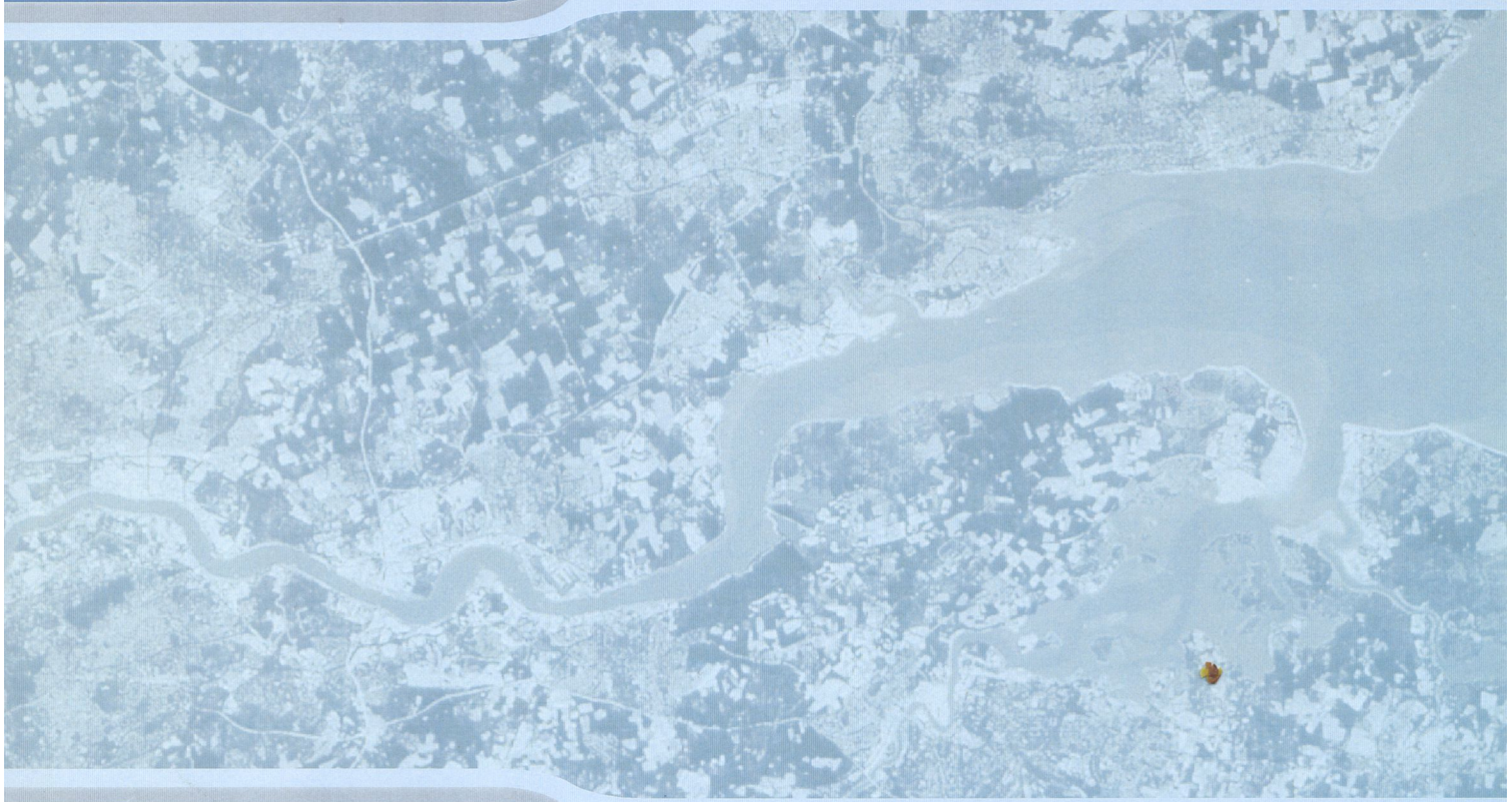
Relationship Between Transport & Development in the Thames Gateway

For the ODPM

FINAL REPORT

April 2003



Llewelyn-Davies and Steer Davies Gleave With Roger Tym & Partners and Atkins

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5. Transport and Development Interaction

5.1 Strategic and Local Transport

Settlements require a range or 'layering' of transport facilities, each serving trips of varying lengths and purposes. The conception in the Thames Gateway needs to pay equal attention to strategic and local networks, and the means whereby these are integrated. We deal with these in turn below.

5.2 Strategic Transport

Three major transport proposals are of undoubted strategic sub-regional significance: CTRL (full operation, 2007), Crossrail, and Thames gateway Bridge. A fourth important proposal - a DLR extension to Barking, Dagenham and Rainham – is essentially a local link but which has the ability to release a lot of potential in its immediate corridor. The three projects all seem to have the capability to help shape development choices and urban structure over sizeable tracts of the Thames Gateway.

Nonetheless, the relationship between "strategic" transport facilities and development in the Thames Gateway needs to be closely examined. As so often is the case, the devil is in the detail. While we cannot, in the limited time available for this study, examine all of the arguments, certain aspects give cause for concern and should be treated with caution. We highlight some of these concerns in the following paragraphs.

The regeneration areas are mostly closely related to established rail corridors (the North Kent line, and the c2c lines to Tilbury and Southend). These provide for longer distance movements to central London, as well as providing an alternative to the car for some internal east-west movements, including education, shopping in the inner areas, and to the coast for recreation. However, the existing settlements have high levels of car use for both local and longer journeys, and the road system caters for the great majority of all trips, even the journey to work.

