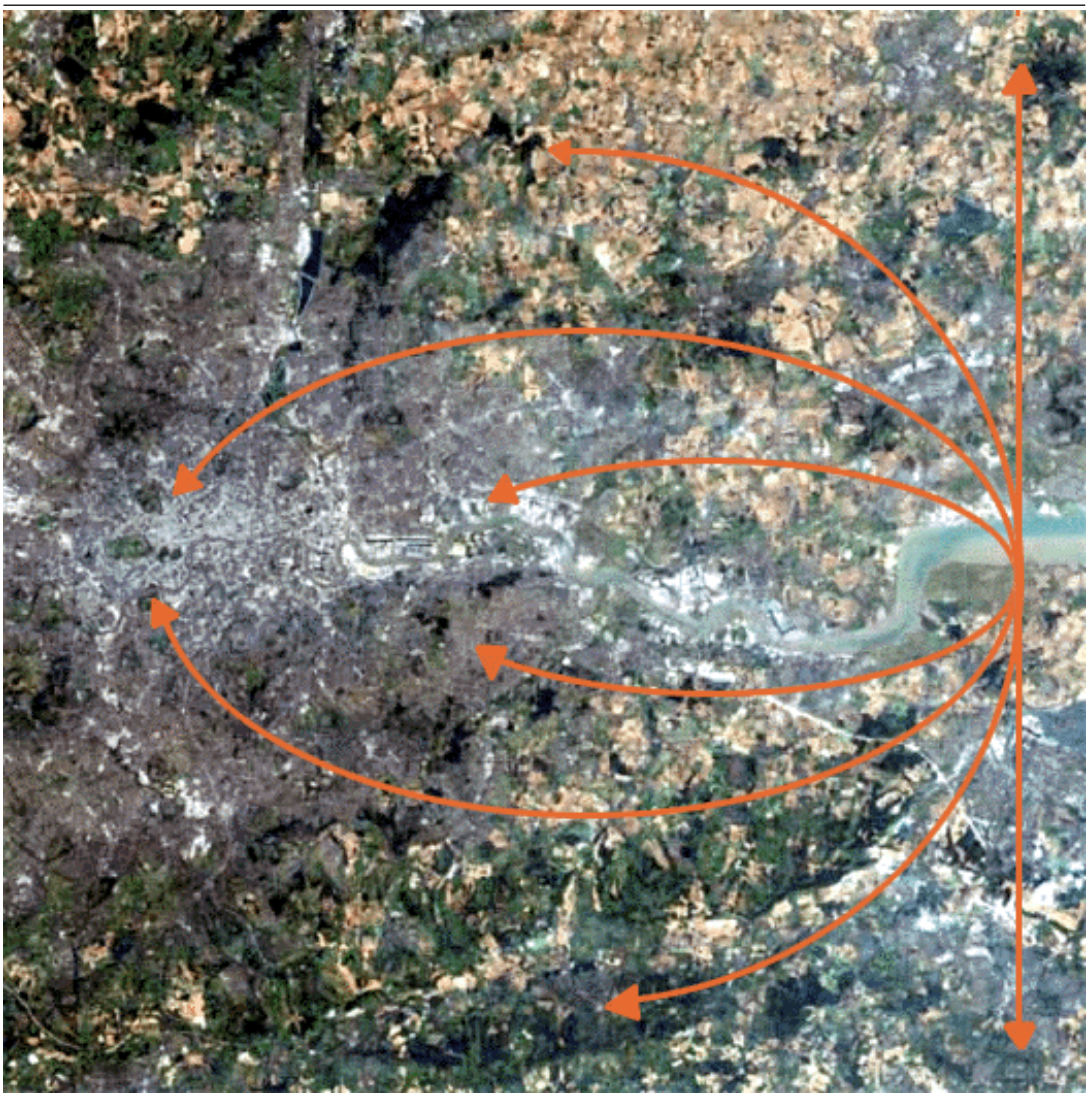

An integrated hub-airport solution for London and the South East

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Location map: major airports in southeast England

1.0 EXECUTIVE SUMMARY

Thames Reach Airport is an independent private sector initiative, supported by leading UK consultants, whose key strategy for the provision of aviation capacity is the development of a modular, hub airport in the Thames Estuary led by a multi-modal Lower Thames Tunnel under the Thames Sea Reach. The prospectus introduces the economic, infrastructure and environmental benefits that a Lower Thames Tunnel allied with Thames Reach Airport can bring to the Thames Gateway region and to the future growth of London. The proposals have been developed over the last two years from consultations with a wide range of interested parties and earlier versions have been forwarded to various strategic planning organisations.

Thames Reach Airport has five key advantages in meeting the SERAS requirements: -

- An integrated solution for the wider transport infrastructure of the southeast and the future growth of London.
- A single-site, hub-airport providing the most accessible, unconstrained aviation growth in the southeast.
- A low environmental impact per passenger owing to the estuary location, rail-led infrastructure and sustainable operation.
- A low cost per passenger owing to cross-funding of the surface access, phased new-build construction and efficient operation.
- A readily implementable proposal within the scope and realm of the SERAS/Cliffe consultations.

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An integrated transport solution

Thames Reach Airport provides an integrated infrastructure solution for the Thames Gateway region and for the future growth of London. Thames Reach Airport resolves the aviation objectives whilst substantially contributing to the objectives of the following strategic planning initiatives concerning the growth and sustainability of London: -

- Thames Gateway Communities Plan,
- Thames Gateway Freight Study,
- London Orbital Study,
- Stansted/M11 corridor,
- Lois (London to Ipswich Multi-modal Study),
- London Gateway Container Port,
- Crossrail
- The East-Coast High-Speed Line
- London's flood defences
- Dredging the Thames Estuary shipping channels
- London Olympics Bid 2012
- London eastern sea and air defence
- The Government's Renewables Obligation

A single-site, accessible hub-airport

Thames Reach Airport provides a single-site, new-build solution for additional growth from 2011 when the existing airports reach their planned capacity. The construction programme allows for the first runway to open in 2011 and the second in 2018, along with the incremental provision of terminal capacity from 10 mppa to 130 mppa by 2030. The compact new-build design reduces transit times within the airport perimeter, which together with the efficient surface access results in the most accessible airport serving the southeast. The 20-hour passenger and 24-hour cargo operations make the most efficient use of a 2-runway system.

A low environmental impact per passenger

Thames Reach Airport is an environmentally responsible solution aiming for a low carbon audit and compliance with the Government's Renewables Obligations. The estuary location, with 50% of the flight paths over open water, mitigates the environmental impacts and provides greater energy efficiencies as set out below (see also 5.3. Environmental impact comparison chart): -

- Low population within the risk, noise and nitrogen dioxide contours
- Low social and economic impacts through widely spread rail network
- Low property impacts (agricultural land, homes, listed buildings, other structures)
- Rail-led surface access: 70% for passengers and 95%for employees
- Opportunity for Rail/Air substitution for short haul destinations
- Use of 100 % flood risk land for airport platform

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- New-build design efficiencies (energy consumption, aviation fuel, utilities etc)
- Sustainable solar, tidal, wave and wind energy
- Easing of congestion on the M25/Dartford Crossing
- Low ground water and water supply impacts

Thames Reach Airport will make use of a fully automated 24-hour detection system for bird strike control, placing emphasis on the harmless denial of access to bird life rather than the destruction of their natural habitats. The automated system working in tandem with a 20-year programme for bird management and the creation of alternative habitats along the eastern seaboard will reduce the risk of bird strike to the levels experienced elsewhere in the UK.

A low cost per passenger

Thames Reach Airport combines a high capacity with a low cost per passenger by the following means: -

- The phasing of capacity and investment to match demand
- The new-build design efficiencies (layout, automated operations, transit times etc)
- The cross-funding of wider infrastructure benefits and easing of congestion elsewhere,
- The low acquisition and compensation costs,
- The longer operating hours than other South-East airports

Inputs have been provided for a Thames Reach Airport run on the NAAM, SPASM and SCAB models and supplementary comments on the resulting outputs will be appended in due course. It is anticipated that with low costs per mppa and a high capacity, Thames Reach Airport will emerge in a strong economic position.

A readily implementable proposal

Thames Reach Airport is a readily implementable SERAS option. The proposals are within the realm and scope of the SERAS/Cliffe consultations and could be adopted as a SERAS/Cliffe variant without an additional consultation exercise. The unique environmental advantages of locating an airport in the Thames Estuary provide the necessary legal case for the SSSI and “ramsar” impacts. The low risk, noise, nitrogen dioxide, property, social and economic impacts help mitigate the planning and compensation issues and reduce the associated legal timetable and costs. The surface infrastructure provides wider benefits ahead of the airport opening. Finally Thames Reach Airport will have a domestic catchment area predominantly on the eastern seaboard of England and to the east side of London including the Thames Gateway region. With a focus on hubbing eastern hemisphere long and medium haul flights with short haul destinations throughout Europe, Thames Reach Airport will compliment the core services provided by the existing airports.

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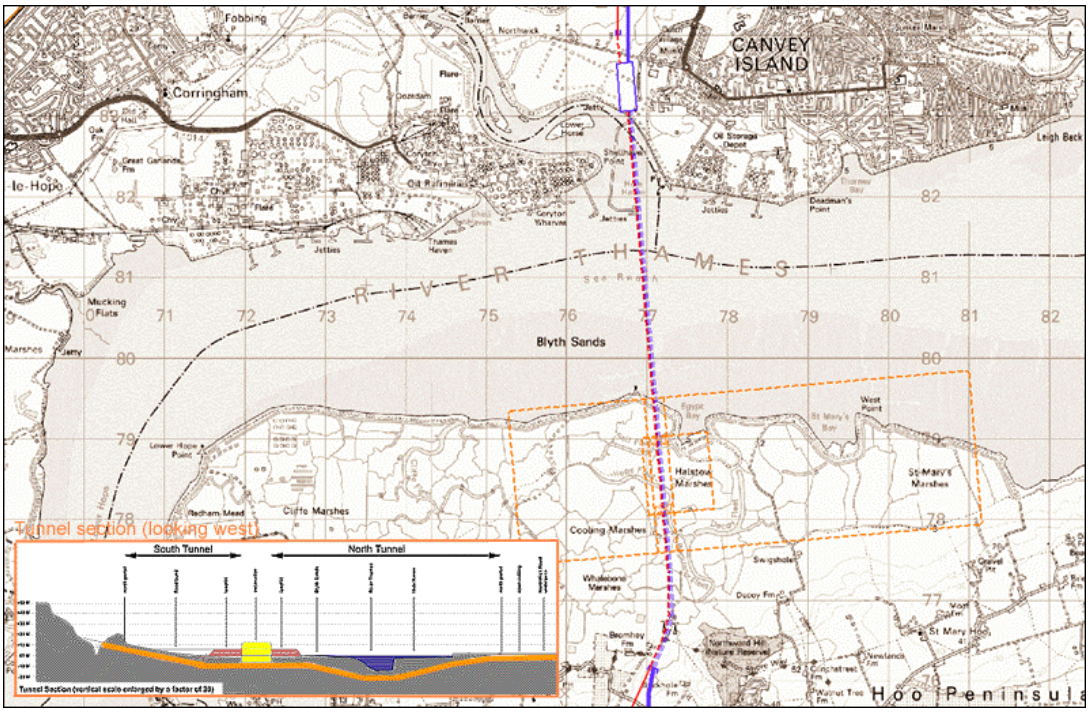

The multi-modal Lower Thames Tunnel: tunnel location and section for rail, road and utilities

2.0 THE INFRASTRUCTURE

2.1 THE LOWER THAMES TUNNEL

- The airport development is led by the construction of a Lower Thames Tunnel that transforms the historic, radial infrastructure north and south of the Thames into an orbital and circulatory system, providing high capacity 24-hour access to the new airport from central London whilst also serving the Thames Gateway region, with new connections to the Stansted/M11 corridor.
- The Lower Thames Tunnel combines road, rail and emergency access with utilities and services to form a multi-modal north-south infrastructure corridor that connects Canvey Island in Essex with the Hoo Peninsula in Kent, while passing directly under the airport site.
- The infrastructure corridor connects the Fenchurch and Liverpool Street lines to the North Kent Line, the A130/A13/A127 in Essex to the A289/A2/M2 in Kent, and links the north and south branches of Crossrail (or makes use of existing rail networks should Crossrail be postponed) to create a new Thames Gateway Shuttle service.
- The form of immersed tube tunnel is similar to that developed for the Øresund Tunnel link between Denmark and Sweden, setting the technical precedents along with the Medway immersed tube tunnel, for the Lower Thames tunnel. A casting factory and basin for the tunnel sections are constructed at the eastern end of the former Occidental Petroleum refinery site, now owned by EEDA, and near to Roscommon Way on Canvey island.
- The Lower Thames Tunnel consists of two sections, each similar to those of the Øresund Tunnel, that together accommodate a 2-track rail link, an 8-lane highway and two service roads

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with utilities. The service roads also provide additional access for emergency and for airport service vehicles. The utilities include power lines linking the national grid north and south of the Thames, pipelines for mains water, gas and aviation fuel, and conduits for telecommunications. The western tunnel section carries the twin rail lines and a twin-tunnel 4-lane northbound carriageway while the eastern section carries the service and utility roadways together with the twin-tunnel 4-lane southbound carriageway.

- The twin-section northbound and southbound carriageways help meet new European tunnel safety objectives with each section providing access and ventilation for its neighbour in the event of emergencies.
- The tunnel, running north-south at an angle of some 5 degrees to OS gridline 77, has two separate lengths, one north of the airport terminal 4.0 kilometres long and one south of the airport terminal 2.0 kilometres long, with the two connected and ventilated by a 960m length of transport corridor that crosses the floor of a 12m deep terminal box excavated within the airport site.
- The casting factory and basin occupy an excavated area 400 x 600m formed at an angle of 5 degrees to OS gridline 77 and located between OS gridline 83 and Northwick Road, on the former Occidental Petroleum oil refinery site. The southern retaining wall of this excavation forms the boundary and north portal between open-cut sections further north and the immersed tube tunnel sections across the Thames to the airport perimeter. From the airport north perimeter a 500m length of cut-and-cover tunnel section connects the immersed tube sections to the airport terminal box. The combined cut-and-cover and immersed tube tunnel length of 4km is similar to the length to the Øresund Tunnel and incorporates similar ventilation fan recesses in the ceiling. The 400 x 600m casting basin provides capacity to cast 2No. 175m long tunnel sections per month. On completion of the tunnel sections the western half of the casting basin area (200 x 600m) is backfilled whilst the eastern half, in line with the tunnel, provides a broad, well-ventilated open area sufficient to accommodate 15No. tollgates each way on the new tunnel highway. Congestion charging technology may avoid the need for tollgates altogether. Northwick Road bridges the new highway and rail lines which then rise on to a causeway over Bowers Marshes. The tunnel portals, tollgates area and ascent to the causeway are protected by 6m high flood bunds.
- The immersed tube tunnel is formed from 40No. 175m lengths of tunnel-section cast, towed into position and sunk into parallel dredged trenches each 3.5km kilometres long across the mudflats and riverbed.
- The infrastructure corridor crosses 960m over the floor of the airport terminal box and continues south for 2km in cut-and-cover tunnel sections, passing east of Bromhey and Eastborough Farms, to emerge at a southern portal beside Lipwell Hill. The 1.5 kilometres from the airport perimeter to the south portal is constructed as a semi-cut-and-cover tunnel to create a flood bund across the marshes.
- The casting factory produces 2No. 175m lengths of immersed tube tunnel every month so taking 20 months to produce 40No. lengths. To this is added 9 months for construction of the casting basin and factory, a 6-month casting programme contingency, 4 months for decommissioning the casting facilities and a further 3 months for making the links between cut-and-cover and

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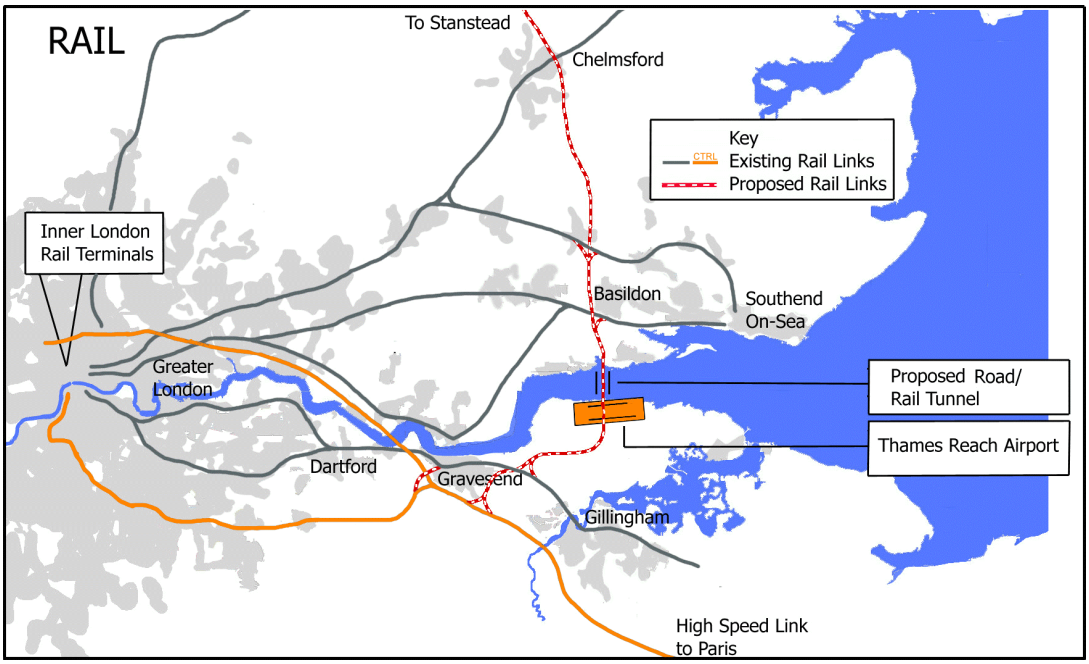
immersed tube sections. A further year for enabling works, fitting out and commissioning indicates a four-and-a half-year contract programme for the twin section Lower Thames Tunnel from 2004 to 2009, if undertaken in one contract. However the cut-and-cover lengths and airport terminal box are constructed concurrently with the immersed tube sections and only one section of the tunnel needs to be complete for the first phase of the airport with casting, placing, fitting out and commissioning of the second section undertaken at a later stage, if required. The western half of the casting facility can continue casting sections whilst the eastern half is decommissioned to make way for the approaching infrastructure corridor. In this way one section of the Lower Thames Tunnel can be opened to carry a D2 highway and twin rail tracks by 2008 with the second independent section postponed for a later phase.

- Preparation of the airport site from 2004 to 2008 is led by construction of the road/rail tunnel, which provides spoil for raising the airport site, access for the airport construction and generates road tolls and rail tariffs ahead of the first phase airport opening in 2011. Sheet piling of the airport terminal excavations and Thames frontage, together with a dyke cut in the marshes and soil embanked around the perimeter, creates the airport site for distributing and settling spoil from the tunnel and from the airport terminal excavations.

2.2 REGIONAL RAIL CONNECTIONS



Principal rail connections for Thames Reach Airport

- London's new airport will need fast, high-capacity rail links from central London to provide a passenger service comparable to the speed and capacity of the Paddington/Heathrow and Victoria/Gatwick express links. The new rail links are provided by a combination of existing rail lines, CTRL lines and proposed Crossrail lines, all connected to the airport via the Lower

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Thames Tunnel. The high degree of rail access sets a target of 70% rail use for passengers and 100% rail use for employees.

- The Waterloo branch of the CTRL passes close to Gravesend, where re-opening a 2½-kilometre length of dismantled railway provides a connection to the North Kent Line. When the St. Pancras CTRL service opens in 2007 spare capacity on the Waterloo/Gravesend CTRL line, together with new twin-tracks along the route of the Isle of Grain line from Lower Higham to the airport, will be used to provide a 25-minute passenger service every 15 minutes between Waterloo International and Thames Reach Airport.
- The St. Pancras CTRL service from 2007 includes a connection to the North Kent Line for running fast suburban services to Thames Reach Airport via Ebbsfleet and the upgraded Isle of Grain Line.
- The twin tracks of the Lower Thames Tunnel connect the Fenchurch Street and Liverpool Street lines, converging near Pitsea, with the Cannon Street and London Bridge North Kent lines near Lower Higham. Track and signalling improvements to existing lines north and south of the Thames enable a 24-hour service to be provided between the north and south bank termini of central London, from Liverpool Street and Fenchurch Street to Cannon Street and London Bridge, via Thames Reach Airport.
- The proposed Crossrail lines from central London to Shenfield and Ebbsfleet are linked via the Lower Thames Tunnel to provide a Thames Gateway Shuttle service throughout the Thames Gateway region with connections to suburban and CTRL services (See section 2.3). Should Crossrail be postponed a similar Thames Gateway Shuttle service can be provided by linking existing lines through the Lower Thames Tunnel.
- Thames Reach Airport will have a 6-platform railway station integrating the fast-rail CTRL services with the Thames Gateway services.
- The twin tracks of the tunnel also provide a rail freight line across the Thames that bypasses central London and provides connections to Tilbury, Thames Haven, the Isle of Grain, Sheerness and beyond. Separate schemes are being considered for using this route to provide a freight line from the Channel Tunnel and Channel Ports to the Midlands, bypassing London. The Lower Thames Tunnel provides a solution to the rail freight objectives of the recently published "Thames Gateway Freight Study" and the rail freight tariffs provide an additional source of income for funding the tunnel construction.
- The Lower Thames Tunnel eases congestion on existing lines by combining separate radial networks north and south of the river to form a circulatory shuttle service via the airport. The tunnel also redirects freight movements away from congested central London lines.
- Waterloo, Liverpool Street, Fenchurch Street, Cannon Street, London Bridge, Ebbsfleet, and other selected railway stations well served by public transport, are provided with remote check-in facilities to encourage broader use of rail access to the airport.
- Rail tariffs are charged for use of the Lower Thames Tunnel.

