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**Secretariat memorandum**

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Agenda item 10  
Information paper LTW324  
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**Minimising disruption on London Underground – upgrading the Piccadilly Line**

**1. Purpose of report**

To present for information a discussion paper prepared for the London Assembly Transport Committee.

**2. Recommendations**

That the report is received for information.

**3. Equalities implications**

None.

**4. Financial implications**

None.

**5. Legal powers**

Section 248 of the Greater London Authority Act 1999 places upon London TravelWatch (as the London Transport Users Committee) a duty to consider – and where it appears to the Committee to be desirable, to make recommendations with respect to - any matter affecting the functions of the Greater London Authority or Transport for London which relate to transport (other than of freight).

## **Minimising Disruption on London Underground**

### **Upgrading the Piccadilly line**

#### **A discussion paper prepared for the London Assembly Transport Committee**

#### **Executive Summary**

- A. Concern is being expressed that it will be unacceptable to passengers and stakeholders for the forthcoming Piccadilly line upgrade to be undertaken by using weekend closures. This view has arisen because of current experience with the Jubilee and Victoria line upgrades. The Piccadilly line carries even more passengers and serves even more busy leisure locations than these two lines.
- B. The previous managing director of London Underground (LUL) suggested that Tube Lines might, following the example of the Madrid Metro, install new signalling on the Piccadilly line without interrupting the train service.
- C. It would be highly desirable if this could be achieved, but there are several reasons to believe it may not be possible. Even if it is technically possible, it may impose extra costs which LUL could not afford.
- D. In any case there are other works, notably track renewal, which would require closures if they are to be achieved by the upgrade target date of 2014. Also, given LUL's financial position, there may be benefits in allowing longer (and therefore more cost effective) closures. This would chime with public discussion which has asked whether shorter total blockades of sections of the line would be less unacceptable than prolonged weekend disruption – worse pain but over sooner.
- E. At first sight the idea of total blockades on a major LUL line may seem quite unacceptable. This discussion paper therefore takes a high level look at how blockades on various sections of the line might be organised, what alternative LUL and National Rail routes would be available for passengers, what spare capacity these would have to carry diverted passengers, and what replacement bus services might be needed.
- F. The conclusion is that the idea of total blockades should not be dismissed out of hand. For passengers from the western end of the line in particular, there is a range of alternative routes which are not at present heavily crowded even in the peaks. These could probably cope with displaced Piccadilly line passengers, as the comprehensive LUL and National Rail network would enable the extra load to be spread around several lines.
- G. It is a great help that by the time Piccadilly line upgrade works have to start in earnest around 2012, current investment in several alternative routes will have come to fruition and will provide significant extra capacity.

- H. At the northern end of the line, particularly on the busy “Green Lanes” corridor through Turnpike Land and Wood Green, the capacity of alternative routes would be more of a problem. Nevertheless we recommend that the idea of blockades be fully investigated.
- I. The key test will be a comparison between an upgrade strategy based mainly on weekend closures, and one based mainly on blockades, and the differences between them in terms of the duration of disruption and in costs.
- J. We therefore recommend that once the precise scope of the upgrade works is known, , LUL and Tube Lines should develop costed alternative plans. One would be based mainly on weekend closures and the other mainly on blockades.
- K. These two alternatives would then be put to consultation both with stakeholders and directly with Piccadilly line passengers. This consultation should include information about the relative costs of the alternatives and an indication of how the cheaper one might allow other improvements, e.g. improved interchanges or more stations provided with step-free access, to go ahead.