Strategic rail improvements (CTRL international and domestic, and Crossrail) can significantly reduce the percentage of commuting by car, but the following must be recognised:

- They will play a limited role in serving inward commuting to sites within the Thames Gateway (because only the two east/west directions are served)
- They will have little effect on the mode split of local journeys (say, up to 5 miles), which account for the great majority of traffic.

Basic questions regarding the strategic rail schemes are:

- Are they sufficient to trigger area-wide regeneration (as opposed to individual sites)?
- If built, do they release greater development capacity?

The answer in both cases is yes, but that the strategic rail schemes will not achieve this by themselves. This conclusion is based on the roles that strategic routes will perform. In terms of the rail routes, their main function is to provide "inbound" accessibility to non-residential activities in central London. The south east rail network, including the two key lines through Thames Gateway, serves this function above any other. They are relatively little used, and are unsuited, for other journeys, simply because any particular station can be reached only from two directions.

For inbound accessibility to concentrations of employment and other activities within Thames Gateway itself, much more reliance must be placed on local transport networks; hence the conclusion above that strategic rail schemes are insufficient by themselves to realise the full development potential.

5.2.1 Ebbsfleet

The relationship between strategic long-distance transport facilities and development is neither straightforward nor direct. It depends on the trip making and development characteristics. At Ebbsfleet three strategic rail facilities are proposed:

- CTRL International services to the Continent (2007)
- CTRL domestic services to Stratford and St Pancras, and to both Ashford and beyond and to Medway and beyond (potentially 2007).
- Crossrail adopting the North Kent Line as far as Woolwich and thence via Docklands to Central London and thence further west to Heathrow and other destinations.

Aspirations for Ebbsfleet include:

- A major transport hub with local, national and international public transport services
- A location for major commercial and mixed use development including housing (20,000 jobs and over 3,000 homes)
- A Motorway Parkway Station with a 9,000 space car park

The reconciliation of these roles will require careful planning, especially since there is potential for conflict between them. For example, a basic criterion for attracting both commercial development and park and ride rail passengers is proximity to the station platforms. Parking and commercial developments are thus competing for the space closest to the station. This is a major issue for the masterplanning of the area, the resolution of which might involve different solutions at different phases of development, or giving priority to one role over another. The following might be seen as relevant factors:

- In the early phases, the emphasis might be on park and ride car parking around the station;

- As development in the wider area increases, total traffic generation including the park and ride will overload the highway network, and so development with lower car trip generation could take place on some of the car parking area (in effect reducing park and ride traffic to allow for trip generation by commercial development). This could work if local transit services (Fastrack) offer a sufficient alternative to the car for access to Ebbsfleet;

- If demand is strong to justify the extra cost, the remaining car parking could be provided in multi-storey format, thus releasing further land for development within the immediate catchment of the station;

- Given the competing demands on parking spaces from park and ride rail users, commuters to Ebbsfleet employment, and visitors to the area, priorities can be established used to inform a parking management strategy that allocates spaces, for example on the basis of price, length of stay or other device.

In addition there will be a need to reconcile the operation of Ebbsfleet with the objectives of the North Kent Thameside transport strategy. An overall target was established in 1999 for the development overall to have a public transport mode share of 40% (and a private car mode share of 60%). This may be difficult to achieve at Ebbsfleet if, as currently expected, 75% of people using the station arrive by car.

It is beyond the scope of this project to determine answers on these points. The relevant point here is the "devil in the detail" one: that the potential for development created by the new public transport hub is very much dependent on the conception and design of the areas (a) around the public transport stops and portals; (b) within the reasonable "station to office" walk catchment; and (c) in the wider hinterland of commercial interest.

The planning of Ebbsfleet apparently has not yet reached the stage where these relative roles have been determined. It is therefore difficult to judge to what extent the strategic transport facilities will enhance or diminish the development potential. What has been determined, through this and earlier studies, is that unless development in the area generates minimal proportions of trips by car, the strategic road network (A2/M2, Dartford Crossings etc) will be unable to cope, even with the currently planned increases in capacity. This is summarised in the table at the end of this chapter.

5.2.2 CTRL International Services

The certain arrival at Ebbsfleet of international rail services (2003; full service 2007) give it a potential edge over competing locations seeking inward investment: comparable in some ways to places with an adjacent airport – though some of this is perceptual, in that the direct links are to Paris, Brussels and Lille, not the much wider range that an airport would usually bring. So they do make it more likely that North Kent Thames-side, and Ebbsfleet in particular, could compete to attract office / B1 jobs in business sectors with growth potential. Crossrail and CTRL domestic services should further reinforce this. And because the decision was taken in 1998, the 2003.2007 dates are now there as potential "early win" targets.

5.2.3 CTRL Domestic Services

The regeneration potential of Ebbsfleet International station is augmented by the (2007) potential for domestic services. They clearly support the effort by providing a fast direct link to St pancreas (and, via Stratford, to Canary Wharf), comparable to the sort of access that East Croydon has in South London. The routes are currently out for consultation. Beyond Ebbsfleet, the potential released within the study areas would appear to be useful, but far from dramatic:

- there are limited new development sites that could be brought into play within 800 metres of the stations served;
- the Medway towns already have quite a high proportion of rail commuting to London, served by a relatively good train service to both the City and the West End, and it is likely that the frequency of CTRL domestic trains serving Gravesend and further east to the Medway towns would be 4 trains per hour (not necessarily all additional);
- and there is also an issue as to whether the time savings will be sufficient to attract sufficient new custom to justify the operating costs of the service, after deducting any loss of custom for the existing services. The current train operator is thought to be sceptical about a positive case being possible.

