



Rijkswaterstaat  
*Ministerie van Infrastructuur en Waterstaat*

# **Market consultation document**

concerning the planned tender:  
"The purchase, installation and maintenance of  
an HF radar system for current measurements  
in the Western Scheldt at the Zuidergat area."



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*Ministerie van Infrastructuur en Waterstaat*

## **Colofon**

|                 |                                                                      |
|-----------------|----------------------------------------------------------------------|
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# 1. Introduction

## 1.1 About Rijkswaterstaat

Rijkswaterstaat (the Directorate General for Public Works and Water Management) is the executive agency of the Ministry of Infrastructure and the Environment dedicated to promoting safety, mobility and the quality of life in the Netherlands. We want to live in a country that is protected against flooding, where there is sufficient green space and an adequate supply of clean water and where we can travel quickly and safely from A to B.

Rijkswaterstaat (RWS) is in the Netherlands responsible for the design, construction, management and maintenance of the main road network (5,695 km), the national waterways network (1,686 km of canals, rivers and 6,165 km of navigation channels in open water) and the national water system (65,250 km<sup>2</sup>). Figure 1 shows the organizational structure of RWS.

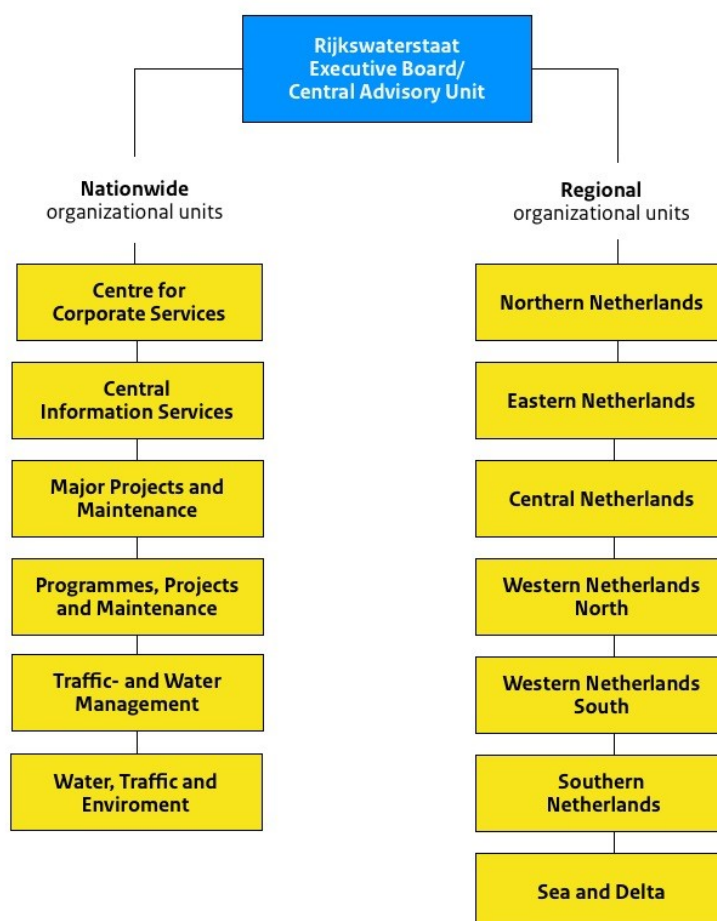


Figure 1: Organisational structure of Rijkswaterstaat



The Central Information Services (CIV) service of Rijkswaterstaat (RWS-CIV) is one of the national organisation units of RWS. RWS-CIV is responsible for collecting, managing and distributing data, as well as ICT management and development. Furthermore, CIV supports in office automation. Within CIV, the department of IGA (in Dutch: Inwinning en Gegevens Analyse) is responsible for the process from data acquisition to facilitation of information distribution. This market consultation is carried out by RWS-CIV and the Flemish government.

The website [www.rijkswaterstaat.nl](http://www.rijkswaterstaat.nl) provides information about Rijkswaterstaat and RWS-CIV.

