therefore the work done should be taken properly into account when an in-depth study is taken forward

3.60 ROAD & RAIL TRANSPORT

Whilst the present investment programme will provide new transport links such as Crossrail, Thameslink and HS2, further improvements in the Thames estuary will be necessary to support the existing housing programmes let alone the expansion, development and regeneration that would result should the major infrastructure being proposed by this review be constructed.

The models used for planning SE England's transport have relied on both orbital and radial paths around, to and from London but have tended to ignore links from north to south which bypass London to the east. This is understandable with the obstacle presented by the River Thames and its Estuary.

In April 2009 the Department for Transport published its Dartford Crossing Report which clearly demonstrates that the present Dartford Crossing is operating at its effective capacity with daily traffic flow of between 140,000 and 150,000 vehicles. The modelling recently undertaken anticipates that by 2031 traffic will have

increased by 60% with the real impact from a 38% increase in HGV vehicles. It is also likely the expansion of marine ports will contribute some 22% again by 2031.

Interestingly the DfT consultants claim that they do not have the tools for the next phase of study because the current traffic models are no longer suitable. This confirms my findings in other areas of study and I was pleased to learn that Imperial College are conducting research in this regard. It is disappointing that no traffic models have yet been developed to interact with those used to evaluate the wider benefits of transport and infrastructure.

The DfT report makes positive recommendations and has reviewed five river crossing options as follows:

- Option A - Additional capacity at the existing Dartford Crossing.
- Option B - Swanscombe Peninsula link A2 to the A1089.
- Option C - East of Gravesend and link to the M20.
- Option D - M2 link to Canvey Island.
- Option E - Isle of Grain link to east of Southend.

The following table has been taken from the report as published by the DfT and indicates the merits of each crossing measured against the five high level government goals identified in ‘Delivering a Sustainable Transport System’ (DaSTS, November 2008):

DaSTS GOALS	'Business as Usual' Minor Modifications to the Existing Layout	Option A Additional capacity at the existing Dartford Crossing	Option B Swanscombe Peninsula link A2 to the A1089	Option C East of Gravesend and link to the M20	Option D M2 link to Canvey Island	Option E Isle of Grain link to east of Southend
To support national economic competitiveness and growth, by delivering reliable and efficient transport networks	Moderate Adverse Impact	Moderate Beneficial Impact	Slight Beneficial Impact	Moderate Beneficial Impact	Slight Beneficial Impact	Slight Beneficial Impact
To reduce transport's emissions of carbon dioxide and other greenhouse gases, with the desired outcome of tackling climate change	Slight Adverse Impact	Slight Adverse Impact	Slight Adverse Impact	Moderate Adverse Impact	Slight Adverse Impact	Slight Adverse Impact
To contribute to better safety security and health and longer life-expectancy by reducing the risk of death, injury or illness arising from transport and by promoting travel modes that are beneficial to health	Slight Adverse Impact	Slight Beneficial Impact	Slight Beneficial Impact	Slight Beneficial Impact	Slight Beneficial Impact	Slight Beneficial Impact
To improve quality of life for transport users and non-transport users, and to promote a healthy natural environment	Slight Adverse Impact	Slight Adverse Impact	Moderate Adverse Impact	Large Adverse Impact	Large Adverse Impact	Likely to be Large Adverse
To promote greater equality of opportunity for all citizens, with the desired outcome of achieving a fairer society	Neutral	Slight Beneficial Impact	Slight Beneficial Impact	Slight Beneficial Impact	Neutral	Neutral
Indicative cost ranges	Not applicable	£1-3 billion	£1-3 billion	£2.5-7.5 billion	£3.5-10.5 billion	

Table 2: DaSTS Goals

Recommendations in the report may be interpreted as follows that

“Business as Usual” with improvements to the approaches

and toll plazas will ease the current congestion. This is necessary but will not meet the demand forecast for 2031 so Options A, B & C are put forward for further consideration and study by the department's consultants. It is noted that it may not be possible to consider Option B further as it conflicts with the Eastern Quarry development which is key to the Thames Gateway development strategy.

The Report also recommends that Options D & E should be dropped. Option D is the alignment on which Metrotidal's scheme is based and the alignment of E would be close to where access is likely to be needed for an estuary airport and outer barrier. Therefore these two options are worthy of further consideration especially as the straight line distance from Junction 9 on the M11 to Folkestone, which crosses the estuary on the approximate alignment of the crossing in Option E, is about 25Km less than the present route over the Dartford Crossing. Moreover if the crossing was considered as part of an holistic review of the estuary and the other infrastructure required the capital cost and disruption would be significantly reduced.

The DfT Report reviews the need of both freight and passenger rail traffic. In the case of freight it is claimed that the shortfall in capacity would not be overcome by a Lower Thames Crossing as the growth in traffic is generally from the Midlands to the Channel Tunnel. In the case of passenger traffic, although trains run full in the rush hours the pattern is radial taking commuters to and from London on the routes both north and south of the Thames. Again a further crossing was not considered necessary.

Whilst the Dartford Crossing Report is a comprehensive report it tends to apply today's approach and thinking to tomorrow's problems and how life may change over the 20 to 30 years. It lacks an holistic review of what is likely or even possible within the Thames estuary. The authors of the report recognise that further and more detailed studies are necessary and should this be the case then they should be closely aligned with the Thames Estuary Development Study as advocated in this review together with the Mayor's London Plan and Outer London Commission.

It is clear that if an airport were to be built in the estuary the whole

pattern of traffic would change dramatically and especially associated with successful regeneration of the areas on either side of the Thames. There would need to be a significant rethink regarding rail connections and

especially High Speed Rail from the network to the airport if a maximum journey time of 40 minutes from Central London to an Estuary Airport is to be achieved.

3.70 SHIPPING AND PORTS

Before the construction of any infrastructure within the Thames Estuary, the most important consideration after the environment, ecology and hydrology, are the trade and leisure activities that the river supports.

Since the decline of the London Docks with the last enclosed docks being shut in 1983, shipping has moved 20 miles downstream to Tilbury Docks where trade still flourishes. The Port of London Authority, which controls the River Thames from Teddington to the Outer Estuary, reports that the Port adds £3.7 billion to the UK's economy each year and an investment of £4.8 Billion is expected to occur over the next ten years. Therefore, no activity must undermine the performance of the Port of London. The River Medway, which enters the Thames Estuary at the Isle of Grain and is home to the Port of Sheerness, Chatham Docks and Thamesport, also makes a

significant contribution to UK's economy. Additionally construction on London Gateway Port has commenced and when finished will be the largest container terminal in the UK able to handle the next generation of massive Container Vessels with a capacity of 14,000 TEUs. (Twenty-foot Equivalent Units)

By the time any new major infrastructure is in place these huge ships will be sailing up and down the Estuary. Therefore these need to be taken fully into account when designing infrastructure so that all steps are taken not to interfere with trade.

The major task for any river authority is to ensure the shipping lanes remain open and are regularly dredged to maintain the correct depth. In the Thames this is almost a constant task due to silting. Also there is a desire to widen and deepen the Princes

Channel to reduce the distance to the route to the ports for shipping coming from or heading to the south. The Dredging quantities to achieve this are large and rather than send to dumping grounds could be gainfully used in any structures to be built in the Estuary, namely, an airport platform or flood defence barrier.

