PROPOSAL TITLE:	Metrotidal Tunnel and Thames Reach Airport	Group:	Inner Thames Estuary
SUBMITTED BY:	Metrotidal Tunnel and Thames Reach Airport Ltd	Reference No.:	48 Updated

PROPOSAL

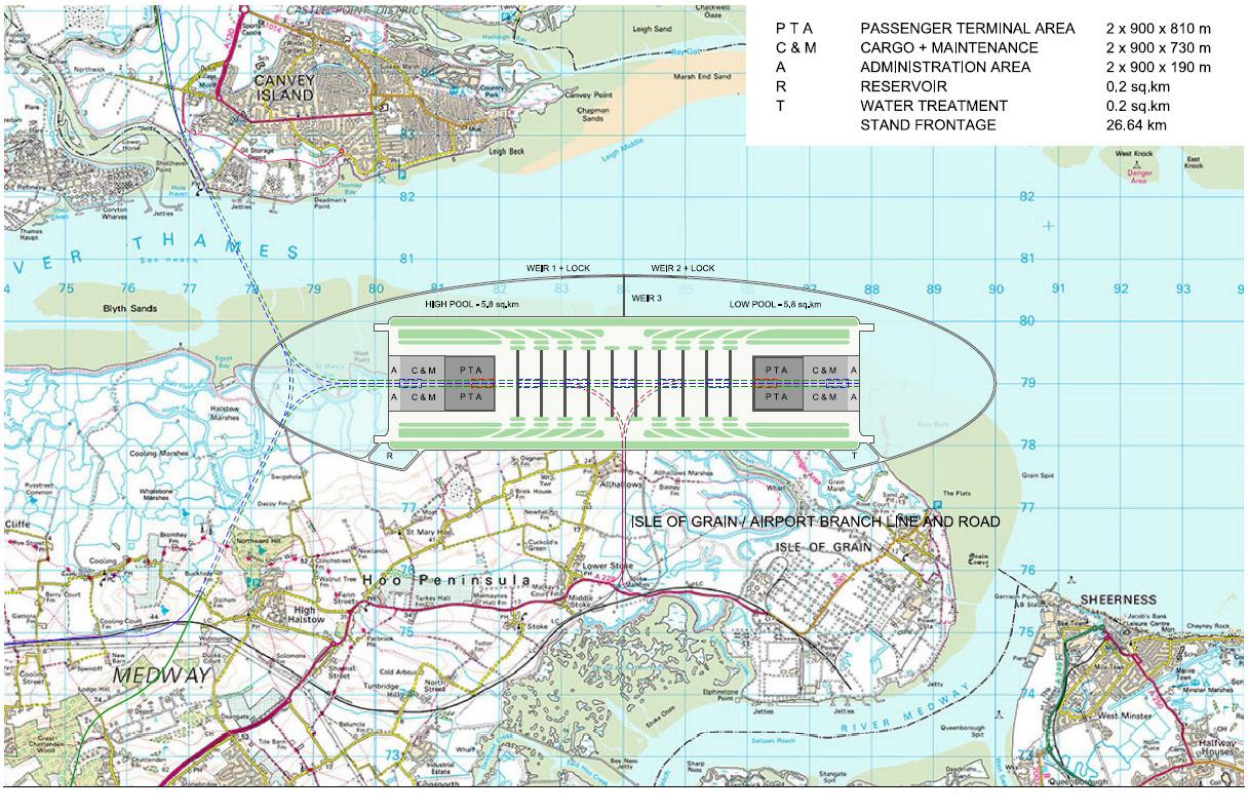
New airport constructed on an artificial island in the Thames Estuary, immediately north of the Hoo Peninsula.

The proposer states that other airports, notably Heathrow, Gatwick and Stansted, would be constrained to their current capacity to encourage growth with the establishment of a hub operation at the new airport, potentially in a split hub with Heathrow.

Amongst a number of runway configurations submitted, proposer's preferred option is the east configuration of a four runway airport, each pair of runways in line East-West, with further scope to extend. Each runway pair is 7,760m long, consisting of two in-line 3,500m runways separated by 760m. All supporting infrastructure (road and rail links, utilities, etc.), plus settlements (with their supporting infrastructure) to accommodate direct and indirect employees, to be constructed. The airport would lie at a major transport node and the "Metrotidal Tunnel" between Canvey and Hoo would facilitate a wider regional surface transport strategy for the East of England, as well as providing flood defences, tidal power generation, and an energy efficient data storage facility. Various rail infrastructure is proposed, including a link to HS1, a connection to the former CTRL line into Waterloo International, twin track tunnel between the Great Eastern Mainline and HS1, and a twin track line between the C2C line and HS1.

