

Manchester Metrolink Tram System

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Introduction to Greater Manchester

The City of Manchester (pop. 500,000) is at the heart of the Greater Manchester conurbation comprised of 10 municipalities that is home to 2.5 million people. The municipalities appoint a Passenger Transport Authority (PTA) for the whole area to set policies and the Greater Manchester Passenger Transport Executive (GMPTe) to implement them. Buses provide most public transport. They are deregulated and can compete with each other and with other modes. There is a local rail network serving Manchester, and linking it with the surrounding areas and also other regions of the country. Street trams vanished from Greater Manchester in 1951, but returned in a very different form in 1992. This article outlines the development of the new system and explores the reasons for choosing trams. It then goes on to analyze the factors that have made the system successful. Finally, expansion of the system is discussed.

Why Manchester Chose Trams?

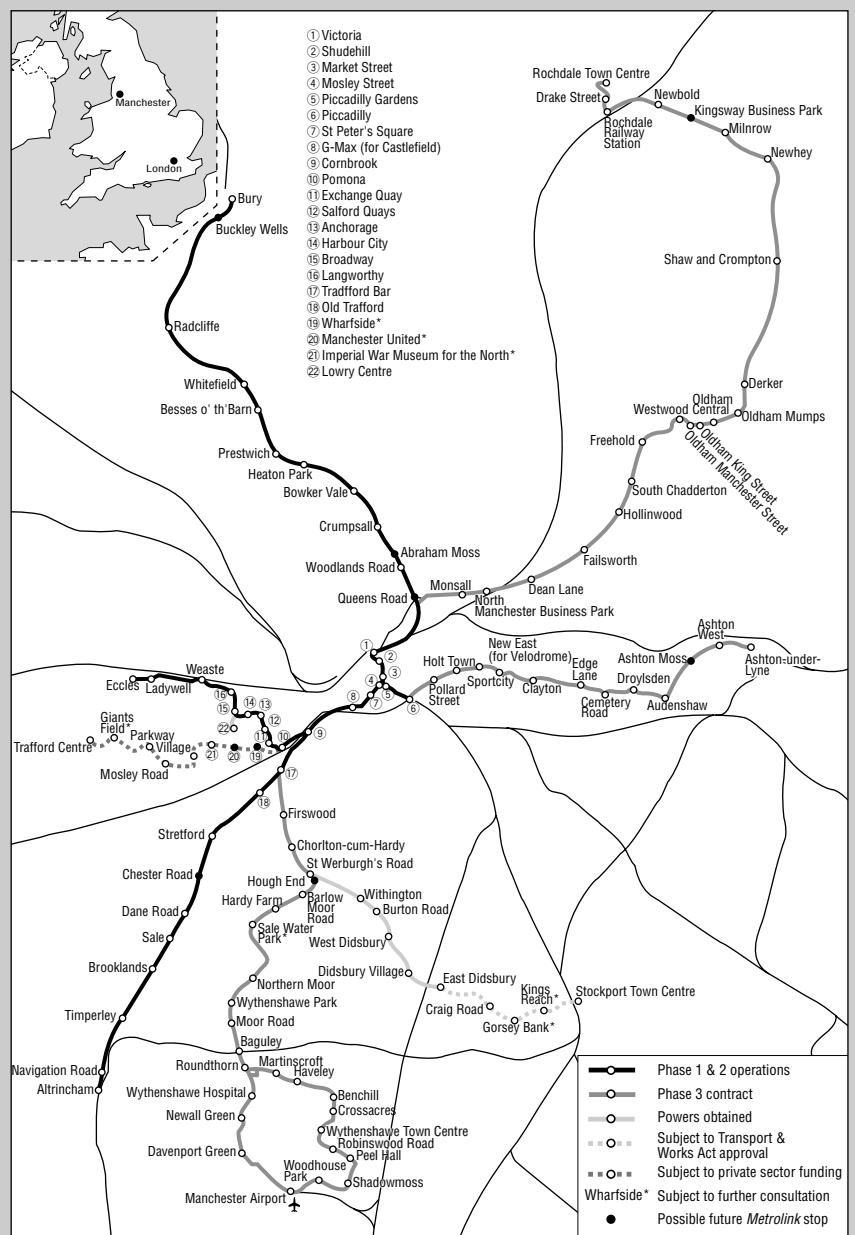
In the mid-1980s, the local rail network was in need of major investment in new rolling stock, power supply and signalling. It also suffered because the stations in central Manchester were at least 1 km from most passengers' destinations in the Central Business District and the main shopping and entertainment areas. As a result, the subsidy bill was increasing as the quality of service was getting worse because of the old infrastructure and rolling stock. The PTA was paying more and more and getting less and less so it initiated a comprehensive study of options for the future of the local rail network in 1982. A wide range of options for the future of the network was examined, ranging from building a tunnel under the centre of the

