



Rijkswaterstaat
Ministerie van Infrastructuur en Milieu

31122403-NR-Appendix 6-Required specification General (VSA) Nautical Radar

Requirement specification General MIVSP LiDAR

Case number: 3112 2403

Date: 18/05/2017

Status: Final



31122403-NR-Appendix 6-Required specification General (VSA) Nautical Radar

Requirement specification General MIVSP LiDAR

Colophon

Issued by: Ministry of Infrastructure and the Environment
Date: 18-5-2017
Status: Final

© 2017, Rijkswaterstaat (Department of Waterways and Public Works) Central Information Provision (CIV). All rights reserved. No part of this document may be reproduced in whatever form or by whatever means without written consent of the CIP. This document is confidential and may only be used for the purposes it was released for.



Table of Contents

TABLE OF CONTENTS	3
1. INTRODUCTION	5
1.1 Background.....	5
1.2 Radar sensor information in relation to wind farms at sea	5
1.3 Radar sensor information in relation to the coast.	6
1.4 Vessel Traffic Services for the inland waterways	7
2. OBJECTIVES	8
2.1 Objectives Nautical Radar	8
3. CONNECTION OF NAUTICAL RADAR TO SITE INTEGRATOR	9
3	9
3.1 General role of the Site Integrator	9
3.1.1 Validation.....	10
3.1.2 Transport	11
3.2 Test strategy.....	11
3.3 Maintenance.....	13
3.4 Management	14
4 SCOPE AND ACTIVITIES ACCORDING TO THE AGREEMENT	16
4.1 Scope.....	16
4.1.1 Activity 1: (ref. A1) Early detection of non-functioning components, FAT.....	16
4.1.2 Activity 2: (ref A2) Deliver documentation, materials, and support for assembling 'Radarsensor'	16
4.1.3 Activity 3: (ref. A3) Supporting SIT	16
4.1.4 Activity 4: (ref. A4) Deliver information and support installation Nautical Radarsensor on OSS for SAT	16
4.1.5 Activity 5: (ref. A5) Deliver support for commissioning of the Nautical Radarsensor for the SAT on the OSS.	16
4.1.6 Activity 6: (ref. A6) Supporting SAT.....	16
4.1.7 Activity 7: (ref. A9) Deliver information and support for installation Nautical Radarsensor on WTG.....	16
4.1.8 Activity 8: (ref. A10) Deliver information and support for commissioning Nautical Radarsensor on OSS	17
4.1.9 Activities 9: (ref. A11) Offshore tests & commissioning	17
4.1.10 Activity 10: (ref O1/O2) Supporting Site Integrator for carrying out maintenance on sensors	17
4.1.11 Activity 11: (ref O3/O4) Supporting Site Integrator for carrying out maintenance on sensors	17
4.2 Relation contractor with basic service MIVSP	18
4.2.1 Overview of activities that required support and information from the contractor..	19
4.2.2 Planning.....	21
5 DEFINITIONS AND ABBREVIATIONS.....	22
5.1 Definitions	22
5.2 Abbreviations	22
6 ASPECT REQUIREMENTS	24



6.1	Introduction	24
6.2	Types of aspect requirements.....	24
6.3	HSE	24
6.3.1	<i>General</i>	24
6.3.2	<i>Electrical installations and equipment</i>	24
6.3.3	<i>Fire safety installations</i>	25
6.3.4	<i>Mechanical safety</i>	25
6.4	Availability	26
6.5	Sustainability	27
6.6	Offshore Substation	27
6.7	Dong WTG	27



1. Introduction

1.1 Background

National Energy Agreement

In the National Energy Agreement has been agreed with more than 40 third parties that by 2023 16% of the energy generated has to be generated sustainable. To achieve this objective several sustainable energy sources are needed. Windenergy on sea is a crucial part of this. It has been agreed that windenergy on sea will generate 4.450 MW of energy by 2023. With which more than 5 million households can be supplied with energy. This means that 3.450 MW has to be built on top of the existing 1.000 MW that has already been build en under construction.

Windparks at sea

In September 2014 the Dutch government has chosen three areas where windparks can be developed at sea: offshore of the coast of Zeeland, Noor-Holland and Zuid-Holland. A new system has been set-up for the realization of these windparks and new legislation has been agreed.

The resolution about this are recorded in the "Routekaart". This routecard has the following high-level planning:

- 2015: 2 x 350 = 700 MW Borssele alpha
- 2016: 2 x 350 = 700 MW Borssele beta
- 2017: 2 x 350 = 700 MW Zuid-Holland
- 2018: 2 x 350 = 700 MW Zuid-Holland
- 2019: 2 x 350 = 700 MW Noord-Holland

The Ministry of Economics and Ministry Infrastructure and the Environment, the State Service of Enterprising and Rijkswaterstaat Zee en Delta work together for the realization of the objectives for the program "Wind op Zee". With the realization of this program the windenergy sector, stakeholders at sea, coastal guard and coastal inhabitants are involved.

The tender (framework agreement) for the Nautical Radar focuses on various clients for shipping on the sea related to the wind farms and Vessel Traffic Services for inland waterways.

By collecting radar data and making it centrally available, this information can be effectively and efficiently provided to third parties. The following sections describe the user groups and the need of the required traffic image.

1.2 Radar sensor information in relation to wind farms at sea

Based on the Electricity Act, TenneT is the designated grid operator at sea, and was designated for this by the Minister for Economic Affairs. Mission for TenneT TSO BV: realize five platforms and connection of the wind areas at sea <2023.

Realising the IV data collection and making it available to third parties in the RWS data centre is a responsibility for the Rijkswaterstaat Central Information Services (RWS-CIV).

The wind farm consists of an Offshore Substation (OSS), a generic platform with associated WindTurbineGenerators (WTG). All data from various sensors is collected at the OSS.

As for the Nautical Radar, at least one radar must be placed at the OSS and there is the possibility of expanding this by placing Nautical Radars at various WTGs for the improvement of the traffic image.

