**702058450 - Bird Detection System (BDS) at RAF Lossiemouth**

**Technical Clarification Questions & Responses**

1. The stated aim of this proposal is *to provide a capability to RAF Lossiemouth to mitigate the risk to life (RtL) caused by the collision with migratory and non-migratory birds in the locality of the airfield.* The “risk” to an aircraft comes from the kinetic energy of an impact and the frangibility of the airframe it strikes. Kinetic energy of a birdstrike is 1/2*mv*2, where *m* is the mass of the birds and *v* is the velocity of the aircraft. Can you define;
   1. the maximum aircraft velocity in the airfield environment?

Approx 400 kts

* 1. the frangibility of the aircraft in terms of kinetic energy that represents low to moderate risk to the aircraft?

Not relevant to tender bid. We need a system that detects birds to reduce the risk of collision. The main threat species being Gulls, Corvids and Geese. The Bird Radar has no consequence once the collision has occurred. We also operate a wide variety of Fast Jet and large aircraft from LOS, so cannot be expected to provide this information.

* 1. Based on expected aircraft velocity in the airfield environment and frangibility of the airframe the body mass (kg) of a bird or birds (flock) that constitutes a risk to life at RAF Lossiemouth?

Dependent on the phase of flight, aircraft, and location of the Birdstrike. For example, a small bird entering the cockpit through the windscreen could incapacitate a pilot whereas a goosestrike on the fuselage of a P8 may have no consequence.

1. *“The capability should attain a standard of performance compatible with the results of Trial WINCHELL[[1]](#footnote-1).”* Can you specifically provide the standard of performance that is expected?
   * Detection Capability
     + Medium targets (Standard Avian Target) to be detected up to 8 km (radius)
     + Large targets to be detected up to 10 km
     + Up to a height of 700 m
   * Radar is to provide 360-degree 3-D coverage
   * High resolution – to be able to provide detailed imaging of individual bird tracks displaying longitude, latitude and elevation details of individual bird tracks up to 10 km distance.
   * The BDS should have a small cone of silence to maximise detection probability
     + The BDS should be able to detect and classify contacts into:
     + Flocks
     + Large Birds
     + Medium Birds
     + Small Birds
     + Aircraft
     + Ground Vehicles
2. Radar requirements are normally written in terms of Radar Cross Section expressed in square meters or centimeters.
   1. Can you define the RCS of what you consider to be a large bird?

Large Bird classed as a Goose or Gull.

* 1. Can you define the biomass (kg) or specific species (Scientific and Latin name) you consider to be representative of a large bird and will be used to assess the sensor performance at RAF Lossiemouth for system acceptance?

Large Bird classed as a Goose or Gull

* 1. Can you define the RCS of what you consider to be a medium bird?

Medium Bird classed as a Corvid (Rook, Crow, etc)

* 1. Can you define the biomass (kg) or specific species (Scientific and Latin name) you consider to be representative of a medium bird and will be used to assess the sensor performance at RAF Lossiemouth for system acceptance?

Medium Bird classed as a Corvid (Rook, Crow, etc)

* 1. Can you define the RCS of what you consider to be a small bird?

Small bird classed as a Snow Bunting, Finch, Swallow

* 1. Can you define the biomass (kg) or specific species (Scientific and Latin name) you consider to be representative of a small bird and will be used to assess the sensor performance at RAF Lossiemouth for system acceptance?

Small bird classed as a Snow Bunting, Finch, Swallow

* 1. Is a single “large” bird considered to be a “risk to life”?

Dependent on the phase of flight, aircraft, and location of the Birdstrike. For example, a small bird entering the cockpit through the windscreen could incapacitate a pilot whereas a goosestrike on the fuselage of a P8 may have no consequence.

* 1. What number of small birds, in a flock, is considered to represent the equivalent

“risk to life” criteria?

The system should classify 20+ small birds in proximity as a flock. There is no specific Risk to Life criteria due the variable nature of Bird Strikes. The purpose of a Bird Detection System is to provide additional situational awareness to the Bird Control Operators and ATC on Bird Activity within the range of the system.

* 1. What number of medium birds, in a flock, is considered to represent the equivalent

“risk to life” criteria?

The system should classify 15+ medium sized birds in proximity as a flock.