5.2.4 Crossrail

Crossrail is potentially a very important addition to the transport armoury in Thames gateway, as we have argued in relation to Greenwich & Bexley Riverside and North Kent Thames-side: in particular, it would add to the commercial attractiveness of Ebbsfleet, and to the development potential east of Abbey Wood. However, it is not the case that Crossrail's case depends on its effects in the Gateway (it serves many other important opurposes), and neither is it true, as some have suggested, that without Crossrail the regeneration of the Thames Gateway is a non-starter. First, Crossrail would serve only the Thamesmead-Erith and North Kent Thames-side areas. Second, the principal benefits of Crossrail would be confined mostly to catchment areas up to around 800 metres from the three currently-proposed stops (Abbey Wood, Dartford and Ebbsfleet) – though of course a limited number of others could be added (say, Erith) if more development potential were thereby released. Ebbsfleet has the potential for major new development within 800 metres, but as discussed above, the primary trigger is CTRL – Croosrail is a useful addition to the array. So if Crossrail is to release more new development potential than this, the stations will need to be connected to new areas by high quality local public transport. Crossrail's ability to produce major potential is thus limited, unless it can be integrated with major local public transport investment, and the re-designation of sites within station catchment areas for development.

Assuming such potential is realised, Crossrail would significantly increase longer distance travel opportunities, not least of which would be fast access to Heathrow and Stansted airports. This too could be a major advantage in attracting businesses to Ebbsfleet, at least in the longer term.

5.2.5 Thames Road Crossings

Cross-river links, particularly upstream of Dartford, offer the prospect of knitting together parts of the Thames Gateway to become a more "normal" part of Outer London, with economic and social links in more directions and more choice of employment, homes and entertainment. There has thus tended to be a policy thrust in favour of such linkages for many years. Various studies[24] have nonetheless found it difficult to make a strong regeneration case for the provision of new road crossings of the Thames. This is partly because the benefits are in part seen as a result of improved image and perception, which inevitably are difficult to quantify.

There are two proposed road river crossings that have been included in the transport tests summarised in the table at the end of this chapter: the Silvertown link (outside our main area of study) and the Thames Gateway Bridge which would in effect connect the North Circular Road A406 and Beckton across the Thames to the Thamesmead spine road east of Woolwich. A Lower Thames road crossing between Thurrock and North Kent Thameside has also been suggested, but not defined as a project.

A number of studies have been undertaken into the impacts of the Thames Gateway Bridge. Having considered the various arguments, the main points for this study are that:

- Development of the Greenwich & Bexley Riverside and Barking & Havering Riverside areas is not dependent upon the Bridge; though on the southern (Thamesmead / North Bexley) side it would have some positive effects in terms of attracting employment investment;
- The Bridge would enlarge the area that is accessible within a given time to people each side of the river, both by public and private transport, but the significance of this in promoting development is difficult to judge, especially as compared to the accessibility offered by public transport projects in the area;
- Some labour market and business development advantages can thus be identified, and they benefit areas targeted for regeneration, but they are not great in scale;
- The magnitude of benefits and disbenefits in terms of sustainability indicators such as vehicle kilometres generated and mode split has not been established. Most of the benefits have been measured in terms of "drive times", without questioning what degree of additional driving is consistent with other policy aims.

On this basis we conclude that the decision on the Thames Gateway Bridge should be made by weighing the different impacts in relation to its costs, but that in this process the argument of releasing or stimulating development potential should not be over-played. There is a scenario in which it can be argued that the Bridge would have a positive impact on development (particularly on the south side), but there is another scenario in which the trip making encouraged by the bridge is of relatively little value to the area, and could

[24] For example, see the contribution to the debate made by: SACTRA, 1999, Transport and the Economy; Llewelyn-Davies for TfL, 2002, Thames River Crossings: Economic and Regeneration Impacts; and Whitelegg, 2002, Thames Gateway River Crossings: A Social, Economic and Environmental Assessment

even be counter-productive (congestion on the north side). The overall judgement then has to be set against the cost of the Bridge.

The specific arguments rehearsed in various studies are briefly summarised in Appendix D.

5.3 Local Transport

"Developers will want to see a quantum advance on the public transport commitments before they even consider going on site" (Alex Nickson in "Regeneration & Renewal", 28th March 2003.)

5.3.1 The Requirements

Transport must serve a range of access requirements, but in terms of **volume** of movement, the most important are local in character. So although the strategic transport links are vital in attracting and shaping the economic potential, it is the local transport provision for the Thames Gateway that will be the main determinant of how people actually travel, and the degree of sustainability that is achieved.

Investment in local transport systems in Thames Gateway needs to satisfy accessibility and trip-making demands in a way that:

1. Reduces existing high levels of car use, a task common to virtually all settlements in the UK. The growth and intensification occurring as part of the Thames Gateway project could help with this task in the existing settlements.
2. Enables and promotes the building of new settlements that achieve higher standards of sustainability than existing settlements, and avoids the excessive costs of road investment (or high levels of congestion) associated with high levels of car-dependency.

These objectives are linked, since the greater the mode shift away from car for existing travel, the less stringent will be requirement to limit car travel generated by new development. In practice new public transport services will link into existing settlements, and will thus open up potential for mode shift in all the areas served. This is an explicit objective of the Fastrack proposals for North Kent Thames-side, for example, where a target has been set for 40% of all motorised trips to be made by public transport by 2025 (Kent Thames-side, "Draft Fastrack Specification", April 2003).

