**Date of Issue:** 30 November 2021

**Version:** 1.0

**Document Status:** Final - Issued

Early Market Engagement:

Acoustic Vehicle Alerting System (AVAS) Retrofit

Ref: tfl\_scp\_0025206

Market Sounding Questionnaire

# **Part 1**

# **Introduction**

The Mayor’s Transport Strategy (MTS) sets out the Vision Zero goal of zero people killed or seriously injured (KSIs) on London’s roads by 2041. It includes targets for a 70% reduction in KSIs by 2021 and for no one to be killed on or by a bus by 2030. The Bus Safety Standard (BSS) was launched in 2018 to help achieve the Vision Zero goal for buses. The BSS mandates the use of safer vehicles and supports safer behaviours and speeds, specifying safety requirements that new buses entering service in London must meet.

An Acoustic Vehicle Alerting System (AVAS) is one of a number of the measures in the BSS. AVAS is a system to make quiet running buses (i.e. electric, hybrid or hydrogen) audible to pedestrians and cyclists, and other road users outside the vehicle.

The United Nations Economic Commission of Europe (UNECE) Regulation 138 has required AVAS on new electric and hybrid vehicles since July 2021. TfL committed to introducing this early and since September 2019 AVAS has been required on all new quiet running London buses as part of the BSS. The UNECE regulatory requirements have also been exceeded for London Buses. This includes the development of a unique and trademarked Urban Bus Sound, which along with moving the speakers to the front of the bus, aims to maximise the benefits of AVAS by making it easier for Vulnerable Road Users (VRUs) to distinguish the sound over typical city background noise and improve acoustic conspicuity compared to a diesel bus. A 'beacon' element has also been introduced which provides directionality to blind and vision-impaired persons (or anyone listening for the bus but not looking). In addition, a responsive AVAS has more recently been developed. Responsive AVAS will provide optimal volume levels for the sound dependent on the location of the bus. This will both optimise the potential effectiveness for casualty reduction but also minimise the impact on the London soundscape, and the possibility of complaints. Ultimately, TfL is encouraging Original Equipment Manufacturers (OEMs) to develop a dynamic AVAS which will continually respond to changes in ambient noise.

However, the requirement for new buses in London to have AVAS does not address existing or pre-2019 manufactured buses in the fleet. Therefore, to support our Vision Zero targets for no deaths on or by a bus by 2030 and for zero deaths or serious injury by 2041, we are developing a project to potentially retrofit AVAS onto existing quiet running buses in London (i.e. electric, hybrid or hydrogen buses). This retrofit will be for responsive and non-responsive AVAS, the type of AVAS chosen being determined in each instance by the model of bus being fitted, and whether that model is capable of supporting responsive AVAS or not.

We are still evaluating which vehicles in the London bus fleet are suitable for retrofitting either responsive AVAS or non-responsive AVAS, and this will depend on cost, age of vehicles, and technical factors. The potential number of vehicles in scope to be retrofitted is up to 3,566 and is not anticipated to be any lower than 240. Appendix B to this document provides a list of the potential vehicles in scope for the AVAS retrofit project.

This Market Sounding Questionnaire (MSQ) is issued by Transport for London (TfL) and seeks to obtain market feedback in relation to the availability of AVAS which can meet (or is capable of meeting) TfL’s specification requirements. This includes the availability of responsive AVAS and non-responsive AVAS.

The feedback from this MSQ will be used to help inform our Business Case and any associated procurement approach for retrofitting AVAS onto existing buses in London.

# **Feedback Request**

Feedback is requested in relation to the proposals described within this document. The overarching objective of this questionnaire is to identify organisations that are capable of (or potentially capable of) supplying AVAS that can meet (or are capable of meeting) TfL’s Bus Vehicle Specification requirements for AVAS.

Please see Appendix B to this document for the full AVAS Bus Vehicle Specification.