1. The requirements for sensor coverage are confusing and ideally would have an illustration to indicate the requirements.
   1. Your statement says that the BDS shall have *“a small (no larger than 30 degrees) cone of silence to maximise detection probability.”* That would indicate a beam width of 60 degrees is required. Large Birds have to be detected to 10 km / 6.25 miles and up to a height of 700m / 2,333 ft. A 60-degree beam width at 6.25 miles is approximately to 58000ft and not 2,333ft as stated.

Can you please illustrate the coverage requirements with a diagram to accurately explain the requirement precisely? 700m / 2,333 ft at 6 miles requires approximately 4 degrees of coverage but would have a cone of silence of 86 degrees.

Please explain this discrepancy in your height requirements specification in unambiguous terms?

It is for the bidder to accurately define the range and detection capability of their system and not the other way around. I would ignore the cone of silence requirement and focus on the requirement to detect a large bird (gull. goose) at a range of 10km and up to 700m. This was the standard required for Trial WINCHELL. The bidder should also note that the requirement is for 3D 360-degree coverage as this was also a requirement for Trial WINCHELL

1. Does this sensor system have to provide target height (altitude) information? IE is the requirement for a 2D radar system (range and azimuth) or 3D radar system (range, azimuth, and elevation)?

The requirement is for a 3D sensor system as per Trial WINCHELL. A 2D system would be a significant capability reduction.

1. Classification
   1. How will the requirement to classify a target as a flock be measured and evaluated for success?

This is a capability requirement for the system. It would be for the bidder to articulate how their system does this and for us to evaluate against other bidders.

* 1. What metrics will be used to describe a flock of birds? IE distance between individual birds to be considered in a flock, number of birds that constitutes a flock?

Small Birds 20+, Medium Birds 15+, Large Birds 10+. The purpose of defining a number of birds as a flock is avoid clutter on the display by displaying lots of bird tracks in a small area. Also, a flock should be measured in proximity of height and distance.

* 1. Is there a difference between a flock of birds and a skein of birds, if so what is the metric that is used to separate the two? If flock of birds and a skein of birds are considered the same how will the “risk to life” be described to end users in terms of spatial extent? i.e.a flock could be a small point and a skein in this geographic area can be a mile or more across.

There is no difference. A skein is a word used to describe a flock of geese.

* 1. Is a UAS\UAV considered an aircraft for classification?

Large RAF UAVs operating from LOS would be classified as an aircraft by the system.

* 1. Is a small UAS\UAV considered an aircraft for classification?

If the system is able to detect small UAVs (privately operated drones) not known to LOS ATC it should be able to classify them as such. However, this is a desirable not essential capability.

* 1. Is this system requirement just for a primary radar or a primary and secondary radar as aircraft classification is required?

The system is for primary radar only.

* 1. Ground vehicles, are ground vehicles fitted with transponders?

Not yet, this is aspirational at LOS. The ability to track vehicle movements is a desirable, not essential capability.

* 1. What is the classification metrics that will be used for each class and for evaluating delivery of successful performance?

The system should be able to detect, identify and track small, medium, and large birds and classify as flocks when the criteria is met. It should also detect and track aircraft. Vehicles and drones are desirable not essential requirement.

1. *BCU Operators should be able to digitally receive the live bird picture on a tablet device (provided as part of the contract) in a format that can be sent / received and used on MODNet without further data manipulation.*

Is the MODNet ICD available, and can it be provided before we bid with time to review the requirements?

The BCU operators should be able to receive the radar picture over 4G from the sensor provider. There is no requirement for BCU operators to access the radar picture via MODNet.

1. *Software should enable BCU Operators to configure the bird picture to meet user preferences and requirements.*

This is an open-ended requirement with no bounds, can you clarify and specify the user preferences and requirements in a form that can be evaluated for successful delivery for this requirement?

The radar display should be configurable to select/de-select.

* Bird types (Small, Medium, Large, Flocks)
* Heights
* Overlays – Runways, Roads, Approach Lanes

1. *Digital picture should be available 24/7.* The term 24/7 appears to define a “mission critical” and “always available” system requirement. What level of redundancy is considered acceptable to meet this requirement? What is the maximum time that switch over has to occur in in the event of a failure to provide an acceptable performance? Are the redundant systems to be always on hot systems, on stand by or boot from cold?

The radar is required to be able to operate 24/7, 365 days per year. Downtime is accepted for routine servicing which would need to coordinated through LOS. Downtime due to adverse weather conditions is accepted and needs to be defined in the tender, ie the radar will automatically shut down a xxkts windspeed.