# Minimising Disruption on London Underground

## Upgrading the Piccadilly line

### A discussion paper prepared for the London Assembly Transport Committee

#### Introduction

1. Since 2003, as part of the Public Private Partnership (PPP), London Underground has been engaged in a programme of line upgrades. This major investment programme aimed, over many years, to recoup previously underfunded maintenance, install new signalling systems and with some new trains as part of the package. The outcome was to be improved reliability, more frequent trains and reduced journey times. Taken together, these features would increase carrying capacity by between 20% and 50%, depending on the line.
2. Work started with **track renewals** on most lines, as this was the area which had suffered most from underfunded maintenance. It soon became apparent that this could be done more quickly and more efficiently if the engineers were given longer access to the lines than the normal four hours or so per night, and longer even than occasional Sunday closures of sections of line in the suburbs. Thus began a policy of extensive Saturday and Sunday closures both in the suburbs and in the central area.
3. Meantime the **line upgrade work plans** were being developed, with the Jubilee (for completion in December 2009) and Victoria lines (2012, but new signalling to be installed by 2009) the first to be done. Since 2007 this has intensified the weekend closures, and on the Victoria line added weekday evening closures as well.
4. Although the heavy programme of weekend closures has coincided with a steady increase in weekend traffic, until recently the rest of the system seems to have coped quite well with passengers diverting around the closed sections. Indeed, passengers' **preference for staying on the tube**, rather than switching to replacement buses, has meant that provision of the latter was soon confined to the outer suburbs where alternative tube routes are some distance away from the closed sections of line.

#### Problems emerging

5. Despite the apparent high level of tolerance of disruption arising from this work, there have been **signs that there is a limit to what is acceptable** to passengers and to others with a legitimate interest in the operation of the tube. This view was aired by Tim O'Toole in his final days as managing director of LUL, when he spoke of the Piccadilly line upgrade (due for completion in 2014) and wondered if the number of weekend venues served by this line – plus its link to Heathrow - would require a different approach. The same question was raised at the London Assembly Transport Committee hearing on 8 July 2009, and since then there has been a rising current of dissatisfaction at what now seems to be an unending stream of Jubilee line weekend closures affecting access to Excel and the O2. **There is therefore now**

**an urgent need to find ways of minimising the disruption to the lives of Londoners resulting from extensive works on this heavily used line.**

6. The much higher level of weekend traffic on the Piccadilly line compared with the Jubilee line was referenced in the Transport Committee's secretariat report to the 8 July meeting in the following terms:

“As an indication of the potential disruption which could be caused by weekend suspensions to the Piccadilly line relative to those as a result of the ongoing Jubilee line suspensions, an average of around 23,000 passengers exited North Greenwich station (which serves the O2) in 2008; equivalent figures for stations on the Piccadilly line include: Piccadilly Circus 68,000, Leicester Square 64,000, Covent Garden 40,000 and Knightsbridge 33,000.”

7. In parallel with these developments, another major problem has emerged with the Piccadilly line upgrade – **funding**. There is disagreement between LUL and Tubelines as to what the second period PPP works – including the Piccadilly line upgrade – should cost. The difference is measured in billions. Ultimately it will be decided by the PPP Arbiter, but almost certainly whatever the precise outcome it will be higher than LUL can afford, in the wake of the Metronet collapse and lowered revenue as a result of the recession. **There will therefore be strong pressure on the one hand to organise the upgrade in a way which reduces the cost and defers expenditure as long as possible, but on the other hand to maintain the projected completion date of 2014.**

## **Are line closures necessary?**

8. When Tim O'Toole spoke about finding a better way to handle the Piccadilly line upgrade he made a comparison between London and Madrid and said that the latter had installed new signalling without closing lines. This appears to be a reference to Lines 1 and 6 in Madrid. For these the original contract specification included a requirement to install it without interrupting the normal train service. The contract was priced and awarded on this basis to Bombardier, one of the suppliers of modern railway signalling<sup>1</sup>.
9. Tube Lines intend to install a system supplied by a different manufacturer, Thales. This is the same as they are fitting on the Jubilee and Northern lines – using weekend closures – and there are very good reasons for the Piccadilly line to have the same system. The Thales system seems to be broadly similar to Bombardier's, so we can surmise that it could be installed without interrupting train services, but this is highly likely to increase the cost. Given the desirability of using the same system as on the Jubilee and Northern lines, LUL / Tube Lines' negotiating position could be weak, and of course (as already discussed) funding is a major issue for LUL.
10. If new signalling, at an affordable price, could be installed without line closures, then plainly that would be a good outcome. However this may only be attractive if new signalling is the only potentially disruptive ingredient of the upgrade. In a strict sense that is probably the case,

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<sup>1</sup>[http://findarticles.com/p/articles/mi\\_m0BQQ/is\\_2\\_45/ai\\_n9547601/](http://findarticles.com/p/articles/mi_m0BQQ/is_2_45/ai_n9547601/)

as it is the signalling (plus enhanced power supplies, but this work should not need closures) which delivers the promised 25% more capacity and 19% reduction in journey times.