METROTIDAL CANVEY - HOO TUNNEL + THAMES REACH AIRPORT

EAST CONFIGURATION- MCT(C) - MAY 2014



ASSESSMENT SUMMARY

Broadly similar scheme to others on the Hoo Peninsula or nearby in the Thames Estuary, proposing an east London airport that might replace Heathrow. All schemes offer a substantial reduction to noise affected populations with the closure of Heathrow, however all remove protected habitats which would require replacement and demonstration of no alternative and overriding public need to construct over.

Positioned partially off-shore, the scheme affects the smallest population of the "on-shore" options; its capital cost is broadly in line with other on-shore schemes, though all are substantially higher than development at existing airports or new sites with better existing surface access.

The early phases of proposed development only replace the lost capacity at Heathrow, with the fuller build-out required to add capacity to the system. The runway configuration proposed, whilst reducing the land requirement potentially offers the least certain operational benefits being based upon untried operational procedures

Although the scheme adds to capacity, and does so without significantly weakening competition in the London system, its cost, location and environmental impact are challenging.

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OVERVIEW

Approach	Government imposed constraints to expansion at other airports supported by government funded initiatives to encourage airlines to transfer to the new airport enabling it to be developed in competition with existing airports. Assumes surface transport schemes commence in 2014 and first phase of the airport opens in 2024.							**Opening Year** 2026
Capacity	Not certain that the novel proposed runway configuration could achieve claimed ATM or passenger throughputs. The first phase would replace Heathrow but not add to system capacity. Capacity impacts on London City and Southend Airports were not considered during Sift 2. However, subsequent analysis conducted as part of the inner Thames Estuary feasibility studies indicates that capacity at both airports may be reduced.						**Runways**	**Airport** 4 / **Net** 2
							ATM	900,000 / 420,000
								1,541,760
							pax	160 / 70
								202
Cost		**Airport**	**Access**	**Other**	**Sub Total**	**Including Risk/OB**		
		18.2	14.2	0.8	33.2	71.4		
Surface Transport	Major capital works include the Metrotidal Tunnel System, new rail line from Hoo Junction to HS1, new rail line from East Coast Main Line to HS1 west of Stratford, new rail line to C2C line at Dagenham, major eastwards extension of Crossrail, and connections into several London termini.						**1 hr isochrone**	11
							2 hr isochrone	22
							London centre	30 miles

Economic					
Borough	**Dartford**	**Gravesham**	**Medway UA**	**Maidstone**	**Swale**
Unemployment (%)	7.0	9.1	9.5	6.7	7.5
Ave. Salary (£/yr)	29,510	28,106	27,378	28,236	28,085
Borough	**Thurrock UA**	**Basildon**	**Castle Point**	**Southend UA**	
Unemployment (%)	7.7	8.1	7.9	7.6	
Ave. Salary (£/yr)	28,033	28,553	26,718	27,664	
County	**Medway UA**	**Kent exc UAs**	**Thurrock UA**	**Essex exc UAs**	**Southend UA**
GVA (£/capita)	13,631	15,883	14,956	16,707	15,449

Environment	More northern location on Hoo Peninsula results in fewer properties affected compared to Isle of Grain proposal. The footprint of the scheme is 26km^2 and impinges further into the Thames estuary than other Hoo Peninsula proposals. This has potential increased impacts on estuary coastal processes and related impacts on flood risk and changes to estuary habitats. 1,660 ha of SPA / Ramsar site (internationally designated sites) lost. This is less than the Foster + Partners and Transport for London Hoo Peninsula options. The SPA / RAMSAR impact would require establishing no alternative and overriding public interest along with compensatory habitat to maintain integrity of the Natura 2000 network. 28 ha of good quality grade 1 agricultural land lost.							**Airport**	**Net**
							57 LA_{eq}	2,000	(238,000)
							55 L_{DEN}	56,000	
	SAC[1]	**SPA**[1]	**Ramsar**	**CA**[1]	**AONB**[1]	**SSSI**[1]	**Listed Buildings**	**SAM**[1]	**Houses Lost**
	-	1	1	-	-	1	1	1	486

[1] SAC: Special Areas of Conservation; SPA: Special Protection Areas; CA: Conservation Area; AONB: Area of Outstanding Natural Beauty; SSSI: Site of Special Scientific Interest; SAM: Scheduled Ancient Monument.

