



THAMES HUB

An integrated vision for Britain

Foster + Partners

Halcrow

Volterra

“We need to recapture the foresight and political courage of our 19th century forebears if we are to establish a modern transport and energy infrastructure in Britain for this century and beyond.”

NRM Foster

Lord Foster of Thames Bank OM

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Introduction

Britain can no longer trade on its inadequate and aged infrastructure. A fast-growing population and an evolving global economy demand that the quality of the UK's infrastructure be improved and its capacity increased dramatically.

This report describes proposals for a Spine which combines energy, communications and data running the length of the UK. The Spine is fed by a Thames Hub, which brings together a new river barrier and crossing, an international airport, shipping and rail complex. It represents a holistic vision for infrastructure development in Britain.

The Spine is unique as a project, in both its conception and ambition. It will lay the foundations for the future prosperity of Britain. It will create jobs across the UK and boost the economies of the Midlands and the North by providing them with direct connections to the cities and markets of Europe. In order to realise it, Britain needs to rekindle the foresight and courage of its 19th century forebears and our traditions of engineering, design and landscape.

That will also require political imagination and joined-up decision making. The challenges are also opportunities. This report sets out how these opportunities can be explored and how creative, environmentally sensitive solutions can be devised to serve Britain's long-term infrastructure needs.

The study was instigated and funded by architects, Foster + Partners, infrastructure consultants, Halcrow and economists, Volterra Partners.

Executive summary

Thames Hub is a bold new approach to future infrastructure development in Britain. It brings together rail, freight logistics, aviation, energy and its transmission, flood protection and regional development. It is unique for its scale and strategic cross-sector thinking. Recognising the synergies between these different strands, it reaps the benefits of their integration. It is an opportunity to reassert Britain's role as an international gateway for people, freight and communications.

The Thames Hub incorporates a new Orbital Rail link around London, which would connect with a future high-speed rail line from London to the cities of the Midlands and the North – Birmingham, Manchester, Leeds and Liverpool – and become part of an integrated network, linked directly to Continental Europe. Connecting the ports of Felixstowe, Tilbury, the new London Gateway and Southampton with the planned Atlantic Gateway development at Liverpool and Manchester will create an unrivalled freight distribution network and put Britain at the centre of manufacturing distribution in Europe. By moving freight by rail, pressure would be released from the roads and commuter networks – an important benefit. The Orbital Rail link will also help to create a more efficient and reliable passenger rail system.

A new flood barrier in the Thames Estuary is a necessity, but has the potential to deliver other comprehensive improvements, while securing London's future flood protection: it can alleviate housing shortages by creating new flood-

protected land for residential development; it can provide a platform for an integrated rail and road crossing to open up new trade routes between the UK and Europe; it can generate renewable energy from tidal flows; and it can bridge the Estuary to create a vital new corridor for utilities, communications and data. Combining these elements into a single structure allows greater efficiencies of time and money in construction.

A new international airport located in the Thames Estuary on the Isle of Grain would benefit from these new linkages. The new Estuary Airport would satisfy the capacity needed today and allow for future expansion, while reducing the environmental and security problems of aircraft over-flying London.

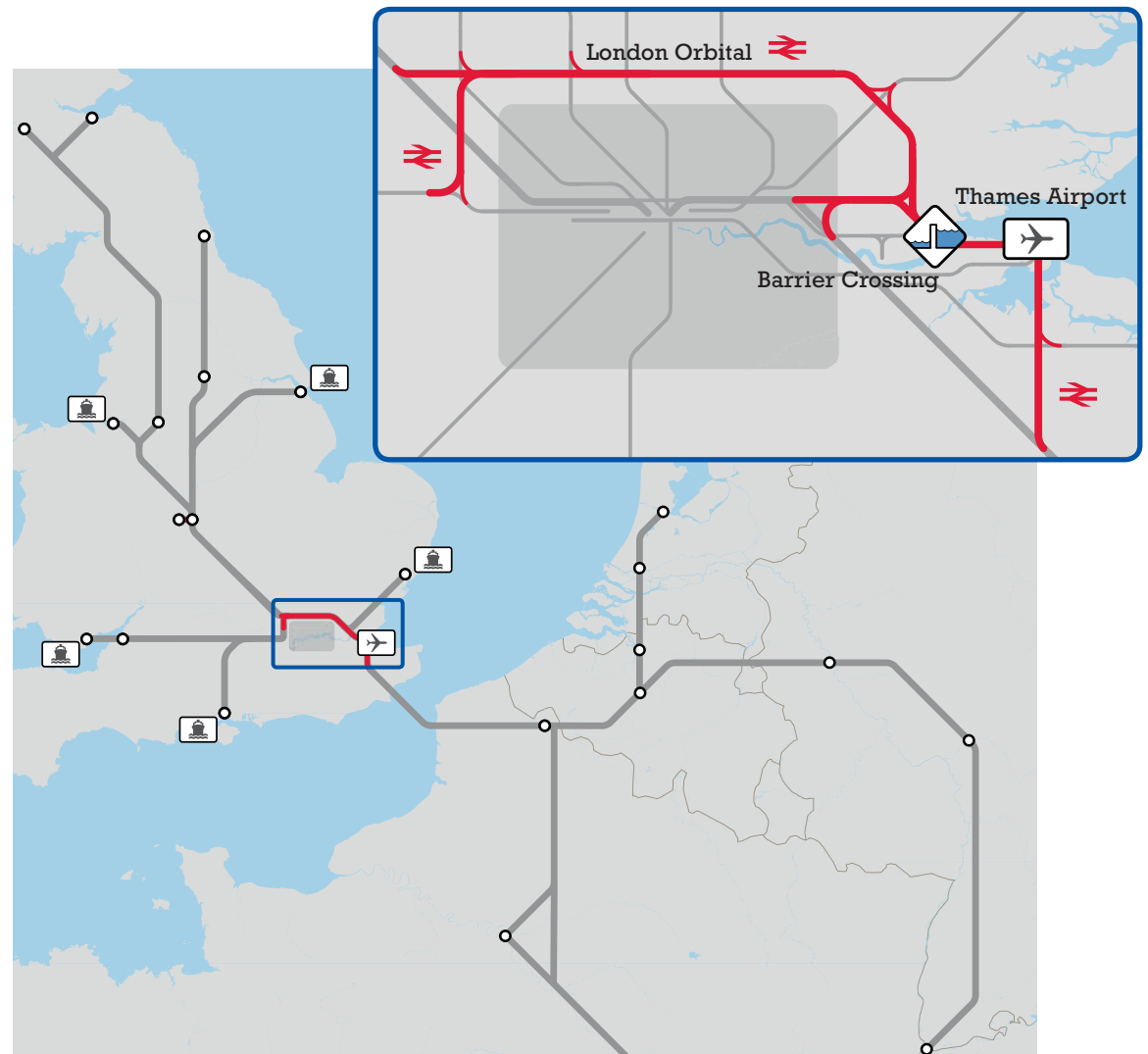
Major new distribution networks for power, utilities and data are needed across the UK, without adding visual clutter to the rural landscape. This is where integration delivers environmental as well as economic benefits. The Spine offers a pioneering new solution. It will incorporate data cabling, water and energy