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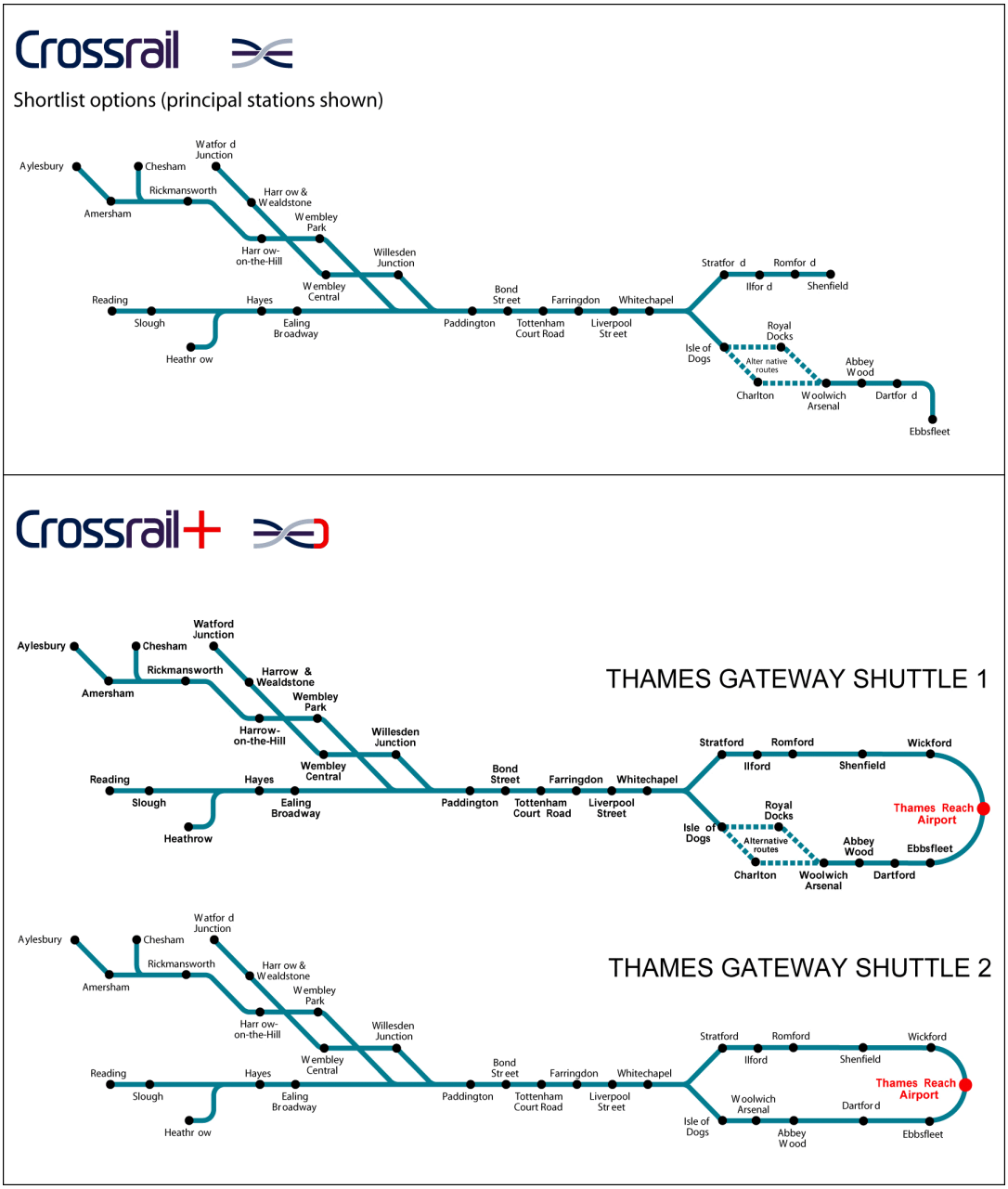

Existing Crossrail schematic and proposed Thames Gateway shuttle options

2.3 THE THAMES GATEWAY SHUTTLE SERVICE AND CROSSRAIL

- On the east side of London there are two Crossrail lines; one to Shenfield and the other to Ebbsfleet.
- The Lower Thames Tunnel and associated infrastructure connections provide a line from Shenfield to Ebbsfleet that passes directly under Thames Reach Airport.
- Thames Gateway Shuttle schematic (1) indicates how this route can provide a Crossrail loop in the east orbiting the Thames Gateway region while serving the airport. Trains would circulate and return west, so providing the airport and the Thames Gateway region with a shuttle service.

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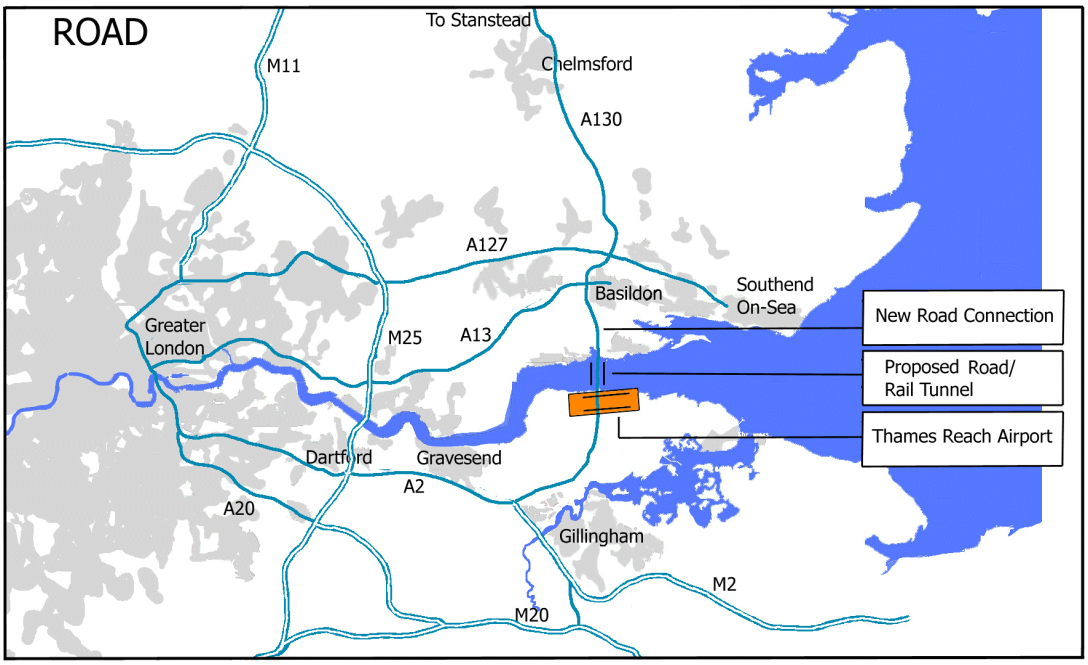
Trains would be pulsed from the airport station to synchronise the Thames Gateway Shuttle service with the proposed services on the two Crossrail lines.

- Thames Gateway Shuttle schematic (2) omits the Crossrail option of a Royal Docks or Charlton Station to save costs, reduce journey times to the airport and speed up the loop, while retaining an option to open one of the omitted stations at a later date if required, subject to the route chosen between the Isle of Dogs and Woolwich Arsenal.
- A similar Thames Gateway Shuttle service could be provided between north and south bank termini of central London via other routes in the Thames Gateway region and the Lower Thames Tunnel. The selected routes would be chosen to compliment the proposed Crossrail routes.

2.4 REGIONAL ROAD CONNECTIONS



Principal road connections for Thames Reach Airport

- The Lower Thames Tunnel completes an outer orbital highway that connects the M11 at Stansted to the M2 at Rochester. This new and extended A130 provides dual carriageway access to the new airport from eastern regions of England, north and south of the Thames, without loading additional demand on to the M25.
- The new A130 incorporates a stretch of the new A120 from Stansted to Great Dunmow, fifteen kilometres of new dual carriageway to be constructed from Great Dunmow to the A12 at Chelmsford, the current A130 from Chelmsford to the Sadlers Farm Roundabout at Benfleet, the new Lower Thames Tunnel highway through to Kent and the A289 from Chattenden to the M2.
- The recently published London to Ipswich Multi-Modal Study (LOIS) identifies proposals that already contribute to creating an outer A130 orbital route i.e. widening of the A12 from the M25 to the A130 Boreham House junction northeast of Chelmsford, providing an A130 northeast

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Chelmsford bypass from the Boreham House junction of the A12 to the junction of the A130/A131, and improvements to the Saddlers Farm roundabout. The current A12 LOIS proposal widens the A12 to six lanes between the M25 and Chelmsford under an £83m scheme by 2011 and a second phase will extend the work to Colchester by 2016. The first phase of work can be adjusted to combine the A12 works with the proposed A130 outer orbital works. This would allow the works cost of £12.6m for upgrading the A12 Chelmsford bypass from D2 to D3 to be removed from the A130 outer orbital costs. See Cost Consultant's Report Appendix 1 Item No.8.0. The A130 northeast Chelmsford bypass can be created by dualling Essex Regiment Way on its current route, from an improved Boreham House junction with the A12 to the A131. From here the A131 is already being upgraded to a junction with the new dual A120 at Braintree. In the medium term this existing A130/A131 route, together with the Lower Thames Tunnel, would already provide a clearway route between the M11 at Stansted and the M2 at Rochester, via Braintree. The fifteen kilometres of new dual carriageway from the Boreham House junction of the A12 to the A120 at Great Dunmow would in due course bypass the slower stretches of Essex Regiment Way and the detour of the A131/A120 to Braintree. The proposed route swings east of New Hall to rejoin and incorporate some 3 kilometres of existing upgraded single carriageway A130 from Little Waltham to Warner's Farm, this stretch incorporating a flyover junction with the A131, and from Warner's Farm the route runs some half a kilometre southwest of the present A130, to join the A120 at the new junction south of Great Dunmow already being provided as part of the A120 improvements. There would be one intermediate junction at Warner's Farm between the A131 and the A120 at Great Dunmow.

- The Lower Thames Tunnel, as far east as the Blackwall Tunnel and Canary Wharf are west of the present Dartford Crossing, completes an inner orbital route for the Thames Gateway Region, connecting the main North-Thames radial arteries, the A13 and A127, with the main South-Thames radial artery, the A2/M2.
- The new outer and inner orbital routes will relieve congestion on the eastern half of the M25 and the Dartford Crossing so providing spare capacity to meet the additional demand for Thames Reach Airport.

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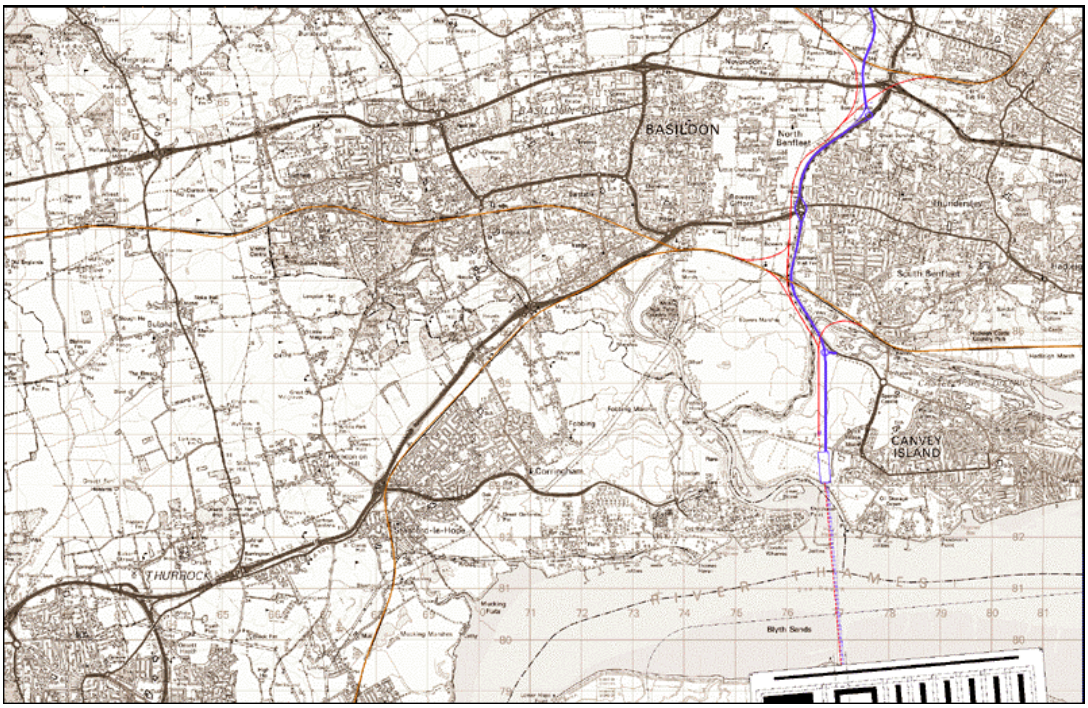
2.5 LOCAL RAIL AND ROAD CONNECTIONS



Local rail (red) and road (blue) connections in Essex

- The widespread regional infrastructure improvements provided by the Lower Thames Tunnel are achieved by quite modest new rail and road links beyond the tunnel portals.
- The twin rail tracks from the north portal cross Bowers Marshes on a causeway to link with the twin tracks of the Fenchurch Street lines just east of Pitsea station. A separate three-mile twin track branch from the causeway rises over the Fenchurch Street Lines and passes North Benfleet to join the Liverpool Street lines to Shenfield via Wickford. Twin rail tracks from the south portal turn westwards and rise beneath the existing Isle of Grain Line, to join the south side of the track before a widened bridge just south of Cooling Court Farm. The Isle of Grain line is broadened from here to accommodate twin tracks to Lower Higham where there are connections to the North Kent Line, to Ebbsfleet for the St. Pancras CTRL line, to Southfleet via Gravesend for the Waterloo International CTRL line, and to a new chord south to Rochester.
- Twin-track return chords heading east are provided at the junctions with the Shenfield-Southend line and Fenchurch Street-Shoeburyness line to provide commuter services to Thames Reach Airport for employees from the Southeast Essex conurbation. A twin-track return rail chord heading north is provided at the Shenfield junction with the Great Eastern network for a route north from Thames Reach Airport towards Norwich and the east coast, for passengers and freight. This route is supplemented by a twin track chord turning north from Pitsea towards Wickford, to serve northbound freight trains from Tilbury and the new Thames Gateway container port at Shell Haven. A twin-track rail chord at Lower Higham, from the Isle of Grain Line to Rochester is provided for passengers and freight. The rail connections north of the tunnel are similar to those mooted by LOIS, the London to Ipswich multi-modal study.

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- The Lower Thames Tunnel sections are designed to accommodate an 8-lane highway. The initial road infrastructure consists of a 6-lane highway, rising from the north portal on a causeway across Bowers Marshes and up to the Sadlers Farm Roundabout junction of the A130 and A13 at Benfleet. From the south portal the new 6-lane highway passes under the Isle of Grain Line and swings east to avoid the Lodge Hill Depot and then heads west through Chattenden Barracks to connect with the new A289 just north of the A289/A228 roundabout. New elevated sections of the A130 are provided over the Sadlers Farm Roundabout at the Canvey Island junction and at the Medway Tunnel junction. The extended A130 can be upgraded to eight-lanes when required and connects the A13/A127/A130 in Essex with the M2/A2 in Kent, while passing directly under the airport.
- The Lower Thames Tunnel sections also accommodate two roadways for emergency vehicles and airport service vehicles.
- Tolls are charged for use of the road tunnel to generate income for the tunnel construction and to balance the demand for road and rail access to the airport, with charges set to encourage rail access. 15No. tollgates each way are provided on a broadened stretch of the highway corridor south of Northwick Road on Canvey Island. However congestion charging technology may avoid the need for tollgates.
- Existing road improvement schemes are already in place to increase the capacity of the A2, A13, A127, A228 and A130 to meet periods of peak demand over the 24-hour cycle. Extending the airport operations from 15 to 20, to 24-hours per day will increase the phased capacity of Thames Reach Airport in the years beyond 2025. In the early phases there would not be sufficient demand to run train services through the night for airport employees alone. During these early-phase periods of lower demand a "Fastway" coach service, similar to that implemented for Gatwick, would provide airport access for employees through the night if required, from local town centres north and south of the Thames, via the Lower Thames Tunnel. These services could later be extended to passengers.

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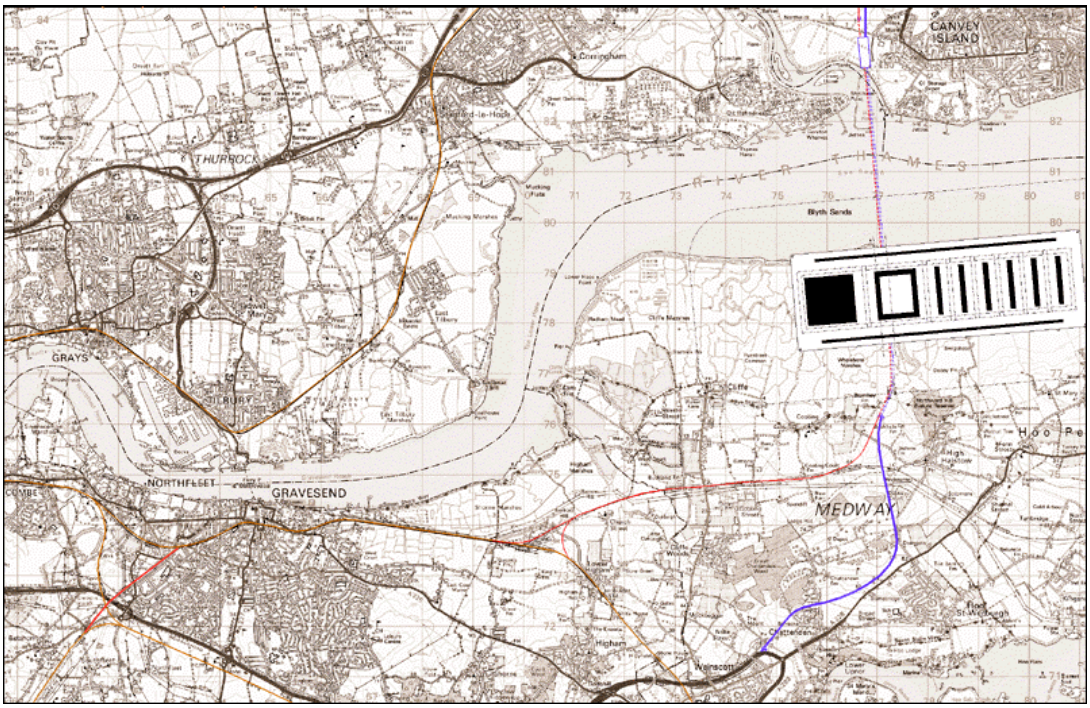
2.6 CTRL AND NORTH KENT LINE CONNECTIONS



Local rail (red) and road (blue) connections in Kent

The two branches of the CTRL provide fast rail access from Central London to Thames Reach Airport, from St. Pancras to Ebbsfleet and from Waterloo International to Fawkham junction near Ebbsfleet. From here both these routes use either the existing twin-track North Kent Line through Gravesend to the Isle of Grain Line or new twin tracks south of Gravesend alongside the CTRL line to Claylane Wood and thence north to the Isle of Grain Line and the airport. The Waterloo International CTRL/North Kent Line route to Thames Reach Airport requires the re-opening of two-and-a-half kilometres of dismantled railway from the CTRL Fawkham junction near Ebbsfleet to the North Kent Line at Perry Street, near Gravesend Station. The embankments and cuttings of this former line remain intact though work would be required to clear and stabilize the earthworks, re-bridge the A2 (where the St. Pancras CTRL line passes under the A2), lower the permanent way to pass beneath Springhead Road (A2260), re-bridge Vale Road and provide elevated tracks, rising beside a new length of Thames Way (A2260) for a junction with the North Kent Line near Coulton Avenue. For a few hundred meters the Thames Way makes partial use of the dismantled railway land but there is sufficient width on this stretch to accommodate both a highway and the new twin tracks subject to re-aligning the carriageway beside the northwest boundary of the railway land. The radius of the new junction to the North Kent Line will require the purchase and demolition of three houses at the end of Coulton Avenue. Recent constructions will need to be cleared from the line near Station House, a former station near Betsham and Southfleet at the junction with the CTRL Waterloo line. Noise reduction measures and/or compensation may apply to houses in Waterdales, Preston Road and Gouge Avenue backing on to the re-opened line through Wombwell Park and Perry Street.