### **1.2 Reason**

This document is a first step towards a planned tender: “the purchase, installation and maintenance of an HF radar system for current measurements in the Western Scheldt at the Zuidergat area”. RWS-CIV is eager to actively involve the market parties before the actual tender is generated. Therefore Rijkswaterstaat kindly invites you to participate in this market consultation.

### **1.3 Purpose of the market consultation**

The purpose of RWS with this market consultation is:

- a) to gain insight into the feasibility of the project and the plan and the preconditions under which the project can be executed;
- b) to obtain input for further implementation of the tender strategy and the tender documents (gain new ideas, test existing ideas);
- c) to find out if the contract is feasible for suppliers and are the set preconditions realistic?
- d) to hear if there are alternative solutions to achieve the objective;
- e) to reach, interest and encourage as many prospective suppliers as possible.

RWS wishes to emphasise that this market consultation is not part of the tendering procedure and that no rights may be derived from this document.

Any insights gained from the market consultation will be used by RWS (wherever relevant) in preparing the tendering procedure and the tendering documents. RWS reserves the right to not (fully) make use of these insights.

### **1.4 Approach of the market Consultation**

The market consultation consists of a written round of questions with all parties who wish to contribute. After the written round, individual meetings can be scheduled with one or more market parties if necessary. At the end the answers to these questions will be published (anonymously) on TenderNed. Explicit business sensitive information will not be published.



### ***1.5 Digital tender procedure***

RWS uses TenderNed for all of her digital tender procedures. This means that if you are interested in participating in the tender procedure, you will have to register digitally and eventually also submit your tender digitally. More information about registration on TenderNed can be found on this site: [https://www.tenderned.nl/foreign\\_registration](https://www.tenderned.nl/foreign_registration).



## 2. Scope

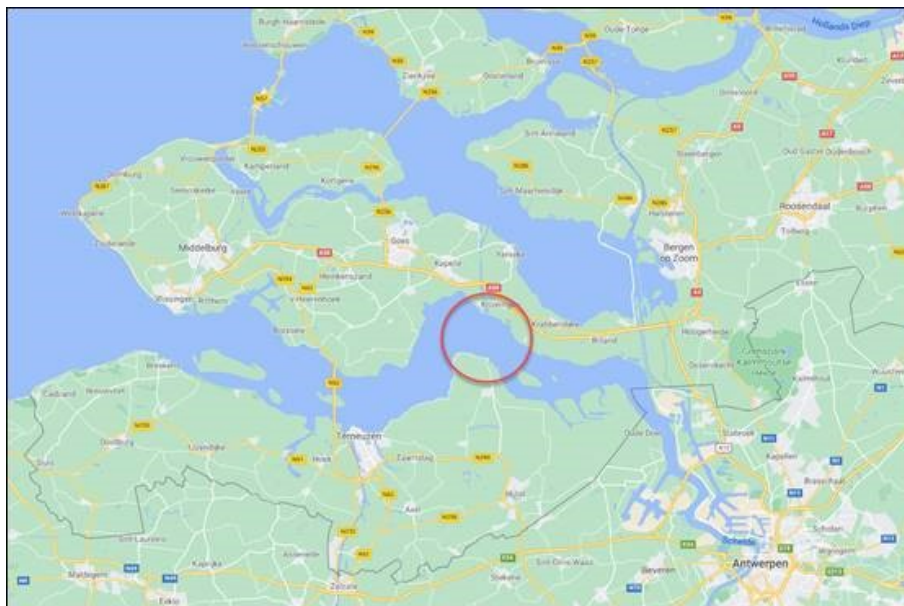
With the envisioned tender RWS has the aim to select and contract a company that is capable of delivering, installing and maintaining (long term) a current measuring HF radar system that meets the criteria and requirements as defined by RWS. These criteria and requirements are described in more detail in paragraph 2.3.

After signing the contract, the purchased components of the radar system can be installed by the contracted company itself or by subsidiary companies under direct responsibility of the contracted company.

Purpose of the market consultation, as described in this document, is to acquire insight in the way the vendors think they are able to meet the criteria and requirements with respect to an HF radar system. Furthermore, the market consultation aims at checking whether the requirements formulated by RWS are realistic from the viewpoint of vendors.