distribution routes, integrated with the rail and road network in conduits in the ground, invisible in the landscape, simple to maintain and easy to secure.

We face 21st century challenges that the short-term patching up of our ageing infrastructure cannot overcome. This project has the potential to deliver lasting economic benefits and, whether privately financed or government funded, there will be a return in the form of the economic activity it will generate. We have the skills here in the UK to achieve it. Our architects and engineers have built the largest airports and most complex infrastructure projects in the world. We simply need the opportunity to focus this expertise closer to home.

The main components of the Thames Hub are as follows:

- A new barrier crossing that extends the flood protection to London and the Thames Gateway into the 22nd century. The barrier harnesses tidal power to generate carbon-free energy
- A four-track, high-speed passenger and freight Orbital Rail route around London, which links London's radial lines, a future high-speed rail line to the Midlands and the North, the Thames Estuary ports, High Speed 1 (Channel Tunnel to London), and European networks
- An Estuary Airport, capable of handling 150 million passengers per annum, thus enabling the UK to retain its global aviation hub status. The airport is integrated within a logistics matrix that connects by rail the Thames Estuary Ports and the ports of Liverpool, Southampton and Felixstowe. Associated with the Hub is a major renewable energy source in the Estuary
- A new utilities and data spine in the Thames Barrier, Orbital Rail line and high-speed networks, with applicability across the UK
- A comprehensive environmental management strategy that minimises the impact of development and provides opportunities to create significant new wildlife habitats to more than offset losses elsewhere. The project can also be the catalyst to reduce pressure on foreshore habitats from rising sea levels and storm activity



Infrastructure challenges for Britain



The lack of direct flights from the UK to emerging markets costs the UK economy an estimated £1.2bn a year

The UK's energy, communications, transport and trading infrastructure is in urgent need of renewal. Decades of patching-up and making-do have led to gradual overall decline. We have reached a point where the scale of the problem demands a comprehensive and holistic vision. The Thames Hub proposes an integrated infrastructure, developed for insertion within a densely populated country, where much of the land is designated as Green Belt or as a protected environment.

These are the major challenges:

- There is an economic divide between North and South, perpetuated by Britain's antiquated transport and communications infrastructure, which needs to be rebalanced
- London needs a long-term replacement for the existing Thames Barrier
- London's rail network is over-congested and acts as a bottleneck within the wider UK rail network
- The UK's only international hub airport, Heathrow, is operating at capacity with no space for expansion within the surrounding urban area; and road and rail access to Heathrow from the regions is difficult
- Inland freight distribution to and from Britain's seaports is over-dependent on a road network that is already overloaded
- The UK needs to increase its renewable electricity generation capacity; it needs new utility distribution networks for electricity and water and enhanced broadband data connectivity across the regions
- There is a major housing shortage, particularly in London and the South East

“Infrastructure is the key. Britain ignores development and investment in infrastructure at its peril. Look around the world and you see the way in which China and Latin America are investing heavily in infrastructure. They see it as a passport to strong economic development.”

David Kerr, Group Board Director, Halcrow



“Creaking transport systems are very painful for us all. It is vital that we take an integrated approach to our major transport networks so that they can fulfil our needs for commuting, for inter-city linkages, for connections to other countries and for the movement of goods. That embraces everything: rail, freight, access to airports and aviation. Getting the jigsaw to come together is what matters.”

Bridget Rosewell, Volterra Partners

An integrated approach

£20bn Airport

£20bn Orbital Rail

£6bn Barrier
Crossing

£4bn Improving
infrastructure

Britain's strength as a trading nation has as much to do with its geography as with its domestic economy and industry. However its role as an international gateway is declining through a failure to invest in future airport capacity. The Thames Hub offers a lifeline.

An air/rail/road/sea transportation hub in the Estuary, the Thames Hub presents an opportunity to deliver lasting social, environmental and economic benefits.

The Estuary Airport will be energy self-sufficient, using tidal power generators. It will reduce noise and pollution for millions of people and improve flood protection. In the process it will create tens of thousands of jobs. Even without these benefits the economic case for action is compelling. The lack of direct flights from Heathrow to destinations in emerging markets, alone, is costing the UK economy an estimated £1.2 billion a year and rising. Over the next ten years the cost of simply doing nothing could be as high as £14 billion¹.

Britain led the world in establishing its transport infrastructure, but it is still living off the remains of that inheritance. The UK was able to reinvent itself economically because there was capacity in the rail network to enable a shift in emphasis from manufacturing to the service sector.

However, Britain also needs to expand its manufacturing industries. The UK economy relies on being able to move people and goods – whether by road, rail or air – quickly and efficiently. New investment is imperative, both to increase capacity and to set the agenda for long-term economic growth.

The focus of the global economy is shifting with the rise of the BRIC nations – Brazil, Russia, India and China – and other emerging economies. Many of these countries have recognised that investment in infrastructure is a critical foundation for long-term economic growth. The UK needs to enhance its infrastructure in order to be able trade with these nations more effectively. Latin America, India and China are all encouraging development through investment, creating the right conditions for industry to thrive. Cities around the world are building and expanding airports into three or four runways. Britain can only meet these challenges, and maintain its global position, by restructuring its physical infrastructure.