We have already mentioned the ecology elsewhere but it is worth reminding ourselves that there are also important fishing grounds and oyster and cockle beds to be cared for. Also the Estuary, the River Swale in the south and the many small tributaries on the northern shore are the home of much sporting and leisure activities and again steps will need to be taken to ensure they may continue.

PART FOUR:

AN ESTUARY AIRPORT.

4.10 THE NEED FOR AN ALTERNATIVE AIRPORT.

Although Heathrow may have emerged by accident after the war and took the mantle of London Airport away from Croydon in 1946, it is still 96Km south of Upper

Heyford, Bicester which has been calculated to be the centroid for overall passenger demand for the whole of the UK.

Airports	Distance (KM) to Charing Cross London	Distance (KM) to Upper Heyford, Bicester
London Heathrow	28	96
London Stansted	68	171
London Gatwick	47	155
London Luton	56	66
Birmingham	182	86
East Midlands	188	126
Thames Estuary Airport	96	218

Table 3

It is interesting to note that Luton and Birmingham are closer to the centroid than London Heathrow. However, neither of these Airports has the space to expand significantly, even though both have good mainline rail connections.

Given Heathrow's location and space it is not surprising it has developed since 1946, albeit in an ad hoc manner. As a consequence, within a 40Km radius to the west of

the airport, industry and huge distribution warehouses have been established and on the outskirts expensive residential property. In stark contrast on the east, urban development spreads all the way to west London. The development of this conurbation emerged between the two Wars and hence before Heathrow was established. It is the people in these districts living directly under the flight path of the world's busiest passenger airport who are constantly exposed to noise, pollution and risk. This

nuisance should not be dismissed as minor for Heathrow has been functioning at 99% operational efficiency with approximately 477,000 air transport movements (ATM) last year alone and the prospect of this increasing to 605,000 by 2020. The latter takes account of the introduction of the third runway with the number of ATM's constrained by prescribed noise and air quality tests but will be subject to review in 2020.

Capacity of the present two runways could be increased with the introduction of mixed mode operation which is favoured by many operators and air traffic controllers. However this would have the disadvantage of increasing the frequency of flights with the associated disruption and risks. No doubt it is for the latter reason and politics that this mode of operation has been rejected.

If one confines concern for those who live directly under the flight path to sympathy alone it is difficult to find reasons to close or transfer considerable volumes of traffic from Heathrow. This view is to some degree reinforced by the extensive research Rolls Royce are currently undertaking to develop the next generation of aircraft engines and aircraft designs

capable of using alternative fuels reducing CO₂, NOX and noise emissions.

Although many cities around the world have airports adjacent to the central area there is not really an example that parallels London with the predominant approach from the east traversing the whole of London to reach Heathrow in the west. Therefore the impact on Greater London may be considered to be both unusual and high. Obviously if the third runway were to be built the impact would increase. Given that the Nation's concern over terrorism attacks is intensifying and more especially since the attack on the World Trade Centre in New York on September 11th 2001 and the London bombings on 7th July 2005 the risk arising from so many aircraft passing at low level over London is a major concern. The Nation's concern is demonstrated by the plans being prepared for the 2012 Olympic Games to divert hundreds of flights away from Central London.

The aim, therefore, should surely be to reduce rather than increase air traffic over the city. The fact that the popular London City Airport also exacerbates the issue should not be overlooked.

Hopefully with the introduction of high speed rail and HS2 in particular being given priority the ambitions to build a third runway in the short term at Heathrow will disappear.

Sir Terry Farrell has expressed the view that the efficiency of Heathrow could be improved if it was better used and the layout improved. The airport has evolved with the market rather than being designed for purpose and hence needs a major retrofit. My thoughts parallel much of this thinking for at present, despite Heathrow being the busiest passenger airport in the world, it is not rated in the World's Best Airport List and this contrasts with London's role as a World Class City.

Whilst Asia dominates the World's 10 best airports, Zurich is rated 4th, Munich 5th and Amsterdam 8th. Neither does Heathrow feature anywhere in Europe's league tables despite the addition of T5.

If London as a city is to retain its premier place in the world surely the current airport position needs improvement and it is unlikely that an increase in the volume of traffic will help. Therefore plans for a new signature airport must commence so that the smart green economy that UK wishes to establish can be achieved and be ready for when the existing airports serving London can no longer meet the demand or become too expensive to operate efficiently.

4.20 THE LOCATION

If a new major airport is to be considered then the Thames Estuary is the most likely place to be selected being approx 96Km from the centre of London at Charing Cross even though it is 218Km from Upper Heyford, the

perceived centroid of customer demand. The main advantages and disadvantages of an estuary airport are to be seen in Table 4 balanced against the possible disadvantages.

Impact of an offshore airport

Advantages

- 24 hour operation
- Minimal pollution
- Approach not over Central London
- Reduced risk for residents
- Incremental expansion without disruption
- A Green Airport
- The catalyst for regeneration and wealth creation
- No CPO of Land

Disadvantages

- Distance from Central London and transport links
- Reluctance of Airlines to move and perceived loss of premium revenue
- Air movement complicated over SE England
- Possible loss of interline traffic
- Move in the centre of gravity for business
- Capital costs will be high. How will it be paid for?

Figure 13

Although not at the top of the list as tabled the fact that the site does not require a Compulsory Purchase Order to acquire the land and property is extremely important commercially. This is the issue that causes most controversy when planning major infrastructure projects. In this case the seabed is Crown Land and is likely to be leased.

The preferred Hub Airport should be operational 24hours per day 365 days per year and that is never possible when located within or close to an urban area due to the noise created by aircraft landing and taking off. Further it would not require aircraft to traverse London on the approach or indeed landing for the route will be predominately over the North Sea. With an airport

open 24hours night operation provides air freight with more opportunities. Also it will assist long haul flights, especially from the Far East, to overcome the present situation where they have to depart around or after midnight their local time in order to reach London as Heathrow is about to open. Certainly, had it been possible for Heathrow to have operated 24hours the question of a third runway would in all probability never have arisen.

Provided it is located such that aircraft landing and taking off will not cause a nuisance to the residents living in the adjacent coastal towns, an airport in the Thames Estuary could operate on a 24hours basis and would also present a major challenge to the competing European airports of Amsterdam (Schiphol), Paris (CDG) and Brussels. The distance from the centre of London can be overcome by high speed trains. Already Eurostar has a maximum operational speed of 300Kph and its scheduled service between St Pancras and Ebbsfleet completes in 17 minutes - a journey that usually takes at least 50 minutes by the normal services. With high speed trains improving constantly and the fact that it is now accepted by most high speed operators, especially Japan, that the optimum

speed in terms of operational efficiency and energy consumption is 340Kph, distance is no longer an issue.

The actual location of an airport within the Estuary is a very sensitive issue and would be the result of much modelling and design. Whilst the construction of a platform at sea is a well proven technology, having already been achieved in several other locations around the world, the actual location as to where it should be built is totally unique in each case. The Thames Estuary is certainly no exception to this.