ECONOMY

Borough	Dartford	Gravesham	Medway UA	Maidstone	Swale
Unemployment (%)	7.0	9.1	9.5	6.7	7.5
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Impact on Industry

A new airport on an artificial island off the Hoo Peninsula would provide a net increase of one runway, or two (depending upon configuration) runways, assuming Heathrow is closed. This creates benefits by allowing new short haul and long haul services at the hub and reducing operational costs due to operation of a more efficient airport, and the provision of capacity for resilience to minimise delays. This may be offset in part by increased landing charges to recover capital costs of construction, and being less well located for the airlines' prime passenger market. It will free up land at Heathrow helping address demand for land for other uses.

Airports	The large capacity of the airport would attract some network traffic away from Gatwick. The three runway proposal would provide adequate capacity until at least 2040, whilst four runways would meet demand until at least 2050. It may also restrict capacity at London City and Southend Airports, and inhibit development of Manston, but otherwise there is relatively little impact on other regional airports. By enhancing connectivity with the regions, it may see an increase in services to airports in the north of England, Scotland and Northern Ireland.
Airlines	As with any other major airport on an estuarial site, airlines using Heathrow and others seeking to use it would benefit from the increase in capacity allowing new direct routes, higher frequencies, reduced delays, because of sufficient capacity for resilience. Greater competition and reduced airline 'slot' values and uncompensated relocation cost from Heathrow will have a countervailing effect on some airlines. Interline traffic would have more potential to increase, enhancing the viability of more direct routes, particularly by airlines based at the new hub. LCC and charter airlines would likely face more choice of airports, as some network traffic may transfer out of Gatwick because of the greater interlining opportunities.
Passengers	As with any other large hub airport on an estuarial site, passengers will benefit from increased capacity at the new site via delay reductions, a greater choice of destinations/enhanced frequencies, more competition (reducing fares) and faster terminal throughput times, but to a lesser extent than for airports with 4 independent runways. Travel times and costs would increase on average for typical customers, but less so than for typical estuarial sites, as it has a direct connection to Essex (though such a cross-river connection could also be provided for other estuarial airport proposals if attractive). Reduced passenger travel times for Kent, Essex and E London.

Local & Regional Economic Impacts

The airport is located off Medway district, and close by to the Borough of Gravesham, an area of relatively high unemployment and low economic product for the SE. It is also close to Castle Point, due to the cross river connection, and not far from Thurrock, Basildon and Southend, being an area of somewhat higher unemployment and lower economic product than is typical for the SE. The new site providing an expanded airport with sufficient capacity to meet expected short to medium term demand would facilitate growth of new and existing industries in aviation, airport and aviation support services and travel, tourism, logistics and other related sectors, to service the growth in passenger and freight demand met by the new airport. Most of these businesses will have relocated from the vicinity of Heathrow. The immediate effect will be to increase commercial property development in the vicinity of the new site, but there will also be significant potential to redevelop the Heathrow site for both commercial purposes and residential development. The agglomeration effects of the existing Heathrow/Thames Valley/M4 corridor will be diluted significantly, as such businesses may prefer to locate closer to the new airport on either side of the Thames estuary. Reduced noise impacts are likely to have a modestly positive effect on land prices to the east of the Heathrow site, offset by some smaller negative impacts closer to the new airport. There would be significant dislocation of employment, with many employees needing to relocate, although relative housing prices around nearby towns may mean this is affordable for many. Existing commuters in the Thames estuary may experience increased congestion and travel costs, despite the improved transport connections.

National Economic Impacts

The main national economic impacts come from the provision of new capacity, enabling more flights and connectivity, and the increase in business and leisure trips, and trade in goods and services (and the indirect effects on inward investment). Increased choices of flights and airlines, reducing travel time and fares should generate significant consumer/welfare benefits. These would be offset by higher access costs from London (although lower costs for Kent, Essex and East London).