11. However there is also the question of track renewals. It may be that contractually this is not part of the upgrade, but instead is part of the general PPP objective of improving performance and availability by catching up on the historic legacy of under investment. Nevertheless it makes no sense to install new signalling on old track, nor to run more and faster trains on track which is worn out or will be due for renewal anyway within (say) the next ten years. Therefore in practical terms we must regard track renewals as being part of the upgrade.
12. Technically it would be possible to renew track during the four hours or so that the Underground is closed each night. However the length which could be replaced each night would be so short, and the proportion of productive work time to set up and reinstating time so low, that it would take forever and cost a fortune. This is why, since the PPP started, there have been weekend closures all around the system – even on lines which are not yet being upgraded.
13. The reality therefore is that we face line closures to renew the track, and possibly to install the new signalling system if it is agreed that the Madrid experience does not provide an answer for London.
14. Of course some track on the Piccadilly line has already been renewed. We do not know exactly how much, but we do know that, in the first six years of the PPP, Tube Lines renewed 55 kilometres of track across its three lines (Jubilee, Northern, Piccadilly)<sup>2</sup>. That is roundly 10 km per year, the majority of which has been on the Jubilee and Northern lines.
15. There is therefore likely to be much Piccadilly line track renewal still to be done. How much might this be? The relevant length of the line appears to be about 56 route km, i.e. about 112 track km<sup>3</sup>. The upgrade is due for completion by 2014, so if Tube Lines maintains a track renewal rate of 10 km per year, that is 50 km which may need to be renewed between now and 2014. Even if only half that (25 km), needs to be renewed, it still implies a large number of weekend closures for just one line - and any closures for signalling renewal are likely to be additional.
16. We therefore conclude that, much as everyone would wish otherwise, **a very significant number of closures will be necessary**. We must therefore think seriously about how best to cope with them.

## Two problems

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<sup>2</sup> LUL PPP & Performance Report 2008 – 2009 Chapter 4, Table 5. Available at <http://www.tfl.gov.uk/assets/downloads/london-underground-ppp-performance-report-2008-2009.pdf>

<sup>3</sup> 56 route kilometres excludes the Heathrow Terminal 5 section (new in 2008), the Rayners Lane to Uxbridge section (part of the Metropolitan line and maintained by Metronet) and the Barons Court to Ealing Common section (joint with the District line and also maintained by Metronet). Judging by the number of closures which have already occurred on the Metronet sections, we assume that much of this track has already been renewed. We are grateful to the LUL Stakeholder Communications office for help in calculating the route length of the Piccadilly line.

17. The two problems are:

- How can closures be organised whilst minimising the disruption for Londoners?
- How can the upgrade work be organised to make best use of the limited money available?

## One solution to the two problems?

18. There are clear signs in the press and through other communication channels that the number of weekend closures now occurring on the Jubilee and Victoria lines, and in 2008 - 2009 the evening closures on the Victoria line, have stretched passengers' patience close to breaking point. This is despite a powerful public relations campaign by LUL to explain the benefits of this method of working, which for several years appeared to be effective.

19. Increasingly questions are being asked why such frequent closures are necessary and whether, if they are necessary at all, it would be better to go for total blockades and get the pain over more quickly.

20. Interestingly, even in Madrid where we have seen that the signalling works specified no closures, this summer has seen total blockades for up to six weeks on successive sections of circular Line 6 between June and September in order to change the electric current collection system<sup>4</sup>.

21. For Piccadilly line passengers, the balance of advantage between the two methods must depend on the duration of each individual blockade, the total duration of disruption before upgraded services are introduced, and the nature and quality of the alternative routes which can be offered.