The Coast Guard is responsible for the supervision and enforcement of the passage and Search and Rescue (SAR) in and around the wind farm. TenneT is responsible for monitoring the OSS.

Currently, passage and joint use of wind farms at sea are not permitted. From mid-2017, existing wind farms will be opened up for passage and joint use. Passage will be made possible for vessels up to 24 metres in length. The corridors in wind farm Borssele will be opened up for vessels up to 45 m long.

Figure 1 provides a visual insight for the clients who want to make use of radars on the wind farms. Borselle Alpha (right) and Beta (left), the green points are the first two TenneT platforms of the five wind farms.



Figure 1 Wind farm Borssele. The shaded area indicates the coverage area for the zonal marking for the Coast guard, monitoring TenneT, waterways (green line) for Schelder Radar Keten.

1.3 Radar sensor information in relation to the coast.

The Schelder Radar Keten Management and Exploitation Team (SRK-MET) is responsible for the instrumental support for proper shipping guidance in the Scheldt area. For optimal SRC Vessel Traffic Services, additional radar coverage between the wind farm Borssele and the coast is important. See figure 1, green line responsibility of SRC.



In addition to the Schelder Radar Keten, the Coast Guard is responsible for the entire coastline. Within the Coast Guard, it is also important that the coastline has a good radar coverage for offshore enforcement (12NM). If necessary, the Coast Guard may have a need for Nautical Radar within the modernisation programme of the Coast Guard (MOC programme).

1.4 Vessel Traffic Services for the inland waterways

The project National Uniformity Replacement VTS (LUV VTS) is focused on the replacement of the information provision tools for the Vessel Traffic Services for several RWS VTS centres. A VTS radar can be involved from this project if necessary.



2. Objectives

2.1 Objectives Nautical Radar

With the framework agreement and the requirements included in the Tender Specification, the Client strives to achieve the following objectives.

Objective 1: Providing quantitatively and qualitatively sufficient radar information

The radar sensor should continuously and throughout the year provide sufficient current information about ship traffic movements in and around the sensor location.

Objective 2: Providing collected radar data that is usable for Radar Data Processing

The radar sensor provides radar data that RWS makes available within the RWS domain for third parties in accordance with an open standard. The customer can then process (RDP) this data as part of their role, task, and responsibility.

Objective 3: Suitability for placing on land at sea with minimal maintenance

The Nautical Radar must be suitable for placement on land for coverage of the inland waterways, the coast, and the sea (OSS and WTG).

3. Collaboration of Nautical Radar to Site Integrator

3.1 General role of the Site Integrator

Because the Site Integrator (SI) plays a major role in the implementation of the project, an explanation of the expected working method with the Site Integrator is provided below.

The support of the Contractor to the SI can be divided into the preparatory phase, the realisation phase, and the implementation phase. These three phases are made visibly clear in figures 2 and 3. No rights can be derived from these figures.

In the preparatory phase, the Contractor must deliver the Nautical Radar to the SI. In the realisation phase, the SI must further realise and maintain the designs and tested situations, whereby the Contractor of the Nautical Radar supports the SI if necessary.