SURFACE ACCESS

Time/Distance to Central London	1 hr isochrone population	Key required upgrade schemes
25 minutes 30 miles	11	▪ Metrotidal Tunnel System (road and rail) from Canvey to Hoo ▪ New rail line from Hoo Junction to HS1
Journey times to other population centre	**2 hr isochrone population**	▪ New rail line from ECML to HS1 west of Stratford ▪ New rail line from HS1 to C2C line at Dagenham
Birmingham 90 mins Manchester 110 mins (via HS2)	22	▪ Connections to Waterloo, Victoria, London Bridge and Liverpool Street ▪ Crossrail-Plus

Rail Infrastructure Capacity Analysis

A multimodal Canvey to Hoo tunnel from the airport, emerging on the north bank in the vicinity of Canvey Island, delivered instead of the Lower Thames Crossing alignment referenced by the Mayor of London and Foster + Partners.
A wide range of rail elements are proposed which include:

- Branch line from HS1 to connect the airport to St. Pancras and Europe.
- Connection to the Fenchurch Street and Southend C2C line via the Metrotidal tunnel.
- Extension of the southern branch of Crossrail from Abbey Wood.
- Extension of the northern branch of Crossrail from Shenfield.
- Direct airport express connections to Waterloo, Victoria, London Bridge (via Kent lines) and Liverpool Street.
- 'HS3' providing direct services to Ashford International and Europe to the south and Stevenage, Peterborough, Newcastle and Edinburgh to the north via the East Coast Main Line (ECML).
- Link between the airport and the Medway Valley line to connect the airport to Gatwick.

The proposal claims **122,000 passengers travelling each way on the rail connections per day;** with the additional demand of airport employees, **a flow of 19,300 passengers and commuters for peak hours during shift** changes is stated.

It is not proven that there is sufficient capacity on HS1 to cater for the significant increase in proposed airport-related traffic. The business case for the proposed rail link between the ECML, GEML and HS1 at Stratford is not proven and is unlikely to be justified on passenger demand, and it is unclear whether any of the other proposals have benefits that exceed costs.

Highways Capacity Analysis

The scheme proposes the following road enhancements:

- An outer orbital route across the estuary via a dual-two link in the Metrotidal tunnel, linking the A289 (upgraded to dual-three where required) to a dual-two extension of the A130;
- Upgrading the A13 between Orsett and Pitsea to dual-three where required, with the provision of new sections of road to relieve local capacity constraints;
- A new dual-two East London Crossing between the A406 and A2016.

The proposer indicates in the submission that long-term capacity enhancements on the outer orbital link would enable the Lower Thames Crossing proposals to be dropped and avoid the need for another lane upgrade around the eastern half of the M25.
Limited quantitative analysis has been undertaken. It would be expected that other local and sub-regional highway capacity enhancements would be required in line with other similar proposals.

Accessibility to Population & Business centres

The proposed saving of up to half an hour of transfer time between flight and train equates to **an extension of the air-rail surface access catchment radius by 100 miles**. The Metrotidal Tunnel/ HS1/East Coast Main Line link via Essex Cross Country would allow for direct services between Europe, the Midlands and the north via Thames Reach Airport. These services could avoid the congestion of Central London and provide more direct routes to and from the airport, although it is not proven that there is sufficient capacity on HS1 to allow for the utilisation proposed. A link from HS1 to the WCML is provided (without HS2) for connections to Birmingham and Manchester. With some WCML traffic diverted to the new ECML/HS1 link for both passengers and freight, the **sponsor states there is again spare capacity on the WCML to provide the new through services for the Midlands and West Coast**. Without completion of HS2 or upgrades to provide similar additional capacity on the WCML, it is unclear that there is such capacity or demand from existing users to access a hub airport.

Accessibility to Transport Interchanges

Direct rail links to London termini at Victoria, Waterloo, Liverpool Street and St Pancras are proposed. It is unclear whether there is sufficient capacity at those stations to accommodate the expected frequency of services.

Accessibility to Workforce

Connection between South Essex and North Kent, the Medway Towns and Swale via the Metrotidal tunnel system

provides a combined population of just over 1 million people within 20km of the airport. The Crossrail-Plus orbital extends the commuter catchment into the metropolitan boroughs of Central London so that no new urban development or substantial migration is required to support the high-capacity phase of Thames Reach Airport.

