Report JRC6

Park Royal Transit

Preliminary report on a 'hub and spoke' system

Summary - basis for Park Royal Transit (PRT)

1. A primary policy objective for Park Royal City International is to secure major improvements to public transport so that it becomes a practical alternative to the car for more journeys to and within the development. This will unlock road network capacity and enable economic growth without being dependent on major road projects in West London for which there is neither space nor funding. *See report JRC1 on the overall transport elements.*

2. The scale of Park Royal City International and the Old Oak Central area is immense. Old Oak's triangular boundary set by the railway lines is 2.5 miles long. The wider zone extends from Kensal to Hanger Lane and Stonebridge Park, 3 miles distant, and is greater than the Royal Docks in area.

3. These distances merit a dedicated passenger distribution network centred on the Old Oak rail interchange, just as Docklands has its own Light Railway. The vision is to have a 'hub and spoke' Transit system – Park Royal Transit (PRT).

4. Initially it would serve Old Oak Central, and development areas at Kensal, Park Royal's Southern Gateway (North Acton), Eastern Gateway (Willesden Junction), and towards White City via the Hammersmith Hospital health community. Eventually PRT could become an extended network connecting more widely across the catchment.

5. PRT can be DLR-style, or automated mini-trams (Personal Rapid Transit) such as used now at Heathrow Airport. Conventional trams are not favoured because of the potential service intensity which does not work comfortably with manual tram driving. DLR is effectively an automated conventional tram.

6. With PRT, neighbouring developments will be only 3-5 minutes away from Old Oak Central which will offer high frequency Crossrail and extensive London region accessibility.

The objectives of a PRT system

7. The choice of the most appropriate Transit system is made by defining its primary purposes, the passenger demand characteristics, how different systems can be installed within existing and proposed land uses, and capital and operating costs.

8. The primary purposes are:
   - Internal travel within the area served, for both existing and new developments.
   - Access flows to the main London rail and tube networks from these locations.
   - Interchange flows between different railway stations.

9. There may be a requirement for PRT to serve a Park & Ride hub near the A40 and North Circular Roads, particularly with eventual expansion of the system through Park Royal industrial lands. This would support traffic management schemes to achieve further reduction of car commuting and road occupancy within the Park Royal lands, and to provide remote parking for the proposed HS2 Old Oak station (in the same way as remote parking is offered at airports).

Passenger demand and its effects on system design

10. Two of the three flows defined above are intermediate stages within a longer journey, and in those cases the main elements are other journey stages, not the Transit which is a link between them.

11. People will therefore put a premium on easy, quick and frequent access to get on with the journey, and reach the next journey stage as soon as possible. Transport modelling conventionally 'weights' walking and waiting time as twice the perceived value for in-vehicle times [1], and this is a direct reflection of how users see the importance of the travel elements.

12. So a high quality Park Royal Transit is important, and this will need to be built into evaluation of the different system options. It was this type of thinking which led in the 1980s to the London Docklands Development Corporation favouring an automated Transit system (now the Docklands Light Railway - DLR) rather than a more conventional street tramway which had been proposed by London Transport.

13. A cause and consequence of choosing a specific type of Transit is how it will interact with the proposed land uses and influence passenger use. For example, how close can stations be to each individual development, what scale of development (and passenger flows) can be accommodated on each type of system, and how will developers respond to the system being offered by proposing different development scales?

14. All this will affect the ultimate design type and capacity for an initial installation. If there was a large office location in one location, or a new housing estate in another, then what are the potential flows on an hourly basis and indeed every five minutes, and what size vehicles and stations are needed? Is the system design a case of individual 'pods' going direct between different stops 'on demand', or a more conventional service with different service overlays, some all-stops, others fast between primary hubs?

15. At this stage, because there are many different land ownerships it is presumed that individual land owners might seek to propose different developments, albeit within a masterplanning framework. Funding of individual intermediate stops might be a cost to the relevant developers (again subject to masterplanning of preferred station locations).

16. It is preferable that lessons are learnt from experience, with adequate capacity and infrastructure design within Park Royal Transit, to be specified as passive provision (easily capable of being added), if not physically built during early phases.

[1] 2½ times waiting time is used by Transport for London for its project assessment, 2 times is used in other modelling including the Department for Transport and the railway Passenger Demand Forecasting Handbook.

Accommodating foreseen growth in travel

17. DLR has shown the dangers of designing system capacity down to a minimum and then having to retrofit new capacity expensively. It has received new signalling, expansion of stations from 2 car to 3 car (each car is actually a large articulated tram holding more than 250 people), an entire new fleet of trains, additional power supplies, and structural strengthening of the viaducts and track to carry the additional train and passenger volume. It has amounted almost to total reconstruction of the railway apart from some basic civil engineering.

18. DLR has been a great success despite its rebuilds, and is now the primary public transport distributor throughout upstream docklands. DLR serves 11 rail hubs, at Canary Wharf, Stratford, West Ham, Canning Town, Woolwich, Lewisham, Limehouse, Bow, Shadwell, Bank/Monument and Fenchurch Street/Tower Hill. It allows the East and SE London rail networks to access the heart of Docklands developments and also provides cross-river corridors for intra-London travel. It serves London City Airport.