A number of local transport schemes are envisaged for the Thames Gateway, at varying levels of specificity and commitment. A key question is whether the schemes as currently envisaged are sufficient in extent and quality to enable the identified development potential to be realised.

There are two parts to this relationship, namely capacity and quality; and neither is straightforward. In our view the extent and character of local transport provision is not something that should be assumed will simply follow on from key development decisions,

but needs to be planned in relation to those development decisions. The criteria that need to be satisfied include:

- Will the capacity of the public transport system be sufficient to accommodate the expected and desired demand, consistent with the target mode split?
- Will the public transport system be of a quality that will attract users who have a car at their disposal?
- Will this quality be sufficiently self-evident to persuade property investors and developers to adopt development formats with low levels of parking and car use?
- Will other aspects of local transport provision, especially parking supply and price at employment retail and other facilities, be consistent with the desired mode share and levels of demand?

If it were simply a matter of matching the capacity of the system to the anticipated eventual passenger demand, the choice of transport system could safely be assumed to be a matter to be resolved at the local planning stage. Unfortunately there are wider matters to be addressed, especially in the Thames Gateway, as we endeavour to explain below. The choices available are:

1. Conventional bus
2. High quality bus (vehicles, infrastructure, facilities and services), with ot without segregated running
3. High quality bus with variants of power supply and guidance technology (usually referred to as "intermediate" modes)
4. Tram or light rail, with or without segregated running (generally with, to get the benefits).

During the course of this study there was considerable debate about the type of local public transport system that should be provided in the Thames Gateway area. There were differences of view between members of the study team, and between them and people on the client side. It has not been possible to fully reconcile these views in a way that is satisfactory to all parties.

The conventional bus is assumed to be a component of all local transport systems in the Thames Gateway, providing for access on non-core routes with low to medium demand. There is no particular issue here. The main point at issue is whether bus-based systems (choice 2 above) are capable of meeting the criteria set out above.

Two scenarios can be put forward.

5.3.2 Scenario 1 – Bus Based Transit

This is the scenario currently being developed for the East London Transit, Greenwich Waterfront Transit, and Fastrack (North Kent Thames-side).

The main argument in favour of the bus-based systems currently being pursued is that of infrastructure cost. Buses using the general road network are cheap to provide, especially at relatively low passenger densities. Segregated bus ways (roads solely for buses) are cheaper to provide than segregated tramways. For street running on existing roads the cost of bus infrastructure is negligible compared to that required for tram operation. However, the infrastructure costs tend to converge on wholly new sections of track, such as can be provided in the Thames Gateway new settlement areas. Also, costs get closer to that of the tram once guidance systems and electric power supply systems are introduced.

Cost is not the only point in favour of the bus, however. The Fastrack specification, for example, highlights the advantage of being able to implement the system in relatively small sections that can be timed to coincide with development. In addition, the long lead time expected in certain development areas (e.g. Eastern Quarry) means that route flexibility is important. Changing tram routes is much more expensive and difficult than changing bus routes.

The capacity argument is acknowledged, that buses deliver a lower passenger capacity for any given service frequency than the tram. Nevertheless, some at least of the bus transit systems in Thames Gateway are being developed to a specification that will allow them to be converted at some future date to intermediate mode or even to tram operation. This can work if increasing patronage results from more sites being developed, but it does not work if the final development densities are too low to support a tram service.

The specification for Fastrack (and it is assumed the other bus transit systems) is for a very high level of quality compared to conventional buses, including well designed, air-conditioned and fully accessible vehicles, real-time information systems, and facilities at stops. It may be argued that the image presented by the system is sufficient to persuade all concerned to design for and to use public transport.

Overall, the arguments in favour of bus transit for the circumstances of most parts of the Thames Gateway are persuasive **if** bus transit is sufficient to attract investors and developers and to affect their decisions, and **if** one can thereby ensure that a high proportion of travel is undertaken using the system. In those circumstances, it would be very difficult to justify the expense involved in building tram systems. The main difficulty here is that we have been unable to uncover any example of this having been done before, either in the UK or elsewhere. The benchmarking exercise found few examples of new public transport oriented development, and none that demonstrated low-car development formats in relation to the bus. One possible exception to this is the proposed guided bus system serving satellite extensions to Cambridge, but this is still at the planning stage, and unlike Thames Gateway is an area where there is very strong pressure for development.

5.3.3 Scenario 2 – LRT / Tram Based Transit

This scenario is currently being developed for Barking / Havering Riverside (proposed DLR extension from the Royals) and for Medway (proposed Medway Transit system, though at an early stage). It can be argued that only LRT or tram can provide the degree of certainty and commitment necessary to attract and promote development at a high density in areas like Barking, Greenwich / Bexley Riverside, and North Kent Thames-side.

LRT / tram (particularly Light Rail) is undoubtedly more expensive than other modes, at least in terms of construction cost. Operationally, at high passenger densities there comes a point where a tram at least is cheaper to operate than bus systems. (Cost comparisons with intermediate modes are less easy in view of the small number of systems currently built.)

LRT / tram, however, has the big advantage of a powerful image, due partly to the appearance of the vehicles, but more importantly due to the fixed certainty of the system, the commitment to the route taken, and the message that it sends out that there will be high quality services in perpetuity. The large-scale investment signifies to everyone that there is a high level of commitment to public transport, and that utilising that investment is an imperative sufficient to persuade people that services will not be allowed to wither and diminish over time.