Obviously great care must be taken to ensure the impact on the environment is kept to an absolute minimum and of equal importance are the people living on either side of the Estuary. As a consequence whilst issues of the inter-tidal feeding grounds, bird strike and noise contours will be key drivers in positioning the platform they are not alone for so are the avoidance of the shipping lanes, leisure activities and fishing grounds and their nursery areas.

The hydraulic modelling of the river again considers the environment and its sustainability

in depth and also determines the least impact to the natural flows and currents thus avoiding undue sedimentation and change in water quality. Fortunately over the last decade the world’s leading experts in this field, HR Wallingford, have developed the tools necessary to achieve this degree of modelling and analysis as a result of its work with the Port of London Authority, the Environmental Agency and P&O (now DP World).

Having made clear that the final location and design of the airport platform is sensitive to many factors it is thought the most likely site would be in the outer estuary

some 7Km to 10Km north east of Whitstable in the direction of the Shivering Sands Fort and The Kentish Flats Wind Farm. But I should stress this will need to be determined in line with the above criteria during the conceptual design stage of development. Figure 14 and Figure 15 provide an approximate indication of these areas.

Further the location may again be modified if the outcome of an holistic study of the Estuary advocated the wisdom of integrating an airport platform with the outer flood defence barrier and transport links.

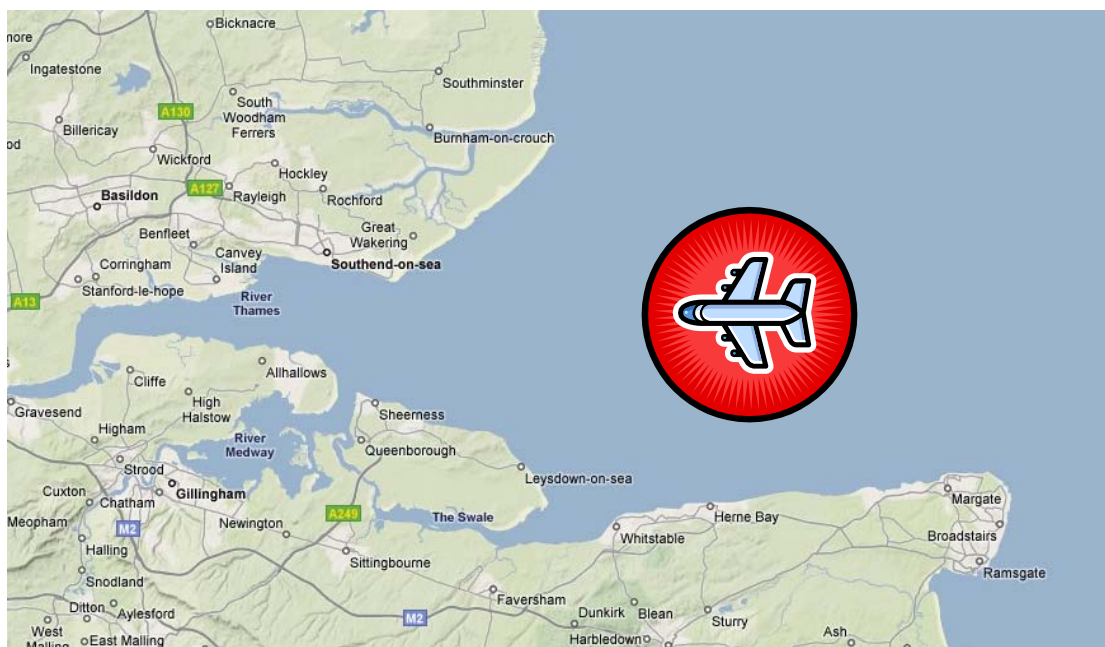


Figure 14



Figure 15

4.30 THE TIMING OF A NEW AIRPORT.

The introduction of a new airport in the Estuary, given the time it is likely to take from the present to opening, should not cause any major controversy or interruption to the other London airports before their full capacity has been reached. In most cases around the world this has been the criteria used for the commissioning of a new airport.

Both Figure 16 and Figure 17 below take account of the latest CAA data and then use the DfT

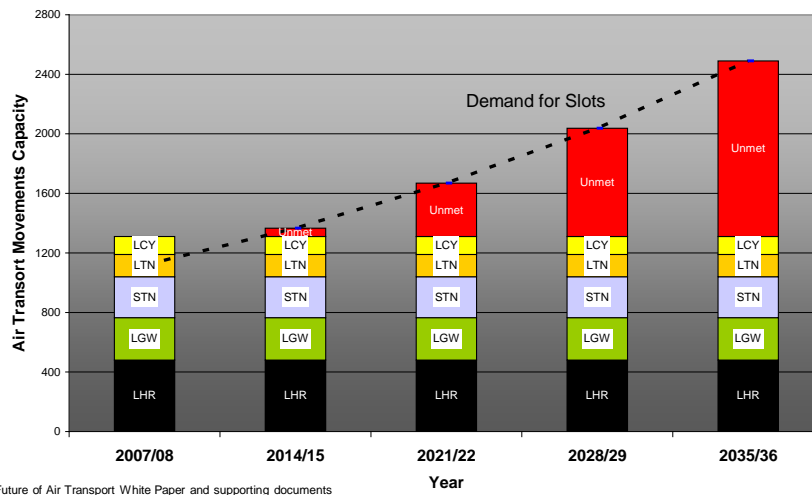
forecast to determine rate of growth in Air Transport Movements from 2007/8 through 2014, 2021, 2028 to 2035. The figures used are based on DfT's unconstrained forecast of 3.2% increase per annum in passenger demand for UK as a whole and associated assumptions on average aircraft size.

Together they show the relationship between supply of runway capacity at those dates both without and with new

runways at Heathrow circa 2020, Stansted 2020 and Gatwick 2025. This shows that even with three new runways in theory there is a shortfall of some 540,000 slots by 2035. That is about the capacity of two runways which is notionally equivalent to 70 million passengers per annum.

As we know from Heathrow 70mppa means that the runways are operating at about 99% efficiency and at near capacity requiring another runway. From this it certainly would appear that a further airport is required by or before 2030.

Capacity and Demand Forecast in SE England (Assuming no new Runways)

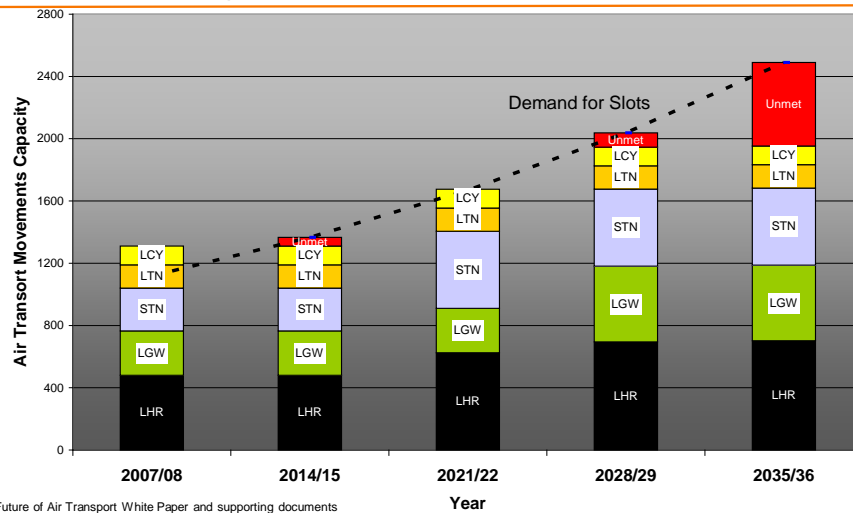


Source: CAA, Future of Air Transport White Paper and supporting documents

The unmet demand by 2035/36 is in the region of 1.2 million slots – almost as big as the capacity of the 5 London airports today.