city that could be used by local rail services—taking them into the central area—to complete closure and replacement of the services by buses. Two options were to convert some heavy rail lines to light rail (tram) and extend them

into the city centre either in tunnel or on the street.

I carried out an appraisal of these options and showed that closure of the lines had a negative benefit-to-cost ratio, and that—at the very least—they should be kept

Figure 1 Metrolink Future Network



Source: GMPTe, 2003

open in some form. If they were to be extended into the city centre, light rail conversion with a surface tram line in the city would have the highest benefit-to-cost ratio because it was the lowest-cost way to provide access to the city centre.

These two options were taken forward into further appraisals that showed that the tram option was the better of the two in cost-benefit terms. The PTA adopted the tram option as policy and in 1988, the GMPTE obtained the statutory powers to build and operate it, followed in 1988 by agreement from central government of a grant towards the construction costs.

Delivering the System

Besides being the first modern light-rail street system in the UK, Manchester also developed a new form of business concept by involving the private sector in operation of the system. The government of the day insisted that the private sector should play a role in operating the new system. This was consistent with government deregulation and privatization of most bus services outside London and later privatization of the rail network between 1993 and 1997.

A new form of contract was devised for the tram—Design, Build, Operate, and Maintain (DBOM). As the name suggests it combines a conventional design and build contract with a concession to operate and maintain the system for a period of 15 years. Financial estimates by GMPTE showed that passenger revenue on the tram system would exceed operating costs but would not cover the initial construction costs.

Bids from consortia for the DBOM contract comprised two elements: the cost of building the system, and the amount that they were prepared to pay for the right to operate the system accepting both the cost and revenue risks for the 15-year period. In the event, the

construction cost was £160 million (£1 = US\$ 1.80) and £5 million was offered for the operating concession.

The main terms of the operating concession are that GMPTE sets the minimum frequency of the services and periods of operation and specifies the levels of reliability that have to be achieved. The operator can set fares but is in competition with commercial bus services and pays all the system operating costs.

Construction took place between 1990 and 1992. Two local heavy rail lines were selected for conversion to the tram network—one to the north of the city and one to the south. They were connected by 2.5 km of on-street track in the city centre, most of which is segregated from other traffic. Both local rail lines terminated at purpose-built bus–rail interchanges (Fig. 1) in the centres of the towns they served (Altrincham in the south and Bury in the north). Passengers from the north were given direct access to the main national and inter-regional rail station at Piccadilly for the first time and passengers on both lines get direct access to the city centre.

Services

Services on the local rail lines before they were converted to trams ran every 10 minutes during the Monday–Friday peak hours, every 15 minutes between the peaks and all day on Saturdays, and every 30 minutes in evenings on the Altrincham line on Sundays. (The Bury line had no trains on Sundays.) By contrast, the trams provide a 6-minute service from 07:00 to 18:00 on Mondays to Saturdays and a 12-minute service at most other times (a 15-minute service runs on Sunday evenings). The trams also run for longer each day than the rail services did.

When the system was built, Europe had no low-floor trams in mass production and all the stations on the former railway lines had high platforms, so the system uses

high-floor trams. In the city centre, most stops have high platforms although two have low platforms with a high section at one end. This makes the system fully accessible to the mobility impaired, including passengers in wheelchairs and those with heavy luggage, shopping or children in pushchairs.