Potential Wider Use

Good rail connection times between Stansted, Thames Reach and Gatwick airports would allow for a marginally wider passenger catchment. The sponsor claims that **integrating the tunnel infrastructure provides economic growth without the associated increase in carbon audit, through improved transport connectivity, emphasis on rail, integrated with a flood defence system and tidal power plant.**

ENVIRONMENT

Overall noise impact Significant system reduction on the closure of Heathrow.

	Airport	Net
57 LA_{eq}	2,000	(238,000)
55 L_{DEN}	56,000	

SAC	SPA	Ramsar	AONB	SSSI	CA	Listed Buildings	SAM	Houses Lost
-	1	1	-	1	-	1	1	486

Air Quality

Complicated scheme with various surface transport upgrades that complicates air quality assessment, but likely to decrease air quality, however, offset by the improvement likely upon the closure of Heathrow.

Mitigation Plan

Noise

No information provided. Independent noise modelling for comparison provided the following results:

- 57LAeq: 2,000 people affected;
- 55Lden: 56,000 people affected.

The population affect by 57LAeq represents a net reduction of 238,000 given the closure of Heathrow.

Mitigation Plan

Designations

Approximately 64% of the site (1,660 ha) is located within the boundaries of the Thames Estuary and Marshes SPA/Ramsar sites and another 3 SPA / Ramsar sites (Medway Estuary and Marshes; Benfleet and Southend Marshes and Foulness (Mid-Essex Coast Phase 5) and the Essex Estuaries SAC are located within 5km. The Thames Estuary and Marshes is also nationally designated as a SSSI (overlapping with the international designations) and would be within the footprint of the scheme.

The more northern location on Hoo Peninsula reduces direct impacts to Medway Estuary SPA/Ramsar but increases land take within Thames Estuary & Marshes SPA/Ramsar.

The SPA/Ramsar sites are designated primarily for their bird interest, especially wintering wildfowl. In addition to the direct land take losses to habitats, there are likely to be additional impacts from disturbance, fragmentation of habitat, bird strike management and changes to estuarine processes.

Significant effects on Natura 2000 sites are unlikely to be avoidable and therefore compensation i.e. replacement habitat needed. This will need to follow the process under Habitats Regulations (implementing EU Habitats and Birds directives) and undertake Appropriate Assessment, demonstrate no alternatives and overriding public interest and provide compensatory measures

The scheme requires flooding of significant areas of the northern fringe of the peninsula for the tidal pools.

Impact from surface access, associated development and tidal turbines not covered. Additional in-combination impacts on designated sites would be likely to arise from the surface access links. Possible further impacts associated with coastal

Mitigation Plan

Proposal suggests that the pumped-storage operation would expose new intertidal area within the low pool, and that a very large area of freshwater habitat at risk from storms surges would be protected.