Figure 16

Capacity and Demand Forecast in SE England (Assuming new Runways at LHR, STN and LGW)



Even with new runways at Heathrow, Stansted and Gatwick, there is unmet demand of 540,000 slots by 2035/36.

Figure 17

The need to expand London’s airports to meet the growing demand has been alleviated to some degree by the recent downturn in air traffic movements monitored by NATS. Air traffic movements now equate to the levels previously seen in 2004. This is reflected by the large losses now being recorded by the national and legacy carriers who tend to focus on the business end of the market. This is thought to be the result of the global recession. At present this drop in traffic has not stopped but is showing signs of slowing down. To some extent this decline in the UK has been camouflaged by

the increased use of the bigger budget airlines. It is thought by some that this decline will have levelled out by the end of the year and growth will continue as before, whilst others see a much slower recovery. Whichever is the case, the best that can be expected is a slip of approx three years before returning to the rate of growth previously experienced. Even then that prediction may not be possible if the world is to meet the targets for the reduction in CO2 emissions set by Government. This is especially so given that aviation contributes at least 5% of the world’s total carbon emissions each

year. In addition airports contribute considerable amounts of CO₂ as a result of the private and public road vehicles they attract and the service vehicles at the airport. The CO₂ signature for Heathrow is particularly high.

Therefore a fundamental change in air travel behaviour and

technology will become a necessity if climate protection measures such as halving global emissions by 2050 are to be achieved. Unless industry can come up with a solution in time the use and need for airports as we know them today may change and influence the timing for a new airport.

4.40 AIR TRAFFIC CONTROL

NATS, responsible for Air Traffic Control for the UK, has been most helpful in reviewing the future possibilities and has welcomed being invited to assist in this review.

No more evidence than a day picked at random in July 2008 and as depicted in Figure 18 & Figure 19 needs to be seen to understand that our sky is nearly operating at capacity. Therefore one has to question whether it is the sky or our airports which in the long term will govern growth.

Heathrow

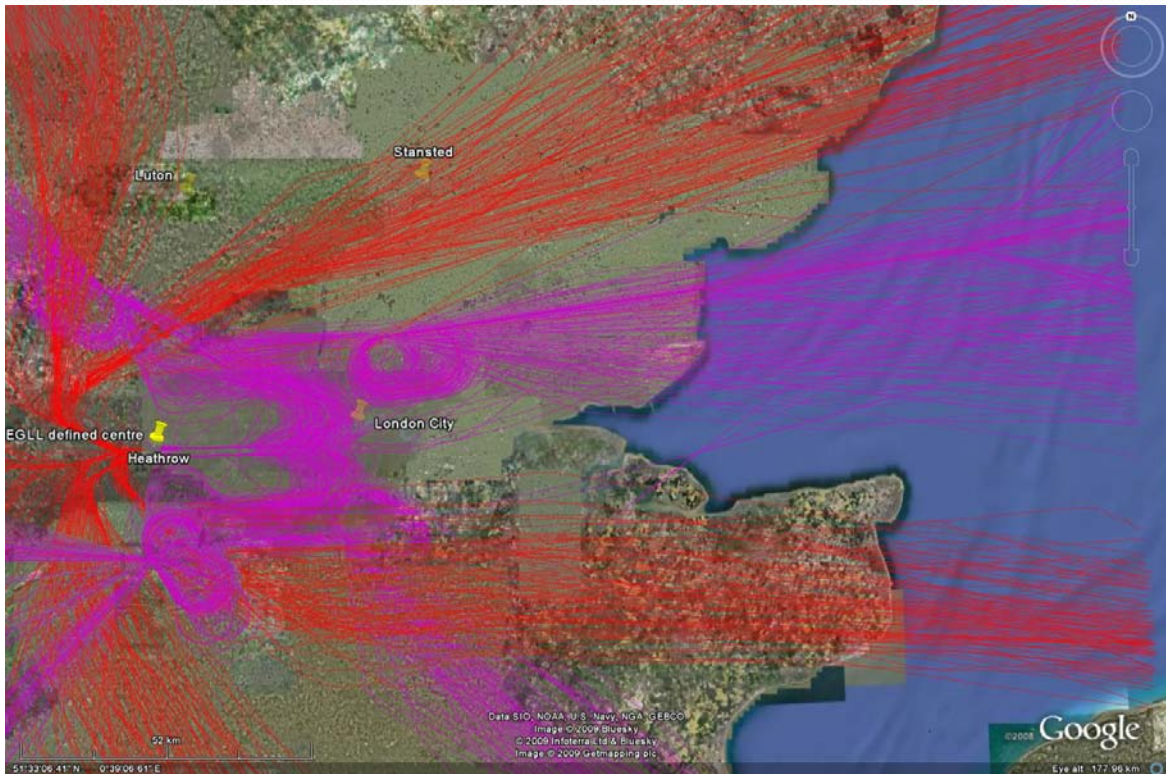


Figure 18: Heathrow Radar data 24h

Each line in Figure 18: Heathrow Radar data 24h represents an aeroplane, the track over the ground and this is taken from actual radar data from one day in July last year. This is a

representative day and just shows the tracks in and out of Heathrow airport. The magenta pink colour represents the inbound routes and if you would note the holding patterns which you can see to the

north, south and north east and south east of Heathrow where the aeroplanes appear to be going round in a circular pattern. Those are the often referred to stacks, or holding patterns. The red lines are the departure routes.

Although all aircraft plan and fly standard routes, depending on their destination and origin, they do deviate and a degree of spread can be seen. They are not all following the exact track over the ground and the spread illustrates the tactical ATC intervention which is done to maximise capacity and achieve the most efficient climb and descent profiles.

So there is a spread of traffic, but the image clearly shows the obvious separation of inbound and outbound flows. This happens all the way around the London area and links with integrated main artery routes right the way across Europe. So when aircraft reach the airspace boundary they are transferred to the control of the adjoining authority. This is part of a European network.

Looking at the Thames Estuary area the proximity of our eastern air space boundary, where these tracks appear to stop, is the UK eastern boundary about 40 miles east of Canvey Island. The eastern boundary coincides approximately with left hand side of the image.

In order to review the impact of another airport the size of Heathrow it is not possible to mirror image the present air traffic pattern but instead once the preferred position has been decided then NATS is prepared to undertake the major task of reviewing the entire traffic patterns around the London area and the south east for all would need to be changed. The eastern boundary in the southeast is known as the Clacton interface out to the north east down to the eastbound route out to Dover. This is acknowledged to be the busiest piece of airspace in Europe. Hence it can be appreciated the exercise to see how best to accommodate an estuary airport together with those already serving London is far from minor. But NATS acknowledge nothing is impossible.