¹'Connecting for growth: the role of Britain's hub airport in economic recovery: a report prepared for Heathrow'. Frontier Economics, September 2011

As power generation changes, Britain is also presented with new challenges for energy transmission. The proposed Orbital Rail route and the future high-speed rail link between the South East and Birmingham – and on to the cities of the North – create a transport spine. But if these new routes were to integrate national power, water and data networks in the Spine, they also could provide the backbone for new industry and future prosperity.

For twenty years we in Britain have been talking about the Thames Gateway, but there has been a tendency to ignore the economic and development potential of the Estuary. This project presents an opportunity to embrace the region's broader strategic potential and to forge connections with the country as a whole.

A decade ago, in just four years, Hong Kong built one of the world's largest airports on an island reclaimed from the sea. It proves that it can be done. In the UK we need to recapture the foresight and political courage of our 19th century forebears if we are to establish a modern energy and transport infrastructure for this century and beyond.

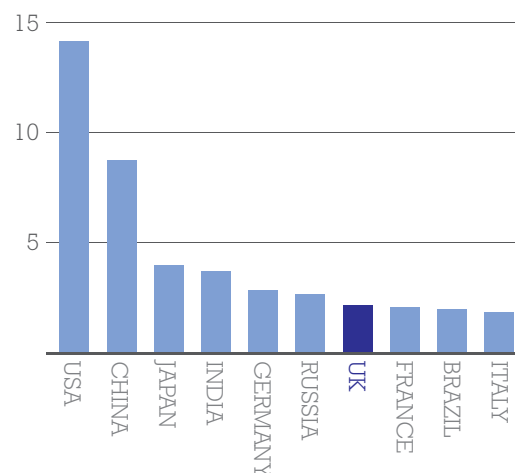
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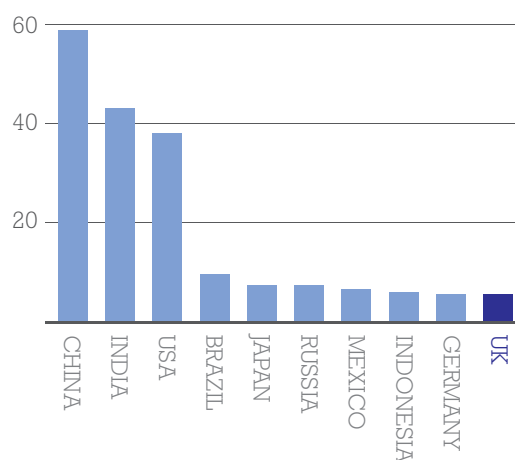
Volterra

Improving Britain's trade with the world

GDP 2011



GDP 2050



Gross Domestic Product (GDP) Projections

GDP at Purchasing Power Parity (PPPs)

(constant 2009 international dollars), \$bn.

Source: PwC main scenario model projections for 2010-50

Over half of all UK container port activity occurs within 50 kilometres of the Thames Estuary. This will increase to almost 70% when the London Gateway Port opens. Creating new connections to channel this freight effectively to the rest of the country will make Britain an attractive destination for manufacturing and logistics.

Most freight arriving in the UK currently feeds directly into the national road network, as capacity on the South East's rail routes is limited because of their convergence on London. An Orbital Rail route, bypassing London's congestion, would enable containers to be transported directly from the Estuary to the Midlands and the North. If all the UK's main container ports, including Felixstowe, Southampton, Liverpool and new London Gateway, were connected to each other and to the Hub, they would be effectively linked to Europe.

This would give the UK a strong competitive advantage and enable our sea ports to compete with Antwerp and Rotterdam to serve locations in northern Europe. The Atlantic port of Liverpool, for example, will benefit from direct rail freight connectivity to both the South East and onwards to the continent. Such a move would support rising volumes of exports and an increased emphasis on rapidity to market, while setting in place the physical infrastructure to trade with the rapidly expanding BRIC nations and other emerging economies.

Cross-country freight rail links to connect our industrial areas and ports can take advantage of both new and existing routes. The new Orbital Rail route can connect to the existing mainline rail services radiating from central London. At the same time, it is possible to exploit the capacity for freight transport along the West Coast Main Line, which will be liberated by the implementation of a future high-speed rail line. To allow for interoperability, the new Orbital Rail route will be built to accommodate continental European-gauge freight trains. Passenger trains will have operating speeds of up to 350 kilometres per hour.

Ports and freight routes via orbital rail and logistics matrix



Glasgow

Edinburgh

Newcastle upon Tyne

Liverpool

Kingston upon Hull

Birmingham

Felixstowe

Amsterdam

Rotterdam

Cardiff

London

London Gateway

Antwerp

Cologne

Southampton

Lille

Brussels

Frankfurt am Main

America

Asia

Paris

Metz

Strasbourg

Basel

Avoiding London's congestion

Orbital Rail will take an estimated 4,000 lorries per day from the M25

Orbital Rail will mean many rail journeys across London reduced by 1 hour

Over 2 million live within 10km of proposed stations on Orbital Rail

A new high-speed Orbital Rail route around the north, east and west of London will open up fast rail connections – passenger and freight – from the North of the UK to Europe, bypassing London's congestion. Incorporating two high-speed lines and two conventional lines, it will improve transport connections dramatically for industry and greatly reduce travel times for passengers.

As much as it is an engine for growth, London is also a physical barrier to trade. Its rail network is operating at almost full capacity and does not have the space to allow a significant increase in either freight or passengers through the city. A new Orbital Rail route can cut congestion and promote a sustainable shift from road to rail.

To reduce the environmental impact of the Orbital Rail line, its route approximately traces the existing line of the M25. For around a third of its length, the network can pass through tunnels, particularly in sensitive areas such as Epping Forest. There are economic as well as social benefits in taking lorry traffic off the road, including reducing the costs of continual motorway expansion and the maintenance demands caused by prolonged heavy use.

