



DERBY CITY COUNCIL

## ENVIRONMENT COMMISSION 31 JULY 2006

### Report of the Chair of the Commission

#### Visit to ULTra Test Track Cardiff

#### RECOMMENDATION

- 1.1 To note the report.

#### SUPPORTING INFORMATION

- 2.1 An invitation was sent to all Members of the Council to attend a visit to ULTra in Cardiff, arranged on behalf of the Council Cabinet Member for Planning and Transportation. ULTra is a type of personalised rapid transit (PRT) which may in the future be suitable for a city like Derby.
- 2.2 Several members of the Commission were able to attend the visit on 11 July and experienced a journey in the prototype vehicles at the test track.
- 2.3 The Commission learnt that British Airports Authority (BAA) has just invested in ULTra and there are plans for a trial system to be installed at London Heathrow, which will be its first application.
- 2.4 This report provides some background information about the technology and its practical application in the form of 'frequently asked questions' attached at Appendix 2.

**For more information contact:** Katherine Taylor 01332 255599 e-mail [katherine.taylor@derby.gov.uk](mailto:katherine.taylor@derby.gov.uk)  
**Background papers:** None  
**List of appendices:** Appendix 1 – Implications  
Appendix 2 – Frequently asked Questions about the ULTra system

<b>IMPLICATIONS</b>
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**Financial**

1. None arising directly from this report.

**Legal**

2. None arising directly from this report.

**Personnel**

3. None arising directly from this report.

**Equalities Impact**

4. Effective Overview and Scrutiny will be of benefit to all Derby people.

**Corporate Priorities**

5. This report has the potential to link with the following Council priorities for 2006-09.
  - Improve the quality of life in Derby's neighbourhoods
  - Build healthy and independent communities
  - Deliver excellent services, performance and value for money

pNotes following the ULTra visit.doc

## Advanced Transport Systems Ltd Frequently Asked Questions

### What is ULTra?

ULTra stands for Urban Light Transport, an innovative form of PRT (Personal Rapid Transit), which is a system of driverless automatic pods travelling on their own guideway network, available on demand to passengers.



### How many people fit in one vehicle?

Up to 4 people.

### Is there a fare for use?

Use of the BAA pilot scheme at Heathrow (LHR) is expected to be free to ticket holders. Elsewhere fares for a vehicle will be similar to a single bus fare.

### How is it powered?

It is powered by a battery pack providing an average 2KW of motive power. This only adds 8% to the gross weight of the vehicle.

### How are the batteries recharged?

The system ensures that batteries are recharged, as necessary, when the vehicles are stationary. This is an important part of system management.

### Are the vehicles heated/air-conditioned?

The vehicle can be adapted to accept either heat or cooling in extreme climates.

### How frequent are the stations, what is the average distance between them?

They are distributed around the area like bus stops or cab ranks; positioned where they are needed by passengers. In an urban environment spacing of a few hundred metres is typical.

**How is the destination selected?**

At each station there are a series of berths at which passengers can enter a pod and each has a destination selection point. Selecting a destination is done by using a smart card and a touch screen. Each passenger can be identified by their smart card so the service can be personalised to respond to passengers' individual requirements.

**What is the average journey time?**

For a typical 1 mile journey, the time taken is approximately 3 minutes.

**How reliable is the ULTra system?**

In 2 years of tests there have been no failures of the system.

**How are the pods guided?**

They run at ground level or on elevated tracks in the form of a concrete trough, supported on a lightweight steel structure. The cabs are guided electronically with sensors embedded in the vehicle.

**What operating system does ULTra use?**

The operating system is managed by software developed by ATS. It utilises synchronous control, similar to that used in air traffic control. It ensures vehicles are only launched from their berth when it is known that there is a safe free route to their destination.

**How does central control manage the empty vehicles to ensure efficiency?**

Central control is in charge of the empty vehicle management process, which ensures vehicles are sent to where they are required. This reduces waiting times and ensures lower environmental impact due to no unnecessary journeys.

**What is AVP?**

AVP is Automatic Vehicle Protection. This is a system adopted by ULTra to provide ultimate protection to its vehicles. It is based on a block signalling system like that used on railways.

**This has been tried many times before, to date all have failed, why will ATS and ULTra succeed?**

Perhaps earlier attempts were before their time. In the 1970s a model was established which nearly all PRT systems have adopted since then. ATS started with a clean sheet and have a new approach to PRT which has a wide number of improvements over the older ideas. ATS has also taken advantage of the considerable recent advancements in technology and computing.

**Isn't this the same scheme that failed in Cardiff?**

Cardiff County Council remains committed to the use of PRT for the city. For a variety of political reasons it became impossible to establish long-term funding.

**How much did it cost to develop?**

Over £10 million and 50 years of design effort has already gone into the ULTra system with considerably more invested in city studies by ATS and other partners. The BAA investment will allow the whole development to be completed.