### 2.1 Introduction

In the southwestern part of the Netherlands the Western Scheldt estuary forms the shipping lane from the North Sea to the Port of Antwerp. Near the Belgian border, east of the so-called "Schaar van Ossensisse" in the Zuidergat area (see the red circle in figure 1 underneath) very treacherous and strong side currents can sometimes occur with velocities up to 5 knots.



**Fig. 1 Zuidergat area in the Western Scheldt shipping lane to and from the Port of Antwerp (Belgium).**

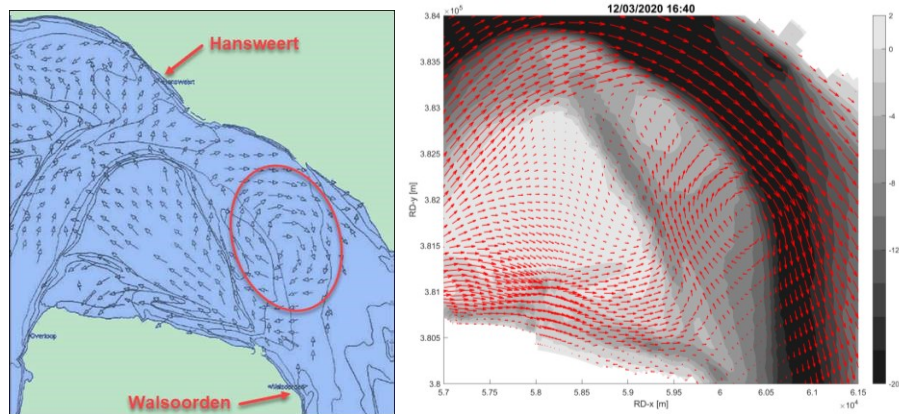
These side currents may occasionally appear during a strong springtide in two weekly intervals and manifest themselves in the shape of an eddy (gyre) with a diameter of about 2 km that is present for more than an hour, from 20 minutes before High Water until one hour after High Water.



Due to centrifugal forces the water level in the center of the gyre is locally depressed down to a maximum of 50 cm.

Apart from the shear strength of the side currents, it is especially perilous to shipping that, in a relatively short time interval and/or in a relatively short distance, the occurring side currents can change in strength and even in direction.

A side current, that is constant in strength and direction, can in most cases be compensated by changing the steering angle, but a dynamically changing side current poses a huge risk to the helmsman and pilot, especially when they are not prepared for such treacherous conditions.



**Fig. 2 Two current maps of the Zuidergat area. The gyre is visible in a current map measured with an HF radar (left) and in a model simulation (right). the red ellipse marks the dangerous gyre.**

In figure 2, which is more or less in the vicinity of the red circle depicted in figure 1, the dangerous gyre is visible in two different current maps. The figure on the left is the result of a measurement with an HF radar system in 1996; the figure on the right is a model simulation.



**Fig. 3 The Fowairret container vessel run aground in 2005.**

Over the past decades the treacherous eddy currents have on multiple occasions lead to dangerous situations for the large ships sailing in that area, leading to ships nearly colliding or running aground.

In September 2005 a serious accident occurred involving the container ship Fowairret from Qatar that beached on her way to Antwerp. As the photograph in fig 3 shows, the ship was bent amidships.

Because of the obvious danger to shipping a reliable and accurate information system is required that timely gives data regarding the occurrence, location and strength of the gyre, so that the ships sailing in that area can be warned in advance about the expected strong side currents.

The Netherlands and Belgium both have large nautical interests in the Western Scheldt and, consequently, this project is a joint undertaking of both countries.

## ***2.2 Present monitoring system***

In 2008 a preliminary method was setup to timely warn the ship captains, the shipping control centers and the pilots. This method has made it possible to anticipate on the occurrence of strong side currents.

Using a decision model, based on the astronomical tide, it is possible to predict when the extreme side currents are likely to occur. On these days, when such a situation is expected, RWS carries out current measurements with a survey vessel (see figure 4) and supplies the observations directly to the ship guidance authorities, that can forward this information to the ship crews.