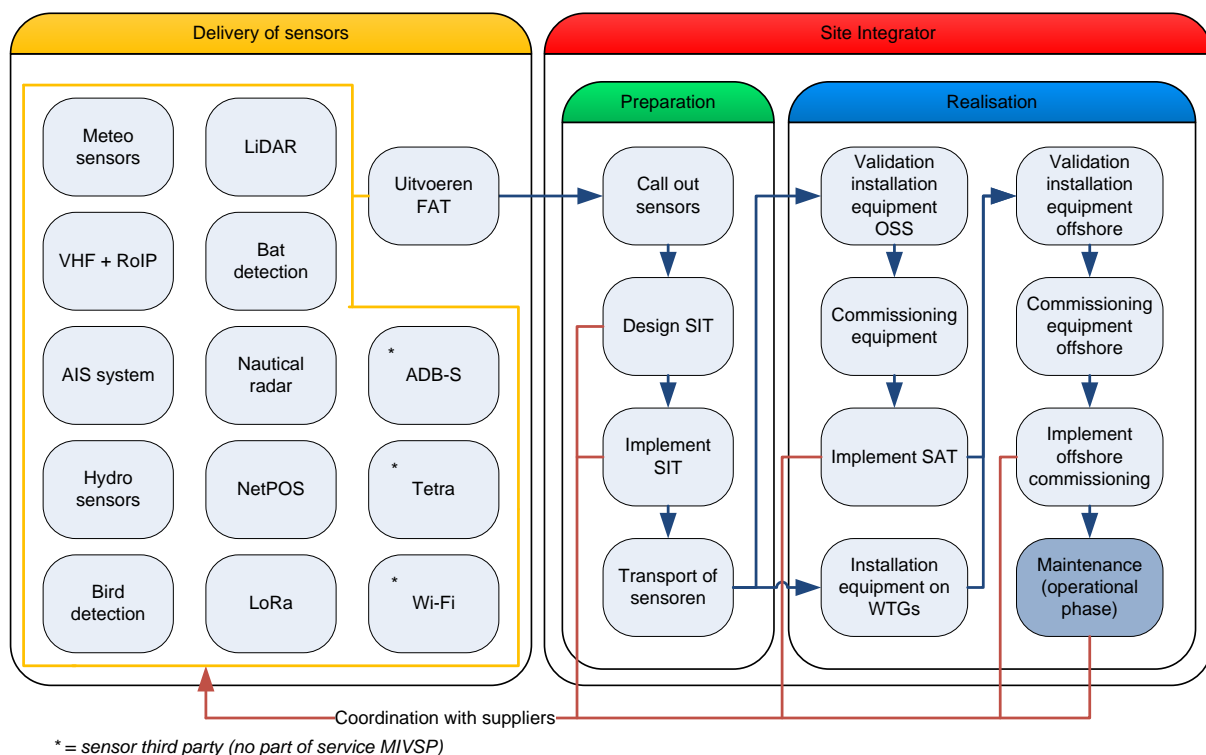


Figure 2 Collaboration of Nautical Radar to the Site Integrator

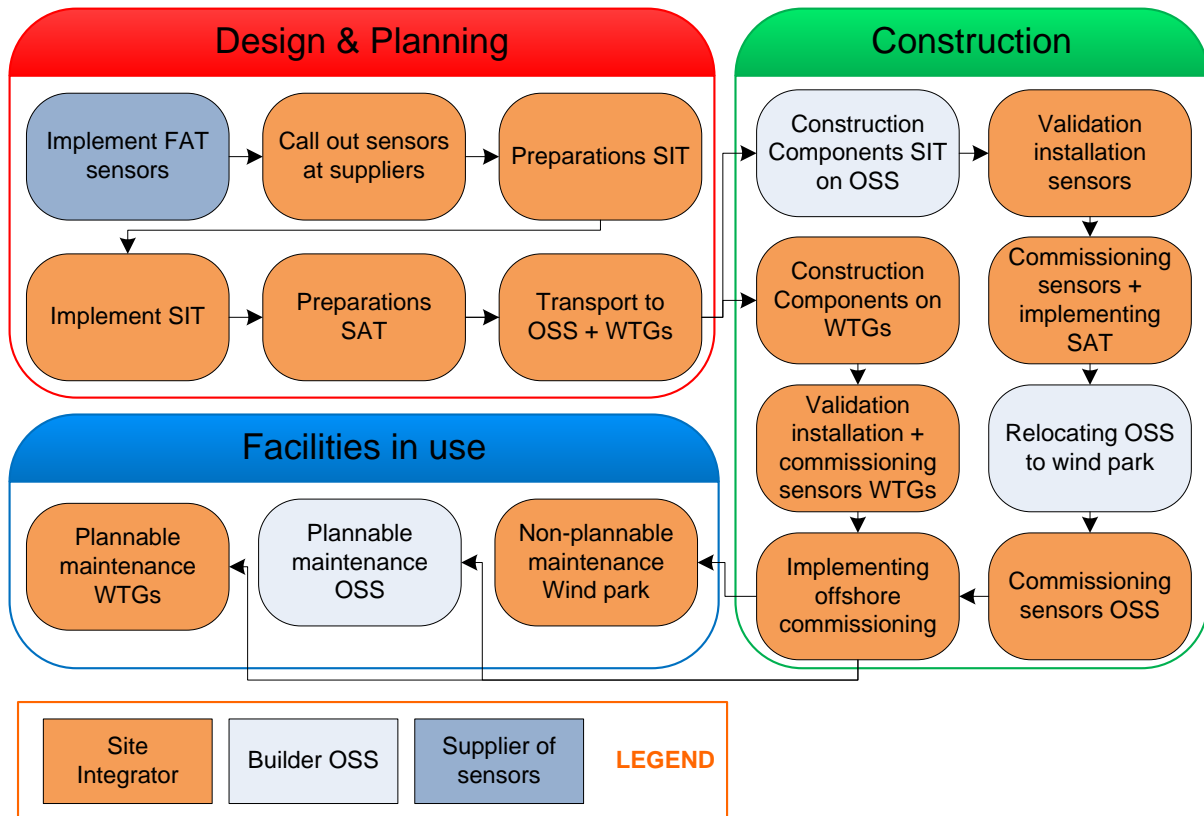


Figure 3: Tasks of Site Integrator

The Site Integrator has the following tasks:

- Realising the optimal functioning of sensors and systems;
- Transporting sensors and systems to the yard;
- Transporting sensors and systems to the WTG
- Installing sensors and systems on the WTG;
- Integrating sensors and systems into the RWS network.

3.1.1 Validation

Based on attending the FAT with the contractor, the Site Integrator and RWS-CIV can validate whether the Nautical Radar sensor meets the set requirements and is ready for integration.

Using the SIT, the Site Integrator performs a test that is attended by the Contractor and RWS-CIV in order to determine that the Nautical Radar sensor still needs the set requirements.

Using the SAT, the Site Integrator performs a test that is attended by the Contractor and RWS-CIV in order to determine that the Nautical Radar sensor still meets the set requirements on the OSS platform.

After the platform has been placed in the final location, a validation will be performed by the Site Integrator, and the Nautical Radar sensor will be commissioned in collaboration with the Contractor and RWS-CIV. If this is successful, the system can be taken into service.



3.1.2 Transport

The Contractor must provide all materials in order for the Site Integrator to assemble the 'pluggable racks'. These are racks/cabinets in which all necessary hardware is placed. This rack must be placed and connected in the OSS on the site. The Contractor must also provide the other sensors and system to the Site Integrator.

3.2 Test strategy

This section describes the test strategy. The test strategy is risk-based. This means that an analysis of the product risks must first be performed in order to then divide the time and means in the test strategy based on the analysed risks. The testing will be more focused on high risk areas than on low risk areas. The test results can be used to validate the estimated risks and if adjust them if necessary.

The tests must be performed in accordance with the IEC standards, including EN ISO/IEC 17025. These tests must comply and be reported. The documentation must be delivered in accordance with J-STD-016.

The tests below focus on an optimal installation of sensors and systems on board of OSS (Offshore Substation) and WTG (Wind Turbine Generator). With the activities that flow from this, the Client intends to achieve the objectives specified in Section 2.2. Table 1 displays the activities for this tender with the corresponding responsibilities of the involved parties.