22. For LUL and for their passengers as a whole, **total blockades should have important financial advantages**. One is that allowing contractors round-the clock access should greatly reduce the costs, because the need to reinstate the railway after short spells of work would be eliminated. It would no longer be necessary, to quote Tim O'Toole again, "to perform heart surgery on the patient while he plays tennis."

23. The other is that the **total duration of the project would be shorter**. To meet the 2014 target date, more time can be spent on planning the details of the work programme to help get the most efficient possible use of manpower and machinery. This should mean a higher quality more cost effective job – and less time on the high cost physical work. It also means that the heaviest expenditure will occur later, which is always a useful tool when facing a financial challenge.

24. In total, using **total blockades should reduce overall costs** and therefore reduce the need for cuts elsewhere in LUL's investment programme and thus help retain other planned improvements for passengers.

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<sup>4</sup> See <http://www.metromadrid.es/en/comunicacion/prensa/noticia217.html>

25. The matter of how the work is organised and what the financial advantages would be is one which only LUL can deal with. What the remainder of this paper seeks to do is put forward ideas about the **nature and quality of the alternative services which might be offered to passengers.**

## **Alternatives for passengers during blockades**

26. The key considerations for passengers are the availability of existing alternative transport facilities and what special replacement facilities are offered.

27. Both these factors are heavily influenced by the sections of the line which are blockaded, so it is helpful to understand the basic possibilities

## **Possible arrangement of blockades**

28. As with any railway, the key to planning blockades of the Piccadilly line is the **location of reversing points** – places where trains can terminate and go back the other way. In addition, any section of line which is to remain in operation must have access to one of the train **maintenance depots**, which are located at Northfields and Oakwood.<sup>5</sup>

29. Possible blockade sections, within the above constraints, are shown in the table which follows. This also shows alternative LUL and rail services, comments on the peak capacity situation on these alternative routes, and suggests likely needs for special bus services or enhancement of existing bus routes.

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<sup>5</sup> This access need not always be the full access required for normal service. There may be circumstances in which restricted access for a smaller than usual number of train is sufficient. It may also be possible to maintain trains temporarily at other locations such as Ealing Common and Lillie Bridge (near Barons Court), but this would involve technical and financial considerations which London TravelWatch cannot judge.



<b>Section blocked</b>	<b>Services still running</b>	<b>Associated consequences for services still running</b>	<b>Main alternative LUL / rail services from affected stations to / within central London</b>	<b>Comments on peak capacity on alternative services</b>	<b>Special buses needed (or existing bus routes enhanced as necessary)</b>
Uxbridge - Ruislip	Heathrow / Rayners Lane - Cockfosters	Metropolitan line only would serve Ruislip – Rayners Lane section	Uxbridge & Hillingdon – nil  Ickenham – Central line or Chiltern from West Ruislip	West end of Central line is not heavily crowded  Chiltern plan to introduce new 2 tph local service at London zonal stations in 2011	Uxbridge – Hillingdon – Ickenham – West Ruislip - Ruislip
Ruislip – Rayners Lane  Also no Metropolitan line service Ruislip – Harrow on the Hill	Heathrow / South Harrow - Cockfosters	Metropolitan line shuttle service Uxbridge - Ruislip	Ruislip - Central line from Ruislip Gardens Central line or Chiltern from West Ruislip  Ruislip Manor - Central line from Ruislip Gardens  Eastcote - nil  Rayners Lane – Metropolitan line from North Harrow  West Harrow - Metropolitan line from North Harrow or Harrow on the Hill	West end of Central line is not heavily crowded  Chiltern plan to introduce new 2 tph local service at London zonal stations in 2011  Metropolitan line will introduce new trains from 2010 – fewer seats but higher total capacity	Uxbridge – Hillingdon – Northolt  Hillingdon - Ickenham – West Ruislip – Ruislip – Ruislip Manor – Eastcote – Rayners Lane – North Harrow  Rayners Lane – South Harrow
Rayners Lane– South Harrow	Heathrow / South Harrow - Cockfosters	Metropolitan line only would serve Uxbridge – Rayners Lane section	Uxbridge – Rayners Lane use Metropolitan line	Metropolitan line will introduce new trains from 2010 – fewer seats but higher total capacity	Rayners Lane – South Harrow