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The St. Pancras CTRL/North Kent Line route to Thames Reach Airport makes use of a suburban line connection to Gravesend that is already programmed for the St. Pancras CTRL works at Ebbsfleet.

Use of the North Kent Line through Gravesend assumes there will be spare capacity for airport traffic once the St. Pancras CTRL line opens. The Lower Thames Tunnel will help to increase the available passenger capacity through Gravesend by redirecting freight traffic elsewhere. However should there be insufficient capacity on the North Kent Line for the later phases of Thames Reach Airport 2No. new tracks could be provided through Gravesend from Perry Street to the junction with the Isle of Grain Line. Gravesend Station, and the bridge adjoining to the west, already has 2No. through lines and 2No. platform lines so there is little impact here. West from Gravesend Station to the new junction at Coulton Avenue in Perry Street the chalk cutting can be broadened within the existing railway-land boundaries to accommodate 4No. tracks, subject to rebuilding 2No. road bridges and 2No. footbridges. East of Gravesend Station an existing narrow cutting with brick retaining walls would have to be widened on the south side to accommodate 2No. new tracks. This requires the demolition of 6No. buildings; The Railway Tavern (No.1A Railway Place), 2No. small shops (Nos. 15 and 16 Windmill Street), 2No. small houses now in office use (Nos. 7 and 8 Parrock Street) and the premises of S&G Motors on the north side of Saddington Street. The new tracks would run under the north side of Saddington Street, which passes parallel to the railway for 250m, and 11No. road bridges over the line would need to be reconstructed. Some carriageway reductions are required further east in Milton Road and Prospect Place, the broadening of an embankment between Milton and Denton and widening of the causeway over the marshes to the junction with the Isle of Grain Line. Grade separation is required towards the junction with the Isle of Grain Line so the twin tracks bound for the airport and Lower Thames Tunnel can cross over the twin-track chord bound for Rochester.

From 2007 when the St. Pancras CTRL comes into service, the existing twin-track CTRL line south of Gravesend will already be running at full capacity without an airport service. Consequently if the North Kent Line through Gravesend is not used for the airport service a new twin-track line would be required bypassing Gravesend for some 11 kilometres from the Fawkham junction of the St. Pancras and Waterloo CTRL lines near Southfleet to the Isle of Grain. 4-tracking the North Kent Line through Gravesend requires less land purchase and arguably results in a smaller environmental impact than building a new twin-track rural line from Fawkham Junction via Claylane Wood to the Isle of Grain Line. Upgrading the existing North Kent Line would also improve local services to and from Gravesend Station. A separate sum for 4-tracking the North Kent Line (£150m) is included in the Cost Consultant's Report.

Rail/air substitution through Thames Reach Airport provides an argument for the route via Claylane Wood, since this route, together with a return chord at Claylane Wood in the Paris direction, would allow high-speed trains to run directly between Thames Reach Airport and the Continent; see below: Section 3.3 Multi-Modal Transport Hub.

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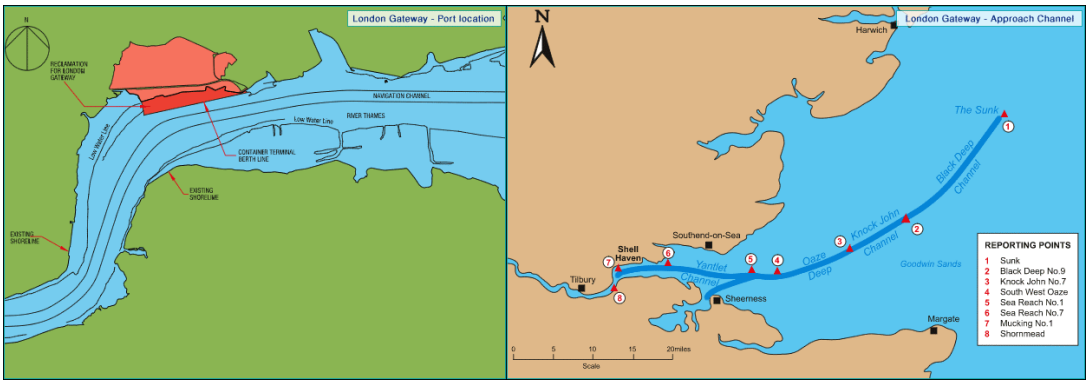
2.7 SHIPPING AND THE WOOLWICH FERRY



London Gateway proposal (source London Gateway): port site location and shipping channel

- The Lower Thames Tunnel provides a strategic connection between the Channel ports and the Midlands and local connections between the Cross Channel and North Sea passenger ferry services at Sheerness and Tilbury and between the sea-container depots at Tilbury, Thames Haven and the Isle of Grain.
- Thames Reach Airport will augment the new facilities to be provided at the London Gateway Container Port to create a major new international freight hub. Construction of the airport will make use of material dredged from the Thames shipping channels, helping to increase the size of ships that can use the Port.
- The forthcoming Thames Gateway, Galleons Reach crossing of the Thames will effectively render the Woolwich Ferry redundant by 2009. The Lower Thames Tunnel and the first phase of Thames Reach Airport would be open by 2010. Before then there would already be considerable airport construction traffic, both vehicular and pedestrian. The boats and landing equipment of the Woolwich Ferry could be relocated to provide a Medway Ferry from Sheerness to the Isle of Grain every quarter hour. Much of the infrastructure for a ferry service already exists at Sheerness, requiring only the landings and a roadway on the Isle of Grain side to complete the 1.5km Medway crossing. Pier to pier the land route from Sheerness to the Isle of Grain is some 58km around the Medway Towns via the A249(T), M2, A289 and A228. From Sheerness to Thames Reach Airport along the same land route is some 49km, compared with 18km on a route via the ferry and this route would also serve the proposed "Zones of Change" on the Hoo Peninsula. The Medway Ferry would provide a useful service for Thames Reach Airport commuters, for "Zones of Change" commuters, for airport bound freight from Sheerness Docks and for car and freight journeys heading from Sheerness Docks to the Lower Thames Tunnel and areas further North. The present Woolwich Ferry, working at 75% capacity, provides 6No. 10-minute crossings per hour each way and carries some 1.3m vehicles and 2.75m passengers per annum. The Medway Ferry would provide 4No. 15-minute crossings per hour each way so on similar load factors the ferry service would carry up to 1.2m vehicles and 2.5m passengers per annum, with scope for a higher frequency and significantly higher capacity, particularly for

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commuters. The new service could be funded from the sale of existing Woolwich Ferry sites and from tolls.

- The Medway Ferry would assist the development of the Thames Gateway Partnership "zones of change" on the north Medway Shore, on the Isle of Grain and on the Isle of Sheppey, by providing a convenient and regular service between these development zones until a multi-modal Sheerness Tunnel becomes viable beyond 2030. In the mean time the Medway Ferry capacity helps to postpone the D2/D3 upgrade of the A289.

2.8 UTILITIES

- The Lower Thames Tunnel is close to existing power stations and major national-grid distribution lines north and south of the Thames. New power lines will run along the road corridors and through the tunnel to the airport, helping to spread loads north and south of the Thames Estuary. New cable and satellite telecommunications will be integrated with existing Thames Gateway systems.
- North Kent suffers from summer droughts. A new water mains connection from the Essex and Suffolk Water region north of the Thames will pass through the Lower Thames Tunnel to supply a reservoir within the airport.
- The Medway Shore and Isle of Grain Thames Gateway Partnership "Zones of Change" and other areas on the Hoo Peninsula already have a water supply problem. It would be possible to pump a water supply from a covered reservoir in the airport terminal-box excavation, to serve the Hoo Peninsula and thereby solve the supply constraints for the "Zones of Change" and “Communities Plan” while prohibiting further extraction from local aquifers.
- Utility companies with way leaves through the tunnel would contribute to the cost of constructing the Lower Thames Tunnel.

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Thames Reach Airport: aerial view from the southeast with rail links and noise contour

3.0 THE AIRPORT

3.1 GENERAL ARRANGEMENT

- By an analogy with railway enactments the Lower Thames Tunnel and Thames Reach Airport site are sufficiently close to the "Benfleet Crossing" and SERAS/Cliffe airport site of the SERAS Report to be within similar "lines of deviation" so that public consultations on the SERAS/Cliffe proposals embrace the Thames Reach Airport proposals. In fact the "lines of deviation" for Thames Reach Airport zone a smaller area than the site for the SERAS/Cliffe proposal and the raised airport platform is half the size of the SERAS/Cliffe proposals.
- The site of Thames Reach Airport is determined by the location of the Lower Thames Tunnel, which lies near to the OS TQ769 Easting (i.e. a north-south line at some 5 degrees to OS gridline TQ77) and by a southern "line of deviation", defined as a line from the junction of Pond Hill and Church Close in Cliffe to Parker's Corner in Allhallows, i.e. a line between the northern fringes of Cliffe and Allhallows on the Hoo Peninsula, at a bearing of 85 degrees. The proposed southern runway and flight path is laid out with a centreline parallel to and not less than 500m from this southern "line of deviation", resulting in the flight paths being more than 500m from almost all habitation on the Hoo Peninsula, with the exception of Dagnam Farm, and a holiday village and caravan park at Allhallows-on-Sea some 6.5km east of the Lower Thames Tunnel. The southern airport perimeter is 150m from the centreline of the southern runway. A northern "line of deviation", parallel to the southern line, would be determined by the required infield width and the acceptable degree of Ramsar impact resulting from wetland reclamation. The whole airport site including the north and south lines of deviation can be translated further north or

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south subject to the balance of issues arising from Ramsar impacts to the north, and aircraft noise and nitrogen dioxide dispersal to the South (See below Section 4.3 Phased Development). The western "line of deviation" for the airport is defined by the existing course of Cliffe Fleet, in order to preserve the Cliffe Marshes and Redham Mead areas further west.

- Thames Reach Airport is purpose-designed to be compact, placing the infield central terminal area (CTA) and the cargo/warehousing/airport services area (CWA) within two 12m deep terminal box excavations, the CTA excavation being directly over the tunnel interchange to minimise the environmental impact and to reduce travel times within the airport perimeter. The 12m depth of excavation plus 6m raised height of the airport platform results in the CTA and CWA boxes being 18m deep from the main runway level.
- Dredgings from the Lower Thames Tunnel and from navigation channels in the Thames Estuary, together with the excavated material from the airport terminal boxes is used to raise the surrounding airport site by some 6 metres above the existing marsh level. This creates an airport platform above flood level and increases flight path clearances over the Thames shipping channels and over ground rising to the east. The airport platform is constructed in phases. Each phase is formed within a sheet piled perimeter and requires 6m of fill and up to 3m of surcharging to accelerate settlement. After 18 months up to 2m of the surcharging is dozed into the next phase of the platform, (along with more excavated material and dredgings) which consequently allows for a combined settlement of up to 1metre, in the 6m of fill and in the original marsh level over the eighteen month period. Towards the end of the process the surcharging is used to fill and surcharge a relatively small final platform phase area so that there is only a small volume of final surcharging to be removed and redistributed elsewhere on site on completion of the platform.
- The overall reclamation material shortfall on site (45m cubic metres), calculated from the volume required to form the complete raised platform (70m cubic metres allowing for 1m settlement) less the spoil excavated from the site (25m), is made up from the tunnel spoil (2m) and dredgings from the Thames Estuary shipping channels (43m). Proposed dredging of the Princes Channel (3m cubic meters) and dredging of the shipping channel for the new Thames Gateway Container Port (12m cubic meters in excess of the container port platform requirements) would contribute 15m cubic metres of material within the required timeframe. The shortfall would be supplied by other estuarial navigation-channel, dredging projects within the timeframe. A dredger can provide up to 250,000 cubic metres of material per week (13m per annum) so there is scope to shorten the platform construction programme, or complete the platform at a later stage in the existing programme, if required. A channel is dredged across Blyth Sands to provide river access to a jetty from where the material is pumped to the various areas of the platform reclamation project. The stages of the airport platform construction are indicated on the airport platform phase diagrams of the Section 4.3.
- The airport functions are laid out on a 14 x 4 unit square 480m grid, which suits the general arrangements and helps simplify the quantification and analysis of the building costs. The resultant platform occupies an area of 12.9sq.km. The CTA occupies some 4 units above the lower Thames Tunnel and the CWA a further 4 units west of the CTA.

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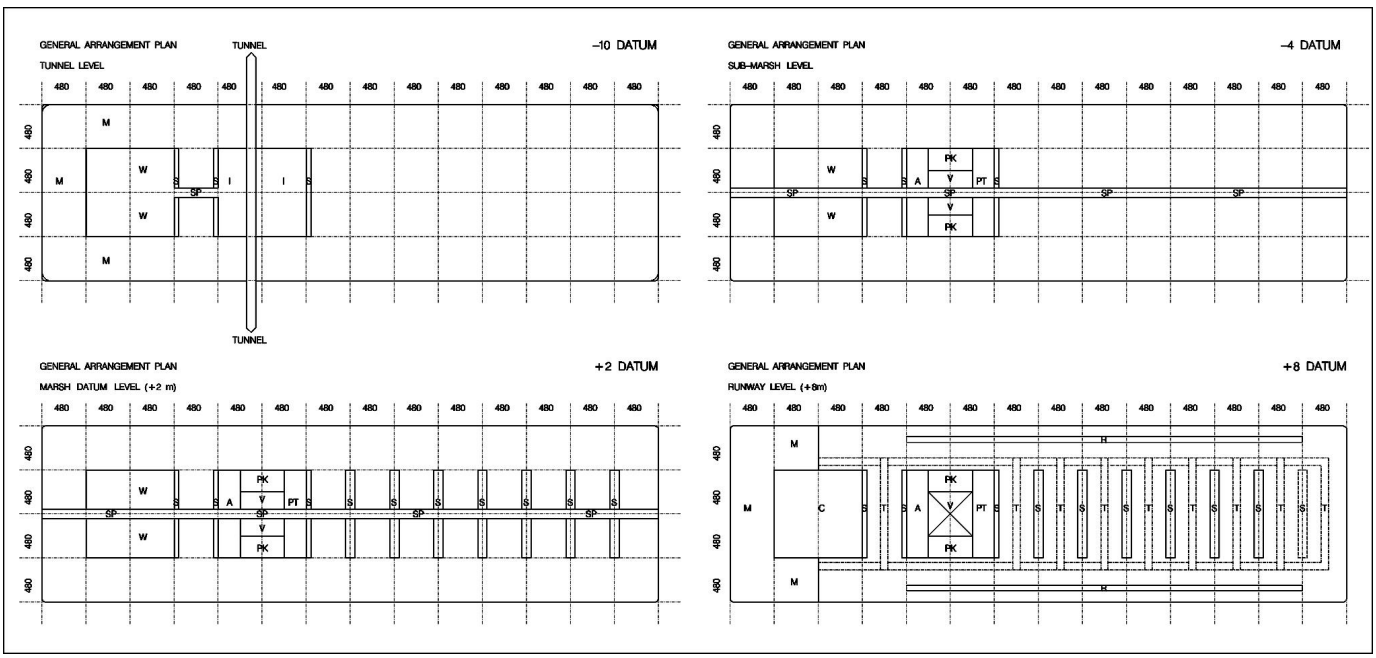
- The site accommodates 2No. 4.32km (9 x 480m) runways with a 1.62km infield (centreline to centreline of main runways) and the optional addition of 2No. close-parallel 2.4km (5 x 480) runways 480m from the centrelines of the main runways, if required.
- The main runways provide four pairs of take-off and landing zones to reduce aircraft ground movements. A long runway version with 5.76km (12 x 480) long main runways could provide take-off and landing zones either side of the centreline i.e. a minimum available runway length of 2880m (6 x 480) in each direction. This helps to reduce overall aircraft time on the ground and the fuel consumption per flight. At congested hub airports today, in particular Heathrow, over half an hour can be spent taxiing between the stands and the main runway. The long runways can also help to marginally increase the ATM capacity, subject to sequencing divergent flights for take-off.
- The CTA has a 960m stand on the east and west elevations and the CWA has a 960m stand on the east elevation. A 960m length of stand can provide 10No.separate 96m aircraft stands, each sufficient to accommodate the new Airbus A380-800 series of aircraft, or a larger number of smaller stands. At 480m intervals to the east of the CTA there are separate satellite stands each with 2No. 960m frontages, served by a 100m wide underground services and circulation spine along the axis of the airport. The “gill” arrangement of stands on separate transverse satellites, with underground links to the CTA, helps minimise aircraft ground movements and transit times within the airport perimeter. Only the aircraft stands on the east side of the CTA have been used in the terminal capacity calculations. The 960m on the west side of the CTA provide VIP handling stands but also additional capacity for passengers and/or freight as required.



Indicative airport floor plan layouts

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- The airport functions are arranged on five principal levels around and within the CTA and CWA concrete boxes cast within the sheet-piled infield airport terminal excavations, as follows: -

CTA

Level 1	+14m; stand and satellite departure gates; upper level of multi-storey parking, hotel and office accommodation.
Level 2	+8m; runways and taxiways, stand and satellite arrival gates, multi-store parking, hotel and office accommodation,
Level 3	+2m (marsh datum level); passenger terminal departures, retail areas, baggage handling, the airport circulation spine, multi-storey parking, hotel and office accommodation.
Level 4	-4m: passenger terminal arrivals, lowest level of multi-storey parking, hotel and office accommodation, retail storage.
Level 5	-10m: the Lower Thames Tunnel, airport railway station, freight siding chords, highway junctions and access roads, emergency vehicle access, services intakes.

CWA

Level 1	+14m; cargo stand crew-gates
Level 2	+8m; runways and taxiways, cargo stand cargo-gates, maintenance areas
Level 3	+2m (marsh datum level); warehousing (6m floor to floor height)
Level 4	-4m; warehousing (6m floor to floor height)
Level 5	-10m; airport circulation spine, freight sidings, highways access, staff parking, reservoir, sewage treatment, airport M+E services.

- Secure 24-hour airside functions for cargo and maintenance are located within the CWA to the west of the CTA while the 16 or 20-hour public access areas with concourses and satellites are laid out within and to the east of the CTA.
- The Lower Thames Tunnel is connected to the airport through the base of the CTA terminal box.
- The railway station beneath the CTA has 6No. platforms; 2No. for the fast rail services to Waterloo and St. Pancras, 2No. for the Thames Gateway Shuttle/Crossrail services and 2No. for the other regional rail connections. There are through lines for the rail freight services, with sidings under the CWA as noted above.
- The highway interchange provides access to 2No. multi-storey car parking zones; north and south, each of 240 x 480m on 7No. levels with 3m storey heights.
- Access to the airport is provided by tunnel only, in order to minimise the infrastructure impact on the surrounding environment.

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- An air-traffic control tower that monitors both air and shipping movements in the Estuary rises from the CTA. The airport radar system also provides data for state-of-the-art bird protection facilities.
- Aircraft maintenance is undertaken at the west end of the airfield. This avoids ATM runway capacity being used to fly aircraft to remote maintenance airfields.
- The airport site occupies the marshes and tidal foreshore of the Thames rather than the Hoo Peninsula hilltop. The runways on their raised platforms will have an elevation of some 8m compared with Northward Hill (66m) and Lodge Hill (74m) respectively some 1.5km and 3km further south. These hills with tree cover will penetrate the aerodrome Inner Horizontal Surface (53m). However since the airport operation will be high capacity with baulked or aborted landings requiring fly-through the CAA has confirmed that the airspace constraints will be acceptable in principle. In addition to these hills various obstacles may require lighting in accordance with aerodrome licensing procedures, such as the St. Mary Hoo church tower, the stacks of the Tilbury, Isle of Grain and Kingsnorth power stations, a water tower near Dagnam Farm (which can be relocated if required) and stacks at the BP Coryton refinery. Measures will be required to prevent shipping from encroaching on the various safety surface limitations of the airport.
- The marsh perimeter is finished with a sectional concrete moat, "ha ha" and perimeter road to provide site drainage and security without boundary fences. The Thames frontage has a similar sectional concrete breakwater, continuing the "ha ha" and perimeter road. The airport site and moat are sealed from the surrounding marshes and the water table below to contain and treat all inclement and other run-off from the airfield.
- The CWA accommodates a reservoir providing seven days capacity in the event of supply disruption, an enclosed sewage and surface-water treatment plant, emergency generators and other airport M+E and service facilities.
- Thames Reach Airport will be the first purpose-designed facility in the UK planned from the outset for a hub capacity in excess of 130mppa. There will be greater clarity and efficiency in the design of airport systems and circulation with a resultant reduction in transit time within the airport. Passengers will first encounter the airport systems at remote check-in facilities located in Central London, around the Thames Gateway and onboard trains, to help disencumber them during their journey and simplify procedures on arrival at the CTA. Outbound passengers will rise from the airport tunnel connections to the departure gates and inbound passengers will descend from the arrival gates to the airport exits and Lower Thames Tunnel. The central terminal area will have wide, open areas, benefiting from natural daylight and will accommodate hotels, shops and offices to serve outbound, inbound and transit passengers. Operations will be gate-related to minimise transit distances within the airport perimeter. CTA hotel and office accommodation will have dramatic views over the airport and the outer estuary. The completed development will have a long hull and a low profile in the Thames Estuary.
- Airport phase diagrams in the Section 4.3 indicate the various functions and areas constructed for each phase of the airport construction.

