



# Offshore Windfarm Operations in the North Sea

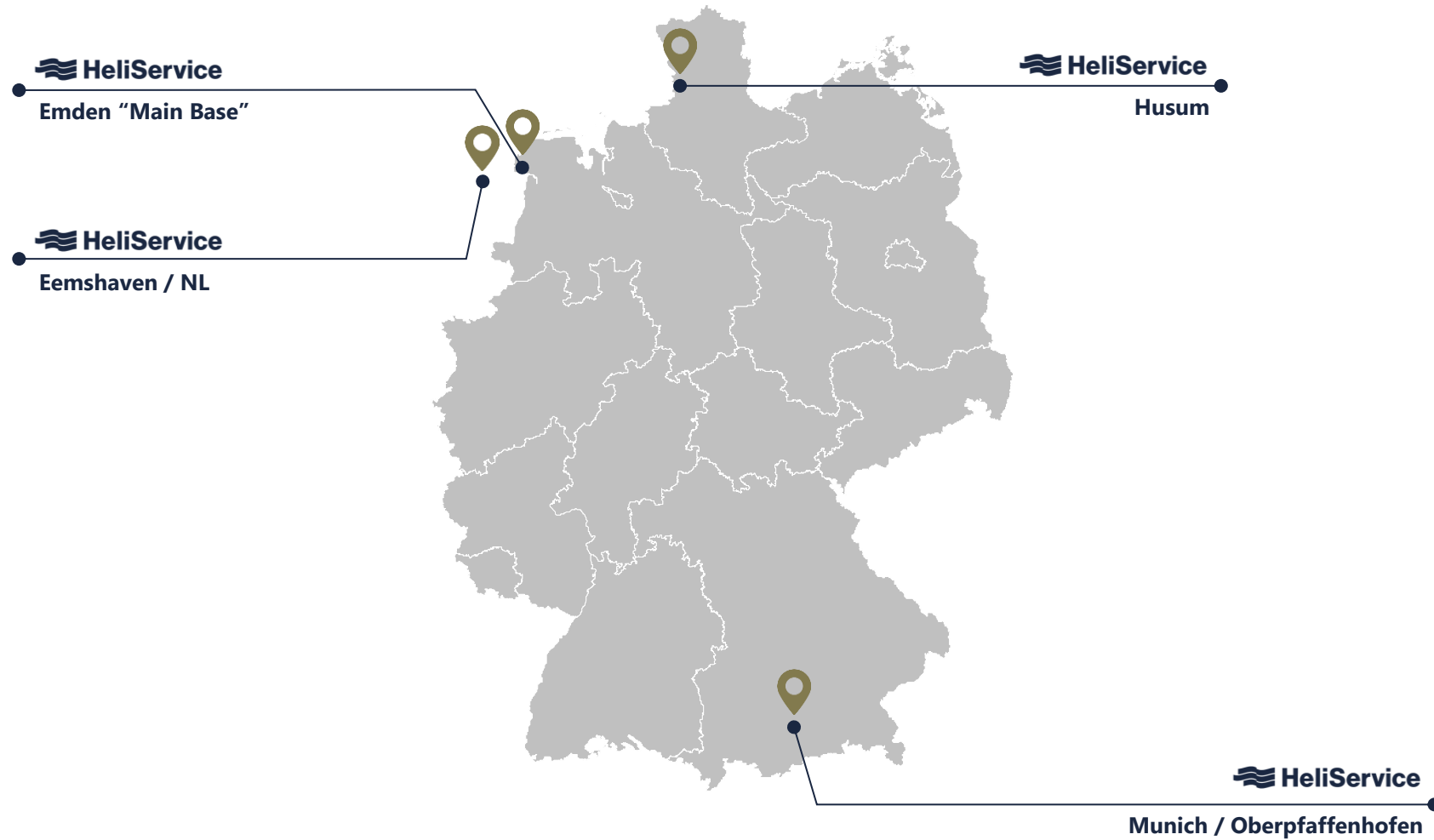
**04. November 2024**

**by Falko Baguhl**

# Agenda

- **Introduction**
  - Company
  - Area of Operations
  - Flight Volume
- **Offshore Windfarm Construction Plans in Europe**
- **Offshore Flight Planning & Procedures (VFR / IFR )**
  - Weather Data / Sources
  - 2.5min OEI Calculation
  - EFB / Ipad Applications
  - General Aviation Traffic ( Private / Commercial ) Onshore / Offshore
- **IFR Offshore in Airspace G in the EU**
  - Current Situation / Limitations
  - Airborne Radar Approach (ARA)
- **Wish List for 2025 and Beyond**