The higher capacity offered by rail-based systems is also significant. To justify the investment it is necessary to build at high densities and to organise roads and parking so as to limit the use of cars for local journeys. The pressure thus created on developers and planners alike thus works to ensure the success of the system. The clearest example of this is Barking Reach / Dagenham Dock; not only are the upper levels of development probably only achievable in transport terms with new rail-based access (whether DLR plus ELT, or DLR plus ELT tram, or ELT tram only), but also developers cannot be expected to commit to high-density schemes (other than right on the waterfront) without the certainty of fixed routes.

It is therefore apparent that the "inflexibility" of LRT/ tram is, in this scenario, portrayed as a positive factor. Investors, developers and end users want certainty that the system will meet their requirements in the long term, not the sort of flexibility that leaves open the question as to what level of service will still be there in five years.

Development in much of the Thames Gateway will need all the help it can get. The problems that have to be overcome are well rehearsed (poor image, low land values, high remediation costs, etc), and account for the slow progress that has been made since the broad strategy was adopted more than a decade ago. Consequently, if local public transport is inadequate (or even simply perceived as being so), and does not raise the stakes significantly in terms of image and credibility, then the prospects of meeting the aspiration of sustainable settlements cannot be fulfilled.

A significant issue in terms of LRT/tram development is that systems can only be implemented in relatively large phases. Timing and coordinating development to minimise

the gap funding to support services until patronage has built up requires skilful planning. Our example of Wateringse Veld (see box below) shows that it can be done, however.

There are a number of examples of high density development being promoted in relation to new or extended tram or light rail lines, and these are set out below (see "Benchmarking"). These examples demonstrate that there are circumstances in which the rail-based transit is seen as affordable and deliverable in the context of new settlements. An as-yet-unrealised example is Granton, Edinburgh (see example below). Consequently, arguments to the contrary in Thames Gateway should therefore be confined to the specifics of the project, rather than relying on general truths or accepted approaches.

Wateringse Veld (Den Haag, Netherlands)

Case example of public transport-oriented development

Waterings Veld is a new suburban district at the south west corner of the Den Haag agglomeration.

It comprises 8,000 houses on 57 hectares of land, accommodating 20,000 people. The development includes schools, shopping facilities and leisure/sports facilities. The construction period is 1996-2005

Two features are of particular importance:

1. The high density of development at a location that is relatively remote from the city centre;

2. High quality public transport links provided simultaneously with the early phases of the development, in particular a direct tram link to Den Haag opened in 1999, but also bus links.

The implementation of the tram route and the housing project started at the very same moment in 1996. The reason behind this was to prevent new residents from buying a second car by providing them with a public transport connection as soon as they moved in. A fortunate side-effect was that most builders could make use of the tram to go to work.

The local authorities involved were able to proceed both projects simultaneously because the housing project was programmed to be built over a short period of time, therefore providing the necessary critical mass to sustain the tram relatively soon. Other housing developments are generally divided in phases and spread over a longer period of time, which restricts a simultaneous implementation.

Granton, Edinburgh – Comparison of Masterplans with and without Tram Schemes

Note: the "with tram" masterplan has been adopted, and funding for the tram linking the area with Leith and central Edinburgh was approved by the Scottish Office in 2003.

1998* (Without Tram)	Jan 2000* (With Tram)
Residential: 45ha @ 45-85 dw/ha 2,925 du (approx.)	*Residential*: 48ha @ 30-170 dw/ha 5,000 du (approx.)
Office/Business Space: 50,000m^2 covering 23.3ha including a 12-15ha urban business park with an anchor tenant comprising 4,500m^2	*Offices*: 75,000m^2 covering 8ha
Industry and Workshops: 45,000m^2 covering 15ha	*Light Industry*: 67,500m^2 covering 8ha
Retail: 2.25ha (0.05ha per 1ha residential land); and 2ha within central mixed use/leisure area	*Mixed Use Local Centres*: 2 local centres comprising 12ha of land
Community/Institutional: 20.25ha community uses; and 10.75ha institutional uses	*Schools*: 8ha (primary and senior)
Leisure: 6ha	*Leisure*: see mixed-use local centres above
Open Space: Unknown	*Open Space*: 30ha
Total Land Take: 124.55ha*	Total Land Take: 114ha*

* This table is representative of the 'key' land-uses. The total site area is 176ha. The figures exclude the land take for:
- water activity, core roads, infrastructure corridors and incidental open space.

NB: Building heights in January 2000 masterplan vary between 1-2 and 8-10 storeys.

Note on Parking Standards:

The standards contained within the January 2000 masterplan are based upon those recently adopted by the City Council, therefore maximum (rather than minimum) standards of one space per residential unit and one space per 50m^2 of gross commercial floor space are advocated.

The proposals also allow for:

- The majority of car parking being in communal rather than private or dedicated use to ensure the maximum use of the land;
- Car parking being provided in internal courts, undercroft or on the street – not in vast open car parks;
- The landscaping of car parks as treed squares within which the cars sit, the squares being framed by buildings not roads;
- The use of pricing systems (including residential and employment permits) to encourage the minimal effective levels of car use and ownership; and
- The staged reduction in car parking provision for access to work could be introduced by the use of green transportation plans as the quality of, and improvements to, public transport increases. Certain car parks within the masterplan are thus later development sites.

The masterplan is based upon a flexible grid pattern/urban block structure; the overriding principle being to provide choice of mode and route.

5.3.4 The Basic Choice

The choice between the two scenarios would appear to turn on which factors are seen as the most important. Table 5.1 below attempts to summarise the main differences. It illustrates that if the most important criteria are believed to be low cost, flexibility of phasing, and speed of construction, then bus transit will be the logical choice. If, on the other hand the most important criteria are believed to be credibility and certainty, good image, high capacity and environmental performance, then LRT/ tram is the logical choice.