ALL LONDON TERMINAL MANOEUVERING AREA

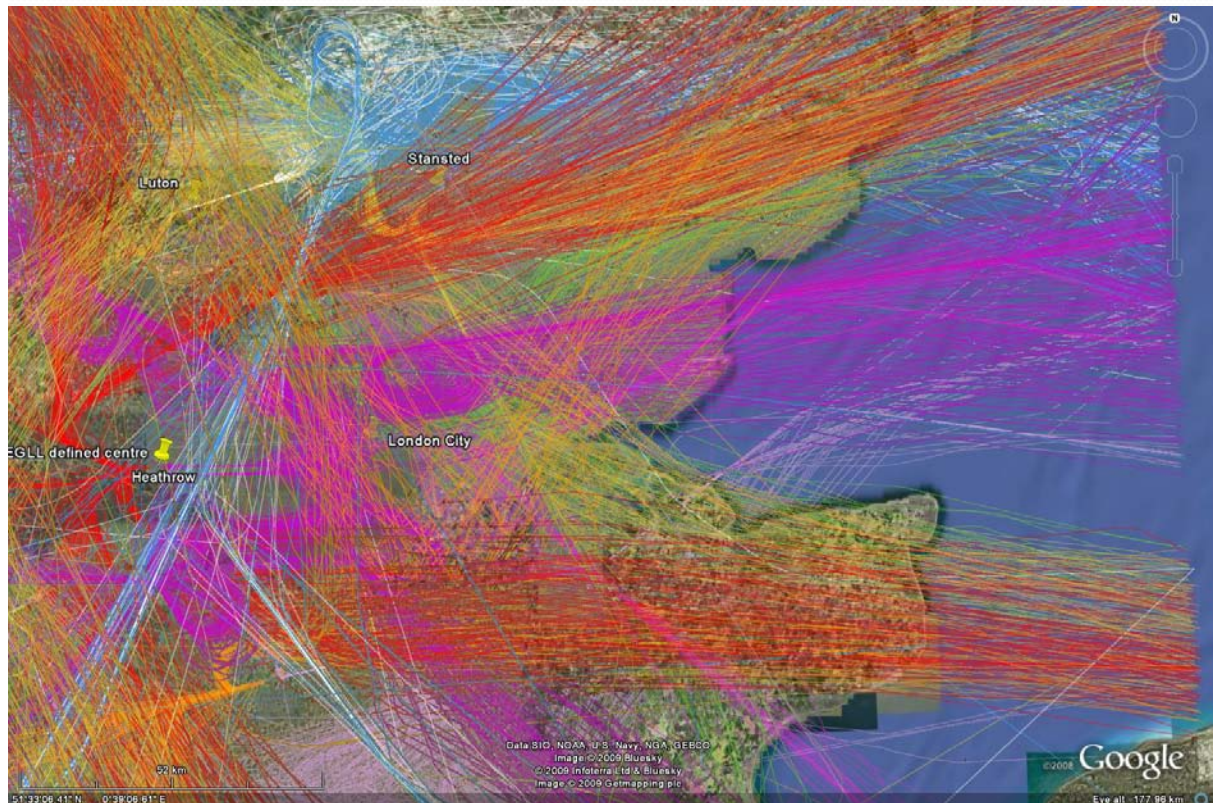


Figure 19: Radar data 24h - Heathrow, Gatwick, Stansted, Luton and London City

The picture becomes even more complicated when the arriving and departing traffic from Gatwick, Stansted, Luton and not to forget London City is included. Again this

is just one day's traffic for all of London's airports on the same day in July 2008 as shown in Figure 19.

4.50 RADAR.

Any future studies would need to consider the aspect of the airport radar very carefully given the obstructions and shipping likely to be using the London Gateway Port at Shellhaven.

There will be several Wind Farms in operation by the time an Estuary Airport would be commissioned but these can be overcome with the existing technology for although their rotors move the actual mast is static.

Shipping has not been a problem in Hong Kong, where container vessels and other shipping constantly pass within a few kilometres of the runways and approaches. However the new generation of container ships of 14,000 TEU (twenty foot equivalent units) capacity being launched are mostly over 360m in length and have a beam in excess of 50m with a draft of 14/15m. As can be appreciated these vessels

are amongst the very biggest sailing the high seas. It is these vessels against which radar must be checked to ensure the safe approach and departure for aircraft. This is however not considered to be a show stopper as new technology is being developed and will have been tried and tested before an airport could be operational. However it is necessary to record this issue.

4.60 BIRD STRIKES

Bird strikes are a threat at the majority of airports around the world including Heathrow, where they are troubled by the Canada Geese. In fact it is interesting to note from the Parliamentary

business on the 15th July 2003 that all London airports suffer from bird strikes as can be seen from Table 5 extracted from Hansard of the same date.

Incidence of Bird Strike			
	Heathrow	Gatwick	Stansted
1998	36	32	14
1999	56	39	16
2000	46	39	21
2001	59	40	28
2002	71	51	30

Table 4 : Bird strike data sourced from Hansard

Therefore as can be seen bird strikes are not an unusual occurrence at our principal London airports but it is of interest interesting to note that none were recorded for London

City Airport located on the river Thames.

This apart, bird strikes need very serious consideration; a fact that

was brought sharply to the attention of many frequent flyers when images of a US Airways Plane floating in the Hudson River were seen around the world.

Also the reality and magnitude of the problem is appreciated when between 1990 and 2004, according to the Bird Strike Committee USA, a group formed to collate and analyse accurate data on bird strikes, there were in the US alone 56,000 reported bird strikes which may be a fraction of the true total, the committee says. The problem may never be eradicated, but anti-bird strike measures are needed, especially in airports near lakes and estuaries where birds congregate.

Therefore, this data indicates that although bird strikes are a real issue there are ways to overcome the problem without being aggressive towards the birds. Whilst much is written on how best to resolve the problem and should be reviewed in detail, I believe the issue should be addressed with the RSPB to find the right solution for the Thames Estuary which must be regarded as both unique and precious.

Most previous estuary airport proposals have been inshore on either the mud flats or marshes or both which are the feeding grounds for the birds. However, what is now being proposed is an offshore airport away from the feeding grounds. What must be watched is that any airport platform does not become a new roosting or feeding source.

Finally although the RSPB have excellent survey records from their volunteer force of the birds' habits and movements inshore the records offshore are not so detailed and circumstances beyond the inter-tidal grounds may be considerably different as was found when London Array undertook their environmental study. A colony of Red Throated Divers was discovered which proved to be greater in numbers than was thought to exist in the UK.

MetroTidal in their studies have produced a map of the flight paths across the estuary and is included as Figure 20 below. If this is representative of the actual situation it would appear that the likely location is relatively free from bird movements. This coincides with my own visit to the area.