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Phasing table: capacity demand in the South East

	forecast (mid)		Existing airport capacity (pack								Demand for Thames Reach Airport				
			Luton		Gatwick		Heathrow		Stansted		volume	185	hourly runway movements		
year	mppa	rail	mppa	rw	mppa	rw	mppa	rw	mppa	rw	mppa	ATM (t)	16h	20h	24h
2000	114.3	0	6.2	1	31.9	1	64.3	2	11.9	1	-				
	120.6	0	6.6		32.5		66.8		13.9		-				
	127.0	0	6.9		33.1		69.4		15.9		-				
2003	133.3	0	7.3		33.8		71.9		18.0		-				
	139.7	0	7.6		34.4		74.5		20.0		-				
2005	146.0	0	8.0	1	35.0	1	77.0	2	22.0	1	-				
	151.4	0	8.4		36.0		79.4		24.6		-				
	156.8	0	8.8		37.0		81.8		27.2		-				
	162.2	0	9.2		38.0		84.2		29.8		-				
	167.6	0	9.6		39.0		86.6		32.4		-				
2010	173.0	0	10.0	1	40.0	1	89.0	2	35.0	1	-				
	178.8	0	10.0		41.2		89.0		35.0		3.6	19	3.3	2.7	2.2
	184.6	0	10.0		42.4		89.0		35.0		8.2	44	7.6	6.1	5.1
	190.4	0	10.0		43.6		89.0		35.0		12.8	69	11.8	9.5	7.9
	196.2	0	10.0		44.8		89.0		35.0		17.4	94	16.1	12.9	10.7
2015	202.0	0	10.0	1	46.0	1	89.0	2	35.0	1	22.0	119	20.4	16.3	13.6
	210.0	0	10.0		46.0		89.0		35.0		30.0	162	27.8	22.2	18.5
	218.0	0	10.0		46.0		89.0		35.0		38.0	205	35.2	28.1	23.4
	226.0	0	10.0		46.0		89.0		35.0		46.0	249	42.6	34.1	28.4
	234.0	0	10.0		46.0		89.0		35.0		54.0	292	50.0	40.0	33.3
2020	242.0	0	10.0	1	46.0	1	89.0	2	35.0	1	62.0	335	57.4	45.9	38.3
	248.2	0	10.0		46.0		89.0		35.0		68.2	369	63.1	50.5	42.1
	254.4	0	10.0		46.0		89.0		35.0		74.4	402	68.9	55.1	45.9
	260.6	0	10.0		46.0		89.0		35.0		80.6	436	74.6	59.7	49.7
	266.8	0	10.0		46.0		89.0		35.0		86.8	469	80.3	64.3	53.6
2025	273.0	0	10.0	1	46.0	1	89.0	2	35.0	1	93.0	503	86.1	68.9	57.4
	278.6	0	10.0		46.0		89.0		35.0		98.6	533	91.3	73.0	60.8
	284.2	0	10.0		46.0		89.0		35.0		104.2	563	96.4	77.2	64.3
	289.8	0	10.0		46.0		89.0		35.0		109.8	594	101.6	81.3	67.8
	295.4	0	10.0		46.0		89.0		35.0		115.4	624	106.8	85.4	71.2
2030	301.0	0	10.0	1	46.0	1	89.0	2	35.0	1	121.0	654	112.0	89.6	74.7

year	South East only	not factored in high speed rail Paris, Brussel, (Edinburgh) before 2030	185p/m top end aircraft load factor	indicative runway phasing 1rw = 48m/h 2rw = 90m/h 3rw ~ 120m/h 4rw ~ 140m/h

Indicative additional capacity demand for the South East up to 2030

3.2 HUB AND RAIL CAPACITY

- The SERAS report seeks to provide sufficient capacity for the projected millions of passengers per annum (mppa) and a second hub airport in the southeast, preferably well served by rail surface access. The report notes that with sufficient terminal capacity and full mixed-mode operation on two widely spaced runways Heathrow, with a load factor of up to 200 per PATM can provide up to 105mppa.
- The long and narrow footprint proposed for Thames Reach Airport seeks to minimise the environmental impact while maximising the capacity. This benefit, along with general improvements in capacity achievable by a new-build airport and the potential for 20-hour passenger and 24-hour freight operations, increases Thames Reach Airport capacity to 130mppa on two widely spaced runways, providing a hub airport with a greater capacity than the fully enhanced Heathrow.

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- Beyond 130mppa additional capacity can be achieved by: -
    - § higher load factors, as would be expected at higher capacities,
    - § use of some of the 4-hour freight ATM's for passengers,
    - § ATM's in excess of 100 per hour from the 2No. long runway version,
    - § providing third and/or fourth 2.4km close separated runways
- The use of the Airbus A380-800 on long haul flights and the development of Rail/Air substitution by making use of the CTRL will help raise load factors at Thames Reach Airport to the levels anticipated at Heathrow (200 per PATM).
- A close-parallel 2.4km north runway can be built by piling over the tidal mudflats instead of reclamation, to mitigate the "ramsar" impact. The close-parallel 2.4km south runway is raised on the marshes just within the line of deviation and would require some ground works near Allhallows to provide sufficient clearance for the flight paths.
- A crosswind runway could be provided to the west of the airport footprint shown but the increased environmental impact arguably outweighs the benefits.

- The airport passenger station has 6No. platforms served by 2No. through lines, which on the south side also double up as the CTRL lines. 2No. platforms are served by CTRL fast-rail trains from St. Pancras and Waterloo International with a train arriving at Thames Reach and a train departing every 15 minutes. There is no through service on CTRL lines before 2030. A CTRL shuttle train arrives at a vacant platform, passengers alight in 14 minutes, passengers board in 14 minutes and the train departs, switching tracks immediately south of the station. With 800 passengers per train this provides a capacity of 6,400 passengers per hour. 2No. platforms are served by the Thames Gateway Shuttle or Crossrail trains (TGS) each way on through lines and 2No. platforms are served by local trains (LT) each way, on through lines terminating in Central London using other radial routes north and south of the Thames. There are up to 10tph each way for both the TGS and LT routes. TGS/Crossrail trains carry 1,000 passengers and LT trains 800 passengers, so the TGS capacity is 40,000 and the LT 32,000. The TGS and LT trains stand at their platforms for four minutes, in which time passengers alight and board.
- At 130mppa capacity on 20-hour operations, 365 days a year there are some 18,000 passengers per hour (arrivals and departures) and with 70% travelling by rail some 12,500 pass through the station per hour. At 130mppa there are 90,000 employees at the airport and with 95% travelling by train over a 6-hour period (the equivalent of 3 shifts allowing one hour spread for arrivals and departures) the employees add some 30,000 passengers per hour at peak times. It is assumed that employees mostly arrive and depart on the TGW and LT lines, not the CTRL lines and if we also assume a load factor of 80% on the CTRL shuttle trains then at peak times there is a combined passenger and employee demand of 37,500 passengers per hour on the TGW and LT lines, resulting in a load factor of 52%. The remaining capacity is taken up by non-airport journeys on the Thames Gateway orbital rail system passing through the tunnel, i.e. 34,500 journeys per hour.
- Each track north of the tunnel carries up to 20tph and the tracks south, with the CTRL shuttle trains, each carry up to 24tph. At Fawkham junction the CTRL shuttle service separates to

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provide 2tph each way to St. Pancras and to Waterloo International. At Higham 4tph each way from the LT service separate to serve the Medway Towns and southeastern Kent. via Rochester. At Ebbsfleet the Crossrail service separates leaving the remaining 6tph LT service each way to run either from Ebbsfleet or to continue into Central London, to be distributed on the London Bridge, Cannon Street, Charing Cross and Victoria lines. On the north side Crossrail takes up capacity on the Great Eastern lines from Shenfield to Liverpool Street. The LT 10tph service each way is distributed on the Shenfield and Southend lines and on the two routes from Pitsea to Fenchurch Street. The LT ambition is to run fully orbital rail routes terminal to terminal, say Charing Cross to Fenchurch Street. As the existing Inner London rail routes are congested the 10tph each way frequency through the tunnel is distributed over a number of lines approaching Central London so that the tph's for direct airport services from Central London through the suburbs can be more easily accommodated on any given line. However the separate rail franchises and Central London rail congestion will tend to favour an LT tunnel shuttle service in the initial phases running between Shenfield, Southend and Pitsea on the north side and Ebbsfleet and Rochester on the south side. From 2018 this minimum LT shuttle service would be extended into the existing networks north and south of the Thames to enlarge the direct airport-service region, for passengers and employees. Peak capacity constraints on existing lines will be encountered when LT airport passenger journeys coincide with commuter rush hours i.e. airport passenger arrivals with the morning rush hour and passenger departures with the evening rush hour. However during these times at least half of the full orbital loop, Central London terminal to terminal will be running counter to the rush hour when there is already available capacity on the Central London routes. Airport employees will be counter-commuting during the rush hours, making use of existing spare capacity.

- Thames Reach Airport will also be an international freight hub with rail sidings and separate through lines for freight trains, bypassing the airport station. Before 2030 spare capacity on the twin approach tracks north and south of the tunnel during passenger operations and full capacity for the remaining night hours, is used for freight trains. Diversion of freight trains from the congested lines approaching Central London will help with the extension and integration of LT services from 2018.

- Rail capacity is phased to match demand both for the airport and for travel around the Thames Gateway. The CTRL shuttle and TGS services are running by 2011, with the TGS at lower frequencies. Only at the higher capacities are the additional LT services required and this mostly for employees and for the anticipated growth in non-airport rail journeys around the Thames Gateway region. The LT services increase in frequency from 2018 with the opening of the second runway. The orbital and circulatory rail system connecting Thames Gateway with Central London via a new hub airport will provide the Thames Gateway region with a world-class rail network.

- With the relatively high percentages of passengers, employees and freight moving by train there is substantial free capacity available on the highway connections through the tunnel and its

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approaches to provide inner and outer orbital road routes for non-airport related journeys around the Thames Gateway region and for relieving congestion on the M25/Dartford Crossing.

3.3 MULTI-MODAL TRANSPORT HUB

- The Lower Thames Tunnel and Thames Reach Airport, together with relatively modest infrastructure improvements, provides a transport hub that integrates the road and rail networks of London and the South East with international air, rail and shipping routes to create a convenient interchange for international passenger and freight movements to and from the UK.
- The proximity of Thames Reach Airport to the CTRL and the proposed East-Coast high-speed line from London to Edinburgh provides an opportunity to develop the integrated transport concept of Rail/Air substitution i.e. combining long haul flights with regional high-speed train journeys. This allows short haul flights to be replaced by energy-efficient high-speed train journeys, while increasing the long haul capacity and average load factor of the hub. Rail/Air substitution at Thames Reach Airport would initially be operated via the rail link to the CTRL at Ebbsfleet and thence to London, Paris, Lille or Brussels. A CTRL connection to the new airport via Claylane Wood would provide an opportunity for a chord in the Paris direction and high-speed services direct from Thames Reach Airport to the Continent. Beyond 2030 the high-speed branch line to the airport could be extended through the Lower Thames Tunnel and north alongside the A130 outer orbital route via Stansted and Peterborough to the North, as part of the East-Coast high-speed line project, enabling both Thames Reach Airport and Stansted to provide Rail/Air substitution for destinations between Edinburgh, Paris, Brussels and the Ruhr.
- The well-connected location outside the M25 enables Thames Reach Airport to make a significant contribution to regional UK tourism from abroad, and UK distribution, without adding to Central London or M25 congestion.
- The Lower Thames Tunnel bypass of Central London road and rail congestion and the proximity of Thames Reach Airport to the proposed Thames Gateway Container Port will establish the location as a major 24-hour international freight hub.

3.4 REGENERATION AND EMPLOYMENT

- Thames Reach Airport transforms the Thames Gateway concept from a regeneration policy radiating eastwards from Central London to a broad regeneration axis running the length of the Thames Estuary.
- The Lower Thames Tunnel provides the key infrastructure improvements required to realise the Government's Communities Plan for the Thames Gateway region and the Stansted/M11 corridor.
- The rail infrastructure improvements provide a 24-hour commuter and freight service for the Thames Gateway region and a new freight crossing of the Thames that bypasses central London.

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- Thames Reach Airport is equally accessible from metropolitan East London, Essex and Kent and from wide areas of rural Essex and Kent. Together these areas provide a large labour resource that traditionally suffers higher than average unemployment during recessions.
- The casting basin for the Lower Thames Tunnel might be located elsewhere and the tunnel sections towed to site and sunk into position. This would allow the work to be directed to the most economic location for construction of the sections, with suitable local employment and environmental conditions. A remote casting basin would also allow the separate sections of the Lower Thames Tunnel to be laid in separate phases. Beyond 2030 the same casting facility could supply sections for the Sheerness road/rail immersed tube tunnel under the Medway. Northfleet, nearby on the south bank of the Thames, has a Cements Works and was the location of the casting basins for the wartime Maunsell Sea Forts, precursors of the Mulberry Harbours used for the D-Day landings.
- A concern has been raised that the SERAS/Cliffe proposals might "overheat" the Thames Gateway region i.e. create labour shortages that would frustrate other Thames Gateway development initiatives and unbalance the economy of the region. Set out below are the reasons why Thames Reach Airport will not overheat the Thames Gateway: -

    - Thames Reach Airport, as a new-build, purpose-designed, modular-hub airport will create a lower employment demand per mppa than similar overall capacity upgrades of Heathrow, Stansted or Gatwick.
    - Ground crew and associated employment serving Thames Reach Airport will be phased in line with capacity so that the maximum employment projections arise beyond 2027.
    - The infrastructure improvements led by the multi-modal Lower Thames Tunnel create a widely spread employment catchment area for Thames Reach Airport that extends beyond the Thames Gateway region, to include large areas of metropolitan and rural Essex and Kent, and almost half of metropolitan London.
    - The new orbital and circulatory transport infrastructure will help to even out hot and cold spots within the Thames Gateway, while diverting growth away from the congested Central London radial networks.

As noted in the SERAS report, the creation of similar overall aviation capacities at Heathrow, Stansted or Gatwick would overheat their local regions unless substantial additional infrastructure were provided. In contrast the Thames Gateway region has a much greater capacity to beneficially absorb the additional growth than the regions serving Heathrow, Stansted or Gatwick.

3.5 FUEL AND UTILITIES

- Thames Reach Airport will require large volumes of aviation fuel, and utilities equivalent to those of a substantial town.
- Aviation fuel pipelines can serve the location from existing oil and gas terminals on the Thames and Medway Estuaries.

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- The location is close to existing power stations and major national-grid distribution lines north and south of the Thames. New power lines will run along the road corridors and through the tunnel to the airport, helping to spread loads north and south of the Thames Estuary. New cable and satellite telecommunications will be integrated with existing Thames Gateway systems.
- A new water mains connection from the Essex and Suffolk Water region north of the Thames will pass through the Lower Thames Tunnel to supply the airport. The airport will have its own reservoir, sewage treatment works and emergency power supply.
- The SERAS Stage Two Appraisal Findings report identifies water supply as a high-adverse problem for all phases at Cliffe, as there is inadequate local water supply and excessive pumping from aquifers at present. The SERAS/Cliffe solution requires pumping water from the Bewl-Darwell reservoir system on the Kent and East Sussex border. Thames Reach Airport will have a gravity-fed mains supply from Coryton in Essex, via the Lower Thames Tunnel, only some 6km from the central terminal area. The water supply solution for Thames Reach Airport via the Lower Thames Tunnel is therefore much closer, more economic and has no adverse impact. The Medway Shore and Isle of Grain Thames Gateway Partnership "Zones of Change" and other areas on the Hoo Peninsula already have a water supply problem. It would be possible to pump a water supply from a covered reservoir in the airport terminal-box excavation, to serve the whole Hoo Peninsula and thereby solve the supply constraints for the "Zones of Change" and “Communities Plan” while reducing the take from local aquifers.
- The coastal location provides an opportunity to develop solar, tidal, wave and wind power supplies for the tunnel and airport mechanical and electrical systems. There is scope for significant sustainable power generation from the outer Thames Estuary to ensure that the Airport energy demands meet the targets of the Government's Renewables Obligation: 10% by 2010 and 20% by 2020. Heat pump and heat sink technology will make use of the ambient Thames water and subsoil temperatures to further reduce the airport summer cooling and winter heating loads.

3.6 PYLONS

- Pylons blight much of the Thames Estuary and near to the proposed airport they present a flight path hazard in emergencies. The tunnel can provide a new national grid connection across the Thames and this work is extended to replace associated overhead power lines with underground lines.
- The pylons that would be removed run on the north bank from Tilbury power station to Benfleet and on the south bank from the Isle of Grain power stations to Gravesend. Though expensive this work would bring a significant environmental benefit to many residents over a wide area of the lower Thames estuary.

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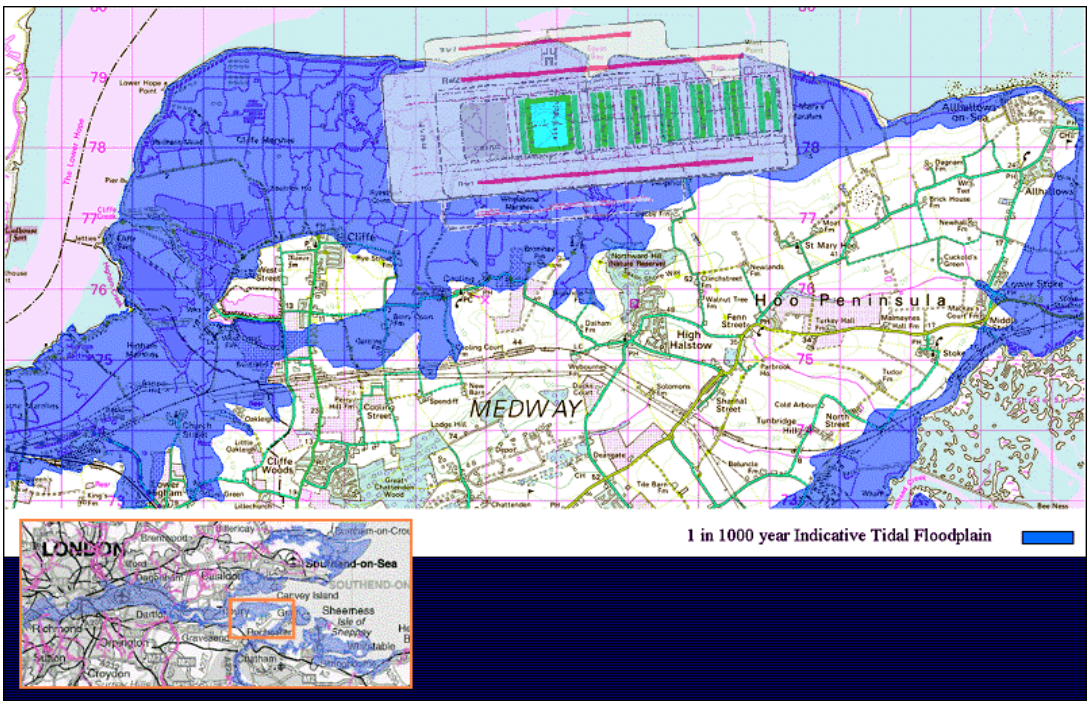
3.7 DEFENCE

- Thames Reach Airport will augment the existing defence infrastructure for London and the Thames Estuary approaches.
- Former and mothballed MoD land is required for the southern road corridor passing through the Chattenden Barracks.

3.8 SAFETY, SECURITY AND FLOOD DEFENCE



Flood risk map showing the airport with an optional third runway

- Minimal low-level flight is required over land or built-up areas. The risk contours for the main runways fall over the Thames Estuary or marshland with a very low population. The eastern extremities of the risk contours extend over the outer estuary and the western extremities extend up to but not over Tilbury. (See risk contour maps).
- The Civil Aviation Authority CAP 168 requirements for the licensing of aerodromes can be met with a limited and acceptable degree of mitigation measures. The Thames Reach runways are located some 1.5km further north than the SERAS/Cliffe proposals, which helps to mitigate the risks from the existing tall stacks of the Kingsnorth and Isle of Grain power stations.
- There is a new-build opportunity to provide economic state-of-the art security against intrusion or attack from land, air and sea.
- The airport perimeter is protected by a sea wall along the Thames frontage and a moat on the marshes, the latter formed by upgrading the dyke of the initial enabling works, using interlocking concrete sections to create a "ha ha" and perimeter access road. Electronic surveillance and fast response teams provide additional security.