TfL would greatly appreciate your feedback in the form of a response to the questionnaire at Part 2 of this document. The timescales for this MSQ are set out in the table below.

|  |  |
| --- | --- |
| **Activity** | **Date** |
| MSQ sent out | 30 November 2021 |
| Deadline for MSQ responses | 5pm on 21 December 2021 |
| Assessment and consultation | 22 December 2021 to 21 January 2022 |
| Complete | End of January 2022 |

# **Legal Notice**

This early market engagement exercise does not form part of any formal procurement process. All responses will be carefully considered but will not bind TfL to any particular approach to any future procurement, nor will responses be treated as conveying any promise or commitment on the part of the respondent.

Feedback received may be considered in the development of any future procurement and delivery strategies relating to AVAS. However, TfL will not enter into a contract based on the responses to the MSQ. Responses will be treated in confidence and shared only within the TfL project team and its advisers as well as with OEMs of buses in the London fleet (subject to Freedom of Information requests).

**Direct or indirect canvassing of the Mayor, any members of the Greater London Authority, employees, directors, board members, agents and advisers of TfL and any of their subsidiaries by any person concerning the MSQ documents or any related procurement process and any attempt to procure information from any of the foregoing concerning the MSQ documents may result in the disqualification of the person and / or the relevant organisation from consideration during the market engagement or for any associated procurement.**

For your feedback to be considered we must receive your response to this questionnaire (consisting of a response to Part 2 of this MSQ and including all requested supporting documentation) by **5pm on Tuesday, 21st December 2021.**

# **Proposals for Consideration and Feedback**

The scope for this MSQ is to support the potential delivery of AVAS that can achieve the TfL performance specification as set out briefly below in section 4.1 and fully in the Bus Vehicle Specification and Assessment Protocol at Appendix B to this document. This should include AVAS that meet the requirements for both responsive and non-responsive AVAS.

# **TfL’s AVAS Performance Specification**

The Bus Vehicle Specification sets out the performance and installation requirements for AVAS on new London Buses, and includes the following:

* System performance of the Urban Bus Sound, including the core sound which should be played at all times on bus start up and the beacon sound which should begin immediately when the bus begins to move forwards or backwards
* Sound amplitude requirements
* Frequency modulation
* Frequency profile
* AVAS hardware requirements
* Communication interface with Controller Area Network (CAN Bus) requirement

In addition, for Responsive AVAS, there will also be:

* Map Interface Requirements
* Location and time-based variation of amplitude

Please see Appendix B to this document for the full TfL Bus Vehicle Specification requirements and Assessment Protocol for AVAS.

# **Assessment of responses**

The purpose of this MSQ is to help identify organisations who have a product which meets (or is capable of meeting) our specification for AVAS based on the performance specification provided above in section 4.1 and fully in the Bus Vehicle Specification and Assessment Protocol at Appendix B to this document. Interested parties will be required to submit relevant documentation including a technical specification, test methodology, reports and certifications to show how your product is able to meet (or has the potential to meet) our performance specification.

A desk-based review will be undertaken by TfL on specific aspects of the submitted information (i.e. evidence to show UNECE Regulation 138 compliance, how frequency profile is achieved, that the system is ‘E’ marked for automotive electromagnetic compatibility, where applicable evidence to show where it has been used in the automotive industry, dimensions, Ingress Protection (IP) rating, impedance, and power etc). This will help determine which products, on paper at least, could meet (or are capable of meeting) TfL’s AVAS requirements.

Should TfL proceed to a procurement exercise for this project, the evaluation of potential products would form part of that exercise, including the need for rigorous testing of the products in controlled conditions in order to demonstrate that the products meet the specification, and can be successfully integrated with on-bus systems, across a range of bus types.

# **Part 2 - Questionnaire**

TfL would appreciate your feedback in the form of a response to the following questionnaire, with the specific questions to be answered in the blank tables/boxes provided. Should you consider a particular question is not applicable to your organisation, please state “not applicable’ or ‘N/A’ in the tables/boxes provided.