It may thus be concluded that the differences of view exposed in the study are in fact differences of judgement as to what order of local public transport investment is needed to achieve the aspirations for development in the Thames Gateway.

If the levels and types of development aspired to for the Thames Gateway can be achieved on the basis of bus transit systems, as currently planned, then this will represent a considerable success in minimising infrastructure investment.

In acknowledging the robust reasoning behind the bus transit approach, however, we must warn of the potential dangers of relying on an approach that is both innovative and untested - especially in an area with such substantial disadvantages for development as found in the Thames Gateway.

Table 5.1: Attributes of Transit Modes

	Positive Attribute	←		→	Negative Attribute
1.	Cheap to build	○	*	●	Expensive to build
2.	Quick to build	○	*	●	Less quick
3.	Easy to phase delivery	○	*	●	Delivery in 'large chunks'
4.	Proven technology	●○		*	Unproven technology
5.	Credible[A]	●	*	○	Less credible
6.	Good Image	●	*	○	Less good image
7.	High Capacity	●	*	○	Lower capacity
8.	Environment friendly[B]	●	*	○	Less environment friendly

● Tram/LRT
○ Bus (including Kerb Guided)
* Intermediate Modes (Various Systems)

Table Notes
[A]. Credible is a cryptic adjective used here to include the degree of certainty and persuasiveness of the system in delivering high density and high quality levels of service in the long term. The acid test is whether developers will adopt low car use development formats on the certainty that the transit system will handle a large proportion of generated trips.
[B]. Environment Friendly means zero emission and low noise at point of use.

5.4 Benchmarking Public Transport Oriented Development

To aid further consideration of the case it may be instructive to look at cases where public transport oriented development has been attempted.

The table below (Table 5.2) lists some examples of urban extensions based on bus, tram, light rail and heavy rail systems.

It is apparent that the best examples producing significant public transport mode share are where development form discourages car use, and where high quality public transport is implemented in an integrated way with the development. The Dutch probably provide the best examples.

Table 5.2: Examples of Public Transport Oriented Development Worldwide

Development Promoted in relation to Bus Transit		
Place	**Description and process**	**Outcomes**
Runcorn, Cheshire	Busway built into structure of New Town (1960s). Development too low density, and car too well provided for to ensure high mode share for bus.	Bus usage declined as car ownership has grown, but still higher than in most equivalent sized towns.
Almere, Netherlands	New town (1970's/80's) with some segregated busways. High density development focused on town centre and rail station. Public sector development and transport funding.	Low public transport mode share due to preponderance of cycling.
Curitiba, Brazil	High density development focused on a high-capacity bus corridor within existing city Large city, high proportion of middle class within corridor. Strong political leadership towards a clear vision.	High public transport mode share. Intensification of development planned around transit corridor.
Cambridge	Longstanton new settlement linked to Cambridge by guided bus	In planning stage
Development Promoted in Relation to Tram/Rail Transit		
Place	**Description and process**	**Outcomes**
Utrecht, Netherlands	"Sneltram" (fast tram) built to serve New Town of Nieuwegein south of Utrecht. (1983) Population 62,000 (2002) served by 16 tram stops. Built by Dutch state railways through greenfield territory. Track still NS owned; operation through private franchise	High public transport mode share to Utrecht centre. Evidence of commercial development focused on tram corridor within Utrecht. Recent extensions and refurbishments.
Utrecht, Netherlands	Western urban extension (Vleuten) on former industrial (and other) land served by tram extensions and direct foot/cycle links to city centre.	Transport and land use planned comprehensively. Construction started.
Den Haag, Netherlands (Wateringse Veld, Rijswijk)	Tram extension serving new suburb in advance. State financed, public operating subsidy.	High density development at edge of city (140 dw/ha net)
Amsterdam	Commercial and mixed use development related to Ring Rail, including Sloterdijk.	Three rail based modes, with major commercial development at interchange stations
Portland Oregon	Tram serving existing and new suburbs. Funded through local public bonds and	Major uplift in public transport mode share to downtown.

	re-directed Federal highway funds.	Commercial development around stations in inner areas. Private sector delivery of station area plans in suburbs has been slow, partly because of continuing opportunities at non-tram locations.
Freiburg, Vauban district suburban extension	Sustainable regeneration of former barracks with tram extension to serve it (not in advance?) Funded by local authority and EU.	Area owned by City council, developed using public and European funds. 5,000 people.700 jobs by 2005
Granton, Edinburgh	High density mixed use regeneration area of 50 hectares. Supported by and requires tram to achieve low car share.	Masterplan adopted 2002. Funding approved for tram March 2003.
Vancouver Sky Train	Opened 1986 for Expo. Serving and stimulating high density suburban development. Funded by Provincial Government.	Includes high density development at and over stations. New line (Millennium Line, 2002) aims to stimulate regeneration of low value industrial areas (impact not yet known)
Joondalup, Western Australia	New settlement and station with Park and Ride rail services to Perth.	Public transport mostly for journeys to city (dormitory function). Most of Joondalup is low-density car-based form of development
Copenhagen, airport extension	New suburban community between airport and city centre. Funded through uplift in land values expected from new airport line	Under construction
Tokyo, Makuhari	New business and residential centre 40 km from Tokyo centre served by fast rail service to airport	Still being developed. Residential district 84 hectares, 8,900 households, 26,000 population (10,000 by 2001) (Gross density 105 h/h per hectare) Major commercial centre including HQ offices, congress centre, hotels, etc.
Other Evidence of Patronage Uplift due to Quality Upgrade		
Leeds guided bus	Quality bus route with some guideway sections	20% increase compared to former bus claimed, but some data inconsistencies
Manchester	Metrolink	20% more than previous bus corridor
Birmingham	Showcase bus routes	More than 20% increase in patronage
Portland, Oregon	Believed to be uplift in passengers to downtown on tram corridor formerly served by bus.	40% uplift compared to bus
Stated preference surveys by SDG (Theoretical)	Tram compared to bus	Stated 20-25% uplift.