Bird Movements

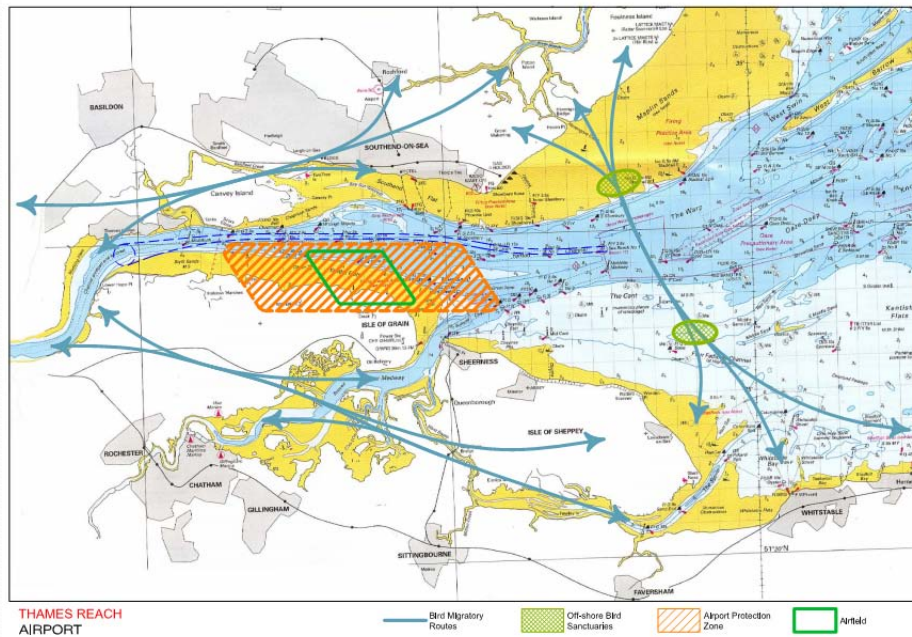


Figure 20: Bird Flight Path Movement Data

4.70 TRANSPORT LINKS

As indicated earlier in the report, for an Estuary airport to function efficiently and serve London and the South East, high speed rail links are essential. They also need to be configured in such a way to make them user friendly and to discourage the use of cars.

Having discussed potential high speed rail routes with representatives of the industry it has been established that a high speed Eurostar link from Ebbsfleet to the airport then continuing to Ashford is not favoured. In their

view, this would impose unnecessary constraint on the CTRL route from St Pancras to the Channel Tunnel. No doubt by 2030 when it is anticipated that a new airport could become operational there would not be sufficient capacity on this line to support a Eurostar link along this route. On the other hand it was thought both feasible and advantageous if “High Speed 1”(HS1) branched at Stratford International Station, followed a new section of railway towards Southend-on-sea and then continued by means of a tunnel out

to the airport and then directly on to rejoin the existing HS1 route at Ashford. This would also have the advantage of linking the new airport with Europe without increasing the load on the busiest airspace in Europe. Further, this would create an integrated transport hub as well as providing a link should the airport have to close for any reason.

The above proposals relate to HS1 alone but there could be much greater opportunities if the high speed links were considered as part of the new high speed network which is beginning to emerge as a result of those working on the development of HS2. This line as published is to link London Heathrow with the West Midlands and then hopefully become the first phase of a new high speed network capable of serving UK's future needs and provide a real alternative to road and domestic air travel. These issues have not been discussed formally with High Speed Two (HS2) Limited but if further airport studies are to be undertaken then consultation with both HS2 and the Department of Transport would be an early requirement.

Whilst it would not appear practical for the Eurostar service to

be run from Ebbsfleet to the Airport the introduction of the new 140mph (or 225kph) 395 Trains, better known as the Javelin, greatly improves rail transport in Kent generally but more specifically the Medway towns and on to Margate. Again by 2030 it is inconceivable that the lines serving both north Kent and south Essex will not have been upgraded sufficiently to enable a high speed Javelin service to the airport from the suburbs of London.

For those passengers coming from the west side of London or indeed passengers arriving at Heathrow by air from other destinations and wishing to transit through to the estuary airport it is thought necessary to have a non stop dedicated connection between the two airports. Also there should be facilities for new passengers arriving Heathrow to check in and board the aircraft at the new airport. This approach has many parallels to the downtown check-ins operated successfully in other cities.

Metrotidal has advocated that Crossrail be extended with the Essex and Kent spurs being connected via the new river crossing to be built to ease the Dartford crossing as discussed

earlier. In its study this would be located at Canvey Island. However, whilst this may provide a useful addition it is likely to impose operational constraints which overall may reflect upon the efficiency of the service. Therefore this proposal has not been considered further but remains open for future consideration by Crossrail and its Sponsors, Transport for London and the Department for Transport.

Reaching the airport has focused on rail rather than road and I am of the view that this must be the correct way forward in the future if the goals to reduce carbon are to be achieved. Further this must be considered the more efficient way in which to move large numbers of people. However to make it attractive the railway services and trains must continue to take massive strides forward to improve customer service as well as becoming more user friendly.

Despite the importance of the rail connections, motorway connections to a new airport still need to be established. It is thought both feasible and economic to connect the new airport through its own estuary crossing to a rebuilt A13 in Essex and then link the improved

A130/A120 to Stansted Airport and the M11. This would provide not only a direct route to London but equally as important the East Midlands and the cyber centre and high tech industries concentrated around Cambridge.

The highway connection to the south would need a new section of motorway to be built across the Isle of Grain to link both the M2 and M20 to the airport crossing. This would then provide high quality connectivity between the Channel Tunnel through Ashford and through the M20, M25 and M23 to Gatwick airport.

If these road connections could be mirrored by rail links also this would mean that the new airport would have efficient links to the other three major airports serving London. London City Airport would also be connected via the A13 and Luton by the A13, M25 and M1.

As will be appreciated, the A13 rebuild would almost certainly demand that it be upgraded to a 3, if not, 4 lane motorway up to Junction 30 on the M25. This change would in itself provide a relief valve to the Dartford Crossing if congestion still exists by 2030.

4.80 PLANNING, DESIGN AND CONSTRUCTION.

As was discussed in section 4.20 of this report the actual location will be the subject of much modelling analysis and design and therefore until this is achieved the detail of the planning, design and construction cannot be reviewed in definitive terms. Rather I provide a series of general statements that will provide the guidance to future activities.

The completion of the project at this stage is not expected much before 2030 as the combined capacities of Heathrow, Gatwick, Stansted, Luton and City would appear to be able to cope with demand up until that point. However, infrastructure of this scale should whenever possible be phased rather than be subject to the “big bang” approach. The engineering and construction industry is likely to welcome this way of working so that the necessary capacity to undertake the detailed design, manufacture and construction is available without recourse to radical solutions to engage a huge labour force and obtain sufficient materials, plant and equipment.

Once the airport plan has been devised and the size and shape of

the platform on which the airport is to be built has been determined, the design and method of construction for the platform is the next key issue.

In order to progress, it has been assumed that the platform would initially be required to accommodate two runways capable of operating independently and then being extended to permit the construction of two further independent runways. This incremental expansion would be achieved by the extension of the initial platform or by a separate but linked platform, subject to an informed judgement once design progress and full knowledge of the hydraulic analysis is known and how best the chosen location functions with the industry and leisure activities in the estuary. Also if it were possible, as is hoped, to integrate the airport with the construction of the outer estuary defence barrier this could understandably influence this decision. Again for the purpose of the report it is assumed a single platform will be extended.