With these measures, the modal share of containers transported by road could reduce from 80% to 50%. This would take lorry traffic off the motorways, as well as allow current freight capacity to be used to increase passenger services across London's overground network.

The Orbital Rail route completes a missing link between the existing HS1 high-speed rail line and the proposed high-speed line to the Midlands and the North. In doing so, it maximises the impact of both. It also integrates with the new Hub Airport in the Estuary, allowing it effectively to serve the whole of the UK. Up to 60% of airport passengers will arrive using fast, frequent services from across the country.

New stations along the Orbital Rail route will be placed close to existing junctions on the M25, making them accessible by two million people within a 10 kilometre radius. Using the Orbital Rail line to reach their final destinations and thus avoiding central London will allow passenger rail journey times across the capital to be reduced by up to an hour.



Proposed new London Orbital Rail linking
high speed and radial rail routes



Passenger routes



Freight routes

South East regions around London projected to grow 20% to 10 million by 2033¹

By 2033 demand for housing will increase by 28% due to population growth and changing lifestyles

Protecting against floods

A new barrier upstream of the London Gateway port would provide effective flood protection for the capital to 2100 and beyond. As well as safeguarding London from rising storm levels, it would free vital land for development to address the housing shortage in the South East.

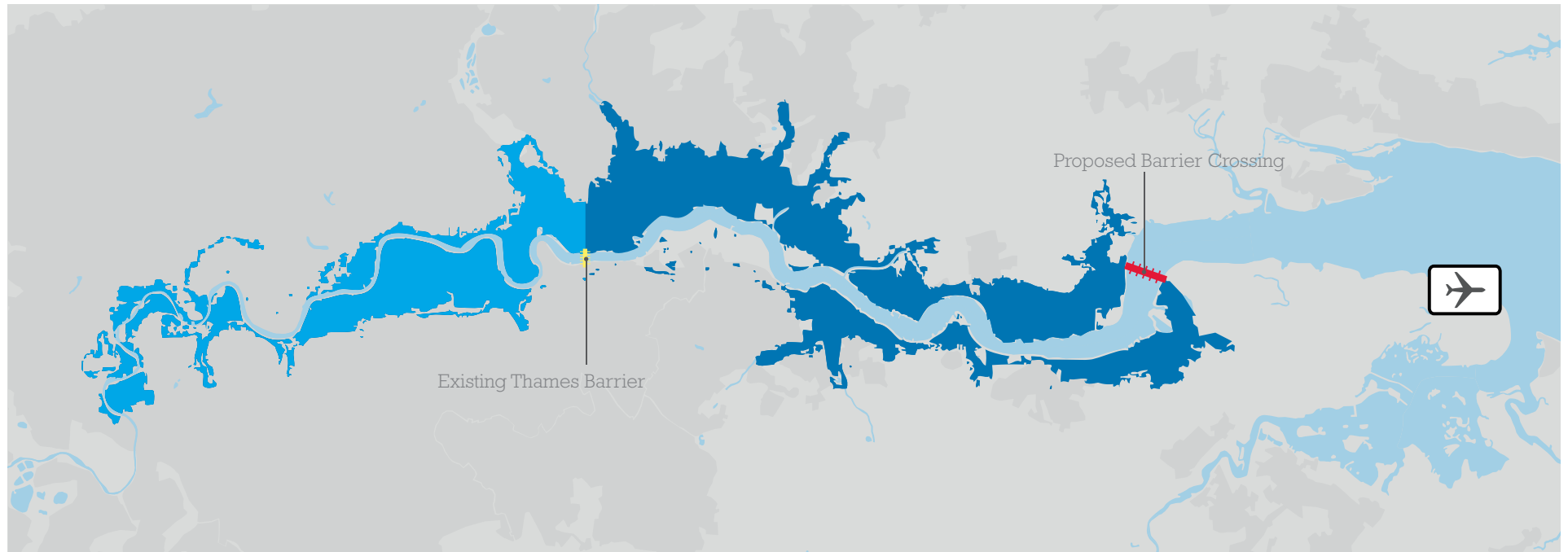
It is generally acknowledged that the existing Thames Barrier will need to be replaced by another barrier further downstream in order to ensure London's long-term flood protection. Lack of investment in effective measures can lead to losses that far exceed the capital investment costs of upgrading the infrastructure. At the same time, a new barrier crossing could bring economic and environmental benefits through the integration of rail and road tunnels, utilities, communications networks and hydropower generation.

The UK has invested heavily in preparing the Thames Gateway for infrastructure development. This project is an opportunity to capitalise on that investment. It would both protect London's low-lying urban areas and increase the area of flood-protected land for residential and industrial development. New housing would benefit from the improved public transport connections created by the Thames Hub, particularly the new renewable energy source in the Estuary.

To maximise efficiency, housing developments could be grouped to form an energy-efficient network of 'smart homes'.

The increased value of newly flood-protected land would be unlocked to help finance the project. Funding could be achieved through an insurance levy on those areas protected, offering an early 'first win' for the Estuary development. Maximising the opportunity for greater synergy between the different strands of the project, residential development on newly protected land east of Gravesend and east of Tilbury could provide homes for Thames Hub staff. Shipping would not be affected, as navigation channels incorporated in the barrier would allow ships to pass through to Tilbury Docks.

¹ONS 2011



- Existing flood protected land
- Proposed flood protected land

The new Thames flood barrier extends land area protected by existing barrier by 150%

Creating a new global aviation hub

There will be a 95% reduction in people suffering 57dB or more aircraft noise compared to Heathrow today

Up to 60% of passengers will use rail to access the Estuary Airport from all UK regions

The UK needs a new aviation hub to satisfy the projected increase in passenger numbers. By locating this airport in the Thames Estuary, the noise and security problems of aircraft over-flying London are reduced and it can benefit from the integrated rail connections provided by the Thames Hub.

The proposed location for the Estuary Airport is the Isle of Grain, on the Hoo Peninsula – the most sparsely populated area within the Thames Estuary. It has been selected for its proximity to London – at 55 kilometres from the centre, it can be reached in 30 minutes by high-speed rail.

