Electronic visibility for Cranes

1. Purpose

This document describes a proof of concept demonstration of a Low Power ADS-B Transceiver (LPAT) installed on a construction tower crane, the objectives and structure of the trial activity.

2. Introduction

On 16 January 2013 a collision occurred in poor visibility between a helicopter and a tower crane. Air Accident Investigation Branch (AAIB) enquiry outcomes noted the recency of the Helicopter Terrain Awareness and Warning System (HTAWS) database and the pilots awareness of the NOtice To AirMen (NOTAM) relating to the St Georges tower crane, as well as the late sighting (if any) in the poor visibility conditions.

The Automatic Dependent Surviellance-Broadcast (ADS-B) standard, RTCA-DO-260/EUROCAE-ED-102 appears to make technical data provision for the marking of point and line obstacles.

NATS has been working on an Electronic Conspicuity device that utilises ADS-B on 1090MHz. ADS-B provides three-dimensional position information to ground and airborne systems as well as between devices for traffic information and collision avoidance.

Whilst the LPAT unit is currently configured as an airborne unit, it was felt that the basic technical proposition, with relevant aircraft capabilities, may present a means to electronically mark obstacles in selected areas of operational risk. This may also mitigate new obstacle risks cognisant of the deficiencies in notification and data exchange of approved planning developments and elapsed time since update of (H)TAWS databases in the AAIB report.

It is acknowledged that the airborne LPAT unit will require significant adaptation and appropriate physical ruggedisation to become a potentially suitable product for this environment and application.

3. Objective

This trial will undertake a temporary proof of concept installation of a NATS LPAT device on a construction tower crane in east London. The location is shown in Figure 1 and Figure 2.

The trial will be conducted in association with the sites principal contractor Carillion plc and the crane owner/supplier Select Cranes.

Demonstrate the interoperability of 1090Mhz devices and crane protection systems, and also any ADS-B IN capable airframes and applications in traffic in the area.

Due to the position of the trial location and proximity to LCY arrival/departure tracks, no specific flight trials against the trial ADS-B installation were initially planned. However in the event three trials were flown against the installation, of which two helicopter flights successfully electronically acquired the crane mounted LPAT with an onboard LPAT carried to the trial flights. A third flight by a

GA aircraft was unsuccessful, as it was operating at much longer range, ~5NM outside controlled airspace to the south of the site.

NATS co-ordinated with both the CAA and London City ATC prior to the trial. No direct risk was expected to be posed to the tower ATC operation, as there is no ADS-B capability and no local SSR at this airfield.

4. Timeframe

Time scales were tight, but indicatively NATS was looking to deploy the LPAT to side for a continuous period of up to 28 days, before Christmas 2015, with recovery in the New Year. Final dates between February and March 2016 were driven by:

- Trial assessment and approval by UK National IFF/SSR Committee,
- OFCOM issuance of required the RF trial license for the devices at the trial location; the trial height was above NATS then licensed limit above ground level.
- Trial run installation was undertaken with Select at their yard at St Neots to de-risk the on-site activities.
- Generation and approval of site RAMS paperwork
- Availability of installation teams and approval of task paper work by crane & site stakeholders.

5. Location of trial

The trial is proposed to take place at the Tidal Basin Road development. This £80m development currently has two tower cranes in place.

The site is to the north and west of the LCY extended runway centre line, approximately 1NM from the RWY09 threshold. As such the airfield is aware of the construction activity, and both cranes are currently NOTAM'd; NOTAMs C4785/15 and C4788/15 refer.

The transmitting element was expected be mounted on the cranes counter weight jib an exemplar is shown in Figure 3, with the LPAT unit located in the cranes cab.