		SI	Contractor	Builder OSS	RWS CIV	TNO	Users	Wind farm owners
A1	FAT	I	A, R	I	I	C	-	C
A2	SIT	A, R	S	C	I	C	-	C
A3	Transport to OSS	A, R	C	I	I	-	-	-
A4	Installation sensors on OSS	S	C	A, R	I	C	-	-
A5	Commissioning sensors and systems at SAT	A, R	C	S	I	I	I	-
A6	SAT	A, R	S	S	I	C	C	I
A7	Transport OSS to sea	C	C	A, R	I	-	-	-
A8	Transport to WTG at sea	A, R	C	-	I	C	I	S
A9	Installation sensors on WTGs	A, R	C	-	I	C	I	S
A10	Commissioning sensors and systems at sea (WTGs + OSS)	A, R	C	S	I	I	I	S

A11	Offshore commissioning	A, R	S	S	I	C	C	S
------------	-------------------------------	------	---	---	---	---	---	---

RASCI: R = responsible, A=accountable, S=support, C=consult, I=inform

Table 1: Activities sensors and systems

The test activities to be performed are divided into a series of tests, see Figure 3. These tests have the purpose of identifying non-functioning components early and improving the integration of the sensors.



Figure 4 Series of tests

Factory Acceptance Test

Purpose

In these tests, the sensor supplier demonstrates that their product meets the set requirements.

Subject of test

The sensors and systems are tested against the set requirements. The focus is on the suitability of the sensors.

Site Integration Test/Mock-up

Purpose

With the SIT, the transfer of the equipment of Sensor Suppliers takes place by means of a delivery protocol. Upon receipt, the Contractor is responsible for all equipment. Through an SIT, it is demonstrated that a number of sensors, systems, installations, and other related system components function correctly and without unintentional interference with each other. The sensors are built according to the antenna plan of TNO. For the SIT, the final situation at sea is representatively recreated.

Subject of test

With these tests, the connection to the RWS network and the interferences with other sensors and systems play an important role. If certain network components are not yet ready, stubs should be built.

Harbour/Site Acceptance Test

Purpose

After performing the SIT, the equipment is sent to the site. The site is responsible for storage of equipment. The Builder of OSS installs the equipment according to the design of the Contractor. After installation, there is a validation by the Client before commissioning. The commissioning falls under the responsibility of the Contractor. When the installation is completed, the Contractor performs the SAT on the site of the Builder.

Subject of test

With this test, it is checked whether the sensors and systems work as expected. In the SAT, the sensors and systems are placed at their final position on the OSS. The sensors that are to be placed on the WTGs are not included in the SAT.

Offshore Tests and Commissioning

Purpose

After shipping the OSS to the position at sea, inspections are carried out by the Contractor. Then, integration tests are performed in connection with the operational character in order to take other electromagnetic fields and WTGs into account.

Subject of test

With this test, it is checked whether the sensors and systems work as expected. In the offshore tests, the sensors and systems are tested in their final situation. These tests include the sensors and, if present, the systems on the WTGs.

3.3 Maintenance

The maintenance methods are subdivided into two main groups.

Scheduled: Maintenance that is performed to prevent future defects.

Unscheduled: Maintenance that is performed to repair defects.

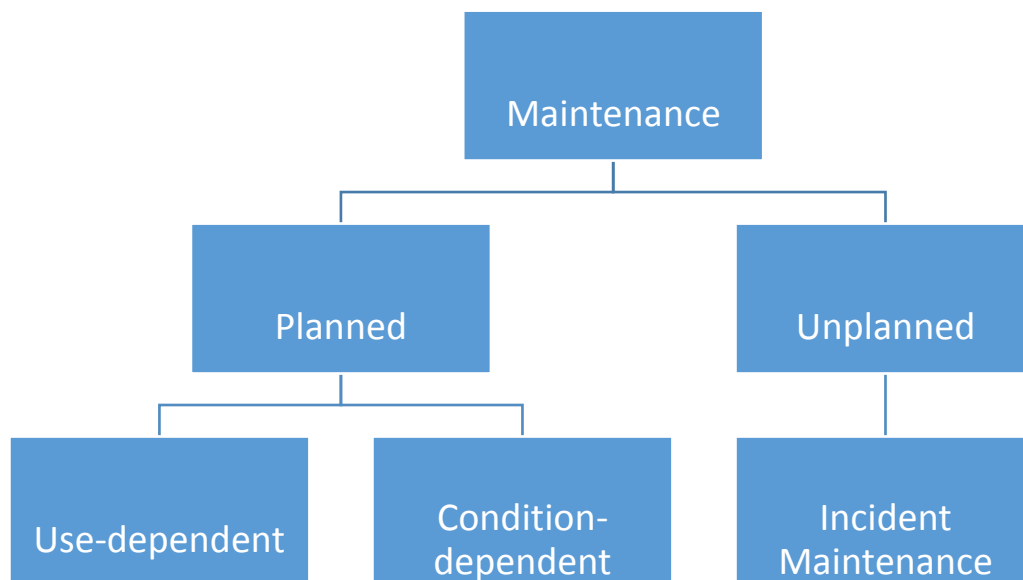


Figure 5. *Nautical Radar planned and unplanned maintenance*

Unplanned maintenance

Unscheduled maintenance is realised by applying Malfunctional Maintenance (MM). The maintenance service only takes action in case of (unexpected) malfunctions or failure of the product.

Planned maintenance

We distinguish between two forms of scheduled maintenance here.

1. Condition-dependent Maintenance (CDM);
2. Use-dependent Maintenance (UDM).

With CDM, the conditions of critical components must be determined by means of inspections and diagnosis. The condition of these components determines whether or not maintenance is necessary.



With UDM, worn components must be replaced at set times, and the sensor or the system must be maintained. For UDM, the following actions must be taken:

- Tracking the uptime of critical components;
- Timely planning of maintenance;
- Reserving required components and resources;
- Performing the maintenance carefully and at the scheduled time.

	Maintenance	SI	Contractor	Builder OSS	RWS CIV	Wind farm owners
O1	Planned maintenance OSS	A, R	C	S	I	-
O2	Unplanned maintenance WTGs	A, R	C	-	I	S
O3	Unplanned maintenance OSS	A, R	S	I	I	-
O4	Planned maintenance WTGs	A, R	S	-	I	S

RASCI: R = responsible, A=accountable, S=support, C=consult, I=inform

Table 2: Maintenance

3.4 Management

Figure 5 shows the management philosophy for the MIVSP project. This figure shows that Rijkswaterstaat maintains control via MCS (Mission Critical Support) and TAM STM (Technical Application Management Shipping Traffic Management). TAM STM is responsible for the management and coordinates the maintenance via the Contractor.