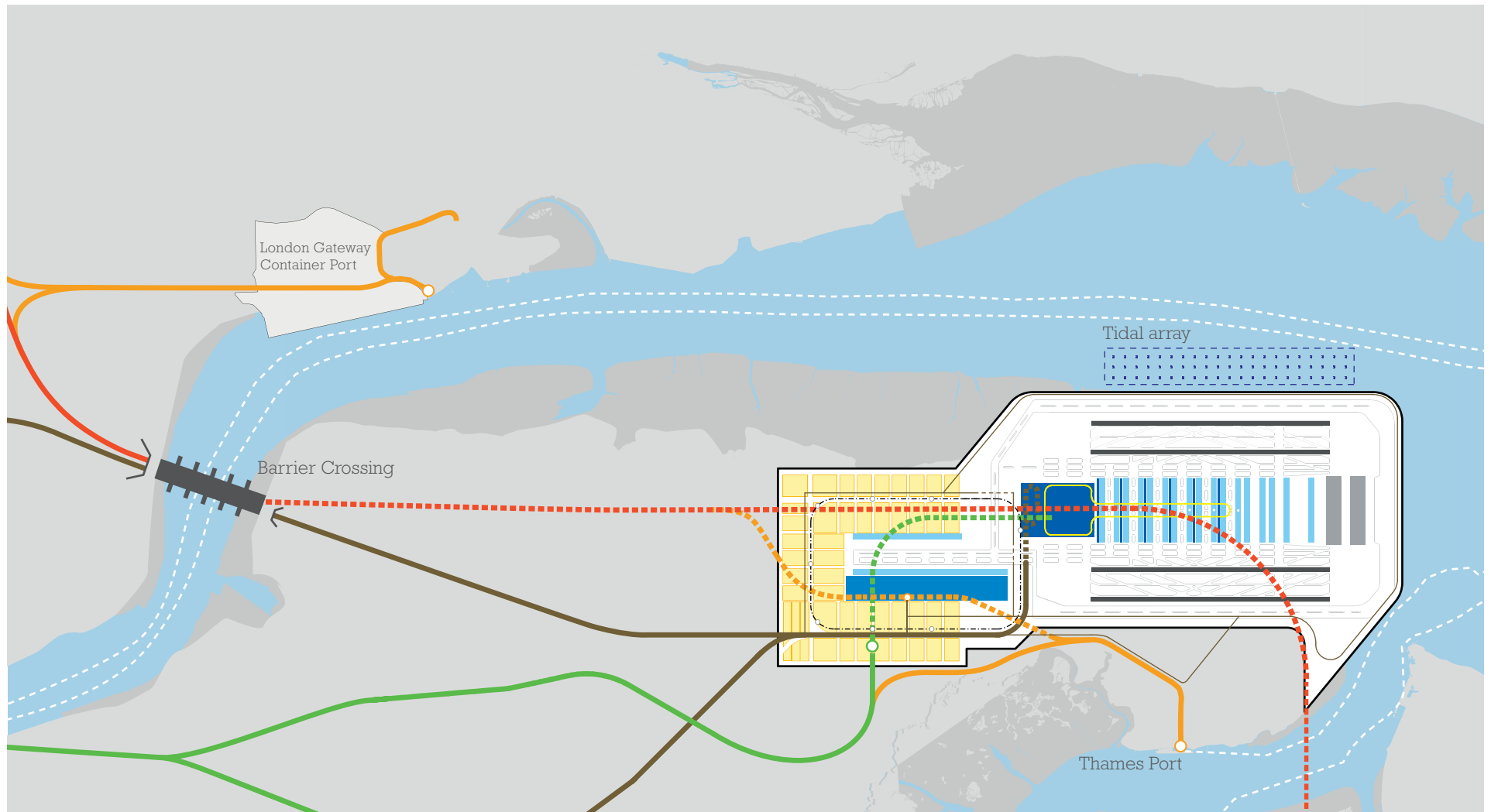
Providing more than double the capacity of Heathrow, the Estuary Airport will be able to handle up to 150 million passengers per year and will have four runways, each 4 kilometres long. An integrated rail station beneath the passenger terminal will be the UK's busiest, with 300,000 arrivals and departures every day.

The approach from the air from the north east will be primarily over water, reducing noise pollution over populated areas and enabling the airport to operate 24 hours a day. This will accommodate long-haul airline schedules and growing demand in the Asian market. Thus it will reassert London's geographical advantage as the stop-off point between North America and Eurasia, which is being eroded by a combination of new long-range aircraft and the emergence of networks centred on a global hub, such as Dubai.

The Estuary Airport will offer more international routes than Paris and Frankfurt, which currently have flights to more destinations than Heathrow. Additionally, the extra capacity will allow new Chinese, Indian and Latin American carriers to operate from the UK and allow existing carriers to expand their operations.

Significantly, it will greatly improve the lives of the five million people who currently live under the flight paths in and out of Heathrow.

Approximately half the area of the new Estuary Airport platform will be on reclaimed land extending into the Estuary, 7 metres above sea level. Here there are persuasive precedents: the established airports of Kansai in Japan; Chek Lap Kok in Hong Kong; and New Doha International, Qatar all began with land reclamation. Furthermore, its location does not interfere with the Yantlet Channel, the main shipping route to Tilbury Docks and the new London Gateway port.