1. *LOS Operators should be able to receive a live bird picture on user laptops and desktop PCs via the Internet/Intranet. The contractor should enable access to the system by specific user accounts and passwords to enable access.*

What security certification requirement is required for a system connected to the Internet/Intranet? IE Cybersecurity protocols etc.?

There is no immediate requirement to be able to access the data from MODNet. The data should be available through the internet on stand-alone devices at LOS. We would need to apply for the website to approved for use on MODNet. This is not the requirement of the bidder.

1. *Digital bird picture should be available 24/7, via a mobile viewer application provided by the contractor and appropriate to the system.*

Is this to be made available over a commodity mobile/cell phone network or is the vendor expected to install a mobile network with full redundancy for a 24/7 always on requirement? It appears to indicate that 4G is to be used in this document. If this is a COTS 4G system has is the vendor to ensure 24/7 availability through a third party?

This is to be available over a commodity mobile/cell phone network. Risk would be taken against the 4G coverage due to unforeseen outages and the internet provided picture would be used for resilience. LOS has good 4G coverage across the airfield and the operators have had no problems accessing the picture via 4G.

1. *Connection to an application that processes the bird picture derived activity into a database.*
   1. What connection is required?

Internet connection

* 1. What database is required?

It would be the providers database

* 1. Can you define “bird picture” requirement as this term is ambiguous? IE How is “bird picture” defined as a deliverable?

The deliverable is access to real time radar picture for the BCU operators and ATC via mobile devices and an internet platform.

The bidder should have the ability to capture radar information (bird numbers, types, times, locations) and have an application which enable the customer to access this data and analyse it. Some examples are:

* Search bird activity type over a defined period
* Produce a heatmap of bird activity over a defined period
* Filter the information by bird type, location, time

It is up to the bidder to sell us their software application to enable analysis of bird activity, not for us to define the requirement and them develop the software as this is a COTS requirement.

1. *Software should provide detailed information and analysis on LOS bird activity over specific geographical locations and time periods.* What are the detailed information, activities, locations and time periods that are being requested as a deliverable?

The bidder should have the ability to capture radar information (bird numbers, types, times, locations) and have an application which enable the customer to access this data and analyse it. Some examples are:

* Search bird activity type over a defined period
* Produce a heatmap of bird activity over a defined period
* Filter the information by bird type, location, time

It is up to the bidder to sell us their software application to enable analysis of bird activity, not for us to define the requirement and them develop the software as this is a COTS requirement.

1. *Software should be able to produce configurable spreadsheets, graphs and pictorial products to display user requests.*

The bidder should have the ability to capture radar information (bird numbers, types, times, locations) and have an application which enable the customer to access this data and analyse it. Some examples are:

* Search bird activity type over a defined period
* Produce a heatmap of bird activity over a defined period
* Filter the information by bird type, location, time

It is up to the bidder to sell us their software application to enable analysis of bird activity, not for us to define the requirement and them develop the software as this is a COTS requirement.

1. *The BDS must not cause adverse interference on LOS NAVAIDS or aircraft systems.*

Please provide the frequencies that are in use at RAF Lossiemouth so that we can see if we can deconflict the systems?

*The cleared frequency for the operation of a BDS at LOS is 9650 Mhz*

1. *The BDS must operate within an approved frequency range. Cleared with OFCOM and the Joint Spectrum Agency.*

*The cleared frequency for the operation of a BDS at LOS is 9650 Mhz*

1. *The Contractor shall provide training for personnel to operate the system. (Initial end user training is required to understand the detection system itself as well as what data is provided and how to interpret it. Additional training should be provided if there are significant changes or upgrades to the systems.*

Can you please clarify in terms of number of personnel and frequency of additional training and future update requirements?

Initially 20 personnel – 10 Bird Control Operators and 10 ATC

Additional trg would be required on negotiation due to the changeover of personnel or due to modifications to the system or software.

1. *Demonstrate that the system does not preclude future development of additional features and capability.* What are the additional features and capabilities that are required so that we can ensure they are not precluded?

Future desirable capabilities would be the ability to detect and track small privately operated UAVs (Drones) and vehicle movements (we would need to provide transponders to vehicles for accuracy).

1. Data collated during the trial (bird occurrences) will be provided).” [↑](#footnote-ref-1)