**Fig. 4 RWS survey vessel performing current measurements in the center of the gyre.**

The current information delivered by the survey vessel is far from ideal. Due to safety regulations measurements with the small survey vessel are only possible at daylight and with winds below 6 Beaufort. Furthermore, since the survey vessel cannot measure in the shipping lane, it is not possible to chart the complete spatial structure of the gyre.

Consequently, since 2018 RWS has been looking for a permanent current measuring system that can replace the present method for acquiring the information. This new system should be able to chart the currents continuously (24/7) in the area where the gyre might occur.

### ***2.3 Envisioned new current monitoring system***

For a robust, accurate and efficient supply of current information for safe shipping to and from the port of Antwerp, Rijkswaterstaat envisions the installation of an HF radar system delivering spatial current information in this region in real-time.

It is emphasized that this plan involves a permanent operational set-up, not a research project set-up.

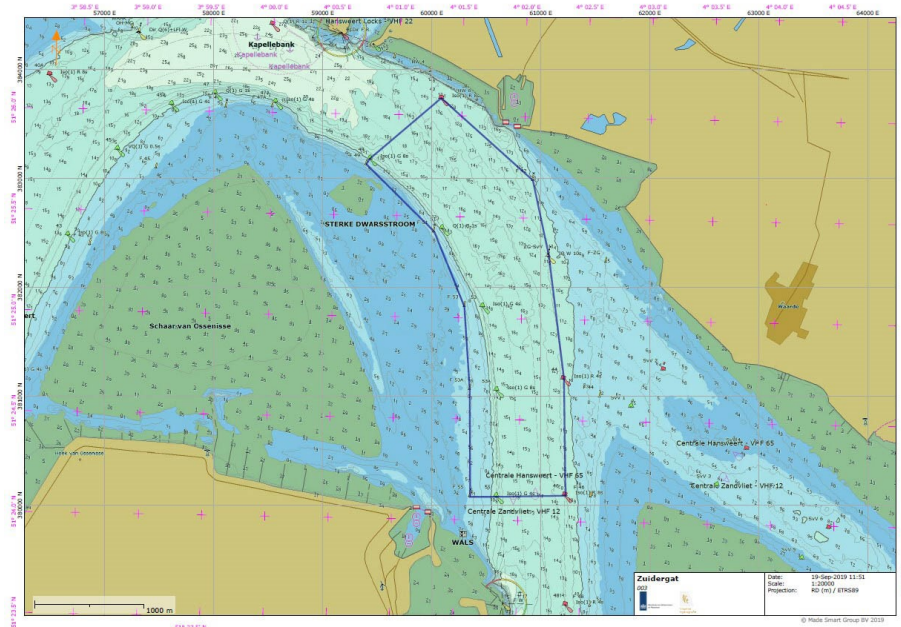
The system performance and data quality specifications of the envisaged HF radar system are described in more detail in this paragraph. In case accuracies are mentioned these accuracies are formulated in terms of the standard error.

The specifications are split in three parts, respectively dealing with the data that is to be supplied, the local environmental characteristics and the permits/licenses that have to be acquired.



### 2.3.1 Data requirements

The area covered by the radar system should at least encompass the area of interest as marked by the polygon sketched in the navigational chart in figure 5. This area of interest mainly runs along the deep draught vessel shipping lane, where the current information is crucial.



**Fig. 5** Area of interest marked by a polygon.

For the end-users (skippers, captains and pilots) the current information in the abovementioned area shall be presented in the form of a two-dimensional array of vectors with their amplitude in m/s and their azimuthal angle in degrees clockwise with respect to true north.

The accuracy of these current vectors is equal to or smaller than 10 cm/s. The uncertainty is in this case defined as the vector standard error in the current vector of a certain grid cell. The accuracy requirement holds as an average value over the entire target area.

The required spatial resolution of the radar current measurements is 250 meters in range and 7,5 degrees in azimuth. This requirement holds as an average over the whole target area.