Proposed hub airport and ground access

- | | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Airport and Logistics City | High Speed Orbital Rail Line through Airport |
| Aircraft Stands | Regional and Local Rail Line serving Airport |
| Cargo Terminal | Freight Only Rail Line |
| Passenger Terminal and Satellite Buildings | Airside Transit from Passenger Terminals |
| Aircraft Maintenance | Landside Transit |
| Runways | Principal Road Access |



New international rail station
directly linked into the hub airport

24hrs

Flights operated twenty-four
hours a day

150m/yr

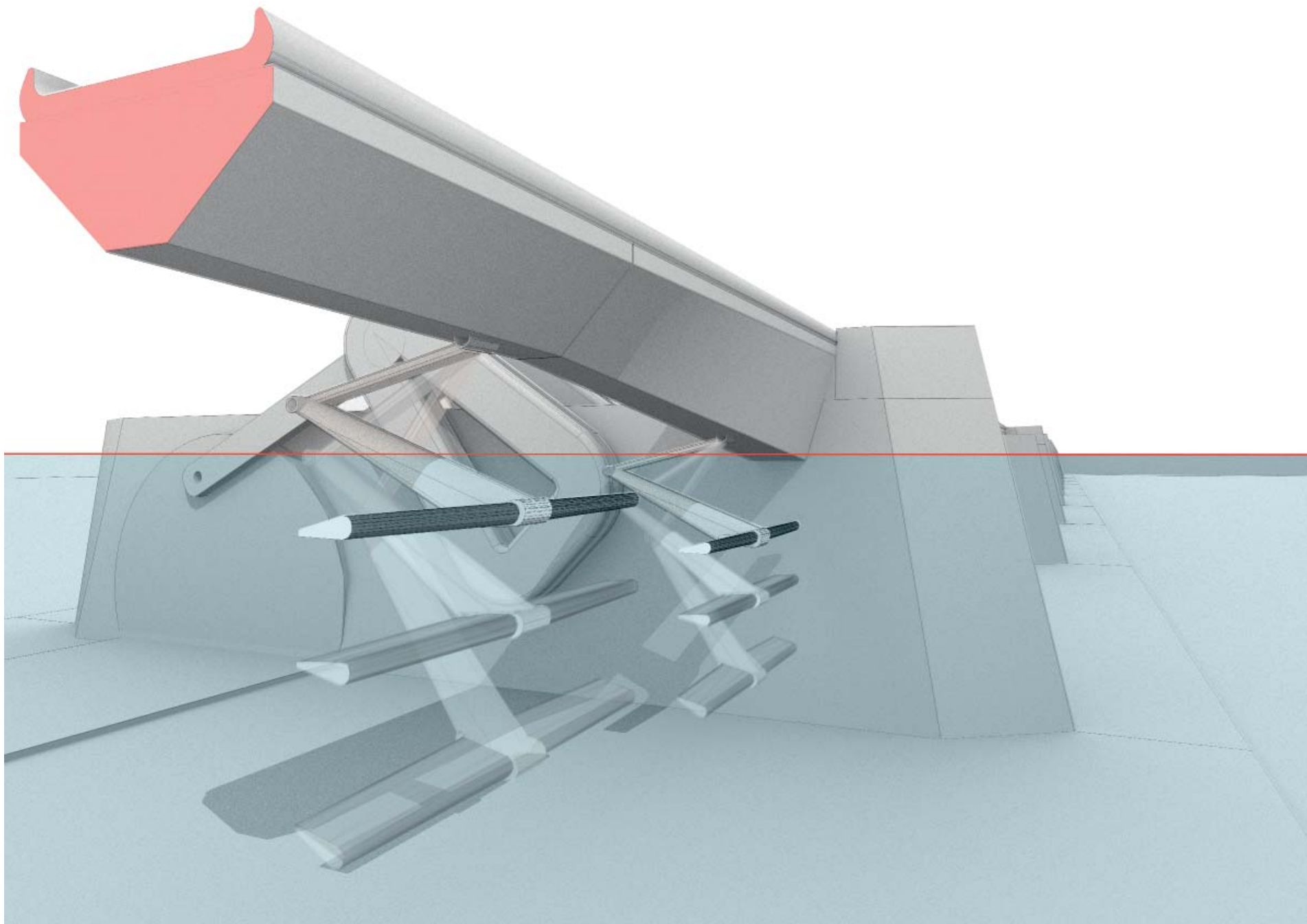
Capacity for one hundred and fifty
million passengers per year

30mins

Thirty minutes from central
London by high-speed rail

300,000/day

The railway station will be the UK's busiest handling
around three hundred thousand passengers per day



Generating clean energy

By focusing on the water instead of the land, the Thames Estuary offers two opportunities to generate renewable power – the integration of hydropower generators with the new flood barrier and an installation of hydropower arrays in the water. Together, these would provide a major new source of clean energy for the South East, while satisfying the demands of the Estuary Airport.

The proposal is for a hydropower array in the Estuary, 5 kilometres long and 500 metres wide, to harness tidal flows effectively. The tidal generation units can sit either on the estuary bed or on floating pontoons. Their proposed location is north of the Estuary Airport and to the south of the Yantlet shipping channel, the main container freight route to Tilbury Docks and the new London Gateway port.

The array responds to current demands in the South East as well as projected development enabled by a new flood barrier. Depending on the type of generation units used, there is the potential to generate up to 525GWh/year of energy – enough to power some 76,000 homes. Over a yearly cycle, the energy produced would be enough to supply the Estuary Airport, where demand is estimated as 400-600 GWh/year, allowing excess power to be fed back into National Grid. Significantly, hydropower has zero carbon emissions.

The creation of new power sources is an opportunity to create a comprehensive and efficient delivery system, based on the integrated model of the Spine. Equally, the Marine Array can benefit from the existing investment in the London Array wind farm – both could be transmitted through the same network, within a new ring main around London.

Tidal hydropower generators
incorporated in the Barrier Crossing

Hydropower in the Thames Estuary could provide electricity for up to 76,000 households

Hydropower in Estuary provides 100% of power demands of new airport

Zero carbon emissions from hydropower

Exploiting railway construction allows the bundling of utilities into a single, efficient corridor

The Spine delivers the world's first national smart distribution network

Integrating infrastructure

The Thames Hub will create benefits through the integration of rail and aviation; of flood protection with hydropower and transport; of key rail corridors with energy and data transmission networks; and job creation with new homes.

To support economic growth, the UK needs sustainable, reliable energy transmission systems. Infrastructure UK's *National Infrastructure Plan*, published in October 2010, identifies a critical need for the integration of future power and digital data infrastructure.