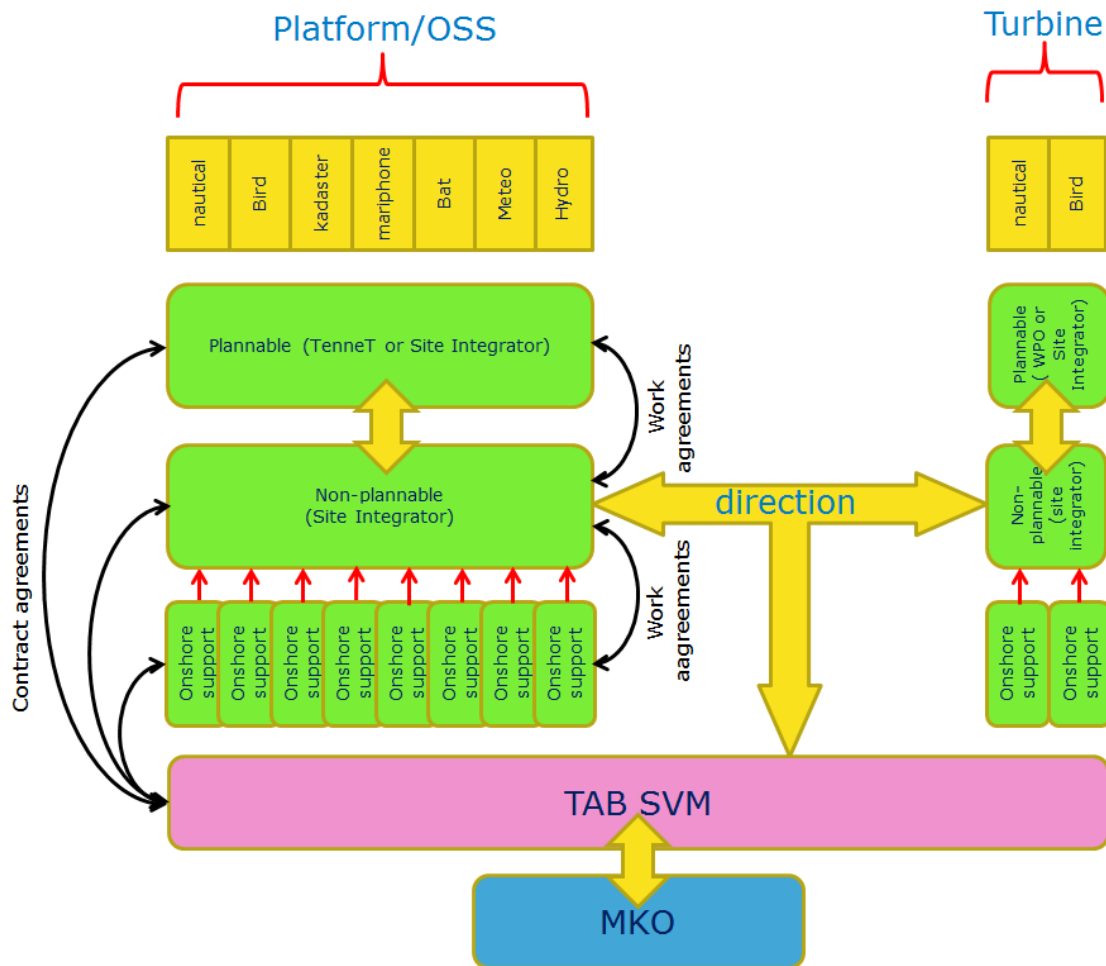


Figure 6: Management philosophy



4 Scope and Activities according to the Agreement

4.1 Scope

See reference (ref. Ax) table 1, RASCI Table activities Contractor or reference (ref. Ox) table 2 maintenance.

4.1.1 Activity 1: (ref. A1) Early detection of non-functioning components, FAT

The contractor implements the FAT for ensuring detection non-functioning parts.

4.1.2 Activity 2: (ref A2) Deliver documentation, materials, and support for assembling 'Radarsensor'

Work activities of the SIT shall be implementing as result that all systems in place are easy installed, transported and meet the expectations. De contractor delivers installation manuals, materials and support for the work activities to the Site Integrator for proper functioning of the Nautical Radar.

4.1.3 Activity 3: (ref. A3) Supporting SIT

Activities of the Contractor must be performed in such a way that the sensors and systems can be connected to the RWS network. This must make it possible to transfer the collected data to the users. In addition, the Sensor Suppliers must be able to perform maintenance remotely. One risk is that certain components of the RWS network are not being ready yet upon commencement of the tests. In that case, the Site Integrator is required to build stubs to be able to simulate these components.

The contractor shall deliver a stub to support the Site Integrator (for example RDP, test tool, temporary building block of missing parts).

4.1.4 Activity 4: (ref. A4) Deliver information and support installation Nautical Radarsensor on OSS for SAT

The builder of the OSS shall install the systems in accordance with the design. The validation is done by the Site Integrator after installation.

If necessary, the contractor supports the Site Integrator with the installation and validation of the Nautical Radarsensor on the OSS.

4.1.5 Activity 5: (ref. A5) Deliver support for commissioning of the Nautical Radarsensor for the SAT on the OSS.

If necessary the contractor supports the Site Integrator for commissioning of the Nautical Radarsensor on the OSS. Inclusive the additional required tools for commissioning.

4.1.6 Activity 6: (ref. A6) Supporting SAT

The final situation (sensors wind farm, incl. OSS) shall be tested in the SAT to ensure the quality. The contractor delivers the needed support for correctly technical delivery and delivers support for testing (SAT).