Where applicable a maximum word limit has been included against questions, **please do not exceed these stated limits.**

1. Your Details

|  |  |
| --- | --- |
| **Organisation Name:** |  |
| **Company Registration Number:** |  |
| **Key Contact Name:** |  |
| **Key Contact Email and Telephone Number:** |  |

1. Please select where you would best place the current maturity of your AVAS solution.

Please note, in terms of delivery timescales (and subject to approval and funding), the AVAS retrofit is currently expected to commence in early 2023. We are therefore primarily interested in feedback on AVAS that are already production ready with proven effectiveness or will be capable of being production ready with proven effectiveness to align with these timescales.

| **Maturity** | **Please tick** |
| --- | --- |
| **Concept:** The idea of the solution has been identified and partially designed, but no working solution has been delivered. |  |
| **Prototype:** An early-stage solution or concept that has been delivered and is workable. |  |
| **Optimised:** Production ready. The solution is stable and has been refined based on feedback to maximise the efficiency of the solution. |  |
| **Established solution**: The solution is operating within its targeting scope and has now identified and is adding new services and features beyond its expected specification. |  |

1. How large is your organisation?

|  |  |
| --- | --- |
| **Size** | **Please tick** |
| Small (less than 20 employees) |  |
| Medium (20 to 200 employees) |  |
| Large (over 200 employees) |  |

1. What industry does your organisation work in?

|  |  |
| --- | --- |
| **Industry** | **Please tick** |
| Automotive (e.g. Automobile manufacturers) |  |
| Technology (e.g. Technology start-ups, corporations) |  |
| Design (e.g. Ergonomic/human centred design) |  |
| Engineering (e.g. Engineering firms) |  |
| Other |  |

1. Please describe your organisation, detailing what services and or products you offer (Maximum 100 words limit)

|  |
| --- |
|  |

1. Please describe your solution and attach a product specification(s) with your submission to provide evidence that your solution meets the performance specification for AVAS provided in the Bus Vehicle Specification and Assessment Protocol at Appendix B to this document (Maximum 200 words limit)

|  |
| --- |
|  |

1. Has your AVAS solution been trialled or implemented in industry? If so, please describe the outcome. If your product has already been fitted and is currently in use it would be beneficial if you could provide the contact details for a customer that has agreed TfL may contact them regarding their experience of using your product. (Maximum 200 words limit)

|  |
| --- |
|  |

1. How many AVAS units do you anticipate can be supplied and installed on a daily or weekly basis? This will help to inform our delivery schedule. (Maximum 100 words limit)
2. Would you be able to support out of hours AVAS installations (e.g. evenings / nights / weekend working? (Maximum 100 words limit)
3. What is the warranty period for your AVAS product? Furthermore, is extended warranty available and if so on what terms? (Maximum 200 words limit)
4. Does your warranty cover on-site attendance and parts replacement for faulty units? (Maximum 200 words limit)
5. What is the expected operational life of your AVAS product in years or miles travelled? (Maximum 200 words limit)

**13**. Can updates to the AVAS unit's firmware be made remotely or will the unit need to be physically updated? (Maximum 200 words limit)

1. **Cost Estimates**

Please provide estimated costs of retrofitting AVAS, both responsive and non-responsive. This information will be used to update TfL’s Business Case for the AVAS retrofit and will be used for our cost estimating purposes only.

We have included the following table for capture of the indicative unit cost elements of your response:

|  |  |  |
| --- | --- | --- |
| **Cost Elements** | **Responsive AVAS** | **Non-responsive AVAS** |
| Single AVAS unit cost |  |  |
| Installation cost (per unit) |  |  |
| Maintenance and operating costs (per unit) |  |  |
| Standard Warranty cost (per unit) |  |  |
| Extended Warranty cost (per unit) |  |  |
| Any other costs (per unit) |  |  |
| Estimated total **cost per unit** (inclusive of supply, installation, maintenance and standard warranty and any other costs) of retrofitting |  |  |

1. What cost savings could be achieved in the event multiple AVAS are procured? Please note the minimum number of vehicles potentially in scope for the TfL AVAS retrofit project is anticipated to be 240 and the maximum number of vehicles in scope is anticipated to be 3,566. Please explain how economies of scale would affect your pricing and provide details of the break points and associated percentage discounts that would apply. (Maximum 300 words limit)
2. Is there anything else you wish you to raise or inform TfL of in connection with AVAS at this stage? (Maximum 200 words limit)

Please provide a written response to all questions in this questionnaire by 5pm on Tuesday, 21st December 2021.