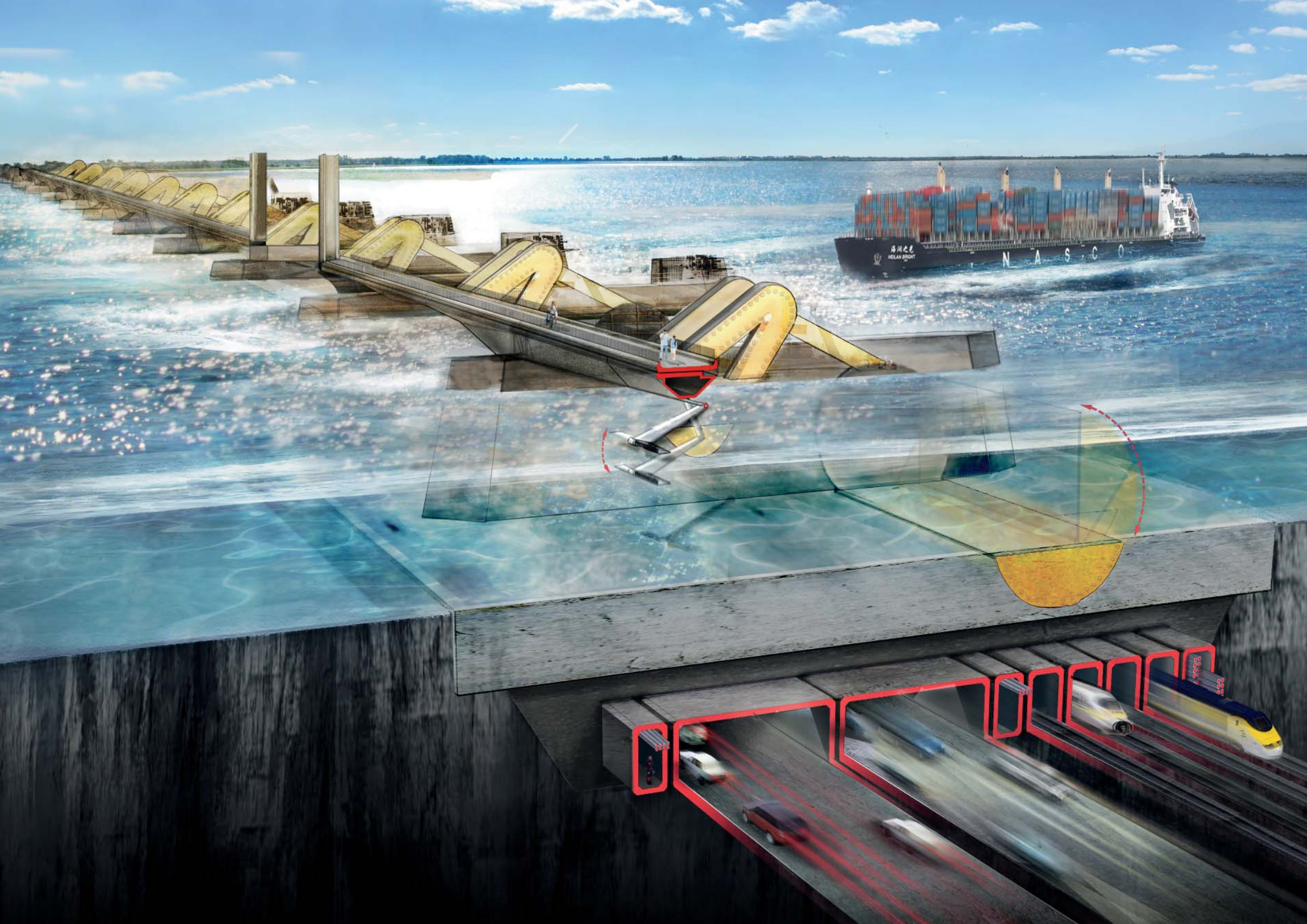
The Spine will provide conduits for high voltage power, broadband fibre and water distribution. These conduits will be integrated within the new flood barrier and with the Orbital Rail and high-speed rail routes. The Spine will also follow the course of the future high-speed rail line north.

Cutting the rail tracks into the ground and using the excavated soil to create a mound, which accommodates the utilities conduits, has the effect of lining the tracks acoustically and making crossing points easier. By landscaping the mound sympathetically, the rail route will be discreetly hidden – like a 'ha-ha' in a traditional landscape. Hiking routes and cycle ways could be integrated along its length, according to local needs.

By locating electricity transmission within the Spine, planning problems associated with upgrading or replacing old pylons and distribution systems can be avoided. It will also be accessible to enable easy maintenance and inspection, without the need for earthworks.

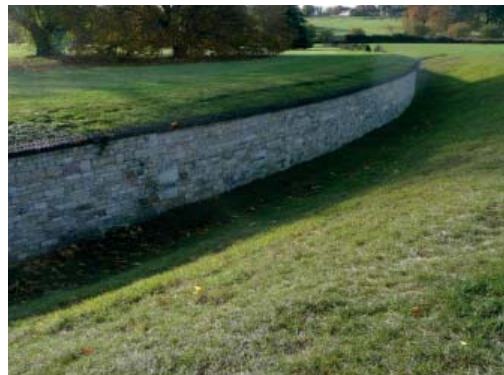
The Spine offers a model for power transmission and, with the potential for wider applicability, could stretch the length of the country. Spurs along its route will provide excellent data connectivity for high-tech industry and empower local communities by linking them to high-speed digital communication networks.