4.1.7 Activity 7: (ref. A9) Deliver information and support for installation Nautical Radarsensor on WTG

The final situation (sensors wind farm, incl. OSS) shall be tested in the SAT to ensure the quality. The Site Integrator installed the Nautical Radarsensor on the WTG / transition piece. This situation is tested in the SIT, accordance the design in the SIT.



If necessary, the contractor support the Site Integrator to install the Nautical Radarsensor on the WTG/ transition piece.

4.1.8 Activity 8: (ref. A10) Deliver information and support for commissioning Nautical Radarsensor on OSS

If necessary, the contractor delivers support to the Site Integrator for commissioning the Nautical Radar sensor offshore.

4.1.9 Activities 9: (ref. A11) Offshore tests & commissioning

If necessary, the contractor delivers support to the Site Integrator for the integration tests of the Nautical Radarsensor offshore.

4.1.10 Activity 10: (ref O1/O2) Supporting Site Integrator for carrying out maintenance on sensors

The Site Integrator is responsible for the maintenance of the sensors in the wind park. Plannable maintenance on the OSS is carried out by the Builder. If necessary, the contractor shall support the Site Integrator for carrying out maintenance. On the WTG the Site Integrator is responsible for non- and plannable maintenance.

The contractor delivers remote maintenance if it is appropriate to do so.

4.1.11 Activity 11: (ref O3/O4) Supporting Site Integrator for carrying out maintenance on sensors

The Site Integrator is responsible for the maintenance of the sensors in the wind park. The Site Integrator is responsible for the non-plannable maintenance on the OSS. If necessary, the contractor shall support the Site Integrator for carrying out maintenance. The contractor delivers support for remote maintenance if it is appropriate to do so.

4.2 Relation contractor with basic service MIVSP

The basic service of MIVSP is to collect and transfer data to other parties. Figure 6 illustrates the basic service.

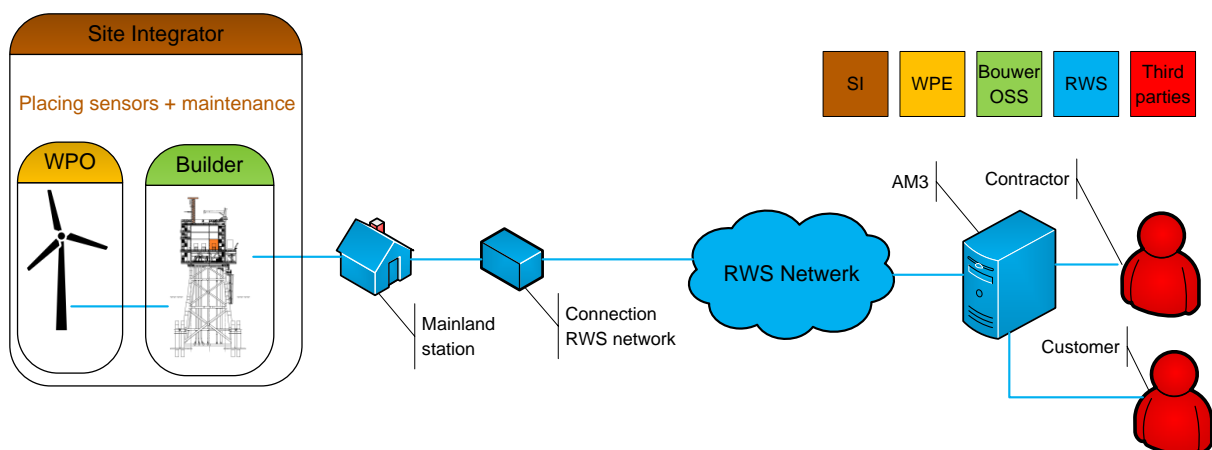


Figure 4: Basic service MIVSP

The activities of the Site Integrator can be divided into three main tasks:

1. Delivering and when it required installing of the Nautical Radar sensor.
2. Supporting the Site Integrator with testing.
3. Supporting the Site Integrator of the Nautical Radar sensor.

The SIT should simulate a similar situation of the sensors and systems in the entire wind farm (OSS+WTG). Figure 7 provides a situation sketch of the SIT. No rights can be derived from the situation sketches.