Independent from the abovementioned measurement resolution, the current information should always be presented to the users as vectors in a rectangular grid in earth coordinates with square sized 250 x 250 meter cells.

The average number of total technical failures of the system should on average be no more than 3 times per year, calculated over any period of 3 consecutive years. This does not apply, however, to situations that are



outside the reach of the radar supplier, such as strong radio interference, vandalism, unforeseen natural disasters like flooding or any other natural hazards. The maximum downtime to recovery should not exceed 12 hours.

The time resolution is defined as the smallest time window over which the data are collected, processed and averaged. This averaging window should preferably be 3 minutes, but the minimum requirement is a set of uncorrelated data every 5 minutes.

The current data shall preferably become available at the output of the system every minute, calculated over the preceding averaging time window specified above.

The data should be made available on-line to the users in a standard format that still has to be agreed upon by the user. The data should become available no more than 1 minute after the measurement time window (see time resolution) has ended.

Raw and processed data should be stored in the radar system and to be made available upon request. It should remain available up to 12 months after the measurement.

The technical lifetime of the radar based information system shall be at least 10 years.

Remark: an HF radar supplies spatial current information, but can also produce wave, shipping and wind information. Although this additional information may perhaps be of some interest, no requirements are given for this information.

### **2.3.2 Characteristics of the local environment**

On the banks of the Western Scheldt four preference locations, suitable for installing a radar station, have been selected by RWS; three on the northern bank and one on the southern bank. These preferred locations are depicted as red circles in figure 6. Also shown as yellow circles are two alternative sites.

Note that in the area of interest sometimes very large ships (400m long and 50m high) are sailing with a speed of about 10 km/h, which might impair the performance of the radar system.

The salinity (salt concentration) of the water in the area of interest is 10 to 15 PSU (Practical Salinity Units), which is somewhat less than seawater.



The tidal flats belonging to the “Schaar van Ossenissee” (see figure 5) as well as other sand banks in the area fall dry, depending on the tidal conditions, for about 50% of the time. When they fall dry, a very large and very dry sand surface is present, that will probably give rise to high propagation losses of the radar signal.

### 2.3.3 Requirements with respect to permits and/or licenses

The antennas as well as any ancillary construction works, like e.g. a shed or container housing the electronic equipment, should occupy as less space as possible. In general, the larger a construction, the less easy it becomes to obtain a construction permit from the local authorities.

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In order to acquire a broadcasting licence the radar system shall probably have to operate in the 44 to 47 MHz frequency band. The available bandwidth will probably be about 600 kHz. Unfortunately, the exact frequency allocation and allowed bandwidth are at the moment of publication of this market consultation document not completely certain.

The total average transmitted power, to be understood as the effective radiated power, should be below 20 watts.

Due to water defense safety regulations it is not allowed to carry out any digging activities in the levees during the storm season (from October 1<sup>st</sup> till April 15<sup>th</sup>).



## 3. Process of market consultation

### 3.1 Procedure

The procedure for this market consultation is as follows:

- 1) The market consultation will be launched with the publication of this document on TenderNed.
- 2) Any interested market party that considers itself able to contribute to the market consultation, is requested to reply to the questions in this market consultation. The replies should be submitted by e-mail to [inkoopcentrum-iv@rws.nl](mailto:inkoopcentrum-iv@rws.nl) before the closing date and time, referred to in paragraph 3.2.
- 3) On the basis of the submitted reactions, RWS-CIV retains the option to invite parties to give face-to-face verbal additional explanations to their answers if necessary. RWS-CIV will contact these parties and, in consultation with these parties, plan a meeting during the period referred to in paragraph 3.2.

### 3.2 Planning

RWS-CIV will operate the following planning timetable:

| Activity                                                                     | Date and time             |
|------------------------------------------------------------------------------|---------------------------|
| Publication of market consultation document                                  | April 19th 2021           |
| Closing date for submitting questions about the market consultation document | May 19th 2021 at 15:00 pm |
| Publication of answers to questions about the market consultation document.  | May 26th 2021             |
| Closing date for submitting completed questionnaire                          | June 8th 2021 at 12:00 pm |
| Dates for additional interviews (if necessary)                               | June 8th–June 14th 2021   |
| Publication answers to the questions                                         | June 30th 2021            |

Interested parties may derive no rights from the planning timetable above.