This first phase of the system is 31-km long with 25 stops, five of which are in the city centre; a sixth stop in the city centre was opened in 2003. Of the 20 former railway stations, 16 are now entirely tram stops, two are shared between tram and local trains on separate platforms, and two are parts of larger city-centre rail stations. The average distance between stops is 1.3 km. Twenty-six trams that can each carry up to 206 passengers provide the services. Up to 23 trams are in service during the Monday–Friday peaks and 25 are sometimes in service.

Impacts

The tram system opened in sections between April and November 1992 and was an instant success. The local railway lines had been carrying about 7.6 million passenger journeys each year when they were closed for conversion to trams. In the year to 31 March 1994, the trams carried 11 million passenger journeys—20% of whom would otherwise have used the car. I estimated that patronage would settle at 12 million passenger journeys per year after 2 years of operation of the full service. This level was achieved by the end of 1994, just over 2 years from the start of the full service in November 1992. These initial patronage levels have continued to grow. By 1997–98, patronage had risen to 13.8 million passenger journeys, reaching 15 million passenger journeys in 2002–03, or more than double the patronage on the old local railway services.

The tram increased its market share for



Metrolink at St Peter's Square in the business district. The system is fully accessible to the mobility impaired. (GMPTe)



A busy Metrolink in central Manchester (GMPTe)

journeys to central Manchester from the immediate catchment areas of the stops to 58% from the former 17% achieved by the trains. The car's share for these trips has fallen from 55% to 33% while the bus' share has fallen from 28% to 9%. As a result, traffic levels on roads running parallel to the tram services have fallen by up to 10%, reducing both congestion and pollution. The tram uses less primary energy per passenger-km than any other mode and the environmental impact is created at power stations where it can be controlled.

Accident rates per passenger-km have also been reduced as a result of the transfer of trips from cars to trams because trams have much fewer accidents than cars. Although the trams run through very busy pedestrian areas, there have been few accidents involving pedestrians. After the initial period of new operations in mixed traffic passed, in over 10 years of operations in a busy city centre, there have been few collisions between trams and other vehicles with only one serious accident (that was not the fault of the tram). Since the tram system took over two railways that served established suburban areas, it has not had a major impact on regeneration. However, it does link a regeneration area west of central Manchester with the city centre.

Reasons for Success

The system has been a success by every measure and is widely recognized as such. There are several reasons. First, it offers high-quality services that are frequent, fast, clean, safe and reliable. At peak times, it offers faster overall journey times than either cars or buses. And journey times are equal to those of the car even outside peak times. Second, it has opened up new markets for evening- and late-night travel (services now run until 01:30 on Friday and Saturday nights), journeys across the city centre (now 5% of total travel but negligible before), and journeys generated by the system's full accessibility. Third, the system has three major traffic generators and attractors—Manchester at the centre of the network, and the towns of Bury and Altrincham at the ends of the lines. This has resulted in a highly successful commercial operation, because there is a good balance of travel in both directions even at peak times. Outside the peak times, there is a fairly even balance of traffic with passengers boarding and alighting at most stops. This contrasts with the classic model of a city centre to suburb railway line, which is usually dominated by single-direction peak traffic. Finally, the system has generated a high level of public support;

it is fully supervised by closed circuit television (CCTV) with automatic recording and is viewed as safe. Despite a few incidents, it still has a good record relative to other modes of public transport. This support has even extended to the mass media; the local *Manchester Evening News* has been a staunch supporter of *Metrolink* and supported the PTA's bid to extend the system.

The only problem is that the trams are now full to capacity during peak hours so part of the extension programme described below includes provision of more trams.