**What will it cost to maintain?**

At its most efficient scale it costs about £0.40 per trip to operate and maintain ULTra. LHR is a smaller system, so will cost more per trip.



### **Who designed it?**

The original concept development was led by Martin Lawson, but the practical realisation of the idea has been down to the whole ATS team

### **What does it feel like to ride in ULTra - is it smooth?**

Yes. Passengers have been enthusiastic about the quality of the experience in ULTra.

### **How much does it cost for 1km of ULTra?**

The total cost of an ULTra system - vehicle, infrastructure and control system - works out between £3million and £5million per km of track.

### **Is it expensive to have it elevated?**

It is about 3 times the guideway cost at grade to have it elevated.



### **What is the average waiting time?**

4 out of 5 of users will have no waiting time.

19 in 20 ULTra passengers will wait less than 1 minute, even at peak times. This compares with average bus waiting times, which are 6 minutes.

Due to the stations being off line, the journey is non-stop, which reduces waiting time and therefore reduces overall journey time.

### **What is the average journey time?**

For a typical 1 mile journey, the time taken is approximately 3 minutes. The vehicles travel at 25 mph; typically, cars in cities average 12 mph taking five minutes to travel a mile. So ULTra is nearly twice as fast as a car and about three times as quick as a bus.

**Are there facilities for disabled people?**

It is designed to facilitate access for the disabled. The pods have level entry and can accommodate wheelchairs, as well as buggies/pushchairs and bicycles.

All stations that are not at ground level will have a lift or will be housed in a building that provides disabled access.

Disability groups who have tried the system have told us that it would be very attractive to them as a means of transport.

**What is the visual intrusion of the ULTra guideway?**

The overhead structure has now been reduced to 45cm in depth. When running alongside the motorway/road it is visually unobtrusive with regards to its surroundings.

**Can ULTra operate up and down hill?**

Yes, it readily copes with grades of 20% although operating routes are limited to a maximum of 10% or less to ensure passenger comfort.

**Can ULTra operate internally and externally?**

It can operate outside on guideways, either elevated or adjacent to the road, and it can operate internally within buildings.

ULTra has a low loading footprint so it can be carried by conventional building structures with no need for structural strengthening.

**Does ULTra need considerable space for turning?**

No, the vehicle has a small 5 m turning radius.

**What is the maximum area over which ULTra can operate, to still maintain efficiency?**

The current generation system will work best in a densely populated area with a typical radius of operation up to 5km.

**How will ULTra cope with growing numbers of people coming through the location in years to come?**

ULTra is a modular transport solution that can expand and adapt to suit demands. For example by changing the number of vehicles, guideways and routes employed.

**Where else is ULTra used - other cities, countries?**

Nowhere, Heathrow will be its first application

**What are the risks of waiting at night?**

As there is much less waiting time than for a bus or taxi, the risks are reduced. Simulations show that 80% of the time during peak periods, and virtually all the time during off peak periods, there is a vehicle waiting for you when you want to travel. All stations will be supervised by CCTV. Once in the vehicle, risks are obviously very small; also passengers can contact the controller directly from the vehicle. In addition vehicle ULTra requires no drivers, staff will instead provide a customer service role on the network and at stations.

**What about passenger security in general?**

ULTra provides a fully personal and secure service. Passengers have exclusive use of their vehicle and travel only with chosen companions. The system can be readily arranged to provide fully private vehicles and or fully private stations not accessible to other users. CCTV and the presence of customer service staff will enhance the security.

**What happens if there is a breakdown?**

As ULTra is expected to operate to aircraft standards of reliability, the possibility of breakdown is kept to a minimum. A monitoring system will diagnose weaknesses in a vehicle so it can be taken out of service to deal with them, before it breaks down. Breakdowns that do occur will be dealt with on a case-by-case basis. Because the vehicles are individually powered, the system is not brought to a halt by power failure. In the extremely unlikely event that a vehicle does break down a service vehicle will go and retrieve it immediately. The vehicle also has emergency exits and when no vehicles are travelling on the guideway it is entirely safe to walk on.

**What happens if there is an obstruction on the guideway?**

The vehicles' detection system will automatically stop the system and alert control that there is something on the guideway preventing the vehicle from proceeding. A person will be sent to retrieve the object immediately. There is also extensive CCTV arranged over the whole system, the obstruction is likely to be noticed and removed before it even becomes an obstruction. Customer service staff will also be present throughout the system and able to retrieve any possible obstructions should they come across them before system control is alerted.

**How do you ensure safety?**

Safety is the overriding design requirement. We have achieved this by careful attention to detail design in conjunction with the regulatory authorities. ULTra is fundamentally safe because it operates one way only in its own designated and segregated guideway. The maximum speed will be 25mph, and within stations the maximum speed will be 5mph.