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- The robust multi-section tunnel incorporates dedicated emergency and airport service vehicle access tunnels.
- The raised airport site together with the infrastructure causeways north and south of the Lower Thames Tunnel can be used to create an outer barrier for the next generation of Thames Estuary flood defences, once the Thames Barrier at Woolwich becomes obsolete. The raised airport platform reduces the area liable to tidal floods by some 13sq.km. Increased risks of flooding elsewhere in the lower estuary may require improvements to sea defences around Canvey Island and the remaining northern shore of the Hoo Peninsula. These improvements would in any event be required by 2030, even without the airport development.
- An emergency access roadway is provided on top of the flood bund, over the semi-cut-and-cover southern approach corridor from Lipwell Hill to the raised airport site. This roadway would be for emergency use only, to protect the marshland habitat, and provides alternative, surface access to the airport "island" in the event of a flood tide breaching existing flood defences further downstream.
- New air traffic control programmes will integrate the new flight paths and stacking areas for Thames Reach Airport with those of Heathrow, and in the short term with those of London City Airport and Southend Airport for the period 2011 – 2013. Already potential conflicts with Heathrow and London City are resolved for events such as the annual Southend Airshow and for leisure use of Southend and Rochester Airports. For the higher capacities of Thames Reach Airport beyond 2013 the London City and Southend Airport operations are relocated to Thames Reach, perhaps retaining a local leisure and air-display role for Southend. There is time to programme the transfer of capacity from the London City and Southend Airports to Thames Reach and this business capacity assists the seeding process. Excess land at the London City Airport site becomes a valuable waterside residential site, for which the infrastructure connections are already in place, with the residential development value more than compensating for closure of the airport. Closure of the London City Airport would also remove aircraft noise and nitrogen dioxide from a large and densely populated area of East London and lift height restrictions on development at Canary Wharf and elsewhere in the Thames Gateway region. Similarly capping the growth or closure of Southend Airport would provide a site with a high residential development value and prevent an increase of aircraft noise and nitrogen dioxide pollution over the Southend area.

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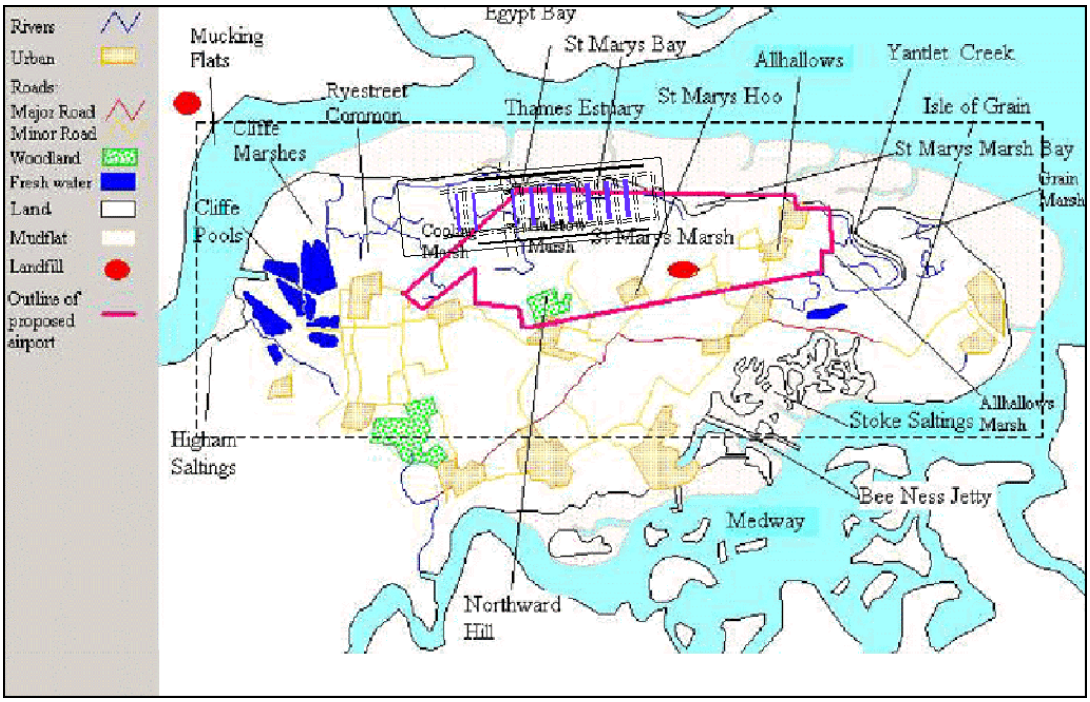
3.9 BIRD STRIKE CONTROLS AND BIRD MANAGEMENT



Environmental assessment area (source SERAS) with Thames Reach Airport Location (black outline)

- The Civil Aviation Authority guidelines CAP 680 “Aerodrome Bird Control” and CAP 726 “Guidance for Developing and Auditing a Formal Safety Management System” will be applied to the new airfield.
- The current bird populations are the result of successful conservation management since the 1970's, and given time the same management techniques can develop habitats away from the airport site. Phasing of the airport construction allows up to 20 years for conservation management to direct existing bird populations away from the airport site to alternative habitats. A key first step is the closure of the local landfill sites that are amongst the main attractors for local bird populations. The landfill sites at Shakespeare Farm and Mucking Flats will be closed as soon as possible and their operations transferred to sites that will not generate new bird attractors in the estuary.
- The site of Thames Reach Airport and is further north than the SERAS/Cliffe proposals, which results in the covering of the bird attractors at Egypt Bay, St.Mary’s Bay and much of the inter-tidal mudflats of the Blyth Sands. The flight paths are some 1.5km further north so that they pass north of the Allhallows Marshes and Yantlet Creek roosting and breeding areas. The more northerly location on the shore of the Hoo Peninsula allows the existing cross-peninsula bird flight routes to continue largely undisturbed since they will not cross the airfield. Finally the more northerly location places emphasis on bird controls around the airfield and across the Thames Estuary but distances these measures from the south shore of the Hoo Peninsula and Medway Estuary.

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- The proposed areas of wetland reclamation represent a small proportion of the total available wetland area in the region, which includes the Blackwater, Crouch, Medway and Thames Estuaries, the Swale and other tidal foreshores.
- Alternative habitats are provided to compensate for loss of drained marshland and inter-tidal mudflats. This work can commence in 2004 and extend beyond 2024 with set aside provisions applied to flood risk agricultural land on the eastern seaboard of England where compensation agreements with farmers can be reached in return for no longer maintaining their sea defences. This is a programme of compensation that will need to be implemented in the coming century whether or not an airport is built in the Thames Estuary. There is plenty of scope to more than compensate for the lost areas of inter-tidal mudflats and salt marshlands over the period 2004 to 2018 when both runways open. Over this sixteen-year period bird populations are directed away from the airport and flight paths, with airport operations only commencing in 2011, halfway through the main alternative habitat programme.
- Phased bird control measures will protect an area extending up to 1km beyond the long flanks of the airfield and 1.5km from the east and west perimeters.
- State-of-the-art bird strike measures will be used to reduce the risks at Thames Reach Airport to the levels encountered at other major UK airports, without a corresponding increase in adverse impacts on the local environment.
- The proposed system will consist of batteries of bird control lasers and acoustic dissuasion systems, controlled by bird-detection radar and infra-red sets that are designed not to interfere with the airport radar systems and will detect birds at a distance of up to 750m. Three rings of these batteries separated by some 300 to 500m run around the flanks and ends of the airfield. Access restrictions will be required for the safe operation of the bird control systems over the surrounding range areas.
- The advantage of a fully automated 24-hour bird control system, in comparison with say dogs, is that it can deliver a constant and reliable degree of bird dissuasion over a known range and height. This will not provide 100% exclusion but it will substantially reduce the number of birds entering hazardous airspace and importantly it will provide information on actual risk profiles; frequencies for times of day, month, year, altitude, speed, direction etc. This can be used to programme the system and further reduce the risks in the long term. The use of the dissuasion modes only at times when needed also substantially reduces the risk of bird tolerance developing to any given dissuasion mode. The system keeps birds out of harms way, without harming them and allows for a reduction in the use of traditional techniques that depend mostly on the destruction of the birds' natural habitat.
- Current RSPB sites in the vicinity of the airport including the Northward Hill bird sanctuary are retained. Civil Aviation Authority guidelines CAP 680 "Aerodrome Bird Control" and CAP 726 "Guidance for Developing and Auditing a Formal Safety Management System" will be applied to the new airfield. This area reaches towards but excludes the Northward Hill bird sanctuary, which may be retained though some bird control measures will have to be applied.

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3.10 LOCAL HISTORY

View from the Hoo Peninsula across St.Mary's Marshes towards the Coryton Refinery in Essex.

- The impact of an airport on the local environment should be seen in the local historic context.
- The mediaeval habitat of tidal mudflats and marshes was hazardous to negotiate and conducive to outbreaks of malaria. Through generations of land drainage and flood defence measures, most recently upgraded in 1982, the marshland habitat of the proposed airport site became maintained farmland for growing wheat and potatoes. With the advent of the CAP most of the site has been set-aside, though there are still annual costs for drainage and the maintenance of sea defences.
- The Hoo Peninsula has a long industrial history including associations with the aviation industry. A post-war "Victory" airport was proposed on the Cliffe Marshes to supersede London's main pre-war civilian airport at Croydon. The choice of Heathrow instead is now recognised as a missed opportunity.

Set out below are some key points in the local history: -

- Natural chalk cliffs once the shoreline of the Thames Estuary.
- Changing shorelines and the Redham Mead channel.
- Evidence of Neolithic sea trade and pre-Roman settlements.

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- Roman settlements, farming, saltings, burials, pottery and limekilns.
- Saxon settlements and the changing shoreline.
- Mediaeval settlements and farming.
- Cooling Castle and estuarine defences.
- Flood defences.
- Smuggling.
- Naval base at the Isle of Grain.
- Charles Dickens and the hulks of Egypt Bay.
- Thames Forts; Cliffe, Coalhouse, Shornemead and Slough Forts.
- Medway Forts; The Isle of Grain Fort.
- Cement and whiting works at Cliffe 1868.
- Clay extraction for the cement works.
- Hundred of Hoo Railway Line 1882.
- Malaria and the draining of the marshes.
- Admiralty oil storage depot; Isle of Grain 1908.
- The Isle of Grain naval air station 1912 - 1924.
- Curtis and Harvey powder works at Redham Mead.
- Kingsnorth Airship Factory 1913 -1920.
- MOSCO (Medway Oil and Storage Company) 1923.
- Kingsnorth Refinery 1930.
- General Post Office Wireless Receiving Station, Eastborough Farm 1937.
- PLUTO (Pipe Line Under The Ocean) 1942.
- The Maunsell Forts 1942.
- The post-war "Victory Airport" scheme on the Cliffe Marshes.
- Post-war drainage, flood defences and reclamation.
- The Kent Oil Refinery 1950.
- Closure of the cement and gunpowder works.
- Closure of the Kent Oil Refinery.
- The CEGB power stations.
- BP aviation fuel terminal.
- Transco LPG terminal.
- Improved tidal flood defences, 1982.
- Sand and gravel dredging from the estuary and from Tilbury Docks.
- RSPB purchases land for bird sanctuaries.

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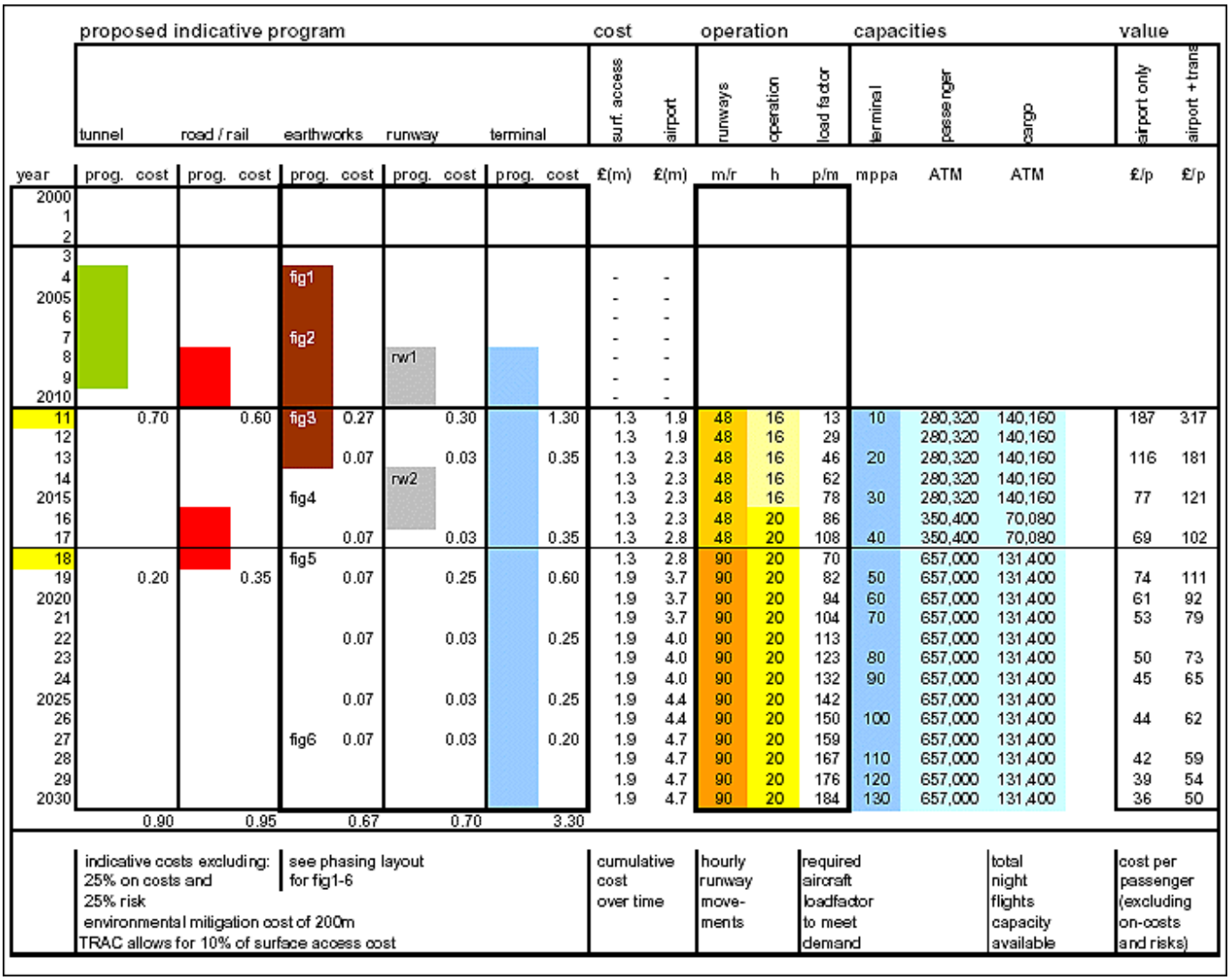

proposed indicative program									cost		operation			capacities			value	
	tunnel		road / rail		earthworks		runway		terminal		surf. access	airport	runways	operation	load factor	terminal	passenger	cargo	airport only	airport + trans
year	prog.	cost	prog.	cost	prog.	cost	prog.	cost	prog.	cost	£(m)	£(m)	m/r	h	p/m	mppa	ATM	ATM	£/p	£/p
2000																				
1																				
2																				
3																				
4					fig1						-	-								
2005											-	-								
6											-	-								
7					fig2						-	-								
8							rw1				-	-								
9											-	-								
2010											-	-								
11		0.70		0.60	fig3	0.27		0.30		1.30	1.3	1.9	48	16	13	10	280,320	140,160	187	317
12											1.3	1.9	48	16	29		280,320	140,160		
13						0.07		0.03		0.35	1.3	2.3	48	16	46	20	280,320	140,160	116	181
14							rw2				1.3	2.3	48	16	62		280,320	140,160		
2015					fig4						1.3	2.3	48	16	78	30	280,320	140,160	77	121
16											1.3	2.3	48	20	86		350,400	70,080		
17						0.07		0.03		0.35	1.3	2.8	48	20	108	40	350,400	70,080	69	102
18					fig5						1.3	2.8	90	20	70		657,000	131,400		
19		0.20		0.35		0.07		0.25		0.60	1.9	3.7	90	20	82	50	657,000	131,400	74	111
2020											1.9	3.7	90	20	94	60	657,000	131,400	61	92
21											1.9	3.7	90	20	104	70	657,000	131,400	53	79
22						0.07		0.03		0.25	1.9	4.0	90	20	113		657,000	131,400		
23											1.9	4.0	90	20	123	80	657,000	131,400	50	73
24											1.9	4.0	90	20	132	90	657,000	131,400	45	65
2025						0.07		0.03		0.25	1.9	4.4	90	20	142		657,000	131,400		
26											1.9	4.4	90	20	150	100	657,000	131,400	44	62
27					fig6	0.07		0.03		0.20	1.9	4.7	90	20	159		657,000	131,400		
28											1.9	4.7	90	20	167	110	657,000	131,400	42	59
29											1.9	4.7	90	20	176	120	657,000	131,400	39	54
2030											1.9	4.7	90	20	184	130	657,000	131,400	36	50
		0.90		0.95		0.67		0.70		3.30										

indicative costs excluding:
25% on costs and
25% risk
environmental mitigation cost of 200m
TRAC allows for 10% of surface access cost

see phasing layout for fig1-6

cumulative cost over time

hourly runway move-ments

required aircraft loadfactor to meet demand

total night flights capacity available

cost per passenger (excluding on-costs and risks)

Indicative programme for the implementation of Thames Reach Airport

4.0 IMPLEMENTATION

4.1 INITIATION

- Lobby the Government and others to include Thames Reach Airport in the White Paper.
- Incorporate the Thames Reach Airport Consortium (TRAC).
- Instruct consultants and advisors to develop and promote detailed feasibility studies and appraisals for the phased Lower Thames Tunnel and Thames Reach Airport.
- Integrate the Lower Thames Tunnel and Thames Reach Airport proposals with other regional initiatives including the Communities Plan for the Thames Gateway and Stansted/M11 regions, the London Orbital Study, Lois (the London to Ipswich multi-modal study), the Thames Gateway Freight Study, The Thames Gateway Container Port, the Environment Agency London and

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Coastal Defence review, the East-Coast High-Speed Line, Crossrail, the Government's Renewables Obligation and Renewables UK etc.

- Resolve and fund a programme for providing alternative wildlife habitats.
- Commence first phase implementation of the bird control and bird strike measures.
- Advance PFI negotiations, with the DfT taking the lead and responsibility for the Lower Thames Tunnel including the associated infrastructure connections and initial airport enabling works and TRAC taking the lead and responsibility for the airport construction and operation.
- Landowner consultations and compensation packages.
- Consultations with Essex County Council and Kent County Council.
- Thames Gateway South Essex and North Kent Partnership consultations.
- LPA consultations and the submission of planning applications.
- Construction of the Lower Thames Tunnel and the airport enabling works.
- Construction of the initial phase of the airport for opening in 2011.