Extending System

The PTA and GMPTe were actively working to extend *Metrolink* even before the system was completed. In the UK, the process of getting statutory powers to build and operate a tram system is very protracted and can take at least 3 years to plan and get powers for a new line. The PTA policy has always been to obtain powers so that work can proceed as soon as funding is available. Consequently, the necessary powers were obtained well in advance for the system extensions shown in Figure 1. The first extension is the 6.4-km line to Eccles branching from the Altrincham line about 2 km from the city centre. Unlike the first lines described above, this is an

entirely new line on a route that has never had a rail service. It serves a major regeneration area in Manchester's old docklands now known as Salford Quays. (Manchester was an inland port served by the Manchester Ship Canal.) This section of the line was planned alongside the development and although much of development area was already occupied before the line opened, the route had been left clear. The line then runs west to Eccles in the municipality of Salford. The section through Salford Quays has its own right of way while the last 3 km to Eccles runs entirely on the street.

Funding for this line came from a combination of sources, including the PTA, central government, the European Union, contributions from private developers in cash or as land gifts, and the proceeds of re-letting the concession for the Bury and Altrincham lines. The total cost of the line was £150 million with some 65% coming from the private sector. The concession for the Bury and Altrincham lines could be re-let because the first agreement contained a clause dealing with system expansion. In summary, this stated that if GMPTE got powers and funding for an extension, the consortium holding the concession would be invited to bid for construction and operation of the extension. If this bid did not represent good value for money in the view of GMPTE, the concession could then be terminated with the concession holder receiving compensation based on the amount originally paid for the concession.

This did happen and a new concessionaire took over on 1 May 1997 with a contract to design and build the Eccles extension and to operate and maintain the whole system. This concession is for 17 years, comprised of a 2-year construction period and 15 years of operation. The private sector, including the concessionaire, paid £95 million toward the £160 million cost of the extension.

Prime Minister Tony Blair opened the first section in December 1999 and the line to Eccles was completed in July 2000. Patronage grew slowly as expected for an entirely new line but growth has been steady and now runs at about 3.25 million passenger journeys per year. The long-term estimate is for an annual patronage of 5.5 million people. Six new trams of a similar design to the original trams were purchased to provide 12-minute services throughout the day. The line also includes a large Park & Ride car park just outside Eccles that is less than 1 km from an exit on the M602 motorway to Manchester. The line completion has already seen more new developments both in Salford Quays and Eccles.

The next priorities for extensions comprised three other lines shown on Figure 1. The first is a 24-km line to Oldham and Rochdale that will take over another local railway line. However, the old route will be partly diverted to run on-street through the centre of Oldham and serve a new bus interchange east of Oldham. It will also be extended from Rochdale railway station into the centre of Rochdale and terminate at the bus station. The second extension is a 10-km line to Ashton-under-Lyne east of Manchester. Two-thirds of this entirely new line will be on segregated tracks over a new route with the remaining one-third running on an existing road. It will serve a major new regeneration area close to the site of the 2002 Commonwealth Games, and a major Park & Ride car park, as well as the town of Ashton.

The third 21-km line will serve

Manchester Airport linking it with major residential areas to recruit staff for the expanding workforce. The line will also contribute to regeneration of a suburban area of Wythenshawe that includes some of the most socially deprived areas in the UK. Most of this line will be on segregated tracks at the side or middle of roads but some 3 km runs on an abandoned railway line. At writing (January 2004), funding for these three new extensions is still being finalized.

Conclusions

When these extension lines have been completed the Manchester *MetroLink* will be over 93-km long with more than 80 trams carrying about 45 million passengers each year. At that time, it is likely to account for about 20% of all public transport trips in Greater Manchester. The *MetroLink* is one public transport mode that has enjoyed almost continuous passenger growth since it opened and the factors contributing to the success of the first three lines have been taken into account in planning the new lines. The three new lines will not be the end of the tram story—more lines are in planning and some are shown in Figure 1. Our experience in Manchester shows that the modern light-rail incarnation of the tram has enormous potential to help reduce the adverse impact of the car on large cities and to help achieve wider economic regeneration and social inclusion objectives. ■



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Mr Tyson, OBE, is Managing Director of the GMPTE Transport Management Group. He obtained a Master's degree in economics from Manchester University in 1970 while on the staff of the university and then left to form his own consultancy business in 1980, becoming involved in the economic appraisal of *MetroLink*. Until recently, he was a member of the UITP Transport Economics Commission and was part of a team that advised the British government on new transport policy.