Section blocked	Services still running	Associated consequences for services still running	Main alternative LUL / rail services from affected stations to / within central London	Comments on peak capacity on alternative services	Special buses needed (or existing bus routes enhanced as necessary)
South Harrow – Acton Town  <i>Would not allow blockade at Ealing Common, (i.e. between Hanger Lane Jct. &amp; Acton Town) as this would prevent District line access to Ealing Broadway However Piccadilly line would be blocked through Ealing Common</i>	Heathrow - Cockfosters	Metropolitan line only would serve Uxbridge – Rayners Lane section	South Harrow – Chiltern from Northolt Park or Central line from Northolt  Sudbury Hill – Chiltern from Sudbury Hill Harrow or Central line from Greenford  Sudbury Town – Chiltern from Sudbury & Harrow Road or Bakerloo line or London Overground from Wembley Central  Alperton – Central line from Perivale or Hanger Lane, or Bakerloo line or London Overground from Stonebridge Park  Park Royal – Central line from Hanger Lane or West Acton  North Ealing – Central or District lines from Ealing Broadway or Central line from West Acton	West end of Central line is not heavily crowded  Chiltern plan to introduce new 2 tph local service at London zonal stations in 2011  London Overground, Bakerloo line and west end of Central line are not heavily crowded	South Harrow – Northolt Park – Northolt  Sudbury Hill – Greenford  Sudbury Town – Wembley Central
Heathrow T5 – T123	Heathrow T4 / Uxbridge – Cockfosters		Heathrow Connect to Paddington (also Heathrow Express if acceptable financial terms can be agreed with BAA)	Heathrow Connect plan to increase service to 4 trains per hour (tph) (100% capacity increase) from 2012 / 13	
Heathrow T4 loop	Heathrow T5 / Uxbridge - Cockfosters		Heathrow Connect to Paddington (also Heathrow Express if acceptable financial terms can be agreed with BAA)	Heathrow Connect plan to increase service to 4 tph (100% capacity increase) from 2012 / 13	

Section blocked	Services still running	Associated consequences for services still running	Main alternative LUL / rail services from affected stations to / within central London	Comments on peak capacity on alternative services	Special buses (or existing bus routes enhanced as necessary)
Heathrow T123 – Hatton Cross	Hatton Cross / Uxbridge - Cockfosters		Heathrow Connect to Paddington (also Heathrow Express if acceptable financial terms can be agreed with BAA)	Heathrow Connect plan to increase service to 4 tph (100% capacity increase) from 2012 / 13	
Hatton Cross – Hounslow Central	Hounslow Central / Uxbridge - Cockfosters		<p>Heathrow - Heathrow Connect to Paddington (also Heathrow Express if acceptable financial terms can be agreed with BAA)</p> <p>Hatton Cross – Heathrow 123 for Heathrow Connect or Feltham for South West Trains</p> <p>Hounslow West - nil</p>	<p>Heathrow Connect plan to increase service to 4 tph (100% capacity increase) from 2012 / 13</p> <p>SWT / Network Rail plan to lengthen trains (25% capacity increase) from December 2012</p>	<p>Hatton Cross – Heathrow 123</p> <p>Hatton Cross - Feltham</p> <p>Hatton Cross - Hounslow West – Hounslow Central</p>
Hounslow Central - Northfields	Northfields / Uxbridge – Cockfosters		<p>Heathrow – Hatton Cross – Hounslow West – as above</p> <p>Hounslow Central - South West Trains from Hounslow</p> <p>Hounslow East – South West Trains from Isleworth</p> <p>Osterley – South West Trains from Syon Lane</p> <p>Boston Manor – Piccadilly line from Northfields</p>	<p>SWT / Network Rail plan to lengthen trains (25% capacity increase) from December 2012</p>	<p>Hatton Cross - Hounslow West – Hounslow Bus Station (for Hounslow East) – Isleworth</p> <p>Hatton Cross – Osterley – Syon Lane - Northfields</p>
Northfields – Acton Town					
4-track section – total blockade should not be necessary					