RWS-CIV reserves the right to alter the planning timetable. This planning timetable is therefore indicative. The greatest possible effort will be made to comply with the planning timetable.

### 3.3 Questions about the market consultation document

As RWS favours transparent and clear communication, there is the opportunity to pose your questions about any ambiguity in this market consultation document. This can be done by e-mailing [inkoopcentrum-iv@rws.nl](mailto:inkoopcentrum-iv@rws.nl), before the deadline as stated in paragraph 3.2. The answers to these questions will be published (anonymously) at the date as listed in paragraph 3.2.



### **3.4 Submitting the questionnaire**

Any interested market party that considers itself able to make a contribution to the market consultation is requested to submit the answers to the list of questions in chapter 3 of this market consultation document by e-mail to: [inkoopcentrum-iv@rws.nl](mailto:inkoopcentrum-iv@rws.nl), stating "HF-Radar system Zuidergat - Completed questionnaire". Submission must take place before the "Closing date for the submission of completed questionnaire" referred to in paragraph 3.2.

### **3.5 Confidentiality**

RWS will treat the input from all participating market parties as confidential. RWS will exclusively reveal this information to employees and consultants directly involved in the market consultation and/or the tendering procedure, unless on the basis of legal provisions, RWS is required to make that information available to a broader audience. RWS is entitled to make use of the information provided for preparing the tendering documents. RWS will not include any specific references to participants or commercially sensitive information in the tendering documents.

### **3.6 Other provisions in relation to market consultation**

The market consultation is not part of the tendering procedure. In order to avoid placing participants in the market consultation in a prejudiced position, RWS-CIV will be publishing the outcomes of the market consultation in the tendering documents. In addition, all information shared by RWS-CIV during the market consultation will be part of the tendering documents.

In the tendering procedure, no distinction will be made between parties that did or did not participate in the market consultation.

Information in this market consultation document may deviate from information issued at a later stage (in the framework of a tendering procedure or any other acquisition procedure). No rights may be derived from the information issued in the framework of the market consultation. The information is purely indicative and intended exclusively to enhance the quality of the market consultation. If this information is contradictory to information issued at a later stage, the later information shall prevail.

RWS-CIV will not make any payment to participants in the market consultation.



## 4. Questionnaire

| <b>Questions related to interest in the assignment</b> |                                                                                                                                                                                                                                                                                               |
|--------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| A1                                                     | What are the details to contact you (e.g. contact person and position, e-mail address and telephone number)?                                                                                                                                                                                  |
| A2                                                     | What could be reasons for you whether or not to participate in the proposed tendering procedure?                                                                                                                                                                                              |
| A3                                                     | Do you have knowledge and experience with the delivery, installation and maintenance of an HF radar system as described in the scope? If so, how many systems have you delivered, installed and maintained? How were the duties / responsibilities of you and your possible partners divided? |