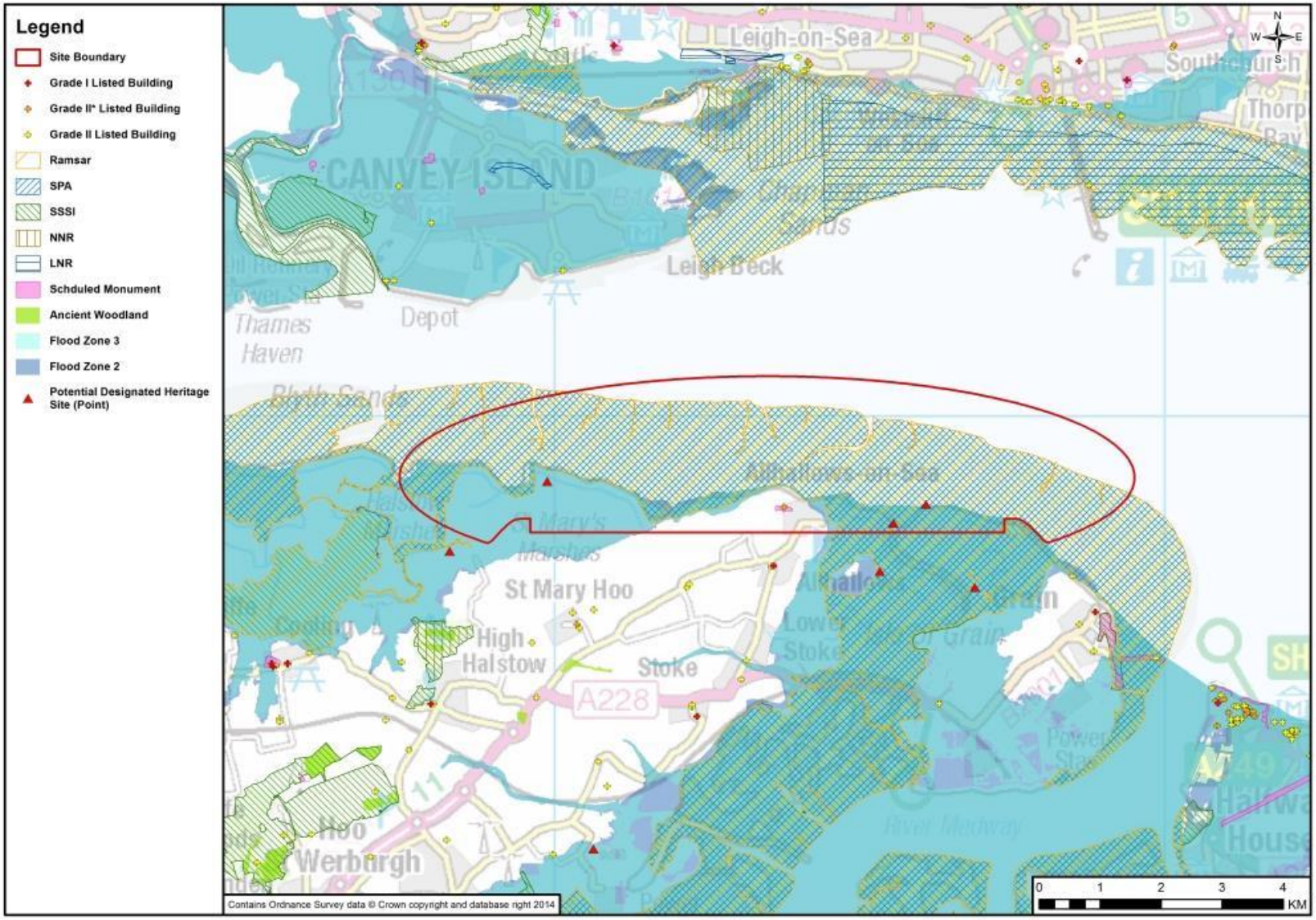
Proposal suggests habitat compensation through managed retreat in the outer estuary (e.g. coastline from Margate to Lowestoft).

Habitat compensation attracting birds would need to take account of bird strike risk and would need to be outside the 13 km safeguarding zone around the airport.

geomorphology changes. **Slough Fort Scheduled Monument would be lost.** This site also includes one Grade II* Listed building.	
Climate Change More efficient capacity should allow operation of efficient aircraft arrivals and departures from the airport compared to other hubs. No estimates of operational changes relating to carbon are given and limited quantitative estimates related to key construction and demolition activities.	**Mitigation Plan** Proposed scheme design includes a tidal pumped-storage system serving peak and prevailing demands. Plus standard energy saving measures for surface access and airport operations.
Other Issues **Metrotidal pools around airport would provide required birdstrike protection zone without need for additional measures on Hoo Peninsula.** It is not clear how this would address bird strike risk, for example, relating to birds moving across the area, Approximately 20% of airport footprint in Flood Zone 3 (high probability), and 20% in Flood Zone 2 (medium probability). With the extent of development outside existing flood defences and within the estuary, some impact on flood risk around the estuary is expected based on HR Wallingford May 2014 studies and would require further detailed modelling Impacts on watercourses, and coastal processes (geomorphology) with potential water framework directive implications, and also from surface transport and additional development, and agricultural land loss and agricultural land quality impacts are also likely to be significant.	**Mitigation Plan**

PEOPLE

Housing The Isle of Grain and wider Hoo peninsula are sparsely populated. **The village of Allhallows–on-Sea would be lost.**	**Demolished** 486
Vulnerable Groups Vulnerable groups not addressed specifically. However, North Kent has relatively high unemployment and poor transport which can affect vulnerable groups.	
Quality of Life Noise and air quality benefits possible for large population around Heathrow. Some noise and air quality disbenefits around new hub, but improved employment and housing access can contribute to health and quality of life.	
Wider Social Impacts Reference is made to wider economic benefits.	