11. Appendix C: Examples from The Netherlands

11.1 Wateringse Veld

Wateringse Veld is a new suburb of The Hague, included here as an example of a high-density, public transport-orientated development, with an extended tramline as the focus for the scheme, and for the higher density housing.

11.2 Sloterdijk

This area is included in view of the parallels with Ebbsfleet station, as an employment location at the intersection of rail-based public transport.

A transport interchange point and commercial development area that was planned at the intersection of a radial and an orbital rail line serving Amsterdam. The commercial appeal of the area was accentuated by restrictions on office development in central Amsterdam, and by the high degree of public transport accessibility from several directions.

The interchange is the focus for the following services

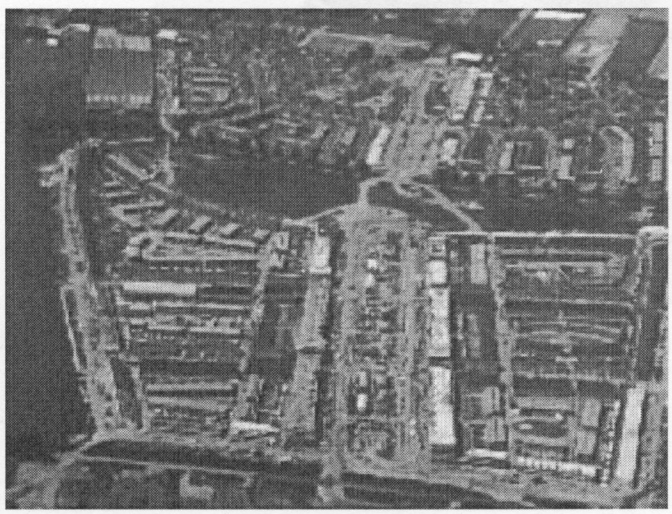
- 56 buses per hour
- 6 trams per hour
- 6 metro trains per hour
- 22 main line trains per hour (including direct trains to Schipol airport and Amsterdam central station)

11.3 Utrecht new satellite suburb "Nieuwegein"

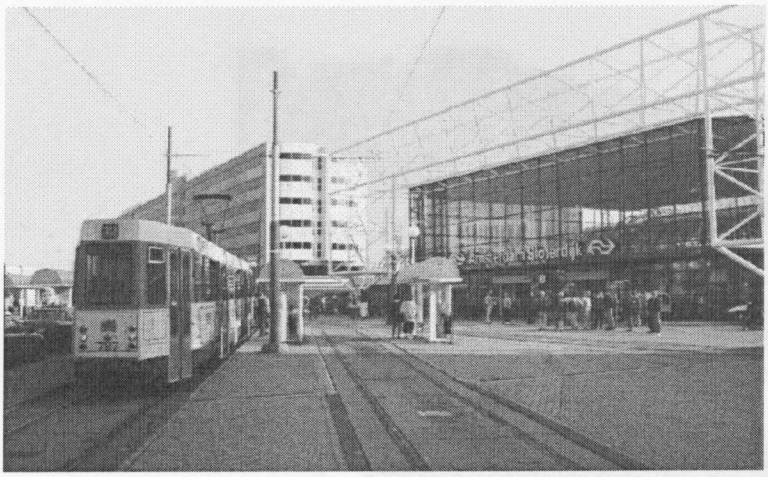
This major satellite new town was built south of Utrecht (Netherlands) during the 1980s. From the start it was linked to Utrecht with a tram line that was built from scratch. The development and the tram stops are mostly well integrated. The new suburb has recently been further extended in conjunction with a new branch of the tram (to Ijsselstein), and general upgrade of the tram facilities and vehicles.

Above: View of higher density housing fronting onto a boulevard carrying the tram line. The tram was operating before the development was fully occupied and, as can be seen, even before the road system was complete (**Wateringse Veld**)

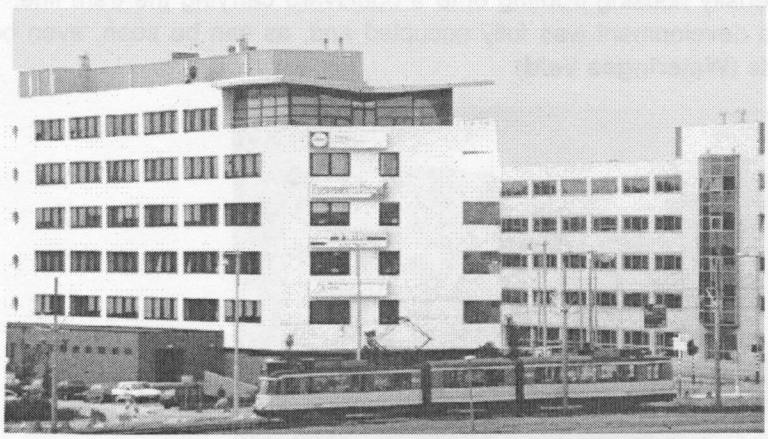
Above: A second view of the boulevard with tram, high density housing, and ample space for pedestrian and cycle paths, tree planting (not yet implemented), parking and single lane carriageway (**Wateringse Veld**).