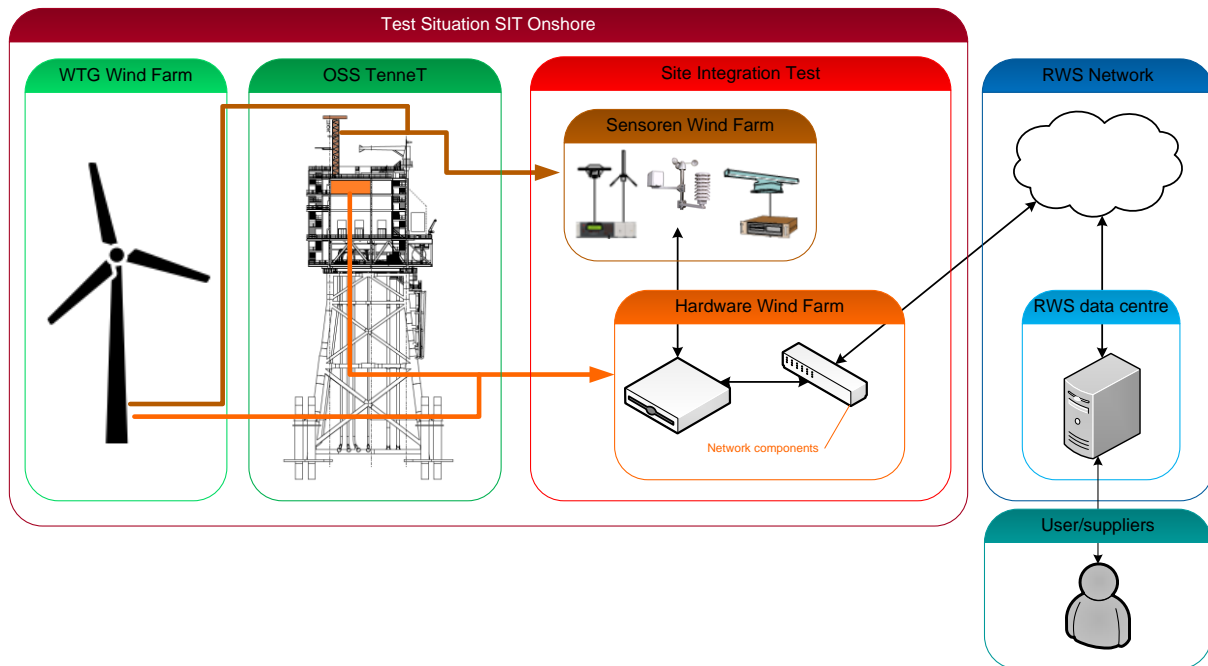


Figure 5: Onshore test situation

In the final situation, all sensors and systems will be installed in the wind farm at sea. In the tests, the situation at sea will be simulated. All factors that can have an impact on the operation of the sensors and systems at sea will be taken into account at the test location. These factors are simulated in the tests in order to test the final situation early.

Various sensors will be installed on the OSS. These sensors are delivered to the Site Integrator and concern the following sensors:

- ADB-S;
- AIS/AtoN;
- Differential GPS;
- Hydro;
- LiDAR;
- LoRa;
- Maritime radar;
- Meteo;
- Tetra;
- VHF+RoIP;
- Bat detector;
- Bird detectionSystem;
- Wi-Fi.

At OSS Borssele Alpha, various sensors from the above list will be placed. On the other OSS, there may be some variation based on progressive insight.

Within the scope of MIVSP will be install Bird Detection and Nautical Radar sensor on the WTG.

4.2.1 Overview of activities that required support and information from the contractor

The activities to be performed by the Site Integrator for the purpose of realisation and management include at least the following activities for which support may be requested from the Contractor:

- General activities



- Project management;
 - Technical management;
 - Managing sensor suppliers;
- Work activities preparation phase (SIT)
 - Designing SIT;
 - Defining, planning and implementing work activities;
 - Building up SIT environment;
 - Simulating final situation, if necessary building stubs;
 - Testing;
 - Inspection and acceptance;
 - Preparation activities SAT
- Work activities realisation phase (SAT and Offshore commissioning)
 - Designing SAT;
 - Support building SAT;
 - Validation SAT and Offshore Commissioning;
 - Commissioning;
 - Testing;
 - Deliver documentation;
 - Follow-up care;
 - Realisation sensors in wind farm (with exception of the OSS)
- Work activities operational phase
 - Managing sensor suppliers;
 - Supporting and maintaining sensors and systems.



4.2.2 Planning

The planning of the activities of the Site Integrator is highly dependent on the planning of TenneT for the realisation of the OSS. The table below provides an indication of the general planning.

Indication of Sensor Integration Planning				
	SIT	SAT	Sensors WTG	Offshore Commissioning
Borssele Alpha	Q1/2018	Q3/2018	Q1/2019	Q1/2019
Borssele Beta	Q1/2019	Q3/2019	Q1/2020	Q1/2020
Dutch Coast South Alpha	Q3/2019	Q1/2020	Q3/2020	Q3/2020
Dutch Coast South Beta	Q3/2020	Q1/2021	Q3/2021	Q3/2021
Dutch Coast North	Q3/2021	Q1/2022	Q3/2022	Q3/2022

Table 3: Sensor realisation planning



5 Definitions and Abbreviations

5.1 Definitions

Further Agreement	A document signed by the Contractor and Client which, together with the underlying Framework Agreement and associated Tender Specification documents and annexes, forms one whole of agreements regarding the execution and results of the Work.
Framework Agreement	A document signed by suppliers which forms one whole with the underlying Tender Specification documents and annexes.
Tender Specification	The contract document, designated as such in the framework agreement, drafted by or on behalf of the client, on which the contractor has based the creation and submission of their offer.
Radar Sensor	IALA guideline 1111; the transmitting, receiving and signal handling apparatus, delivering radar information to the tracking and presentation features of VTS.
Radar-related terms	Radar terms used in this document are derived from the IALA guideline 1111, see Section 2.2.1 for the definition
STUB	Interim IT-function or testtool

5.2 Abbreviations

Abbreviation	Description
CIV (RWS-)	RWS Central Information Services (<i>Centrale Informatievoorziening</i>)
FAT	Factory Acceptance Test
IALA	International Association of Marine Aids to Navigation and Lighthouse Authorities
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronic Engineers
IETF	Internet Engineering Task Force
IMO	International Maritime Organisation
IRS	Interface Requirements Specification
ITU	International Telecommunications Union
IVEF	Inter VTS Exchange Format
IVEF-NL	Inter VTS Exchange Format supplemented with Dutch extensions
LAN	Local Area Network
MIVSP	RWS Maritime IV Service Point (mivsp@rws.nl)
MPLS	Multi Protocol Label Switching
NM	Nautical Mile
NNV	New Network Facilities (national RWS network)
FAM	Further Agreement, can be concluded based on the framework agreement
NTP	Network Time Protocol
OSS	Offshore Substation
PMR	Project Management Requirements
PoB	Proof of Ability
PoP	Point of Presence (Network)



Abbreviation	Description
QoS	Quality-of-Service
FWAM	Framework Agreement
RAF	Radar-AIS Fusion
RRP	Recognised Radar Picture
RWS	Rijkswaterstaat, agency of the Ministry of Infrastructure and the Environment
SAR	Search And Rescue
SAT	Site Acceptance Test
SOW	Statement Of Work
SRC	Scheldt Radar Chain
SRS	Software Requirements Specification
SSS	Systems/Subsystems Specification
TBD, tbd	To Be Defined
TNO	Netherlands Organization for Applied Scientific Research
VSA	General Tender Specification
VSE	Tender Specification Requirements
VSS	Tender Specification Site Integration Test
VPN	Virtual Private Network
VTM	Vessel Traffic Management
VTs	Vessel Traffic Services
WTG	Wind Turbine Generator
WFO	Wind Farm Owner

Table 4: Abbreviations



6 Aspect requirements

6.1 Introduction

In addition to the technical and system requirements, aspect requirements are identified. These requirements should be interpreted as preconditions which the installations provided by the Site Integrator must meet.