Section blocked	Services still running	Associated consequences for services still running	Main alternative LUL / rail services from affected stations to / within central London	Comments on peak capacity on alternative services	Special buses needed (or existing bus routes enhanced as necessary))
Acton Town – Hammersmith  4-track section shared with District line – total blockade should not be necessary	Uxbridge – Acton Town  Heathrow – Cockfosters	District line service is relatively infrequent  Therefore should be possible to run reduced Piccadilly line service, e.g. maintain Heathrow service, run Uxbridge branch as shuttle service to Acton Town plus limited additional trains Barons Court - Cockfosters			
Hammersmith – Hyde Park Corner	Heathrow – Hammersmith  Uxbridge – Acton Town  Hyde Park Corner - Cockfosters	Reduced frequency Hyde Park Corner – Cockfosters	District line Hammersmith – South Kensington, plus onwards to Temple provides alternative for section to Holborn	See Appendix 1 for possible ways of increasing District line capacity if necessary	
Hyde Park Corner – Kings Cross	Heathrow – Hyde Park Corner  Uxbridge – Hammersmith  Kings Cross - Cockfosters	Reduced frequency Hammersmith – Hyde Park Corner  Reduced frequency Kings Cross – Cockfosters	District line Hammersmith – South Kensington, plus onwards to Temple provides alternative for section to Holborn  Victoria line from Victoria provides alternative route north to Finsbury Park  Northern line provides alternative link from Embankment (District line) to Warren St. (Victoria line)	See Appendix 1 for possible ways of increasing District line capacity if necessary  From 2012 the Victoria line upgrade will provide 19% increase in capacity  From 2012 the Northern line upgrade will provide 20% increase in capacity	

Section blocked	Services still running	Associated consequences for services still running	Main alternative LUL / rail services from affected stations to / within central London	Comments on peak capacity on alternative services	Special buses needed (or existing bus routes enhanced as necessary))
Kings Cross – Wood Green	Heathrow – Kings Cross  Uxbridge – Hammersmith  Wood Green - Cockfosters	Reduced frequency Hammersmith – Kings Cross   Reduced frequency Wood Green – Cockfosters	Victoria line provides alternative route north to Finsbury Park  London Overground from Caledonian Road to Highbury for Victoria line  Holloway Road – Victoria line from Highbury  Arsenal – Victoria line from Finsbury Park or First Capital Connect from Drayton Park  Finsbury Park – Victoria line  Manor House –nil  Turnpike Lane - First Capital Connect from Hornsey  Wood Green - First Capital Connect from Alexandra Palace	From 2012 the Victoria line upgrade will provide 19% increase in capacity   From 2011 London Overground will provide over 50% increase in capacity   See Appendix 2 for First Capital Connect capacity issues  ??	
Wood Green – Arnos Grove	Heathrow – Wood Green  Uxbridge – Hammersmith  Arnos Grove - Cockfosters	Reduced frequency Hammersmith – Wood Green	Bounds Green - First Capital Connect from Bowes Park  Arnos Grove - First Capital Connect from New Southgate or Northern line from Woodside Park	From 2012 the Northern line upgrade will provide 20% increase in capacity	Arnos Grove – Woodside Park

Section blocked	Services still running	Associated consequences for services still running	Main alternative LUL / rail services from affected stations to / within central London	Comments on peak capacity on alternative services	Special buses needed (or existing bus routes enhanced as necessary))
Arnos Grove - Cockfosters  <i>Blockade to be one track at a time, so that access to train depot at Oakwood is maintained. This would be necessary to provide sufficient trains to operate full service west of Arnos Grove</i>	Heathrow / Uxbridge – Arnos Grove  Limited shuttle service on single track Arnos Grove – Cockfosters	Possibly confine shuttle service to Arnos Grove – Oakwood during peaks – 3 tph would provide sufficient capacity for Oakwood and Southgate passengers <sup>6</sup>	Cockfosters – Piccadilly line shuttle to Arnos Grove when trains running west of Arnos Grove  Otherwise – Cockfosters & Oakwood – Northern line from High Barnet	From 2012 the Northern line upgrade will provide 20% increase in capacity	Cockfosters – Oakwood (peaks) when trains running west of Arnos Grove  Oakwood – Cockfosters – High Barnet