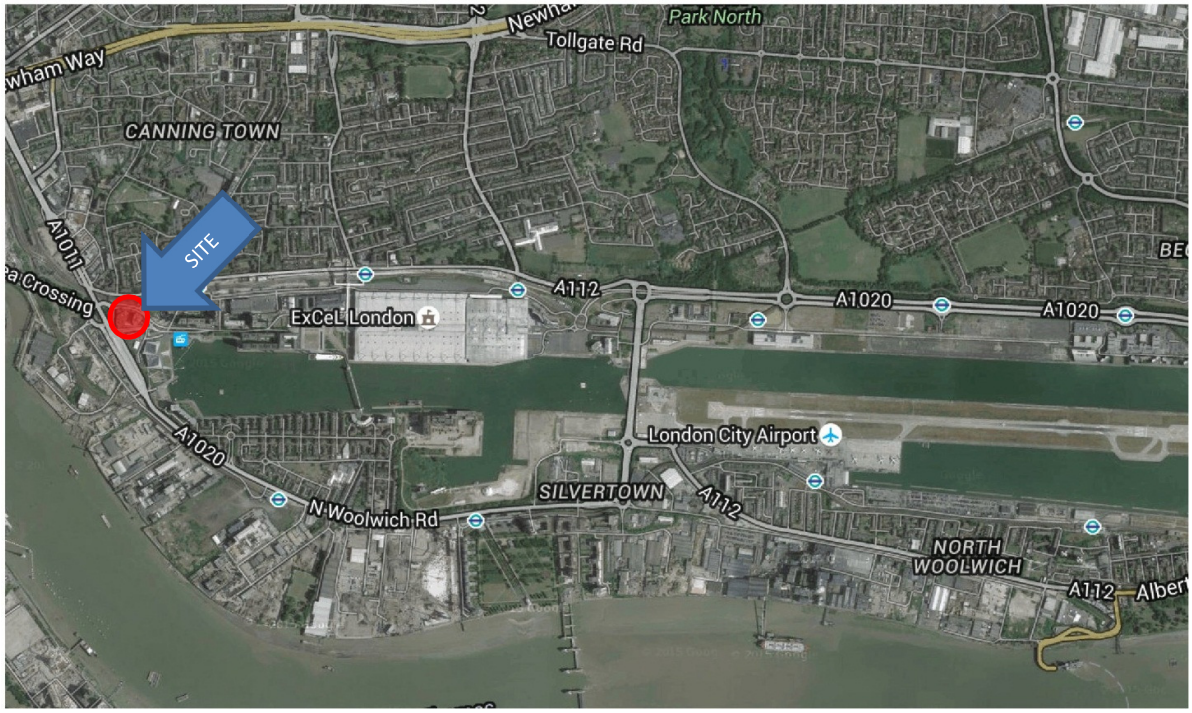

Figure 1; Site location context with LCY

As the LPAT unit does not provide ADS-B integrity values which will be considered by aircraft avionics, there is considered to be no risk of triggering collision warning system (TCAS) alerts from aircraft arriving/departing LCY nor with passing Heathrow traffic.

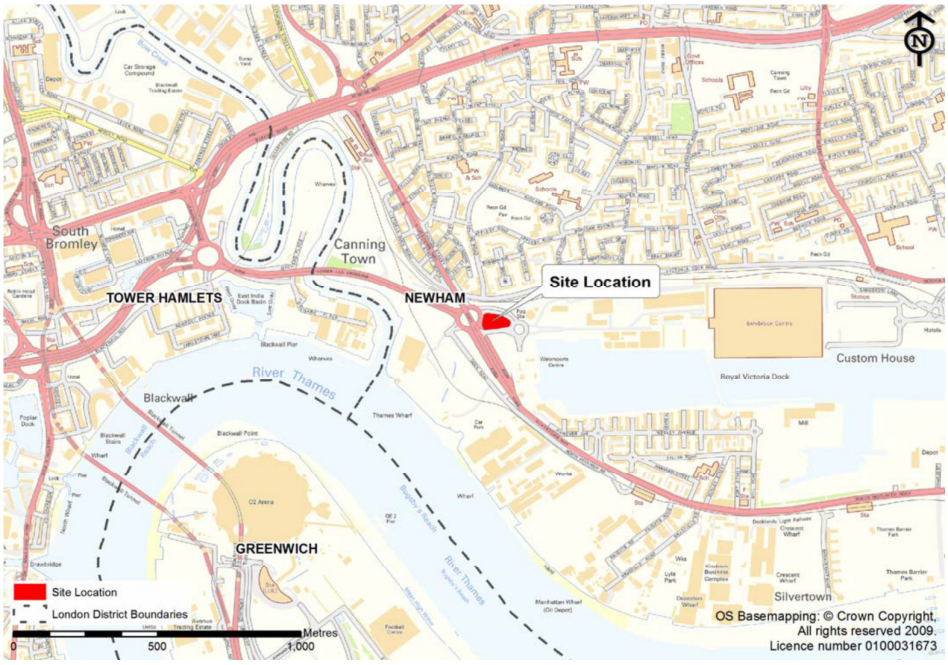

Figure 2, Site Location, taken from Planning Application

Figure 3, Location looking east towards Excel Centre and LCY. Counter weight jib of lower crane at low centre