**Does ULTra meet industry regulations?**

ATS has worked closely with HM Rail Inspectorate to ensure compliance with all relevant safety regulations. HMRI have provided their consent to the carriage of passengers on the prototype system. HMRI have also provided consent, in principle, to the approaches to be used in the initial LHR scheme, which includes operation in tunnels.

What about vandalism?

A design requirement for the system is to resist all possible effects from vandalism. Extensive CCTV and staff providing customer service will be used to deter possible vandals and to minimise the possible effects.

**What happens if passengers are stuck in ULTra?**

The design of ULTra eliminates most of the reasons that cause cars and other transport modes to fail during a journey. For example vehicles incorporate intelligent health monitoring, the guideway is continually monitored and stations are only ever a few seconds away. In the unlikely event of a vehicle having to stop other nearby vehicles are stopped and with the passive track there is no electric current making it relatively easy for the rescue services to quickly recover vehicles and people.

**Why is it driverless - isn't it better to have a driver?**

In all forms of transport the principal cause of an accident is the driver. Existing large scale fully automatic systems in operation world wide have never had a fatality due to the automatic control system. Today's computer technology is a major contributor to a safer system.

**Does it have environmental benefits?**

It has an emission saving of a factor of 3 or 4 over current car or public transport. The vehicles are light, non-stop when travelling on a journey and only operating when required. This results in significant energy savings. ULTra meets Kyoto sustainability targets, providing the required 60% reduction in carbon emissions over the car, now, rather than in 2050, which is the target date set by the Kyoto agreement.

**How does the typical energy usage of ULTra compare to that of other forms of public transport?**

ULTra utilises 0.55 MJ/passenger km

Other forms of public transport use between 1.2 and 1.4 MJ/passenger km.

**Could it run on solar power?**

Solar power could be used via station or track collectors. ATS is also watching a range of technologies, with the potential to offer cleaner energy, that are being developed, for example fuel cells. Once they are available in a practical form and can provide environmental benefits ULTra's modular approach will allow their adoption.

**How does the typical energy usage of ULTra compare to that of cars?**

The typical benefit of ULTra's energy usage compared with cars is over 70%. This rises to 90% in peak periods when cars (and buses) are restricted by congestion.

**How does it compare to other forms of public transport?**

There is a shorter waiting time for ULTra and it is typically faster than other urban transport systems by a factor of 2 or 3.

It costs less to operate than other forms of public transport

It uses much less energy per passenger km and is environmentally friendly with zero city pollution, being both quieter and more efficient.

**Why is PRT preferable over a bus or train in this instance?**

A bus or train is only available at a predetermined time and for a predetermined route.

ULTra is available when you want it, going directly to where you want it to, non-stop.

However we see ULTra as working best in combination with existing forms of transport

**Do we need more infrastructure in our cities?**

The guideway is a single 1.5m track, which is less than half the width of a single lane of road. Present estimates indicate that only one single lane ULTra track for every six current roads would be required to serve an urban area. Each of these tracks would cost approximately 1/6 of that of an equivalent road. Cities can then make a choice either to



have less cars, or less roads or more people! It is also planned to make better use of existing transport rights of way, such as the space beside railway lines or major roads.

### **Why is ULTra better than a bus or a train?**

It is not that ULTra is better than a bus or train as they are designed to do different jobs. Where ULTra excels is in integrating all of an area's transport assets to provide everyone with a high quality transport service. For example rail or bus can do the long distance links down the existing corridors, while ULTra provides an efficient network linkage within the city

### **Will ULTra replace buses and trains?**

ULTra is most beneficial when established over a certain area for a specific application. The plan is not to replace buses and trains, which can operate on a far larger scale. Essentially, ULTra is an alternative to buses and trains when a bus or a train is not the best solution to the transport problem. We envisage that the ULTra network will expand across the city so people will use it rather than getting caught in traffic jams. The consequence of this will be that parts of the city currently used for roads and car parks could be returned to use by people.

### **Why does the location need this?**

BAA believes LHR needs PRT as it provides a much better passenger service, in terms of comfort and speed. It also has a light footprint and thus makes better use of their current infrastructure so they can get more out of the space. This runs together with the reduction it facilitates in congestion and therefore pollution.

### **Why was PRT chosen over other transport systems?**

PRT was chosen as other forms of transport only compound the problems of congestion and pollution without offering a better service. BAA believes that PRT offers an innovative and effective solution to the problems currently experienced.

### **What were the other transport systems available to you?**

BAA considered other forms of public transport, buses, rail etc. and also other suppliers of PRT. However, none of the other forms of transport offered a solution like PRT and ATS's ULTra system offered the most comprehensive and advanced solution to their problems.



Aerial view of the  
Cardiff test track