Legend
Site Boundary
Grade I Listed Building
Grade II* Listed Building
Grade II Listed Building
Ramsar
SPA
SSSI
NNR
LNR
Schduled Monument
Ancient Woodland
Flood Zone 3
Flood Zone 2
Potential Designated Heritage Site (Point)
Leigh-on-Sea
CANVEY ISLAND
Leigh Beck
Depot
Thames Haven
St Mary Hoo
High Halstow
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COST

Capital Cost

Total costs are estimated at £35 bn, including £11 bn of apportioned surface access costs, £5bn for the core Metrotidal Tunnel integration and £4 bn for environmental management. The submitter does not advise if allowances have been made for risk. The costs are unadjusted for bias.

Independent cost analysis assesses the scheme to cost £71.4bn for both phases.

	£ bn
Airport	18.2
Access	14.2
Other	0.8
Sub-Total	33.2
Risk	14.4
Optimism Bias	23.8
Total	71.4

Key Risks

- Nature of reclaimed land platform poses increased risk of differential settlement.
- Marine habitat compensation and coastal flood/erosion protection measures.
- Surface access.
- Sea Bed Licence costs.

Risk and Contingency Allowances

Given the greater risk of off-shore and tunnel construction a 50% contingency has been adopted for all costs. A 50% optimism bias has been applied to the risk adjusted cost.

Surface Access Costs

£6.4bn estimate for road and rail links based on requirement for infrastructure identified by independent analysis. £5bn allocation for the tunnel and a further £4.4bn for the wider transport costs.

Other Off-Airport Costs

An allowance of £0.3bn has been included within the independent cost analysis for marine habitat compensation and coastal flood/erosion protection measures. A further £0.5bn has been included to cover other typical environmental mitigation measures.

Summary Comments

The cost estimate for the airport works appears generally reasonable, however it is likely to show optimism and underestimate the potential total cost.
Costs associated with the closure of Heathrow have been excluded.

OPERATIONAL VIABILITY

Capacity

The submission states a capacity of 202 mppa and over 1,540,000 ATM pa, factoring in a 12% loss due to runway configuration. The proposed four runway configuration, similar to the Heathrow Hub scheme delivers a mode of operation that is untested and therefore, whilst the claimed capacity may be achievable in time, it appears high. The first phase would replace Heathrow but not add to system capacity.

Capacity impacts on London City and Southend Airports were not considered during Sift 2. However, subsequent analysis conducted as part of the inner Thames Estuary feasibility studies indicates that capacity at both airports may be reduced.

	Airport	Net
Runways	4	2
ATM	900,000	420,000
	1,541,760	
pax	160	70
	202	

Resilience, Reliability and Efficiency

The mode of runway use is novel; however, it is not unreasonable. It may be therefore that the scheme could be designed to meet resilience targets.

Safety

Novel, largely untried operational proposal, which whilst not unreasonable may require an extended introduction period to safely fully deliver capacity benefits. Although unusual, it appears likely that the scheme could be designed to comply with safety requirements.
The Kentish Flats windfarm may conflict with radar and may require relocation.

Scalability

Although the proposal is defined within an identified boundary, it appears that additional capacity could be developed, although this would either increase land take on the Hoo Peninsula or extend further into the Thames estuary.

Airspace

The proposal would require significant airspace design in terms of relocating the boundaries of the London Terminal Manoeuvring Area (LTMA), SIDs, STARS and interfaces with en route airspace. The LTMA would extend from the new airport in the east to Gatwick in the South, Luton and Stansted in the north. This would be a major reconfiguration and would also require international consultation and agreement. Given the long-term nature of the option and the likely airspace and air traffic management developments under SESAR, restructuring may be achieved as part of the on-going development process, however this is not certain. International boundaries may require amendment.

DELIVERY

Timescale

Assumes that **works on the Metrotidal tunnel commence in 2016 and to the airport in 2018, with the first phase opening in 2026 and the rest by 2030**. This appears to underestimate the time required to confirm public policy and manage the wider requirements. To migrate the operation from Heathrow around 2030 in line with other estuary proposals may be more realistic.

Commercial Deliverability

Even with government grant the scale of private financing challenge is very significant, but may be achievable subject to regulatory structure and comprehensiveness of government support package. Raises major taxpayer value for money questions plus could impact government balance sheet treatment. Without grant funding landing charges would need to rise to levels that are likely to be unsustainable if the airport were to remain competitive.