



Report Marketconsultation

Bird detection systems on the North Sea

**Rijkswaterstaat Centrale
Informatievoorziening**

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Introduction

This report has been prepared by Rijkswaterstaat (RWS) and presents the main findings and key conclusions of the market consultation. The findings are anonymized, and commercially confidential information has not been included. Publishing this report ensures a level playing field, by giving all interested market parties access to the same information.

On 17 December 2025, RWS published a market consultation on TenderNed for Bird Detection Systems in the North Sea.

On 22 January 2026, the market consultation meeting took place. During this meeting, RWS explained the background, purpose, scope, and challenges of the project. The presentation, including an overview of participating market parties, has been published on TenderNed.

Eight market parties submitted written responses to the questions posed. Follow-up meetings were subsequently held with six of these parties.

This report covers the outcome of both the written responses and the individual meetings.

The insights provided by market parties have proven valuable and will support the further preparation of the tender.

Thank you for that!

Responses of market parties on the market consultation

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Below, you'll find a general overview of the responses from market participants, based on each question from the market consultation, both from the response forms and from explanatory discussions.

Questions regarding interest in the tender	
A1	QUESTION: Does your company have experience in the development, construction, and commissioning of the bird detection system you propose? If so, what is the current installed base and at which locations are these systems operational? Do these include comparable offshore locations?
	Six parties have experience in the development and construction of bird detection systems. Two parties offer consultancy in commissioning of a bird detection system bought on the market. Currently various bird detection systems are installed onshore and offshore on platforms, wind turbines and buoys. Various bird detection systems are installed at comparable offshore locations on the North Sea, and several other parties have experience operating such systems on other seas abroad.
A2	QUESTION: Is your company able to deliver the primary and/or the secondary scope? Please indicate which parts of the primary and/or secondary scope can or cannot be delivered.
	All parties indicated they can deliver the primary and secondary scope.

A3	The requirements include, among others: • Detection range • Accuracy • Data quality • Noise suppression <u>QUESTION:</u> For each of the above items, please indicate at a high level how your solution will meet the functional requirements (in combination with the technical requirements), and where you see risks or requirements that are difficult or impossible to meet.
	<u>Detection range, accuracy, and data quality</u> Detection range, accuracy, and data quality differ depending on the proposed technology and sensors used. The detection range depends on the required resolution (bird size class) and on environmental conditions (such as visibility). Several suppliers mentioned that there is a trade-off between: on the one hand systems with a wide-reaching detection range that can span several kilometers and (part of) a windfarm but lack the resolution to detect small migrating songbirds, and on the other hand systems that can detect objects as small as insects and have capabilities for species identification but have a limited range of only a few hundred meters. <u>Noise suppression</u> The methods for noise suppression also differ depending on the proposed technology, sensors used and field of view. Some sensors do not apply a method for noise suppression, and other sensors utilise innovative methods such as micro-doppler signatures or Artificial Intelligence (AI) algorithms. <u>Risks</u> Identified risks include: - The requirement for the specified temperature range of -20°C to +55°C. - The requirement for the specified operational weather conditions (such as Beaufort scale and sea state). - The requirement for the horizontal and vertical detection range. - The requirement for spatial resolution or target distinction. - A potential requirement for species identification.
A4	<u>QUESTION:</u> Can you indicate innovations in the following areas, and their applicability to the bird detection system, including feasibility and risks: - Improving data quality and reducing noise in the data, for example noise caused by wind turbines, precipitation, and waves. - Combining different measurement techniques/sensors in one integrated system, taking into account the possibilities for data calibration and data validation.
	<u>Improving data quality and reducing noise</u> Innovations that have been mentioned include, among others, AI-algorithms (machine-learning-based) to distinguish a signal or target from noise. For example, to distinguish a signal from noise from video with