The blockades shown in this table are only illustrative. Some may not be necessary. In other cases it may be necessary to combine adjacent sections for short periods in order to work at the boundaries.

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<sup>6</sup> As per passenger data supplied by LUL Stakeholder Communications office

## How will passengers change their journeys?

30. It is difficult to predict how passengers would change their journeys to cope with blockades. Much obviously depends on –
- what is available
  - existing levels of crowding
  - how close are alternative stations
  - the quality of bus links to them
  - arrangements regarding fares (particularly for non-travelcard holders).
31. However, two things are certain. One is that many people, even if they have lived or worked in the same place for years, know little about the proximity of other stations or lines and even less about the routes which they offer. The other is that in the early days of a blockade they may experiment and change their selection of routes in light of experience.
32. These factors mean it is vital that LUL provide a range of effective publicity to explain the options. This should include the offer of one-to-one advice (based on time of day and on origin and destination post-codes) by telephone, e-mail, and personally at stations.
33. They also mean that after the first couple of weeks of each blockade, LUL should review what is happening and make appropriate adjustments to what is provided.

## Capacity on alternative routes

34. Importantly, alternative rail and LUL routes will have substantially increased capacity by the time Piccadilly line closures become necessary. As can be seen from the table, this would make it easier to handle total blockades on the Piccadilly line than would have been possible in the past.
35. The greatest difficulty finding reasonable alternative routes into central London is likely to be felt by users of Turnpike Lane and Wood Green, where nearby First Capital Connect trains will – as plans now stand – not benefit from any capacity increase and the alternative bus route via Green Lanes to Finsbury Park is lengthy and prone to traffic congestion<sup>7</sup>.

## Organisation of special bus services

36. An advantage of total blockades over weekend closures is that it becomes possible to operate replacement bus services with **full time drivers and dedicated fleet of buses**.
37. Full time drivers can become fully familiar with the route and any specific problems which may arise. Dedicated buses mean that they can be **tailored to the differing needs of each route**, so that (for example) longer routes such as Arnos Grove – Woodside Park would be planned for

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<sup>7</sup> See Appendix 2

double-deckers with ample seats, whereas short routes could have single-deckers geared for rapid loading and unloading.

38. Consideration could also be given to **different methods of working in the two peaks**. In the morning, when passengers can plan their journeys with some precision, it would be appropriate to run buses to an advertised timetable. On the way home, it would be better to plan on the basis that buses run at a specified maximum interval but that sufficient are available at the starting point that each bus can depart as soon as all seats are taken.

## Conclusion

39. The analysis in this paper suggests that, if closures are necessary, then upgrading the Piccadilly line by use of total blockades could be a practical proposition and one which – if well organised and well explained – most passengers may accept as an alternative to the prospect of an extended period of short closures.
40. It looks easier at the west end of the line and in the central area, where there is a close relationship with the District line and there are several alternative routes which are not – or by the relevant date will not be – heavily crowded.
41. The north end of the line looks more difficult because there are fewer alternative routes and less spare capacity. The balance of judgement here will be more difficult and much will depend on the duration of blockades as against the number of weekend closures which would otherwise be necessary.
42. The sensible course would be, once the precise scope of the upgrade works is agreed, for LUL and Tube Lines to develop costed alternative plans. One would be based mainly on weekend closures and the other mainly on blockades.
43. These two alternatives would then be put to consultation both with stakeholders and directly with Piccadilly line passengers. This consultation should include information about the relative costs of the alternatives and an indication of how the cheaper one might allow other improvements, e.g. improved interchanges or more stations provided with step-free access, to go ahead.