TfL and relevant subject matter experts will be available throughout the MSQ assessment period to discuss your solution and provide feedback as required.

**METHOD TO RESPOND**

Please submit your responses via TfL’s e-procurement portal [ProContract](https://procontract.due-north.com/Login" \t "_blank) using the following link:

<https://procontract.due-north.com/>

If you do not already have a log-in to ProContract then you will need to register with ProContract , however, this is a simple and quick process.

**CLARIFICATION QUESTIONS**

All clarification questions in relation to this MSQ must be submitted via the ProContract portal using the ‘Messaging’ functionality.

We would like to thank you for taking the time to

respond to this questionnaire

**Appendix A - Vehicles In Scope**

The vehicles in scope for the retrofit are all hybrid, electric and hydrogen buses that are older than 2013 (so vehicles from 2014 onwards). The only exception to this is New Route Masters (NRM) where all vehicles are in scope regardless of age. The potential maximum number of vehicles is 3,566. Responsive AVAS is the preferred solution for vehicles either already installed with Intelligent Speed Assistance (ISA) or included within the ISA Retrofit Project. This is because responsive AVAS requires the map system that is fitted as part of ISA to provide a real-time location of the bus. For buses without ISA and not included in the ISA Retrofit Project, non-responsive AVAS will be fitted.

The table below sets out the maximum number of vehicles in scope, it is not guaranteed or confirmed at this stage that all the vehicles in the table will be included in the AVAS retrofit. A preferred option with the confirmed vehicles in scope is currently being developed based on technical consideration and a cost benefit analysis to ensure to the retrofit provides values for money.

|  |  |  |
| --- | --- | --- |
| **Manufacturer / model** | **Hybrid / Electric / Hydrogen** | **Maximum number of vehicles in scope** |
| Wrightbus New Route Masters (NRMs) | Hybrid | 1000 |
| ADL400H  ADL400H City  ADL400H MMC  ADL400H 48v / ADL Enviro 400MMC  ADL400H Ultra Cap / ADL Enviro 400HMMC  ADL400H Ultra Cap / ADL Enviro 400H City  ADL400H Zeus / ADL Enviro 400HMMC | Hybrid | 999 |
| BYD K8SR / BYD  BYD D8UR / ADL Enviro 200MMC (EV)  BYD D9UR / ADL Enviro 200MMC (EV)  BYD DD EV / ADL Enviro 400EV City  BYD DD EV DC / ADL Enviro 400EV City  BYD DD EV / ADL Enviro 400EV City OC | Electric | 195 |
| Optare MetroCity EV  Optare MetroDecker EV | Electric | 43 |
| Irizar i2e | Electric | 2 |
| Volvo B5LH / ADL Enviro 400HMMC  Volvo B5LH / MCV EvoSeti  Volvo B5LH / Wrightbus Eclipse Gemini 2  Volvo B5LH / Wrightbus Gemini 3  Volvo B5LH / Wrightbus SRM  Volvo B5LHC / Wrightbus SRM | Hybrid | 1325 |
| Van Hool A330 | Hydrogen | 2 |

**Appendix B – AVAS Bus Vehicle Specification and Assessment Protocol Attachment 30 and 31 (Draft v2.2)**

**Please see the following two documents which have been attached separately:**

* **AVAS BVS Spec v2.2 Draft**
* **AVAS BVS Attachment 30 & 31 v2.2 Draft**