6.2 Types of aspect requirements

The types of aspect requirements that apply to this TSR are listed below.

Aspect	Description	See
HSE	Requirements relating to safety during realisation and safety during the use phase of realised installations, both for the user and the environment. For safety requirements that apply during the execution of the work	§6.3.
Availability	Requirements relating to the availability of (components of) the installation and the lifespan of (components of) the installation.	§6.4.
Sustainability	Requirements relating to, among other things, environmental impact (e.g. avoiding scarce and toxic raw materials and energy-wasting equipment) and social aspects (including working conditions and such).	§6.5
Offshore Substation	Requirements relating to the Offshore Substation.	§6.6

6.3 HSE

6.3.1 General

VSA-01	Electromagnetic Interference (EMI)
Requirement:	The Site Integrator must take measures for working safely around the installation locations.
Explanation:	Among other things, the Site Integrator must take the EMI of the radar sensor into account.
Verification:	Inspection, documentation, measurements

VSA-02	Remote shut down sensors
Requirement:	The Site Integrator needs to take measures for safe working on sensors, they need to be able to be shut down from a safe distance by means of a emergency shut down button.
Explanation:	The Site Integrator need to realise a possibility to shut down the sensors of the bird detection system.
Verification:	Inspection, documentation, test

6.3.2 Electrical installations and equipment

VSA-03	Electrical installations and equipment
---------------	---



Requirement:	All work on electrical installations (up to 1000V) and electrical equipment will be performed in accordance with Fout! Verwijzingsbron niet gevonden., Fout! Verwijzingsbron niet gevonden., Fout! Verwijzingsbron niet gevonden., and Fout! Verwijzingsbron niet gevonden..
Explanation:	
Verification:	Inspection, measurements

VSA-04	General electrical safety
Requirement:	All lightning and overvoltage protection devices must comply with the applicable standards and guidelines, including Fout! Verwijzingsbron niet gevonden. and Fout! Verwijzingsbron niet gevonden..
Explanation:	
Verification:	Inspection, measurements

VSA-05	Safety grounding 19" rack
Requirement:	The metal frame of the 19" rack must be equipped with its own safety grounding.
Explanation:	
Verification:	Inspection, measurements

VSA-06	Grounding and potential compensation
Requirement:	All conductive metal frames placed or moved during the Work must be grounded. Ground lines, measuring points, and connections to the main ground rail must have detachable couplings for performing measurements.
Explanation:	
Verification:	Inspection, measurements

6.3.3 Fire safety installations

VSA-07	Fire safety applied cabling
Requirement:	All cabling provided by the Site Integrator must be halogen-free, have low flammability, and produce little smoke when burning.
Explanation:	
Verification:	Documentation, certificate or certificates

VSA-08	Fire-resistant cable glands
Requirement:	All cable glands must be fire-resistant and must prevent air displacement between areas and between areas and the roof.
Explanation:	
Verification:	Inspection

6.3.4 Mechanical safety

VSA-09	Tipping safety
Requirement:	All constructions placed, such as 19" racks and antenna devices, must be sufficiently protected from tipping over.



Explanation:	Causes for tipping over include light and unintentional pressure applied to by nearby persons and carrying out work to the construction (including adding or removing equipment and/or components). This should especially be taken into account in areas in the Netherlands where earthquakes occur.
Verification:	Inspection

VSA-10	Proper wall mounting
Requirement:	Wall-mounted objects must be attached by means of a suitable and proper method.
Explanation:	
Verification:	Inspection

VSA-11	No cables on floors
Requirement:	For reasons of hygiene and safety (prevention of stumbling), it is not permitted to lead cables over floors.
Explanation:	
Verification:	Inspection

VSA-12	Avoiding protruding (sharp) parts
Requirement:	Protruding parts are not permitted in places where persons are moving. In other places, they should be avoided as much as possible, and if this is not possible, they should be marked with a clear colour scheme. Sharp protruding parts should be rounded off or covered.
Explanation:	Think of things like cable clamps on antenna masts/tubular poles, components of 19" racks, cable ducts, etc.
Verification:	Inspection

6.4 Availability

VSA-13	Minimum lifespan of components, materials, and equipment
Requirement:	Unless explicitly stated otherwise, the following requirements apply to the minimum (not average) lifespan for which all components, materials, and equipment provided by the Site Integrator are designed, taking into account the expected operational circumstances: <ol style="list-style-type: none">1. Externally mounted or placed components, materials (including cabling) and equipment: at least 15 years;2. Internally mounted or placed equipment (including climatization and Ethernet converters): at least 10 years;3. Internally mounted or placed components and materials (including cabling): at least 15 years.
Explanation:	
Verification:	Documentation (specifications), certificate or certificates



6.5 Sustainability

VSA-14	General sustainability
Requirement:	The Site Integrator must apply sustainable materials. In any case, where a reasonable choice is possible, the use of environmentally hazardous (including toxic) materials and energy-wasting active components must be avoided.
Explanation:	For example, in case of climate control systems, the more energy-efficient types are preferable.
Verification:	Inspection, documentation (specifications), certificate or certificates

6.6 Offshore Substation

VSA-15	Employer's Requirements
Requirement:	The Site Integrator must comply with the Employers requirements TenneT, ONL-TTB-03871.
Explanation:	TenneT is responsible for the Offshore Substation
Verification:	Documentation, inspection

6.7 Dong WTG

VSA-16	Employer's Requirements WTG
Requirement:	The Site Integrator must comply with the Training and Medical Requirements, GI 08-01-10, DONG Energy Wind Power
Explanation:	DONG is responsible for the Offshore Substation
Verification:	Documentation, inspection