4.2 OWNERSHIP AND DEMOLITIONS

- Comparable airport and infrastructure development elsewhere in the southeast would have far more complex land ownership and compensation issues.
- The majority of the airport site is held by a few registered titles.
- Only some 20No. households are "taken" for construction of Thames Reach Airport and the associated infrastructure connections, (3No. on the airport site and 17No. for the infrastructure connections) compared to 1,100 households for the SERAS/Cliffe proposal. No listed buildings are demolished. The land for the road and rail corridors is mostly drained marsh or farmland subject to tidal flood risk, with very few buildings to be demolished. In Essex the Lower Thames Tunnel approach passes beneath Northwick Road and crosses the Safeway site beside the Roscommon Way access road, which can be temporarily diverted and reconstructed beside the tunnel approach upon completion. The casting basin and tunnel route requires demolition of an existing jetty across Hole haven, which is already programmed for demolition. The airport site on the marshes will require the demolition of Willow Wick, Shade House and Swigshole together with some sheds, sheep washes and sheep folds. The southern tunnel portal bypasses Bromhey Farm and Eastborough Farm whose buildings can be retained. The southern road connection will require demolition of some mothballed buildings at Chattenden Barracks. The rail link from Fawkham junction for the Waterloo branch of the CTRL requires the demolition of 3No. houses at the end of Coulton Avenue, and some noise compensation will be payable to houses backing on to the re-opened line through Perry Vale and Wombwell Park, if that becomes the chosen route. The new rail links in Essex require the removal of some farm outbuildings.
- Elsewhere the sparsely populated route of the road and rail corridors means that few homes will be subject to noise compensation.
- Integration of road and rail corridors with new utilities minimises the land take.
- The small number of households affected reduces the overall compensation costs and a substantial proportion of them are already subject to tidal flood risk requiring expenditure on sea

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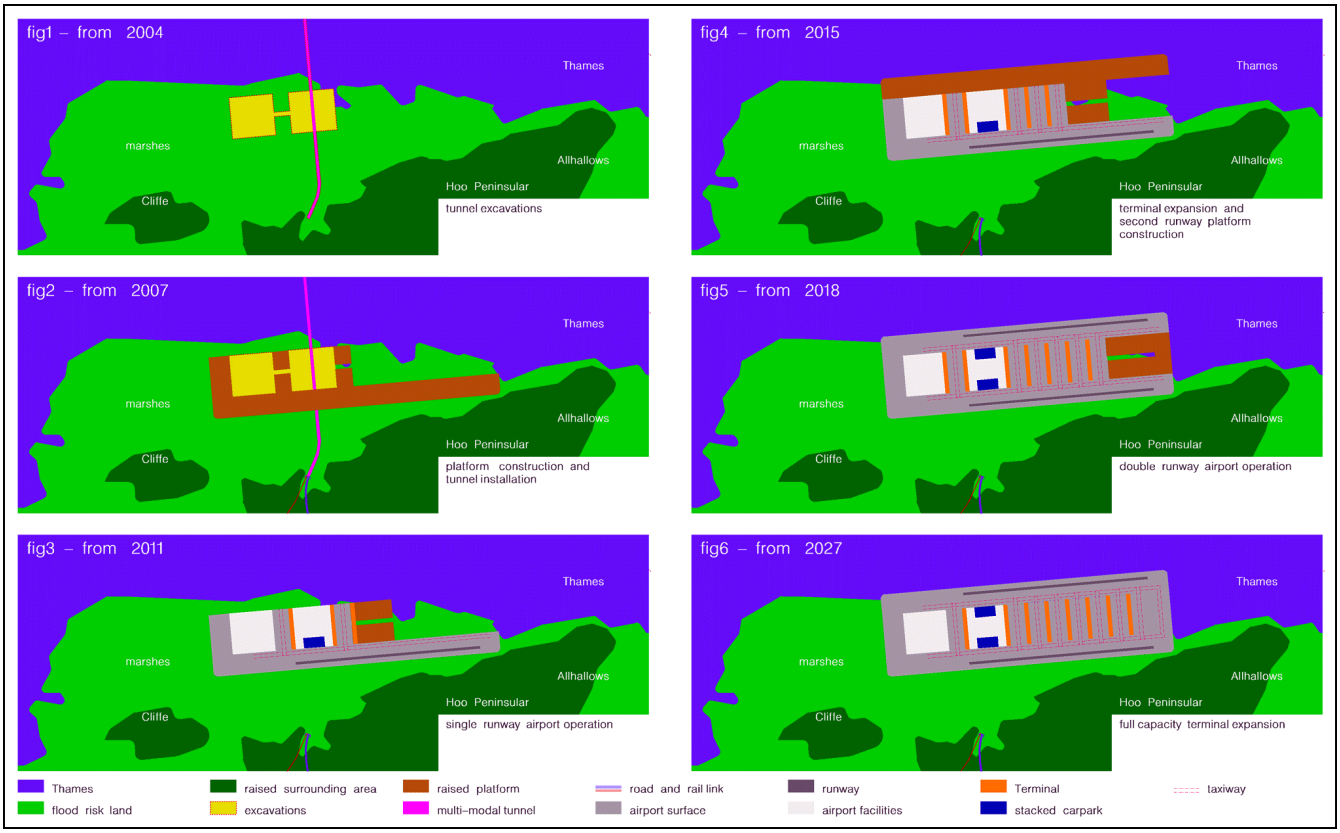
defences. At the same time though there is never adequate compensation for the emotional loss of a home at least the financial compensation can afford to be generous for the small number of individual households involved. This should help meet the programme for the development and control legal costs.

4.3 SEEDING AND PHASED DEVELOPMENT



Indicative tunnel and airport phased construction diagram

- Development of the Lower Thames Tunnel, Thames Reach Airport and the associated infrastructure connections is phased to match investment with demand.
- Diagrams indicating the phases of construction for the airport platform and airport facilities, and the capacities for the various airport phases are illustrated above.
- The SERAS option capacities are based on 16-hour runway operations. The runway capacities at Thames Reach Airport are increased by 20-hour passenger and 24-hour freight operation, an option not available to Heathrow, Stansted or Gatwick. This allows the period for each phase to be extended, if required by financial constraints.
- It is assumed that Thames Reach Airport will be modelled on the basis of SERAS Stage 2 Packages 2 with London City Airport closed over the period 2011 – 2013 and with freight constrained at Heathrow and not developed at Alconbury.

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- Thames Reach Airport opens in 2011 with the south runway and facilities for up to 10mppa on 16 to 20-hour passenger operation and 24-hour freight operation. The first satellite is added in 2013, raising capacity to 30mppa (See Section 4.3 above). It is proposed that the seeding of Thames Reach Airport is only required for the initial two/three year phase from 2011 to 2013. The seeding process consists of a kernel of long-haul, eastern-hemisphere flights; Australasian, Far and Middle Eastern, Levantine, former Russian Republic and Eastern European passenger flights, relocated from Heathrow, Stansted and Gatwick, to feed short-haul flights to a full range of European and UK locations. Sufficient eastern-hemisphere long haul flights are transferred to give Thames Reach Airport a competitive S-Curve frequency on these routes. Thames Reach Airport then picks up growth in eastern hemisphere travel, where greater proportionate growth may be anticipated, from where the great circle flight routes can be most easily integrated within existing Belgium and UK airspace, and flight times are marginally shorter (by some 8 to 10 minutes compared with Gatwick and Heathrow, excluding stacking time). In the early years the excess capacity available on the runways encourages the economic operation of a larger number of short haul business and leisure flights with lower load factors. Thames Reach Airport therefore becomes a domain for the growth of low-cost business and leisure carriers in the early phases serving the southeast domestic market but also generating an eastern-hemisphere hub market. Seeding of the low-cost services would include re-distribution of low-cost services from Heathrow, Gatwick and Stansted. The combination of eastern hemisphere and low-cost short haul flights will enable Thames Reach Airport to capture anticipated growth in the Eastern European business and leisure market. The night operating times and relative proximity to Central London will also make Thames Reach Airport attractive and convenient for flights to and from the Far East and Australasian time zones. The comparative proximity of Thames Reach to Central London together with the slightly shorter eastern hemisphere flight times (cf Heathrow and Gatwick, but not Stansted), provides Thames Reach with a 30-minute advantage over Heathrow and 20-minute advantage over Gatwick or Stansted. This translates into customer benefits not just in overall travel times but also fuel savings and consequently cost, especially in a looming world of carbon-audits and aviation fuel taxation.
- Larame graphs for the selected group of eastern hemisphere routes will model the load factors per ATM, with a tendency for the factors to increase with overall increase in mppa capacity and use of the runways. The satellite stands are designed to take the new Airbus A380-800 series of aircraft to allow for higher load factors in the later phases.
- Thames Reach Airport will not encourage domestic to domestic interlining, since in due course with higher-speed West and East Coast lines these journeys will be best served by Rail/Air substitution and the runway capacities are better directed elsewhere.
- The seeding process also aims to establish Thames Reach Airport as a freight hub, with its new-build facilities, location and infrastructure connections providing the most efficient multi-modal international freight access to Central and Greater London, the Channel Ports, the Midlands and the eastern seaboard of England.
- The seeding process is augmented by the closure of London City Airport by 2013, allowing two years to transfer existing operations from London City Airport to Thames Reach Airport. The London City Airport passenger profile helps seed the international schedule and low-cost

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business flight frequencies at Thames Reach Airport. It is assumed that NATS can integrate the relatively low capacities at Thames Reach during the initial phase 2011 – 2013 with existing flights from London City, whilst the operations are being transferred.

- Since the new-build efficiencies of Thames Reach Airport result in a lower carbon-audit per mppa a case can be made for the seeding process to be subsidised by an aviation environmental tax (Government paper of March 2003) applied to the other SERAS region airports.
- The timing of phases after 2013 can be adjusted subject to demand. However it is assumed that by 2013 Thames Reach Airport has already established frequencies and benefits that can then be used in SPASM and SCAB for inputs to the subsequent phase to calculate benefits to generated users and to existing users. Accordingly for each subsequent phase the outputs from the previous phase are used to calculate the benefits to generated users and to existing users for the next phase, so that SPASM and SCAB may realistically project the growth of new services and increasing frequencies of existing services as the airport capacity increases. (SERAS Stage Two; Appraisal Findings Report section 6.17). On this basis it is assumed that Thames Reach Airport will first generate a high proportion of low-cost business travellers and then scheduled-flight, business-passengers, picking up growth in this sector from Heathrow, especially for the City of London/Canary Wharf/East London/Thames Gateway/Eastern-hemisphere market. Finally it is assumed that the SPASM S-Curve advantage enjoyed by Heathrow (Halcrow April 2002 Report section 2.4.12) levels off after 2013 with flight frequencies rapidly catching up on eastern-hemisphere routes at Thames Reach Airport to the point that the airport has already entered the steeper section of the S-Curve.
- Diagrams for the 7No. airport phases are provided in the Section 4.3. In broad terms there are two major phases in 2011 when the airport opens with one runway and 2018 when the second runway opens, with intermediate phase capacities determined by the satellites.
- Corresponding rail and highways capacities are provided for each airport phase. For example the Lower Thames Tunnel is laid in two separate sections but only one is commissioned and opened from the outset. The new A130 opens as a D2 highway upgradeable to D3 and D4 when required. On the Kent side the A289 may have to be widened from D2 to D3 for the higher phases of airport capacity. On the Essex side the northern stretch of new A130 from Chelmsford to Great Dunmow can be postponed until later phases with the existing A120/A131 route via Braintree providing a connection to the M11 in the mean time. The Lower Thames Tunnel and associated infrastructure costs have therefore been calculated in two stages, for 2011 and 2018, to more closely match investment with demand.
- From 2009 a Medway Ferry service would help relieve the capacity constraint of the existing D2 A289.
- Beyond 2030 an optional Lower Hope Thames road tunnel, integrated with a Lower Thames Barrier, together with an optional road and rail Sheerness Tunnel, would provide additional capacity and distribution, if required.

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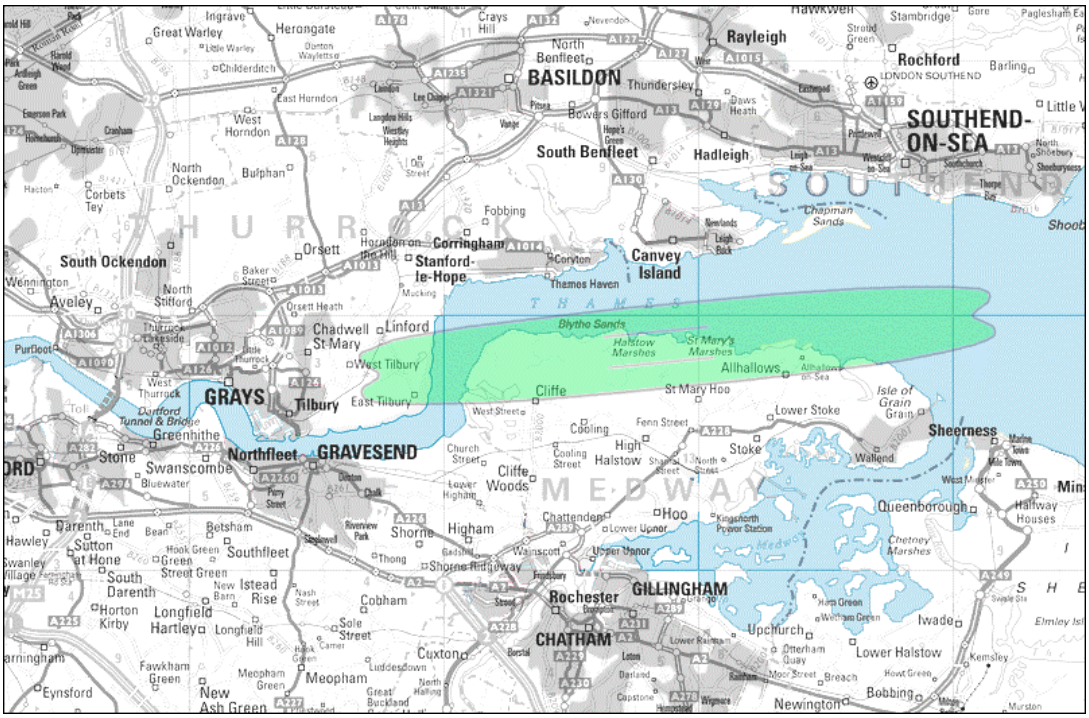
4.4 ENVIRONMENTAL ASSESSMENT



Indicative noise contour for Thames Reach Airport

- The environmental assessment of Thames Reach Airport and its associated transportation and infrastructure benefits should compare favourably with the assessments for the equivalent expansion in capacity located at London's existing airports.
- The new inter-modal transport hub will substantially increase total transportation capacity while relieving congestion elsewhere.
- There will be a high proportion of rail use to and from the airport, assisted by the combined benefits of the Waterloo International and St. Pancras CTRL links, the regional rail links, the Crossrail Thames Gateway Shuttle service, the rail freight line and by tunnel tolls to regulate vehicular access.
- The association of the new airport with the CTRL enables Thames Reach Airport to develop a higher degree of Rail/Air substitution than would be possible at other UK airports. This helps to increase the load factor per ATM while at the same time removes the least fuel-efficient flights from the runways.
- The efficient new-build design of the airport will reduce aircraft taxiing time around the airfield and thereby minimise consumption of aviation fuel per flight.
- The new airport site requires minimal over-flying of densely populated areas and creates minimal noise and nitrogen dioxide pollution.

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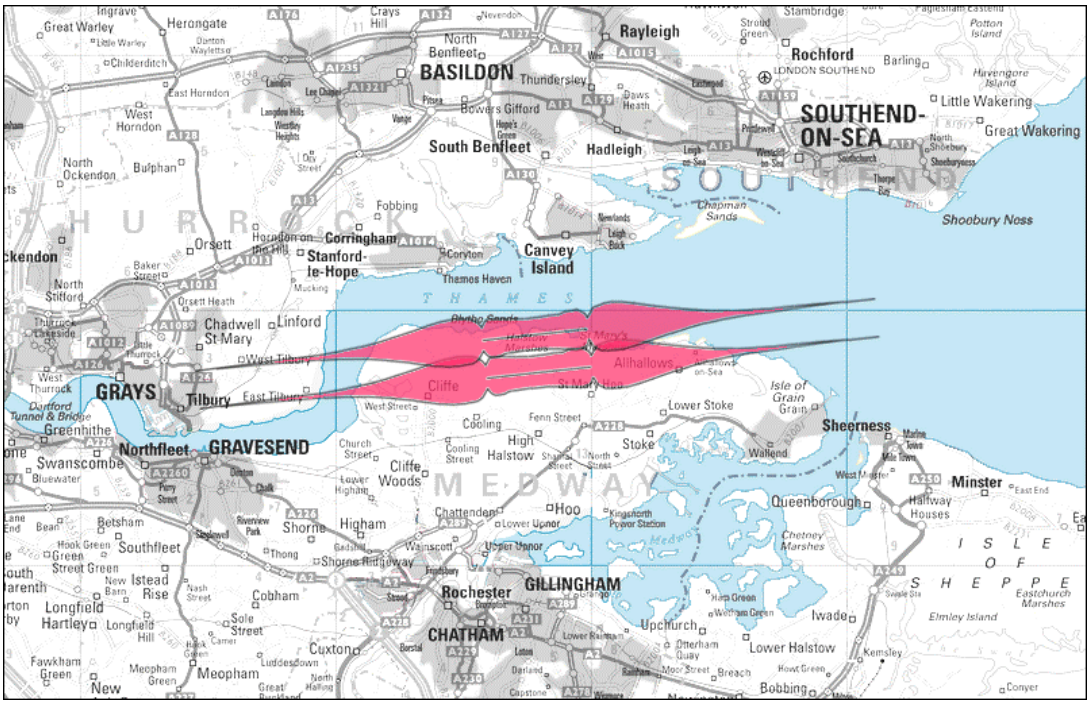

Indicative risk contour for Thames Reach Airport

- A significant proportion of the area beneath the flight-path PSZ risk, noise and nitrogen dioxide contours lies over the Thames Estuary.
- The new-build airport design is compact, minimising the land take for both the airfield and the infrastructure connections.
- Local use of spoil from the tunnel and from the airport terminal excavation raises the runways, creates the necessary flood defence and minimises construction vehicle movements beyond the site perimeter.
- Local jetties and piers will be used to divert construction traffic and the delivery of materials away from local roads on to the river.
- The tunnel access to the airport allows the marshland habitat to be restored above the infrastructure corridor upon completion of the works.
- Pylons that blight a large area of the lower estuary are removed as part of the airport development.
- The airport will make use of locally generated, sustainable solar, tidal, wave and wind power to run the tunnel and airport mechanical and electrical systems in accordance with the Government's Renewables Obligation. Heat pump and heat sink technology will make use of ambient water temperatures to reduce the annual heating and cooling requirements.
- Under Government grants in the 1970's, to encourage draining of the marshes in order to grow cereals and potatoes, the proposed site for Thames Reach Airport was used until quite recently for growing wheat. The sea walls and borrow dyke were improved in 1982 as part of the Thames Barrier sea defences. Only in more recent times under the CAP set-aside policies has the land become pasture, an agricultural use that alone would not justify the expense of maintaining the

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sea defences. Consequently the construction of an airport makes good use of flood-risk land that is expensive to maintain and may in any event have to be sacrificed before the end of the century. Development now would allow time to manage the inevitable change of habitat.

- The environmental effects of the land take are mitigated ahead of the airport development by the controlled sacrifice of existing local, low-lying land that is already subject to high flood risk. In the coming century, the period for which SERAS is addressing aviation demand, the projected rise of sea levels due to the greenhouse effect is likely to result in some low-lying areas of the eastern seaboard being allowed to revert to marshland and tidal mudflats, to reduce the rising costs of maintaining sea defences. The implementation of a series of controlled land sacrifices can at least maintain and has the potential to increase the area of wetlands and tidal mudflats available for migratory birds along the eastern seaboard.
- The SERAS/Cliffe and Thames Reach Airport proposals occupy SPA and Ramsar sites that are protected by EC regulations prohibiting development unless there are no reasonable alternatives. Nitrogen Dioxide levels are already unacceptable around Heathrow and will become increasingly so for the other inland SERAS options. The low population in the vicinity of Thames Reach Airport and the prevailing southwesterly winds minimise the nitrogen dioxide issues, so providing a strong case for permitting the Ramsar impact. The SERAS report has already concluded that owing to noise a Thames Estuary location is the only option for 20 to 24-hour airport operation, and recent European Court challenges to night operations at Heathrow legally endorse this view. Thames Reach Airport has an even lower noise impact than the SERAS/Cliffe proposal and consequently a stronger case for 20 or 24-hour operation thereby providing a legal case for permitting a higher Ramsar impact.
- The area has significant archaeological potential rated as national and perhaps international importance. The extent of actual land disturbance is limited to the transport corridor and the airport terminal excavations. Outside these areas, other than the removal of plant growth the ground level is raised so that the archaeological deposits below would remain in place. There is time for a scheme of archaeological evaluations and, where appropriate, consequent excavations of the disturbed areas while preparations are underway for construction of the immersed tube tunnel.
- New gravity-fed water supplies are provided from the Essex and Suffolk Water region via the Lower Thames Tunnel so that Thames Reach Airport will economically solve the chronic water shortages on the Hoo Peninsula and reduce the existing adverse water impacts that arise from the over-pumping of aquifers.

4.5 ANCILLARY DEVELOPMENT

- Ancillary development will be prohibited in the immediate vicinity of the airport to prevent encroachment on the marshland habitat.
- The airport terminal boxes will include substantial hotel, retail, office and warehouse development to create a self-sufficient hub.

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- Elsewhere in the region there are already several square kilometres of potential development land north and south of the Thames that can usefully accommodate ancillary development with convenient access to the airport via the new transport corridor.
- The Thames Gateway "Zones of Changes" will add to the number and area of suitable sites available for ancillary development.

4.6 CONSTRUCTION COSTS

Cost Consultants E C Harris have prepared a capital investment plan for the project based on rates similar to those used in the SERAS models and using the Halcrow cost template.