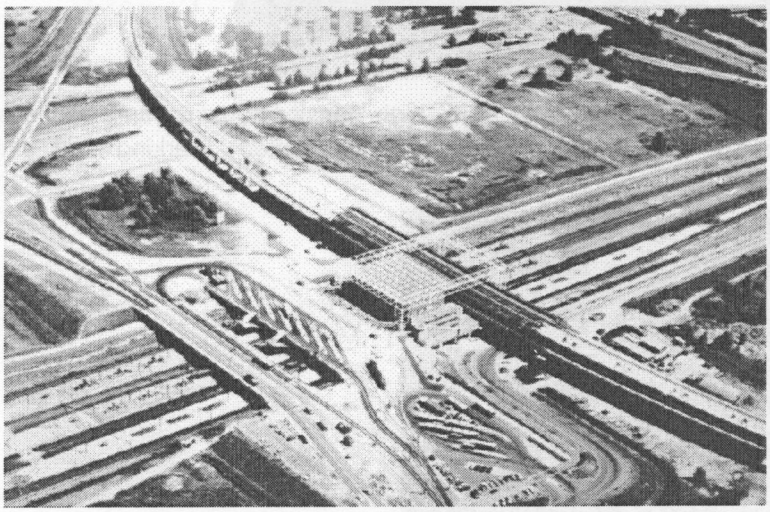
Left: Aerial view of the development. The boulevard with high density development alongside can be distinguished (**Wateringse Veld**).



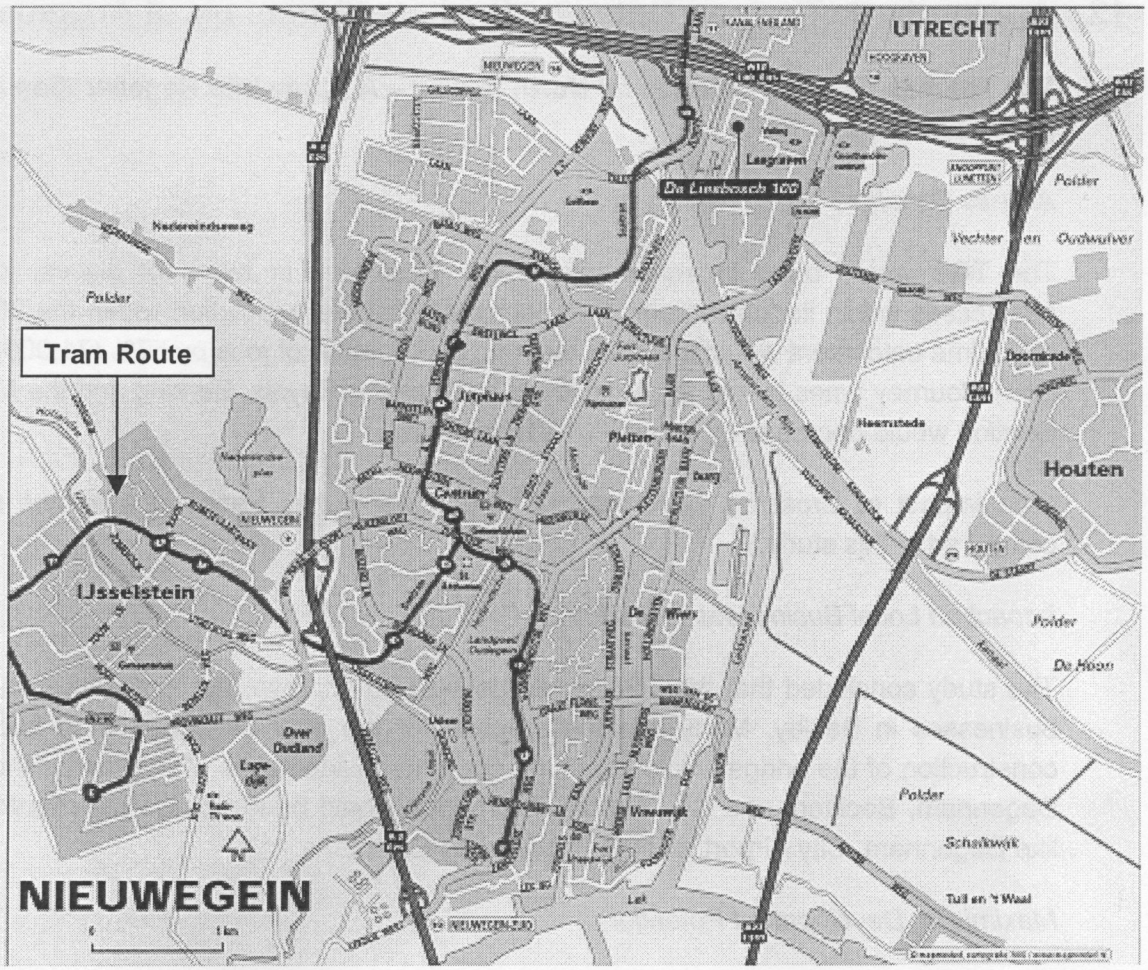
Above: Credible local public transport services (trams and buses) are integrated with two intersecting rail lines at **Sloterdijk**



Above: **Sloterdijk** is not just a transport interchange but also has significant office and other development within a short walk of the station



Above The **Sloterdijk** area under construction. As with Ebbsfleet, the area was developed from scratch.



Above: Map of Nieuwegein, showing the route of the tram through the development.