	image recognition, or to distinguish a signal from noise in radar echoes with micro-doppler signatures. <u>Combining different measurement techniques/sensors</u> Innovations that have been mentioned include combining radar technologies with optical and auditory sensors. Various radar technologies can be integrated with daylight cameras, thermal cameras, infrared illumination panels, pan tilt zoom (PTZ)-cameras, stereoscopic cameras, bird detection microphones, and bat detection microphones. Some companies offer an integrated multisensory system, while other companies offer a sensor that can operate in a master-slave configuration, and must be integrated by the client itself. Some software can integrate data, while other multisensory systems require separate data integration for data validation and data calibration.
A5	<u>QUESTION:</u> What is the horizontal and vertical range of the bird detection system you propose with respect to the functional requirements in section 1.6, and how is this range representative for the typical dimensions of a wind farm?
	Horizontal range varies between 100 meters and 6 kilometers. Vertical range varies between 100 meters and 2 kilometers. For achieving a detection range representative of an entire wind farm, radar technology - with a greater detection range compared to camera- and microphone-based detection - is preferred. Alternatively, multiple cameras can be installed on multiple wind turbines to collect a dataset that is representative of a wind farm as a whole. It was proposed that analyzing the correlation and heterogeneity of bird migration along a line perpendicular to the migration direction can provide insight into what distances between bird detection systems are optimal to collect representative data that covers spatial variability.
A6	<u>QUESTION:</u> How can a trend break in data be minimised when replacing the current bird detection systems with another new system?
	All companies agreed that a trend break can be minimised by operating the current and a new bird detection system simultaneously for a test period. Additional proposed measures included fieldwork to perform human bird observations and aerial surveys from a plane.
A7	<u>QUESTION:</u> Is the bird detection system you propose also capable of collision detection?
	Yes, camera-based solutions have collision detection potential. For example, by automatically annotating videos with turbine interaction events. For collision risk assessment high resolution detection in the rotor swept area is advised. Radar-based solutions do not have collision detection capabilities, but all the proposed radar-based solutions can be integrated with camera systems.

A8	QUESTION: Can the bird detection system you propose be integrated with other third-party sensor systems such as cameras, microphones, and collision detection systems? If so, which ones?
	All proposed systems have the capability to integrate other sensors such as radars, cameras and microphones. IP-based interfaces and Application Programming Interfaces (APIs) are used for the integration of sensors.

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<i>Technical requirements</i>	
B1	QUESTION 1: How will your solution meet the operational conditions at offshore locations, particularly regarding saltwater exposure, harsh weather conditions, and very high wind speeds and gusts? QUESTION 2: How will you ensure that your solution is sufficiently robust and operates without failure with at most one preventive maintenance visit per year on site?
	- Operational conditions at offshore locations have been identified as a risk for the tender. Proposed solutions include the use of certified-for-offshore-use materials, designing the system with redundant components, keeping spare parts in stock, secure mounting of the sensor, and limited moving parts to minimize wear and tear. - Most solutions are expected to operate without failure, requiring at most one preventive maintenance on-site visit per year. Certain components requiring periodic replacement have been identified; however, none of these require replacement within one year. These components include camera lenses, magnetrons, wipers, servers, oil and spray water.
B2	QUESTION: Are there solutions for installation on wind turbines and offshore platforms that take into account obstacles close to the sensor? For example, the turbine mast obstructing a significant part of the view.
	Yes, Different solutions have been proposed. - Installing the bird detection system further away from the turbine mast to minimise the blanking zone. - Creating overlapping camera or radar views with multiple sensors on multiple wind turbines to minimise blind spots.
B3	QUESTION: Do you see opportunities through technical solutions to reduce costs, for example by lowering investment costs or reducing (preventive) maintenance?
	Yes, different solutions have been proposed. Technical solutions to reduce costs include: - Retrieving data for smart maintenance to remotely monitor the health status of the bird detection system. - Installing multiple small sensors on multiple turbines could be cost effective.