Whilst the traditional method of construction would be by means of reclamation and creating a solid

platform using spoil, rock, sand or shingle much of which would normally need to be dredged, other concepts have been promoted and tried elsewhere in the world.

The Japanese Ministry of Land, Infrastructure and Transport in 2000 built a 1000m floating runway in Tokyo Bay using what they called the Pneumatic Stabilized Platform and named the project Mega Float. The structure has since been dismantled and another was considered for construction in Yamaguchi Prefecture. It is understood that the purpose of these experiments was to see how to build a floating airport for San Diego some three miles out to sea.

The scheme has since been abandoned on the grounds of cost.

Prior to the 11th September 2001 attacks in New York a major expansion of San Francisco airport was being planned out to sea and platform alternatives including piled and tethered floating schemes were being reviewed. However this work all appears to have come to an abrupt halt after the terrorist attacks.

The Netherlands has also been looking at floating airports which rotate to face the wind and are enclosed within a reclaimed bund.



Figure 21: Dutch Plans for an Island Airport as Published in the NCE 12.02.09

Whist all these schemes and experiments are of great interest and should be kept under review in case they become viable the approach being advocated for this proposal is prudent and proposes the adoption of the more traditional methods.

ease of reckoning these quantities would double if the platform was to have four runways.

To provide some idea of scale the total excavation arising from the Crossrail project is around 8 million cu m. Therefore the material required is over 16,000 times the amount arising from Crossrail. However to demonstrate this is not ridiculous the amount of material moved in 31 months for the construction of Hong Kong's International Airport at Chek Lap Kok was approaching 400 million cu.m of marine mud, rock and sand. However, the Thames estuary does not have a mountainous island to level which provided a significant amount of this material.

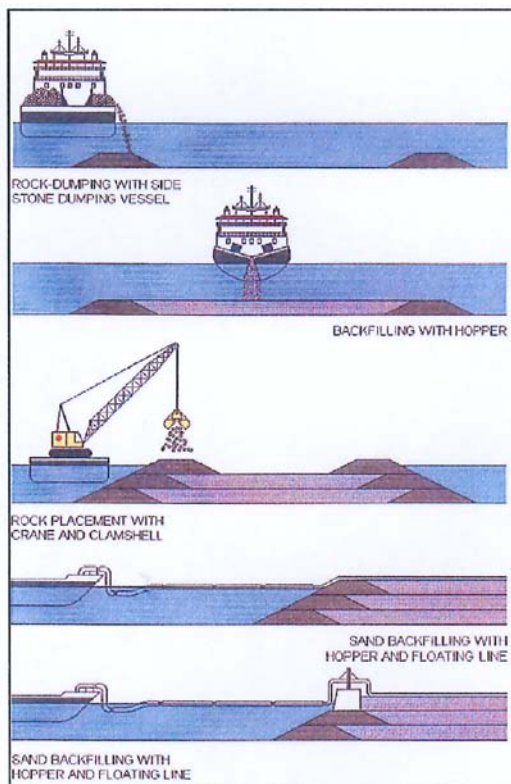


Figure 22: Typical construction of an artificial island in layers

The size of the platform supporting two runways is anticipated to be approx. 4800m long by 1800m wide and the surface level being in the order of 7m above mean high tide. This would require over 134 million cu m. of fill together with the external armoring to ensure stability and protect it from wave action. For

If the creation of the platform can be spread over several years this would be the ideal location to dispose of construction waste being generated in London and the south east. Also in conjunction with those who specialise in the waste industry investigation should be made into what other products could be used. This approach would be both economic and environmentally friendly for providing a free dump would greatly reduce costs; would prevent waste material being sent to landfill sites or incineration and

reduce the amount of dredging required to source sand and other

suitable material from the seabed.



Figure 23: Dredger Brabo

Once the location has been finalised, in order to design the platform it would be necessary to conduct major site investigation surveys including boreholes, cone penetration tests and others.

From an inspection of the geological maps of the area it is clear that the geology of the Thames bed in this area is very suitable for the construction of a platform. Beneath the sedimentation in the river bed is an Alluvium Bed approx. 20m in depth under which there is a good depth of London Clay followed by the Lambeth Beds with the Upper Chalk Beds being reached at about 150m below sea level. The

characteristics of each of these strata and their behaviour are well known and hence the ability to calculate the compressibility of each layer is an established practice. The latter is required to calculate the settlement caused by the weight of the platform. Further calculations will be required when the nature of the fill is known to determine how much settlement would occur and what measures would be needed to accelerate that process. Measures to induce settlement at an early stage rather than allowing time to achieve the process would only be required if the construction of the airport was needed urgently as was the case in Hong Kong.

Geology

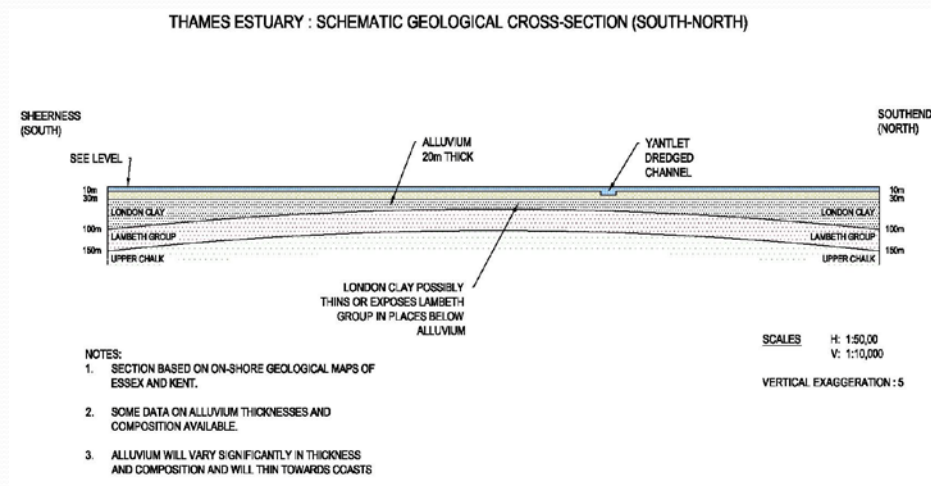


Figure 24: Geological Cross Section

The weather in the Thames Estuary is not as much of a limiting factor as was first thought. The visibility and fog free days in the centre of the estuary are more than experienced inshore and even better than the weather recorded at Heathrow. Therefore this clearly indicates that weather is not an impediment to an offshore location and is preferable to that of the inshore sites considered in the past.

There are some major obstructions to be considered in the Estuary and how best to deal with them. The most dramatic is the SS Richard Montgomery which is a liberty ship which was sunk in

the second World War and which still has high explosives on board equivalent to 2800 V1 flying bombs. A decision on how to deal with this obstruction has to be determined.

SS Richard Montgomery



Figure 25 SS Richard Montgomery

Shivering Sands Army Fort is another structure remaining from the War and is sited in the area

under consideration. The Institution of Civil Engineers has in its archives details of its construction for study.