New Thames Barrier Crossing integrating connection and protection and generation



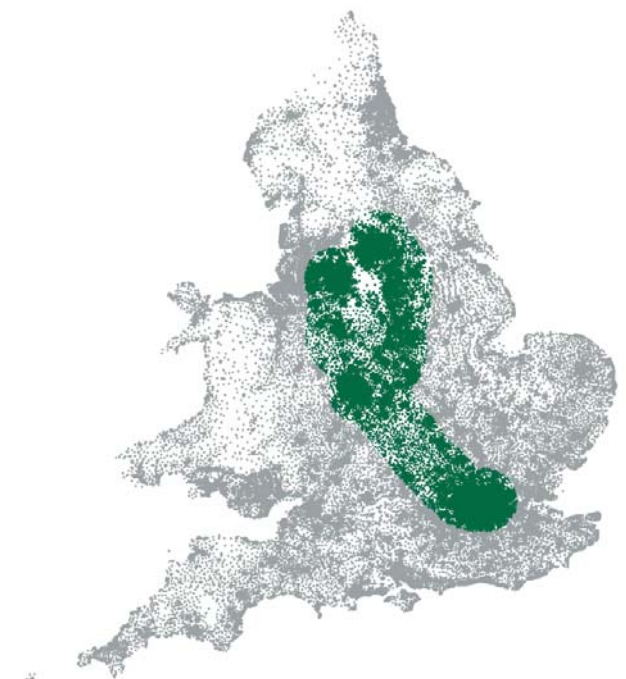


Integrated utilities within the Spine.
Rail lines are placed sensitively in
landscaped cuttings, in the tradition
of the 18th century ha-ha





The Spine



The Thames Hub creates an infrastructure network that runs from North to South, linking the cities of the Midlands and North directly to Continental Europe

Unemployment in the South East is 6.1% compared to 9.9% in the North East¹

Improved port and airport connectivity via Orbital Rail enables trade opportunities throughout Britain

Balancing the regions

The Spine that connects the Thames Hub with the country's ports and its existing and future rail networks will help to balance the UK economy between North and South by transforming the current spider's web of routes through London into a coherent high-speed network that opens up a direct route from the North of England to Continental Europe.

The Spine will put in place the infrastructure connections needed by the whole of Britain in order to maximise trade links with the rest of the world.

The advantages created by the Estuary Airport, in particular, which will open up trade links with the BRIC countries and other, emerging economies, will extend far beyond London to embrace the UK's regional manufacturing and industrial bases.

By locating a new aviation hub in the Estuary, there are additional benefits for the South East.

The project connects the new Orbital Rail route with planned high-speed lines to reduce journey times significantly from the cities of the Midlands and North to the cities of continental Europe. By rail, it will take approximately 1 hour and 50 minutes to reach the new Hub Airport from Leeds or Manchester.

The project will establish new energy and communications infrastructure to promote the development of high-tech industry. The new communications and utilities Spine will extend northwards from the new Orbital Rail to allow reliable electricity and data links to reach the communities along its length. Its impact will be felt regionally with new homes and jobs, as well as nationally – creating opportunities for growth across the UK.

The Spine connects the Thames Hub with the UK's ports and existing and future rail networks to balance the economy between North and South

¹ONS 2011



£150bn of benefits:

£35 billion from rail
and road transport

£35 billion from the
airport, including
tax revenues

£2 billion from
environmental
management

£75 billion from
growth in the
Thames Hub area

Moving the project forward

The Thames Hub represents one of the most innovative and attractive infrastructure projects in the world today. It would require a multi-billion pound investment, with opportunities for private and public ventures – and the first phases could potentially be completed within ten years.

Together, the Orbital Rail route, the Thames Barrier and the new Estuary Airport will deliver up to £150 billion in economic benefits and cost £50 billion.

We need the Thames Hub, but how do we pay for it? The answer is that a project of this ambition does not need to depend solely on public funding. Established private-sector funding models – such as those that employ the Regulated Asset Base (RAB) approach – can provide a funding mechanism for the project. Preliminary discussions with potential stakeholders suggest that the project is of significant interest to inward investment from overseas, including sovereign wealth funds. The UK is generally seen as an attractive place to invest. As an example, the inward investment in the London Gateway is an encouraging precedent.

However, to enable such investment opportunities to be realised, significant changes will likely be needed to the existing UK delivery and approvals systems. These could include

speeding up the approvals processes for major infrastructure initiatives, better co-operation between agencies involved in cross-sector projects and a longer-term strategic planning approach that has continuity between successive governments. Such changes will reduce the perceived risk of the project to investors.

The Thames Hub planning and design team will encourage the relevant agencies and stakeholders to consider how such a large cross-sector infrastructure project can be enabled and delivered. The team has carried out significant technical studies on the different aspects of the proposal and further studies will enable the project to be developed in more detail, including its economic, investment and delivery implications. The team will seek input from parties interested in contributing to these studies.

It is hoped that the Thames Hub proposal will stimulate interest in how the UK should plan major infrastructure improvements. The team welcomes a debate about how this challenge can be met.



The team



Hong Kong International Airport, Chek Lap Kok, Hong Kong by Foster + Partners



The Severn Barrage, Corlan Hafren by Halcrow

Foster + Partners

Foster + Partners, led by Founder and Chairman Norman Foster, is based in London with project offices worldwide. The practice has pioneered a sustainable approach to architecture through a wide range of work, from urban masterplans to product design. Projects include the world's largest airport terminal in Beijing, Swiss Re's London Headquarters, Millau Viaduct in France, the German Parliament in the Reichstag, Berlin, and the Great Court at London's British Museum. The practice has received over 600 awards and won over 100 national and international competitions since its inception in 1967.

Halcrow

Halcrow specialises in the provision of professional planning, design and management services for infrastructure development worldwide. A leading consultancy in transport, development and natural resources, Halcrow employs around 6,000 people and generates an annual turnover of about £500 million. The company has a well-established network of more than 80 offices around the world, from which it contributes to commissions in over 90 countries.

Volterra Partners

The Thames Hub vision is supported by economist Bridget Rosewell, chair of Volterra Partners and founder member of The Thames Estuary Research and Development Company (TESTRAD). Bridget Rosewell is a professional economist and business woman. She has founded several economic consultancies, all of which are still successfully operating, and is now also a non-executive director of a major financial institution and chairs its Audit Committee.

Founded by Doug Oakervee and Bridget Rosewell, TESTRAD has been established to ensure that the UK is in the best possible position to maximise use of the infrastructure possibilities offered by the Thames Estuary. The impetus to form the company arose from a report that Doug Oakervee prepared for the Mayor of London on the feasibility of an Estuary Airport, which revealed the need for much wider investigation.

“We have to have the courage, the political will, the intelligence, the common sense to invest now in our infrastructure. If we don’t then we are denying future generations to come. We are rolling over and saying we are no longer competitive – and this is a competitive world. So I do not believe we have a choice.”

Lord Foster of Thames Bank OM

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