19. DLR has expanded continuously since the original scheme opened in 1987 and is now (June 2011) carrying 78 million passengers a year.[2] This is 5% above the current year's budget and nearly 13% above last year (with use of new 3-car trains). Rail travel is forecast to double in the next 30 years nationally. Greater London's population and employment growth forecasts, when applied by TfL to its own transport modelling, show a projected 67% increase in London rail journeys by 2031.[3]

20. The need for Transit to have a high system quality from the start underpins a clear policy and marketing statement about Park Royal City International's wider qualities and objectives. As already noted, the location of Transit stops will be a determinant of how individual localities can be transformed within the development. The recorded growth in DLR usage and the scale of expected future growth in London rail travel are also practical reasons why a bus-based internal Transit system will be neither appropriate nor adequate.

DLR, Personal Rapid Transit or conventional tram?

21. It is too early to be precise about system choice, though there are pointers. System choice should be part of the masterplan process and incorporated within a funding and phasing strategy.

22. A private right-of-way will be important. Sharing servicing roads with distributor traffic and other local flows will not support system objectives of high quality performance and dependable journey times.

23. Because a Transit system will need to fit around many existing developments and the complex mesh of railway lands, canal and green spaces, much of the network is likely to

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[2] TfL Operational and Financial Performance and Investment Programme Reports to TfL Board, 29 June 2011: http://www.tfl.gov.uk/assets/downloads/corporate/Item05-Board-29-June-2011-financial-investment-reports.pdf

[3] TfL's Recommendations for the High Level Output Specification for 2014-2019 (HLOS2), para 4.1.6: http://www.tfl.gov.uk/assets/downloads/corporate/Item05-RUP-12-July-2011-HLOS2-recommendations.pdf

be elevated or in cutting, depending on the locality. Street level routes would curtail pedestrian and cycling accessibility across the terrain, whereas a design objective is to support widespread local use of green modes.

24. Stop locations and frequency are an important factor. These will influence the development characteristics for each catchment. Although typically schemes such as street tram and DLR have been designed around stop catchments of 600-800 metres on the 'trunk' sections of route, there are many instances within DLR of frequent sequences of stops allied to specific developments.[4] So DLR, Personal Rapid Transit and conventional tram can all offer a relevant availability for each local development, as well as offering quick journeys to and from the primary hubs.

25. A significant disadvantage of the conventional, manually driven tram is the variability of driving styles and the over-riding requirement, looking ahead, for high frequency trams following closely one behind the other at reasonably high speeds. If these operational needs become a priority at Park Royal, then this demands automated driving systems to achieve predictable performance and safe braking at junctions and stops. At this point the specification points towards a DLR or Personal Rapid Transit type of operation. DLR is effectively an automated tram.

26. The choice between DLR and Personal Rapid Transit may come down to system capacity vs. start-up costs.

27. Personal Rapid Transit – as seen as Heathrow Terminal 5 and elsewhere – is an automated supply of 'pods' carrying 4-30 passengers a time plus luggage, with top speeds of up to 25 mph, and capable of intelligent programming with close separation of pods, with each being capable of going directly to a different destination.

28. At Heathrow it is a 2.4 mile elevated and at-grade system which links the business car park and the main Terminal 5A building. The system opened to public usage in May 2011, although its usage is currently described as passenger trials, with a general opening forecast during the summer of 2011. *(17 Oct 2011 note: now fully open and carrying 1,000 passengers per day.)*

29. This system has been designed by Bristol-based Advanced Transport Systems (ATS) to their 'ULTra' design. The intention is that an expanded ULTra will eventually transport passengers around the perimeter to other car parks and to the Central Terminal Area.

30. System costs at Heathrow are commercially confidential. ATS quote [5] the total cost of the Heathrow system (vehicles, infrastructure and control systems) at between £3 million and £5 million per kilometre of guideway.[6] It requires 21 'pods' operating 22 hours a day.

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[4] For example, the Isle of Dogs area (West India, Canary Wharf, Heron Quays, South Quay) has stops between 200-300 metres apart (measured as a straight line between stops), and catchments are generally specific to each station because of the intervening docks. In the Royal Docks, Royal Victoria, Custom House and Prince Regent stations are only 500 metres apart, with an average catchment radius of under 300 metres.

[5] http://en.wikipedia.org/wiki/ULTra

[6] "ULTra FAQ", ULTra PRT site

31. It is expected that Heathrow users will wait an average of around twelve seconds with 95% of passengers waiting for less than one minute for their private pod which will travel up to 40 kilometres per hour (25 mph). If the pilot project is successful, BAA have indicated that they will extend the service throughout the airport and to nearby hotels using 400 pods.

32. Start-up system costs are therefore much lower than DLR, even if there are other costs not yet anticipated. A DLR cost comparator is the Stratford International - Canning Town line, which has just opened *(on 31 August 2011)* and uses a former railway line so the majority is 'free' right of way. Nevertheless the cost is put at £182.5m (the TfL-chargeable element of the project) for just over 5 kilometres, plus trains etc, so this is over £35m per kilometre.