Any enquiries regarding this paper should be addressed to:

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## Appendix 1

### Increasing District line capacity to carry Piccadilly line passengers from the west

When Piccadilly line blockades affect the area east of Hammersmith, either by service suspension or by reduced frequencies, the District line can offer a parallel route as far as South Kensington and then a near parallel route as far as Temple for (Holborn).

From 2011 new trains on the Circle line will release existing trains which can be used to supplement the District line if necessary. These could provide extra District line trains from the west as far as Mansion House. According to the number of trains available and line capacity (i.e. signalling), options might include Kensington Olympia – Mansion House (existing Olympia – High St. service diverted), Ealing Broadway – Mansion House or Uxbridge / Rayners Lane / South Harrow – Mansion House<sup>8</sup>.

To accommodate extra District line trains between Hammersmith and Mansion House it may be necessary to increase the signalling capacity of the line. A possible way of doing this would be to reintroduce the speed-control signalling system which was used on the District line from the 1950s to allow operation of up to 40 tph. It was removed in the 1970s to save maintenance costs when reduced demand no longer required such an intensive service. This system used conventional technology and much of the necessary equipment could now be salvaged from the Jubilee line when its existing signalling is replaced by its upgrade at the end of this year<sup>9</sup>.

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<sup>8</sup> Although the Rayners Lane – Ealing Common section is served only by the Piccadilly line, it can accommodate the large size District line type trains.

<sup>9</sup> London TravelWatch referred to this system at the Transport Committee's hearing on 8<sup>th</sup> July. Another witness responded by saying that the system worked "... but it relied on the integrity of the driver not to pass a signal and it was actually found to be a contributory factor in some collisions."

So far as relying on the integrity of the driver is concerned, the whole point of the system was that it was designed to ensure that if a driver was going too fast the signal ahead of him would stay at red and, if he failed to stop at it the train's brakes would be automatically applied and bring it to a stop a safe distance behind the train in front. In other words, a signal would only change to green if speed measurement proved that the train was going slowly enough.

Regarding collisions, we have examined the official accident reports since the 1950s and find that only one collision on LUL involved speed control signalling. This was on the Central line at Holborn in 1980 when a driver totally ignored two red signals and collided with a train standing in the platform ahead. The Inspecting Officer noted that "... the collision that resulted was greatly reduced in severity" by the automatic braking system, that injuries were minor and only the driver and one passenger were detained overnight in hospital. Most important, this system was different from the one used on the District line and it did not include the key feature of frequently measuring the speed of the train as it approached the station to ensure that if a driver passed a red signal it would be stopped a safe distance behind the train in front.

## **Appendix 2**

### **Capacity issues on First Capital Connect**

The closest alternative rail route for the Piccadilly line north of Turnpike Lane is the First Capital Connect (FCC) line from Welwyn Garden City / Hertford East and Moorgate. At the moment this is heavily congested in the high peak, particularly between Alexandra Palace and Finsbury Park or Highbury.

FCC and Network Rail have a funded scheme to increase capacity, in order to run more trains. The rolling stock – transferred from London Overground as their new trains are delivered – will be available very soon. However the Network Rail infrastructure works, which involve upgrading of tracks and reinstatement of a platform at Finsbury Park, are not scheduled for completion until March 2014. This is likely to be too late for the Piccadilly line upgrade works.

An obvious option would be to bring the Network Rail works forward. However if this proves impracticable, consideration could be given to using the extra rolling stock to run additional shuttle services between Bowes Park and Moorgate or Kings Cross. This would mean operating the route closer to its theoretical line capacity than at present, thus reducing the margins for recovery from delays and impacting on punctuality. As the latter is a key target on which national rail operators are measured, it may be necessary to negotiate a derogation with the Department for Transport.

If no solution can be found to increasing high peak capacity on FCC, and taking into account the bus issues along Green Lanes as discussed above, then unless some innovative thinking can be brought to bear, it might be necessary to conclude that a total blockade of the Piccadilly line section between Kings Cross and Wood Green would be unacceptable.