Shivering Sands Army Fort



Figure 26: Shivering Sands Fort

Kentish Flats Wind Farm consisting of 30 turbines has been operational since 2005 and is again in the area under review. However the life span of these turbines has yet to be established.

Kentish Flats Wind farm



Figure 27: Kentish Flats Wind Farm

The London Array Wind Farm having 341 turbines has yet to built although construction is due in the near future. However, it is thought that this is sufficiently distant not to cause a problem.

London Array

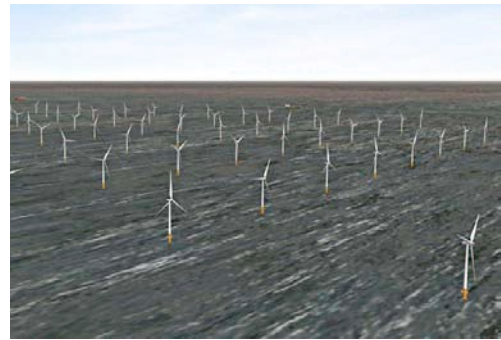


Figure 28: London Array

The planning and designing of the actual airport and all its facilities will demand high standards of architecture and engineering adopting best practice and a close relationship with all the stakeholders involved. Over the last two decades British architects and engineers have proved themselves in this field for they have been responsible for many of the new signature airports in Asia and Europe. These same airports regularly receive awards for the functionality and innovation as well as their beauty.

Therefore there should not be doubt about UK's ability to build this airport nor would it be an exploration into the unknown in world terms.

The time scale for this project depends upon approval and when agreement is given to proceed but for the purposes of this exercise it is assumed that agreement to the

next stage is given from 1st June 2010. The times allowed for each step have been based on all the major projects planned or built over the last 20 years and therefore may be considered conservative. The new planning

approval processes for infrastructure being introduced may ease the situation even so, as they stand, this is a realistic approach.

Programme

Start	2010
In depth Study and consultation complete	2013
Concept design and drafting of Bill	2015
Approvals	2018
Detailed Planning and consents	2020
Construction and commissioning	2029

Table 5

Completion by 2029 would appear to be compatible with the time London's existing airport's capacity is exceeded and a further airport required. If this be the case then planning and critical studies must commence in 2010.

The cost of the project cannot be estimated in detail but several leading companies within the

industry have agreed that the capital cost should be contained within £40 billion including the airport and transport links. With good value engineering during the future stages it is quite probable that this cost could be brought down. Also if integrated with other infrastructure and especially the outer flood defence barrier, savings would be achieved against both projects.

4.90 THE WIDER ECONOMIC BENEFITS AND FUNDING.

As has been suggested earlier in this report the models to determine the wider economic benefits for this type of project have still to be developed. However, the approach which proved to be successful in determining the merits of Crossrail and accounting for gains achieved

through considering the principles of agglomeration has now been accepted and agreed with HM Treasury. All the same consideration of the economic impact of airports will require considerable additional analysis.

The major problem all our airports have in funding capital works is the fact that landing charges and the like do not reflect market rates. Instead the industry is regulated and it is the Regulator who determines the mechanics for charging. This has resulted in Heathrow having the lowest landing charges in Europe.

The report prepared by Colin Buchanan entitled "ECONOMIC IMPACTS OF HUB AIRPORTS" and dated July 2009 was commissioned and published by the British Chambers of Commerce. This is an excellent report and clearly defines the benefits of a hub airport in general rather than London Heathrow specifically (although this is thought to be assumed). In being generic the findings could be adopted by any UK airport that takes on the mantle of being the Hub Airport.

Consideration of the economics for the Thames Estuary and the wider benefits a major development programme could achieve has yet to be undertaken. This would be needed to demonstrate to both the public and private sectors in order to raise the funds progressively to match a long term robust programme likely to span 30 years or longer.

The full question of the wider economic benefits is not explored further in this report as this forms part of another commission being undertaken through the GLA and its Chief Economic Adviser Bridget Rosewell.

Notwithstanding the need to demonstrate the wider economic benefits to both the public and private sectors two of the major groups who have been involved with different proposals for an estuary airport are keen to progress as soon as possible. They also claim that sufficient funds are available not only to conduct the proposed studies but also develop the entire programme as outlined in this report.

As yet these offers have been verbal and no evidence has been produced to substantiate the availability of these funds nor the terms and conditions under which funding would be forthcoming.

PART 5 CONCLUSION

As identified in the Introduction it soon became apparent that this report would need to be extended beyond its original remit by taking proper account of all potential uses for the Thames Estuary and the plans other stakeholders have in mind. Therefore a more holistic approach has been taken. At the debate held on the 15th July under the chairmanship of Sir David King it too became apparent that the invited group of professionals from all walks involved with Transportation and the Estuary soon agreed that the development and regeneration of the region and the value of the Estuary as a whole were of prime importance. The majority also saw the wisdom of integrating an airport within the totality of a development programme. However although those involved with regeneration of the region were happy with this approach they made it clear that the provision of an estuary airport should not be allowed to be the sole driver or indeed inhibit regeneration but rather enhance its scope.

The overwhelming evidence provided by the Department of Transport's published figures on

passenger growth and future capacity of London's airports shows a shortfall in capacity of about 70mppa by 2030, even when all other potential expansion is put in place. This puts into perspective the debate on Heathrow and its uses as well as the need for further capacity in due course.

Even if these figures are optimistic they indicate an order of magnitude that demonstrates the need for another airport by or before 2030.

Therefore the concern for the health and safety of the citizens of London and especially those under the flight path must be dealt with separately and differently since the introduction of an estuary airport is unlikely to resolve the problem in the foreseeable future. How this is to be done is however not the subject of this review.

The most important and urgent need is to undertake the studies needed to maintain the development of London's infrastructure and the safety of the whole Thames estuary region. This

may best be achieved by making climate change and the environment the drivers and looking at all issues in an holistic study. These studies and the resultant plans should not be subject to the 4 year political agenda as in the past but clearly be devised to create a 30 year plan to be reviewed every 5 years. In many ways this represents a direct parallel with the Mayor's London Plan.

It is clear that the most important period for London is from 2030 to 2035 when a new airport has to be delivered; the second Dartford Crossing has to be operational; the interim flood defence measures in place; extensive regeneration of the Thames Estuary region and new motorways and high speed rail connections built to serve this and the airport. This is a huge programme of work that at present is not being considered holistically.

The route to achieving this must start by bringing together the interested parties to the uses of

the Thames Estuary in all its forms. I recommend the establishment of a Thames Estuary Working Group which would be able to debate the issues and consider the research that must be undertaken in order that the best decisions can be taken to provide a holistic solution to energy, flood management, transport and ecological needs as well as regeneration. Such a group should include representation from central and local government, the Thames Gateway as well as technical experts. Although it is clear that there are no overwhelming constraints to building an airport in the Estuary, we are not yet in a position to decide when or how or exactly where it should or could be built.

The estimated spend of this organisation over the next three years would need to be in the order of £10m.

Finally, I cannot emphasise enough the importance of progressing this work.