4.7 FINANCE AND INCOME

The Lower Thames Tunnel and associated infrastructure connections are funded by a combination of the following sources: -

- Lower Thames Tunnel Road tolls,
- Lower Thames Tunnel Passenger-rail tariffs,
- Lower Thames Tunnel Freight-rail tariffs,
- Lower Thames Tunnel Utility company tariffs; water, electricity, gas, etc,
- Lower Thames Tunnel CTRL tariffs,
- A 10% contribution to capital costs from the Thames Reach Airport Consortium.

The Thames Reach Airport construction and operation is funded by a combination of the following sources:

- Aviation environmental tax (Government paper of March 2003) put to developing an airport with a lower carbon audit per mppa.
- Optional short term passenger aviation tax to fund the seeding process,
- Freeport tax exemptions for cargo handling to assist the seeding process.
- Aeronautical fees for landings and departures, ground handling etc.
- Ancillary airport revenues from parking, retail, hotel, offices and warehousing,
- Technology grant aid from other agencies such as Renewables UK.
- Capital investment from the Thames Reach Airport Operator.

It is assumed that there will be a review of the regulatory regime under the CAA and of the single till, dual till systems. The dual till system might be an olive branch to existing operators while at the same time helping to finance the new airport.

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4.8 BEYOND 2030

- Several proposals have been made for growth beyond 2030 and these are described in more detail here.
- Beyond 2030 there is an opportunity for a second Thames road tunnel under the Lower Hope carrying a highway from the A13/A128 junction near Orsett in Essex, via East Tilbury, Cliffe and alongside the Isle of Grain line to the southern portal of the Lower Thames Tunnel. There is time for this Lower Hope tunnel to be designed and incorporated within a new Lower Thames flood barrier, subject to restrictions posed by shipping, for which the overall costs would make the additional road tunnel cost insignificant.
- Beyond 2030 there is also scope for an immersed tube road-and-rail tunnel under the Medway between the A249 near Sheerness on the Isle of Sheppey and the A228 on the Isle of Grain. This would complete a circuit of the Medway Towns, from Maidstone via Sittingbourne and Sheerness, providing a second route from the M2 and a rail route from Sittingbourne to Thames Reach Airport and the Lower Thames Tunnel. This Sheerness tunnel would bring the Isle of Sheppey into the fold and encourage further development of the "zones of change" identified by the Thames Gateway Partnership and areas to be developed under the Communities Plan, on the Hoo Peninsula, Isle of Grain and Isle of Sheppey, including the proposed “Medway City”.
- Beyond 2030 the optional east-west Thames Gateway route described above crosses the north-south Lower Thames Tunnel route just below the Thames Reach Airport site, providing further confirmation that an East Thames marshland site in both the short and long term provides the most accessible location for a new airport within the Thames Estuary.
- Beyond 2030 a high-speed line through the tunnel via Stansted to the Midlands and Scotland would allow Thames Reach Airport and Stansted to develop Rail/Air substitution for destinations between Edinburgh, Paris, Lille, Brussels and the Ruhr.

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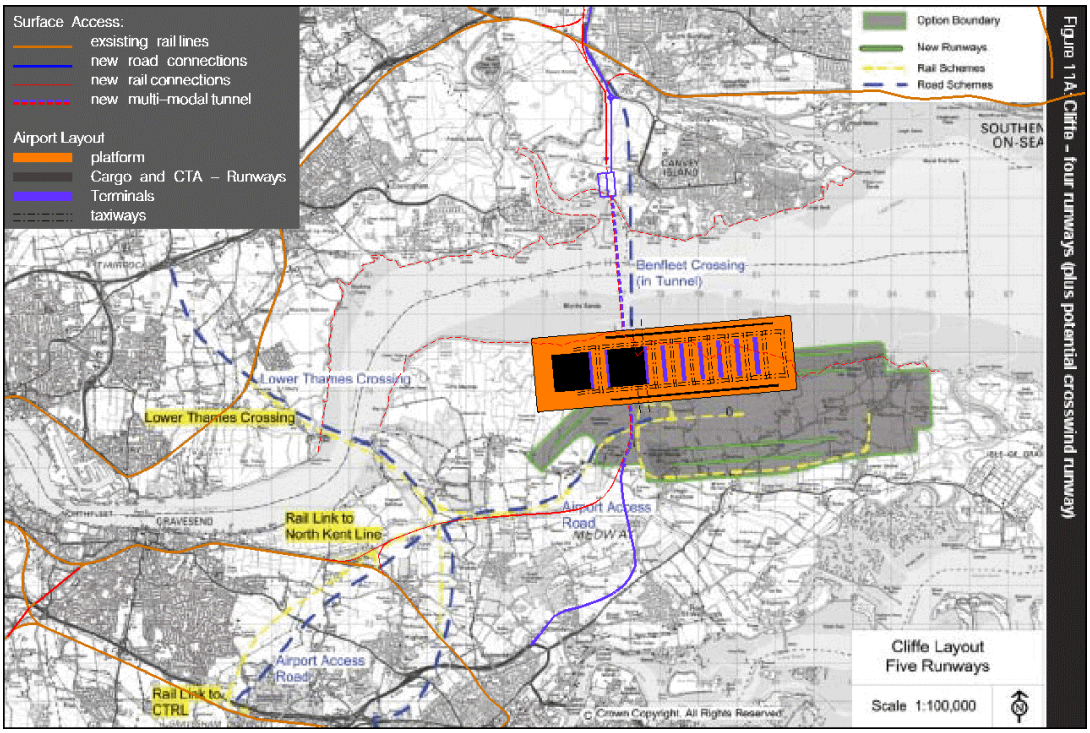

Comparative overlay of Thames Reach Airport (orange) over SERAS/Cliffe 4+1 (Fig11A)

5.0 SERAS REVIEW

5.1 THAMES REACH AIRPORT v SERAS/CLIFFE PROPOSALS

This section compares Thames Reach Airport with the SERAS/Cliffe proposals and raises points on sustainable power and conservation policies.

A. Tunnel v Bridge and the Sea Reach v The Lower Hope

Set out below is the case for a multi-modal tunnel under, rather than a bridge over, the Thames and the choice of the Sea Reach rather than The Lower Hope or Gravesend Reach for tunnelling under the Thames.

- To serve Thames Reach Airport a new Lower Thames Tunnel or Bridge needs to be multi-modal, i.e. combining roads, rail and utilities across the estuary. Though access to Thames Reach Airport for passengers, employees and freight will be rail-led to a higher degree than for existing airports it will still be necessary to provide highways access for each of these categories, including provision for park and ride journeys.
- A bridge is exposed to severe weather conditions and has to close in high winds.
- A bridge is cheaper and quicker to construct than a tunnel, but can only carry a highway and a light-rail system excluding freight if the approach ramps are not to become too long, so a bridge alone does not provide a full multi-modal link including rail freight.

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- An immersed tube tunnel can combine the large cross sections needed for the highway with the shallow approach gradients required for a passenger and freight railway.
- A bridge for the highway, combined with bored tunnels for the passenger and freight railway, provides a full multi-modal crossing but increases the land take and construction costs, so reducing the cost and time advantages over an immersed tube tunnel.
- The depth of a tunnel beneath the shipping channels is significantly less than the height of a bridge over them so the ramps for a tunnel are shorter and more easily accommodated than those for a bridge. The form and extent of these ramps place constraints on the locations where a bridge can provide convenient and economic connections to existing roads and railways.
- The long ramps and main span of a bridge have a much greater visual impact than the cuttings of a tunnel's approaches. The Queen Elizabeth II Bridge crosses the Thames through heavy industrial estates in Essex and Kent where the valley is uncharacteristically narrow and there is minimal habitation in the immediate vicinity of the bridge structures. Even so the long, swerving ramps and cable-stay, main span are widely regarded as crude and unsightly. The characteristic scale of the estuarial landscape develops downstream from Gravesend and from here the outline of a bridge with extended ramps rising high over the estuary would disfigure the landscape and diminish the scale, while the night lighting of the carriageways and drone of traffic would have an environmental impact over a large and widely inhabited area.
- A bridge introduces new obstacles in the river and height restrictions over the Thames shipping channel. With an airport proposal in the vicinity the bridge superstructure introduces a hazard to flight paths and restricts runway configurations. The Øresund Link from Denmark to Sweden was designed to drop into an immersed tube tunnel towards the Swedish end owing to the proximity of an airport on the Swedish coast. The long ramps and bridge superstructure would necessarily distance the bridge from the airport runways and flight paths, resulting in increased surface access costs and longer travel times to the airport.
- An immersed tube tunnel has higher capital and running costs than a bridge, for the mechanical and electrical systems. However Thames Reach Airport located on the estuary proposes to make use of solar, tidal, wave and wind power to offset these higher running costs and reduce the carbon audit.
- The environmental impacts of an immersed tube tunnel, resulting from the casting basin and the dredging and handling of spoil, are mitigated by combining the tunnel construction with the enabling works for the airport site.
- A tunnel under The Lower Hope would funnel vehicular traffic via the A13 on to the congested northeastern quadrant of the M25, and would provide a rail connection to the slower, southern branch of the Fenchurch Street-Southend railway lines.
- A tunnel under The Lower Hope would create longer and more disruptive transport corridors, with a high environmental impact on the Kent side, to reach the airport terminal further east and the M2 further south.
- A tunnel under The Lower Hope cannot fundamentally change the historic, radial infrastructure north and south of the Thames.

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- A Sea Reach tunnel transforms the radial infrastructure north and south of the Thames into an inner and outer orbital and circulatory system for both road and rail access.
- A Sea Reach tunnel spreads transport loads more evenly over the Thames Gateway Region from Canary Wharf and the Blackwall Tunnel to Southend and the Isle of Grain, while relieving congestion on the M25/Dartford Crossing.
- A Sea Reach tunnel provides shorter rail-commuter journeys to Thames Reach Airport for employees from South Essex and the Medway Towns.
- A Sea Reach tunnel is well located for providing a gravity-fed mains water supply to Thames Reach Airport from Essex and for providing a new fuel pipeline between terminals in Essex and Kent, passing directly under Thames Reach Airport.
- A Sea Reach multi-modal tunnel allied to an airport provides additional funding for the tunnel that more than offsets the increased costs.

B. Marshland Site V Hilltop Site

Site view from the Cooling Road with the Cooling Marshes (centre left) and Northward Hill (right)

A decision to proceed with a new airport on the Hoo Peninsula should also determine whether to build on the hilltop, as outlined in the SERAS/Cliffe report, or down by the Thames shore on a raised platform over the marshes. An airport on the marshes results in a lower elevation for the main runways (8m v 18m) and for the Inner Horizontal Surface (53m v 63m), with Northward Hill and Lodge Hill requiring mitigation measures for both schemes. Thames Reach Airport envisages the removal of a water tower near Allhallows and the removal of pylons following the line of the Isle of Grain railway line. On this basis the CAP 168 requirements for the licensing of aerodromes can be met with a limited and acceptable degree of mitigation measures. The Thames Reach runways are located some 1.5km further north than the SERAS/Cliffe proposals, which helps to mitigate the risks from the existing tall stacks of the Kingsnorth and Isle of Grain power stations. Set out below are the key issues in favour of the Thames Reach Airport site on the marshes beside Thames Sea Reach.

- No infrastructure corridor spur is required from the Lower Thames Tunnel to the airport since the route passes directly under the Thames Reach Airport site. The marsh airport site consequently provides quicker and cheaper passenger, employee and freight journeys from both Central London and the Thames Gateway regions to the airport.

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- The marsh location assists with the enabling works for both the Lower Thames Tunnel and the airport.
- Less volume and movement of spoil is required to create the platform for the marsh airport site (70m cubic meters for the marshland platform phased over twelve years compared with 133m cubic meters of spoil in a first phase cut and fill operation for the hill top site).
- The marsh airport site provides greater uniformity of ground conditions than the hilltop site. Both options require made-up ground levels, where the important engineering requirement is not the overall load bearing capacity of the made-up ground, which can be achieved through design, but the uniformity of the made-up ground, which is achieved largely through settlement. The airport terminal box and redistribution of spoil suits the marshy ground conditions, which are uniform over the whole site. The hilltop site requires cutting off ground from high areas and using the spoil to raise the lower areas. This will lead to differential settlement with additional groundwork costs and a longer contract programme prior to the casting of pavements.
- The replacement habitat costs for the marsh site are lower than those of the SERAS/Cliffe hilltop site, since the latter takes a similar area of marshland whilst also destroying the Northward Hill bird sanctuary.
- The marsh airport site accommodates the runways and flight paths some 1.5km further north than the hilltop site. This distances the flight paths 1.5km further from the tall stacks of the Kingsnorth and Isle of Grain power stations, reduces the number of households exposed to the flight path risk contours and reduces the number of households exposed to the aircraft noise and nitrogen dioxide dispersal contours.
- The location of the runways and flight paths further north generally reduces potential blight from the areas on the Medway shore and Isle of Grain. These areas are identified as "zones of change" with considerable development potential in the Thames Gateway Partnership and Communities Plans.
- The marsh airport site further north will have lower noise and nitrogen dioxide impacts than a hilltop site since very few people will live within 500m of the flight paths, the ridge of higher ground running along the Hoo Peninsula will help to screen aircraft noise from retained areas of housing further south and nitrogen dioxide will be dispersed over the Estuary by prevailing south-westerly winds.
- The more northerly flight paths of Thames Reach Airport reduces disturbance of roosting areas around Yantlet Creek.
- The Lower Thames Tunnel and marsh airport site acquires far fewer homes than the hilltop site (20 v 1,100) and takes Grade 3 or 4 agricultural land rather than valuable and productive Grade 1 agricultural land, including orchards on the hilltop. The 20No. dwellings acquired for Thames Reach Airport include those for the Lower Thames Tunnel and all associated infrastructure connections (3No. dwellings on the airfield site and 17No. on the infrastructure connections).
- The marsh airport site is currently protected from the tides by sea walls built in 1982. With ground levels falling, sea levels rising and storm strength increasing, the land may have to

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be sacrificed to the tides by the end of the century to save sea defence costs. The present drained-marsh habitat would then face the prospect of radical change. The construction of an airport makes good use of flood-risk land and allows time to manage this inevitable change of habitat.

- The pattern of land ownership and compensation issues are more straightforward for the marsh airport site, where there will be far fewer individual cases to negotiate and the costs and risks of on-going sea defence maintenance will help settle compensation claims. With far fewer cases to negotiate the terms of compensation can afford to be more generous and in turn this should help bring forward the construction programme.
- The Lower Thames Tunnel and marsh airport site do not require the demolition of any listed buildings.
- The marsh airport site minimises disturbance of the £180m MoD PPP development of Chattenden Barracks and Lodge Hill.
- The hilltop site involves removal of contamination from landfill sites that have been used for waste disposal, including BSE carcasses.
- The hilltop site requires the pumping of new water supplies to the airport from the Bewl-Darwell reservoir system in East Sussex while the marsh airport site can be gravity-fed from a water main passing close to the north portal of the Lower Thames Tunnel.
- The optional east-west Thames Gateway route beyond 2030 crosses the north-south Lower Thames Tunnel route just below the Thames Reach Airport site, providing further confirmation that the marshland site in both the short and long term provides the most accessible location for a new airport within the Thames Estuary.

C. Sustainable Power and the Renewables Obligation

- The Thames Estuary location provides Thames Reach Airport with an advantage over the other SERAS options in the development of sustainable power supplies to meet the Government's Renewables Obligation.
- With the support of Renewables UK, Thames Reach Airport would fund sustainable power supplies from solar, tidal, wave and wind power sources. The airport buildings and site perimeter present a large area for solar power generation. There are already schemes for wind power stations nearby on the south Essex marshes and the outer Thames Estuary. "Stingray", "Frond" and MCP, along with other sustainable energy technologies would be investigated for generating tidal and wave power supplies for the airport operations. Renewable power supplies allied with heat pump and heat sink technology make use of ambient water and ground temperatures in the Thames Estuary to further reduce power demands.
- The development of sustainable power supplies from the estuary would open the way for the Isle of Grain power station to be closed and replaced by a mixed-use redevelopment including some housing and an area for nature conservation.

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D. Conservation

- Conservation planning policies seek to preserve or enhance the character and appearance of a locality.
- The Thames Estuary downstream from Gravesend is a quintessentially English landscape celebrated by Turner (1810 Blythe Sands; 1839 The Fighting Temeraire) Constable (1829 Hadleigh Castle) and Dickens (1860 Great Expectations) amongst many others to this day.
- A Lower Thames Bridge with an airport on the Hoo hilltop would be intrusive, unsightly and would diminish the scale of the estuary.
- The proposed form of construction for Thames Reach Airport is similar to the excavations and embankment of 19th century wet dock construction and the hub operations would continue the long tradition of port and industry on the Thames.
- The low profile and long hull of Thames Reach Airport, anchored to the shore with a moat and "ha ha" perimeter, would have a sublime scale commensurate with that of the estuary. Within the perimeter there would be the business of an international airport but oftentimes beyond, the marshes and mudflats will merge with a pale, estuarial sky on their journey to the Sea.

5.2 COMPARATIVE PROXIMITIES

When the combined travel times to and within the various existing and proposed airports for the southeast are compared Thames Reach Airport is found to be the most convenient airport offering the shortest overall travel times.

When comparing the convenience and proximity of airports it should not be just the travel time to the airport perimeter that matters but also the time passing through the airport, from perimeter to take-off and touch down to perimeter. “Propensity to fly” maps for southern England indicate that demand for air travel is focused on Central London and the Home Counties, peaking at some 39.6% in Central London and generally dropping to around one percent on a fifty mile radius, so travel times from Central London to an airport may be used as an average measure of typical journey times for the individual passenger. The SERAS report has compared these journey times within the UK, to and from the airport, but omits the very significant additional time spent within the airport. At present for a typical flight duration of five hours, takeoff to touch down, the UK end of the journey, for either departure or arrival, often includes another hour within the airport, typically some 20% of the flight time. For shorter European and domestic flights the percentage is much higher. Other transport investment schemes are assessed to some degree on the travel time saved and this should also apply to air transport. Saving passenger time within an airport should therefore represent a significant economic benefit.

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Typical journeys within the airport can be described in familiar stages: -

Outbound Journey

- Airport perimeter to train station, bus stop, setting down point or short/long term car park
- Train station, bus stop, setting down point, short/long term car park to check-in desk
- Check-in desk to Passport control and security
- Security to Boarding gate and plane
- Plane to runway and take-off.

Inbound journey

- Touch-down to aircraft stand
- Aircraft to baggage reclaim
- Baggage reclaim to Passport control
- Passport control to train station, bus stop, picking-up point or short/long term car park
- Train station, bus stop, picking-up point or short/long term car park to airport perimeter.

These stages have omitted the retail/duty free aspect since time and money spent there, though a useful passenger service and important to airport revenues, should be a matter of customer choice. If journey times for these various stages are compared for the various SERAS options three distinct airport types emerge: existing large complexes, typified by Heathrow and Gatwick, the proposed formation of new large complexes by the addition of extra runways, typified by Gatwick and Stansted, and the proposed new-build airport options. Existing large complexes such as Heathrow have the disadvantage that short of complete redevelopment and immense investment little can be done to reduce the travel times within their perimeters since they are already sprawling conglomerations of facilities dating from various periods in their evolution. Similarly the formation of new large airport complexes by the addition of extra runways to existing airports will increase the travel times within their perimeter no matter how much is spent on new transit systems. Proposed new-build airports should be designed from the outset to minimise the travel times for each of the outbound and inbound stages described above. This involves reducing distances for outbound journeys from the points of arrival at the airport perimeter to the central terminal area, from the central terminal area to the boarding gates and from the aircraft stands to the take-off points on the main runways, and for inbound journeys reducing the distances from the touch-down points on the main runways to the aircraft stands, from the stands to the baggage reclaim and from the reclaim to the various departure points on the airport perimeter.

Airport designs that introduce additional inbound and outbound journey times within the airport by separating the airfield from the terminal have an inherent disadvantage. Their additional transit time is

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simply added to the times for the other stages, which for new-build designs should otherwise be more or less similar. The additional delay is serious for if the terminal to airfield travel time is increased by six to ten minutes that can represent up to 30% of the time within a new-build airport, and 10% of the overall time at the UK end of a journey to or from take-off or touchdown. Thames Reach Airport has the advantage that it is specifically designed to be compact. This helps to reduce the environmental impact and to reduce the journey time within the airport.

Heathrow is perceived to be convenient for passengers since it is some 20 minutes by train from Paddington (for the comparative times in the chart a fast-rail journey time of 30 minutes is quoted for Heathrow, this being an average of times from Paddington, which though a quick service has a relatively low capacity, and from the City via Crossrail.), served by the tube and close to the M4/M25, but that perception is for the journey time to the airport perimeter. Add the journey time passing through the airport and Heathrow is much less convenient. From a comparison of the combined journey times to and within the various airports we find Thames Reach Airport, as a purpose-designed, compact, new-build airport close to Central London, provides the shortest and most convenient airport journey times i.e. it provides the closest proximity to take-off or touch down. Once this is factored into the economic benefits by converting the delay times into monetary values Thames Reach Airport rises substantially in the economic benefits and costs league. This improvement, together with the longer operating hours, the reduced construction costs, the very much lower compensation costs (land, buildings, housing, noise, nitrogen dioxide), the substantial infrastructure benefits and the wide range of strategic planning benefits for London, places Thames Reach Airport at the head of the economic benefits and costs table. Comparative access times are provided in the environmental comparison chart in Section 5.3.