| <b>Questions about the content of the assignment</b> |                                                                                                                                                                                                                                                                                               |
|------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| B1                                                   | Can you indicate which solutions based on HF radar technology can be proposed by you that fulfill the intended purpose of the assignment?                                                                                                                                                     |
| B2                                                   | What is the space used by your radar installation in length, width and height and which components (e.g. antennas, cables, accommodation, etc.) is your system roughly composed of? This space influences the required permits.                                                               |
| B3                                                   | Which carrier frequency (MHz) and associated bandwidth (kHz) would you like to use and what is the transmission power (ERP = Effective Radiated Power) of your installation? This affects the required broadcasting license.                                                                  |
| B4                                                   | RWS has designated a number of locations (refer to figure 6) for the position of the transmitting and receiving installations. How many locations does your setup need to deliver the requested range? And which locations do you prefer?                                                     |
| B5                                                   | To what extent is your system able to cope with a suddenly and strongly changed current field?                                                                                                                                                                                                |
| B6                                                   | Is the requirement of a measuring time window of maximum 5 minutes for your system compatible with the required accuracy of the current measurement?                                                                                                                                          |
| B7                                                   | Is it possible to deliver a provision so that the flow information can be issued every minute calculated over the previous 5 minutes?                                                                                                                                                         |
| B8                                                   | After installation and commissioning of the radar system, how long does it take for usable current data to become available from the system?                                                                                                                                                  |
| B9                                                   | Can you indicate which requirements your system meets (use the table in Appendix A) and can you also prove that your system meets these requirements?                                                                                                                                         |
| B10                                                  | How do you intend to maintain your HF-radar system?                                                                                                                                                                                                                                           |
| B11                                                  | Do you use partners for the execution of the future assignment? If so: Please explain why you use cooperation partners, which ones you use and for which parts.                                                                                                                               |
| B12                                                  | By 2030, RWS wants to be 100% energy neutral and to work completely circular. How can you contribute to this goal in the requested assignment?                                                                                                                                                |
| B13                                                  | Can you indicate which of the price categories below applies to your system? This concerns the total price for construction including 5 years maintenance. <ul style="list-style-type: none"> <li>1. &lt; 0,5 M€</li> <li>2. 0,5 - 1 M€</li> <li>3. 1 - 2 M€</li> <li>4. &gt; 2 M€</li> </ul> |

**Finally**

|    |                                                                                                                                                        |
|----|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| C1 | Do you have any other ideas, suggestions or comments or do you see any risks / bottlenecks or challenges for RWS with regard to the envisioned tender? |
| C2 | What would you advise RWS with regard to selection and / or award criteria for the envisioned tender?                                                  |



## Appendix A. Answers

| <b><i>Answers related to interest in the assignment</i></b> |  |
|-------------------------------------------------------------|--|
| A1                                                          |  |
| A2                                                          |  |
| A3                                                          |  |

| <b><i>Answers about the content of the assignment</i></b> |  |
|-----------------------------------------------------------|--|
| B1                                                        |  |
| B2                                                        |  |
| B3                                                        |  |
| B4                                                        |  |
| B5                                                        |  |
| B6                                                        |  |
| B7                                                        |  |
| B8                                                        |  |
| B9                                                        |  |
| B10                                                       |  |
| B11                                                       |  |
| B12                                                       |  |
| B13                                                       |  |

| <b><i>Answers Finally</i></b> |  |
|-------------------------------|--|
| C1                            |  |
| C2                            |  |



## Appendix B. Specifications

| Nr. | Aspect                                                                                          | Requirement RWS                                         | Your suggestion |
|-----|-------------------------------------------------------------------------------------------------|---------------------------------------------------------|-----------------|
| 1   | Area of coverage.                                                                               | See fig. 5                                              |                 |
| 2   | Number of required radar locations. Indicate the locations that you would prefer, see figure 6. | Max. 3                                                  |                 |
| 3   | Occupied space per radar station                                                                | <150 m long<br><10 m wide<br><5 m high                  |                 |
| 4   | Spatial resolution of the radar measurements (averaged over the entire area)                    | <250 m in range<br><7,5 degrees azimuth                 |                 |
| 4   | Presentation as two-dimensional array of current vectors                                        | Grid with 250 x 250m cells                              |                 |
| 5   | Accuracy of current vectors (averaged over the entire area)                                     | <10 cm/s                                                |                 |
| 6   | Measuring time window.                                                                          | < 5 minutes                                             |                 |
| 7   | Update frequency                                                                                | > 1 x per minute                                        |                 |
| 8   | Transmit frequency                                                                              | 44-47 MHz                                               |                 |
| 9   | Band width                                                                                      | <600 kHz                                                |                 |
| 10  | Transmit power (ERP)                                                                            | <20 W                                                   |                 |
| 11  | Availability                                                                                    | Failure rate < 3 x per year,<br>failure time < 12 hours |                 |
| 12  | Technical lifetime                                                                              | >10 years                                               |                 |
| 13  | Guarantee                                                                                       | >1 year                                                 |                 |