<i>Operations and maintenance</i>	
C1.1	<u>QUESTION:</u> Can you provide operations and maintenance for the bird detection system according to the primary scope? And for the secondary scope? All companies are able to deliver operations and maintenance for the bird detection system according to both the primary and the secondary scope. In doing so, some rely on remote support services or local subcontractors.
C1.2	<u>QUESTION:</u> Do you have an organization in place for this, and what experience does it have with the mentioned activities? All companies have an O&M organization in place, however not always in-house. Some make use of subcontractors, which often are Dutch companies. Some companies provided examples of their O&M experience. Several companies said O&M can also be done by local third-party contractors when clear instructions are available, with the sensor supplier giving remote support when needed.
C1.3	<u>QUESTION:</u> Is your maintenance organization able to periodically visit offshore locations for preventive maintenance? (Transport to the location will be arranged by RWS.) All companies can carry out preventive maintenance offshore. Several note that weather and offshore logistics make planning difficult. Remote monitoring and condition-based maintenance help to make preventive work more efficient.
C2	<u>QUESTION:</u> Can you indicate whether your solution uses components that need to be periodically replaced during the 10-year service life of the bird detection system (revision parts) to meet the required availability? If so, which parts and what is the estimated replacement interval? Replacement intervals depend on the type of sensor. The components that were mentioned are servers, camera parts, cooling/HVAC parts, acoustic sensors, gaskets, and UPS/power supply parts. The newest hardware has undergone limited offshore testing, which makes replacement intervals uncertain. Proper stock management is important. A modular design with easily replaceable components should be considered. Several suppliers stressed the importance of stable power (including UPS for safe/graceful shutdown) and effective cooling systems to prevent system failures.

C3	QUESTION: In your view, how can life cycle management (LCM) best be secured in the agreement and operations?
	Clear contract requirements and service levels are necessary. An LCM-plan should be created and actively maintained over the full contract lifecycle. Providing scope for innovation and system upgrades is also considered important.

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Questions regarding delivery and commissioning	
D1	QUESTION: What is your standard delivery process up to commissioning, including lead time?
	Delivery usually progresses from engineering to installation and testing (FAT and SAT). Lead time generally is three to twelve months, depending on component availability, production planning, weather, and site-specific needs.

Questions regarding points of attention	
E1	Question: Which of the points of attention identified by RWS (section 1.9 of this market consultation) do you see as a risk, and/or do you see any other risks? What are the main risks of the project?
	1. Weather conditions & offshore access: bad weather and rough sea conditions can make offshore locations unreachable. This may delay installation, commissioning and maintenance. 2. Logistics and cost of offshore work: offshore work is expensive and difficult to plan. Limited time on-site and changing safety rules can make budgeting difficult. 3. IT and cybersecurity requirements: strict IT and security requirements may slow the project or add costs. They may also limit remote updates and remote control. 4. Data quality & scientific reliability: The parties did not identify data quality and scientific reliability as a risk of the project. Some parties have in-house ornithologists and collaborate closely with scientists to analyse their data.

Questions regarding sustainability	
F1	QUESTION: In your opinion, what are the conditions for achieving the most sustainable tender possible? Please also consider smart maintenance for sustainable maintenance.
	The following ideas were given: - Focus on total life-cycle value and not capital cost alone and discourage short-term solutions. - Choose a durable design (long service life). - Minimise on-site maintenance and repairs offshore. - Use predictive analytics and digital twins. - Apply automation and remote control of the bird detection system. - Early end-of-life planning avoids waste and unexpected costs. - Guarantee the availability of spare parts.

F2	QUESTION: Do you have insight into the environmental impact of your product or service? If so, could you elaborate?
	Most companies have somewhat of an understanding of the environmental footprint of their products and services. Some are in the process of obtaining an environmental certificate.

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Finally	
G1	QUESTION: The procurement procedure and execution of the agreement will be conducted in Dutch. Are you able to comply with this requirement?
	4 companies are able to comply 1 company is not able to comply 3 companies are partly able to comply (procurement procedure in Dutch and specifications and execution of the agreement in English)
G2	QUESTION: Are you willing to clarify your answers in a (physical or online) meeting? See also section 2.4.4.
	All parties were willing to explain their answers.