33. It is for consideration whether an initial Personal Rapid Transit system, **with infrastructure designed for eventual conversion to DLR standards of capacity**, might be better value-for-money than going straight to DLR if initial usage were lower. Such an approach could also be better than designing a Personal Rapid Transit down to a minimum capacity which could then require large scale rebuilding to suit a higher capacity system in a future decade.

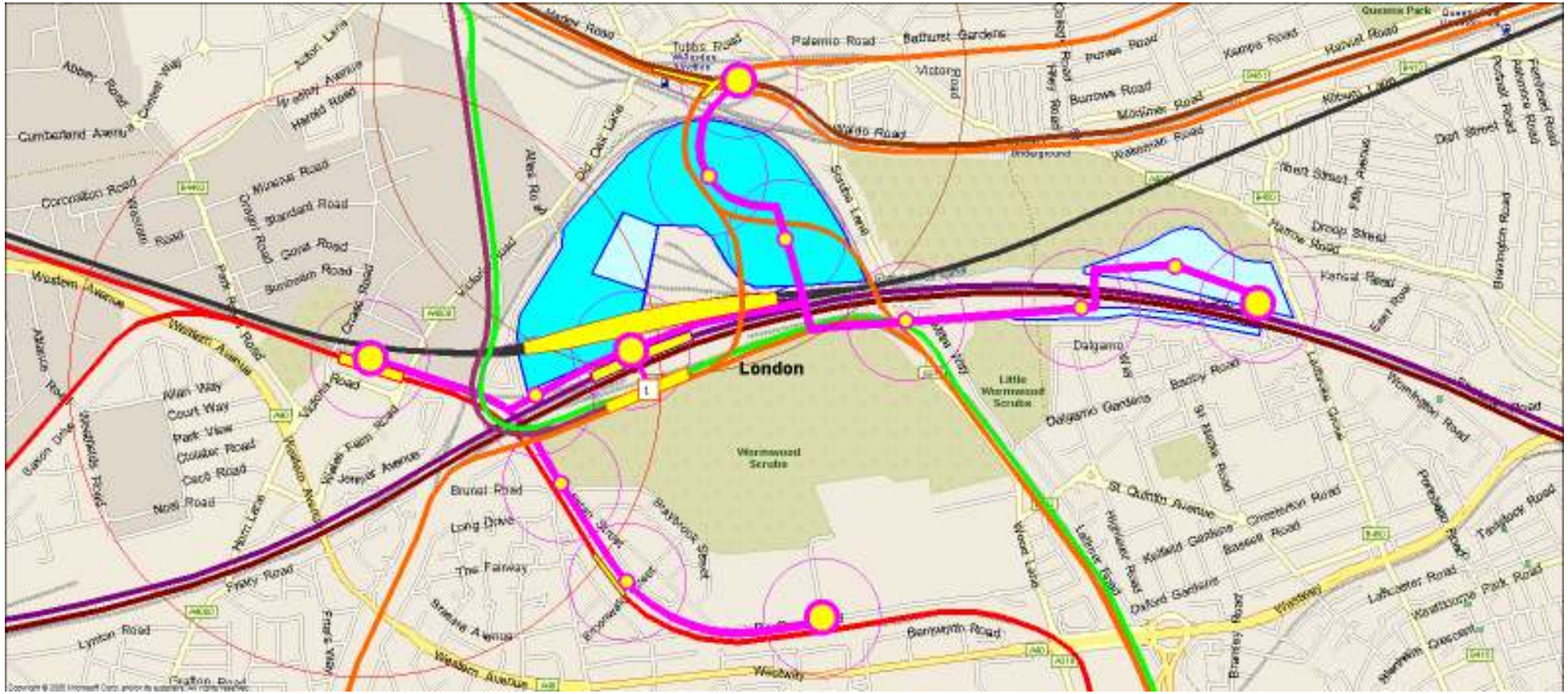
34. Other costs and benefits should be considered, including any desired staffing presence on a public Transit system: Heathrow 'pods' are wholly automated, DLR has a train captain on each service and no staff at stops. DLR has close operational collaboration with the British Transport Police and the local Metropolitan Police forces.

System extent

35. Farrells has set out an extensive vision for the whole Park Royal City International zone, and has identifed the potential to extend Park Royal Transit across the zone. This has been shown diagrammatically in the vision documents.

36. This JRC report focuses on the validity and relevance of a Transit system, potential system characteristics and the implications for system specification. This takes account of local topography and availability of alignments, as well as operational factors which will influence service provision. The JRC research therefore considers transport elements in a geographic rather than diagrammatic context. A map overleaf shows a potential PRT initial network, allied to Option 1 for an Old Oak interchange hub including Orbital services.

OUTLINE INITIAL SYSTEM FOR PARK ROYAL TRANSIT (PRT) based on 'hub and spoke' network



- Initial PRT system based on Old Oak Central interchange hub and Orbital routeing Option 1. *See report JRC2 for Orbital route options.*
- Catchment areas are shown as:
    - Major locations 1 kilometre radius from stops
    - Intermediate locations 200 metres, to reflect local choice in how existing built-up areas and future development zones can be served.