5.3 ENVIRONMENTAL IMPACT COMPARISONS CHART - (see following three pages)

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Environmental impact comparison of South East Airport options for SERAS - June 2003

Indicative data taken from SERAS and HOK publications

	SERAS/Heathrow	SERAS/Gatwick	SERAS/Stansted	SERAS/Cliffe	BLUEBASE.trac Thames Reach Airport
Houses Demolished	260 residential properties	Up to 300 residential properties	Up to 200 residential properties	1100 residential properties	3 (airport site) and 17 (surface access) residential properties
Ancient Monuments Lost	Harmondsworth Tithe Barn will be affected	None	Two scheduled ancient monuments will be lost, another ancient monument site will be lost with the three runway option	None	None
Grade I Listed Buildings Lost	1 Grade I listed building	None	None	1 Grade I listed building – The Church of All Saints at Allhallows	None
Grade II Listed Buildings Lost	8 Grade II listed buildings + 1 Church and loss of 25% of Harmondsworth Conservation. Area	Up to 17 Grade II listed buildings including 5 Grade II* listed	Up to 64 Grade II listed buildings lost including one Grade II*	8 Grade II listed buildings including one Grade II* listed. Total of 9 Grade II listed builds lost if cross runway built	None
Farmland Lost to Agriculture Green Belt Lost and Impacts to Rural Landscape	230 hectares of agricultural land (All Green Belt) would be lost	Up to 200 hectares of high grade agricultural land will be lost. Up to 400 hectares of Green Belt would be lost – SE – Annex F – Land and Property	Up to 1200 hectares of high grade agricultural land would be lost. Up to 747 hectares of Stansted Airport Countryside Protection Zone would be encroached SE - 9.22	2000 hectares of agricultural land (2200 hectares with crosswind runway) would be lost	Up to 1,300 hectares of low grade agricultural land (flood risk marshland)
Brown-field regeneration	No information available	No information available	No information available	No information available	No brownfield regeneration required for airport
Platform spoil movement				133m m3 in first phase, allowing for up to 1 meter settlement	70m m3 in incremental phases, allowing for up to 1m settlement
Noise affects on people (At 57 dBA, Leq, 16h)	Up to 332,000 people affected by 2030 – SE – 7.26 – Table 7.3	Up to 21,000 people affected by 2030 – SE – Annex F – Table 6	Up to 28,000 people affected with 3 new runways. Up to 14,000 people affected with one new runway	Up to 14,000 people affected by 2030 with four runways	Up to 12,000 people affected by 2030 - (eastern noise profile over water) residential area to the south screened by hill
noise contour cover Land / Sea (57 dBA)	100% over land	100% over land	100% over land	70% land / 30% sea by 2015 60% land / 40% sea by 2030	60% land / 40% sea by 2015 50% land / 50% sea by 2030

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	SERAS/Heathrow	SERAS/Gatwick	SERAS/Stansted	SERAS/Cliffe	Thames Reach Airport
Pollution by NO2 above EU Mandatory Limit	Up to 35,000 people will be exposed. Up to 14,000 people will be exposed without new runway.	Up to 4000 people exposed by 2030	Up to 300 people will be exposed	No population is forecast to be exposed in excess of EU limits on NO2	No population is forcast to be exposed in excess of EU limits
Climate Change Renewable Energy Sources	No information available	No information available	No information available	No information available	Solar, tidal, wave and wind power developments in the Thames Estuary allied to heat pump and heat sink technology
Ecology Birds and Wildlife affected	No impacts were assessed as High*/High See – SE 6.27	No impacts were assessed as High*/High See – SE – Annex F – SE 6.27	No specific information available	Adverse effect on the Thames Estuary & Marshes SPA and Ramsar site of very high Ecological value.	Adverse effect on the Thames Estuary & Marshes SPA and Ramsar site of very high Ecological value. State-of-the-art laser and accostic dissuasion methods
SSSIs affected	No specific information available. Assumption taken that no SSSIs will be affected	None	Half of Elsenham Wood SSSI lost	Impact to Northward Hill SSSI / National Nature Reserve, intertidal mudflats and drained marshland	Northward Hill SSSI retained, but restricted Impact to intertidal Ramsar and marshland SPA sites.
Water supply difficulties	Demand for water for extra passengers – difficult to meet even with supply and demand management. & water saving technology – SE 7.2.4	None identified	Demand for water for extra passengers – difficult to meet even with supply and demand management. & water saving technology	Demand for water for extra passengers – difficult to meet even with supply and demand management. & water saving technology	None: Water supply available via the Lower Thames Tunnel from reservoirs in Essex
Water Risks	Potential High Adverse impacts on surface water and groundwater. Numerous areas of contamination are at risk of being mobilised. Therefore - high risk to aquifer. SE 7.2.3	Engineering work, diverting or culverting to several rivers are seen as a significant impact by the Environmental Agency	Engineering work, diverting or culverting to several rivers are seen as a significant impact by the Environmental Agency	Potential high adverse impacts to marsh groundwater and possible increased risk of floods on the Hoo Peninsula T	Raised platform isolated from the marshes Airfield runoff to be contained by new surface water drainage system Preparations for improving London's flood defences.
Public Safety Zones - Risk	Risk Contours over densely populated areas	No information available in Annex F	Risk Contours over populated areas	Risk Contours over water and low density populations	Risk contours over water and non residential area
Land / Sea coverage	100% over land	100% over land	100% over land	85% land / 15% sea (4 runway)	70% land / 30% sea by 2030

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	SERAS/Heathrow	SERAS/Gatwick	SERAS/Stansted	SERAS/Cliffe	Thames Reach Airport
Airspace	Changes to London Terminal Control Area will require time and resources for design, simulation and phased implementation – SE 18.6 pg. 132	Changes to London Terminal Control Area will require time and resources for design, simulation and phased implementation – SE 18.6 pg. 132	Changes to London Terminal Control Area will require time and resources for design, simulation and phased implementation – SE 18.6 pg. 132	Changes to London Terminal Control Area will require time and resources for design, simulation and phased implementation – SE 18.6 pg. 132	Changes to London Terminal Control Area will require time and resources for design, simulation and phased implementation – SE 18.6 pg. 132
Employment	By 2015 –147,000 jobs By 2030 –117,000 jobs at 116mppa	By 2015 – 38,000 By 2030 – 64,000	By 2015 – 60,000 jobs By 2030 – 93,000 jobs at 122mppa	By 2015 – 53,000 jobs By 2030 – 79,000 jobs at 110mppa	By 2017 - 40,000 new jobs at 50 mppa. By 2030 - 90,000 new jobs at 130 mppa.
Land use and Urbanisation	The scope for providing additional housing without incursion into the Green Belt is limited, even assuming intensive use of previously developed land. Estimates suggest the number of dwellings required as a result of the airport development, in addition to those envisaged with the exception of RPG provision to 2030 could be in the order of 30,000 by 2015 and 10,000 by 2030. SE – 7.34, 7.35 7.36	The RPG provision of additional housing (from the core employment catchment areas identified) extended to 2030 amounts to 145,000 dwellings, a shortfall of around 60,000 on the number needed to satisfy total employment requirements. Up to 9,000 of this requirement from Gatwick expansion. Green Belt releases required. SE Annex F	By 2030, the labour catchment area is indicated at 93,000 jobs. 83,000 additional houses by 2030. Significant change in the pattern of development in the partly rural core catchment area would be required to accommodate development on the scale envisaged. Demand only met by fundamental change in settlement pattern. Possible loss of Green Belt. SE – 9.33 – 9.35	By 2030, 162,000 additional households will be required. The reduction in relatively high rates of unemployment suggests the airports needs could be met with a fairly limited additional housing development. Suitable land exists both for housing and off airport employment activity. SE – 11.29	The additional households required will already be available in the Thames Gateway region and well served by public transport. over 90% of infrastructure connections required for airport also benefit the South East (Thames Gateway Communities plan, freight rail routes, outer M25, Crossrail 'eastern loop', etc.
Surface Access Criteria RAIL ROAD	New rail and road infrastructure to be provided – SE – 7.10 to 7.19 – pgs 51,52, 53	Rail service good and requires relatively minor improvements. Road access requiring relatively minor improvements	New rail and new road infrastructure to be provided – SE – 9.11 to 9.21 – pgs 64,65 + 66	New rail and road and Thames Bridge infrastructure to be provided – SE – 11.7 to 11. 13 – pgs 84 + 85	The Lower Thames Tunnel and associated infrastructure connections benefit the Thames Gateway ahead of the airport opening
Access proximities					
Estimated Average Airport Transit Times	40 mins	30 mins	30 mins	15 mins	15 mins
Fast Rail Connection Time (Central London)	30 mins	25 mins	30 mins	28 mins	25 mins
Total Access Time	70 mins	55 mins	60 mins	43 mins	40 mins

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6.0 EPILOGUE: THE SERAS REPORT AND THE FUTURE GROWTH OF LONDON

Money and services, goods and people find their way around the globe, to and from London. The strength of the UK economy is often seen to depend on the strength of London's economy, from the financial services sector to the trading of goods and services through London, supported by a group of airports that provide frequent and economical flights to a wide range of destinations around the globe, enabling London to maintain its position as a world metropolis. A central issue of the SERAS study is that, with limited runway capacity and associated aviation infrastructure, a ceiling will soon be reached beyond which fares will rise, seats will become less available and, as the more profitable routes mop up capacity, fewer destinations will be served. The concern is that London then becomes less well connected so losing its status as a world metropolis and the UK economy falls into structural decline. At the same time London is facing a housing shortage together with projections for increasing population growth in the early part of this century. For much of the 20th century London's population was static or slowly declining, while other world cities were experiencing the doubling, tripling, even quadrupling of their populations. London's ageing infrastructure did not have to cope with the stresses encountered elsewhere. Now London is facing problems that seen in isolation appear exceptional; the rapidly rising immigration, unaffordable keyworker homes, inadequate capacity on the roads, rails and tubes; but seen together these problems indicate a return to the kind of growth not experienced in London for two generations, demanding a step change in the way we approach infrastructure planning. The result of the SERAS consultations will be a decision not only for aviation capacity but also for the future growth of London.

The issue of providing additional capacity at an overcrowded port, constraining London's growth, is a problem that has been encountered before, just over two centuries ago. Then it was not Heathrow but the Pool of London, not runway capacity but the capacity of the legal quays and warehouses around the Pool to off-load and handle goods. Since 1558 the Port had required all goods to be discharged at Legal Quays, on the north bank of the Pool from London Bridge to the Tower. Ships would anchor midstream in the tidal course of the Thames and their cargoes would be transferred to open lighters, which unloaded them at the legal quays. The duty on the goods would be collected before they were transported elsewhere, or the goods would be stored in warehouses with the duty becoming payable only when released. At first there were 17 legal quays, rising to 20 in 1665 then a number of "sufferance wharfs" were licensed on the south bank, to handle goods with low duties. Trade and the Port grew throughout the 17th and 18th centuries with warehouses stretching up and down the river from London Bridge along both banks of the Thames. By the late 18th century the Port of London had become the largest in the world handling two-thirds of the nation's seabourne trade. Up to 8000 vessels of various types could be found at any one time in the Port. The congestion would cause a ship to remain moored midstream for up to two months. 1775 ships were permitted to moor where space had been allocated for only 545. The double handling of goods encouraged pilfering and the goods would stand for weeks on the open quays due to inadequate warehousing. In 1797 an estimated £506,000 of cargo was lost, of which the West India Company alone lost £150,000, immense sums in their day. Various ambitious schemes were promoted to develop quays further downriver but they were still subject to the tides and the vested interests controlling the double

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handling and payment of duty on goods. Liverpool had already demonstrated the benefits of protected wet docks developed at the port's expense. However in London it was not the port authorities that met the challenge but the East and West India Companies, through the West India Dock Act of 1799 and the Commercial Road Company. William Pitt attended the laying of the foundation stone for the West India Docks on 12 July 1800, which opened in 1802, and the Commercial Road from the docks to the City opened in 1803. A marshy area of meadows on the Isle of Dogs within a bend of the river had become an immense system of wet docks. Ships could moor safe from the tides, besides miles of quays with warehouses protected by high dock walls. The ships no longer required the transfer of goods to lighters and could unload in four days rather than four weeks. Their goods were secure and could be stored in the warehouses or distributed to merchants in the City via the broad and straight thoroughfare of the Commercial Road. The docks were an immediate commercial success, even after paying heavy sums of compensation to the vested interests controlling the old port operations. Steam power had been used in the construction of the docks and would soon arrive in the form of railways to further transform the capacity of the docks and the growth of the Port. London emerged from the Napoleonic Wars with a dock infrastructure that was the wonder of its age, enabling London to expand as a world metropolis.

The docks had solved the problem of port capacity and led to the transformation of London. The immense new handling capacity had not been provided by an expensive and disruptive attempt to expand existing facilities around the Pool but by the conception of entirely new infrastructure on the marshy reaches of the Thames. The SERAS report examines a variety of options to increase aviation capacity, from the expensive and disruptive expansion of existing capacity at Heathrow, where the M25 hinterland and M4 Corridor are already developed and congested, to the conception of entirely new infrastructure on the outer reaches of the Thames Estuary near Cliffe. In the mean time Thames Gateway, an area north and south of the Thames Estuary from the Isle of Dogs to the Isle of Sheppey, has been designated a priority area for economic and social regeneration, aiming to accommodate London's growth as part of the Communities Plan to the extent of 200,000 new houses and 100,000 new jobs by the year 2020. The SERAS options of expansion at Heathrow or Stansted do not provide the additional infrastructure required for this growth. The only SERAS option with the potential to address London's growth is the option of a new airport in the Thames Estuary. Thames Reach Airport combines major new aviation capacity in the form of a new-build hub airport, with widespread infrastructure improvements for the Thames Gateway region and the Stansted/M11 corridor, at less cost than the SERAS/Cliffe proposals and with less environmental impact.

The Thames Reach Airport prospectus has been prepared for the formation of the Thames Reach Airport Consortium (TRAC) and submitted to the Government's South East Regional Air Services (SERAS) consultations. Thames Reach Airport is an independent private sector initiative whose key strategy is the alliance of a Lower Thames Tunnel under the Thames Sea Reach with an airport on the Kent marshes near Cliffe. Other locations for a Lower Thames Crossing have been examined but the alliance of a tunnel under Sea Reach, with Thames Reach Airport on the marshes, as far east as Canary Wharf is west of the present Dartford Crossing, not only provides key infrastructure benefits for the Thames Gateway region and Stansted/M11 corridor but also provides an economical strategy

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for the required PPP's and PFIs. The Government would lead the Lower Thames Tunnel and associated infrastructure works through PFIs with established construction companies, funded by tunnel tolls and tariffs together with an agreement on future tariffs payable by TRAC for the airport access, while TRAC would fund the construction and operation of the airport, unencumbered by the capital cost of the necessary access infrastructure. In short the tunnel needs the airport and the airport needs the tunnel and when both are mooted for the Thames Estuary they naturally come together. TRAC's strategy for the SERAS consultations is to encourage closer examination of the new-build Thames Estuary SERAS/Cliffe option within the range of Government options, and then demonstrate that greater benefits for less cost and less environmental impact can be realised by Thames Reach Airport.

Thames Reach Airport also combines strategic aviation objectives with objectives for the growth and sustainability of London including the Thames Gateway Communities Plan, the Thames Gateway Freight Study, the London Orbital Study, Lois (London to Ipswich multi-modal study), Crossrail, the Thames Gateway Container Port, the East-Coast High-Speed Line, the Government's Renewables Obligation, North Kent water supplies and London's flood defences, to provide an integrated development strategy for the benefit of London and the Southeast.

The development of the West India Docks, followed soon after by the London Docks, led to the uncontrolled ancillary development of the East End in an age before strategic planning. The relocation of London's premier port to Heathrow after the war, allied with the 1947 Town and Country Planning Act led to the relatively controlled ancillary development of Hounslow, Staines, Slough, Maidenhead and Reading, drawing London's growth westwards along the M4 Corridor, with mixed results. The outcome of the SERAS consultations has the potential to direct London's growth for the next century. Heathrow cannot provide the best technical solutions for increasing aviation capacity and the already constrained M4 corridor is not the place to direct London's future growth. The Stansted/M11 corridor passes through countryside that is rightly protected by Green Belt legislation: the region of the airport is rural and the location is less well connected than the Thames Gateway. Development of a hub airport at Stansted would be unacceptable, resulting in the environs (Bishops Stortford, Great Dunmow, Stansted Montfitchet) becoming the Staines and Sloughs of the 21st century. London's new premier port should be located eastwards on the Thames Estuary to regenerate the Thames Gateway region, where the land and much of the infrastructure already exists to accommodate the necessary growth and where there is the scope and will to shape a new metropolis.

7.0 APPENDICES/IMAGES

Site plan (see following page)

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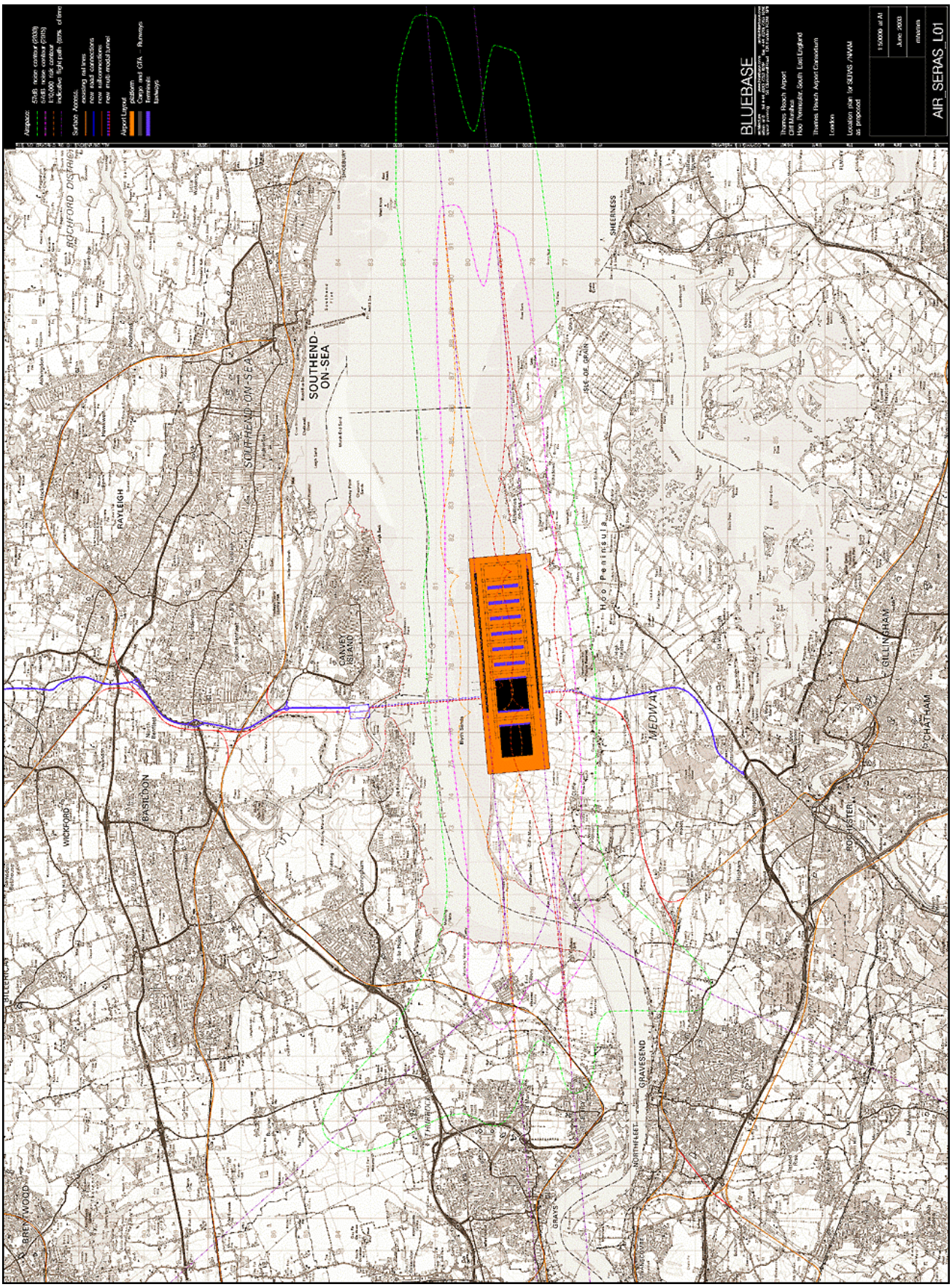

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