# Bases in Germany / NL



# HeliService Int. Fleet

## Type

**4 x AW 169 ( 4.8 t )**

## Utilization

- VFR / IFR
- Day / Night
- Hoisting
- Crew Change (8 Pax)
- HESLO



**4 x AW 139 ( 7.0 t )**

- VFR / IFR
- Day / Night
- Crew Change (12 Pax)
- Hoisting



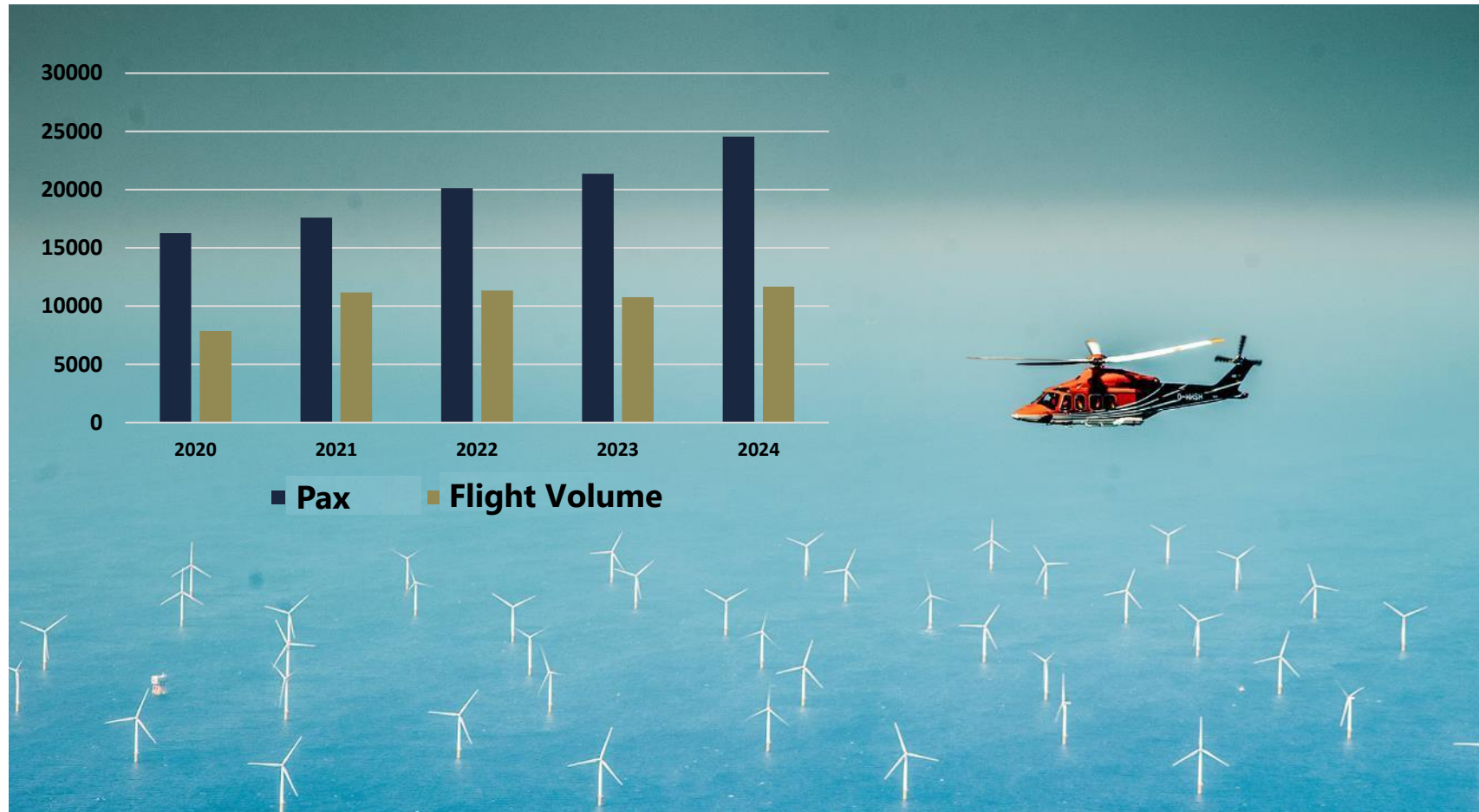


# HHO / Crew Change

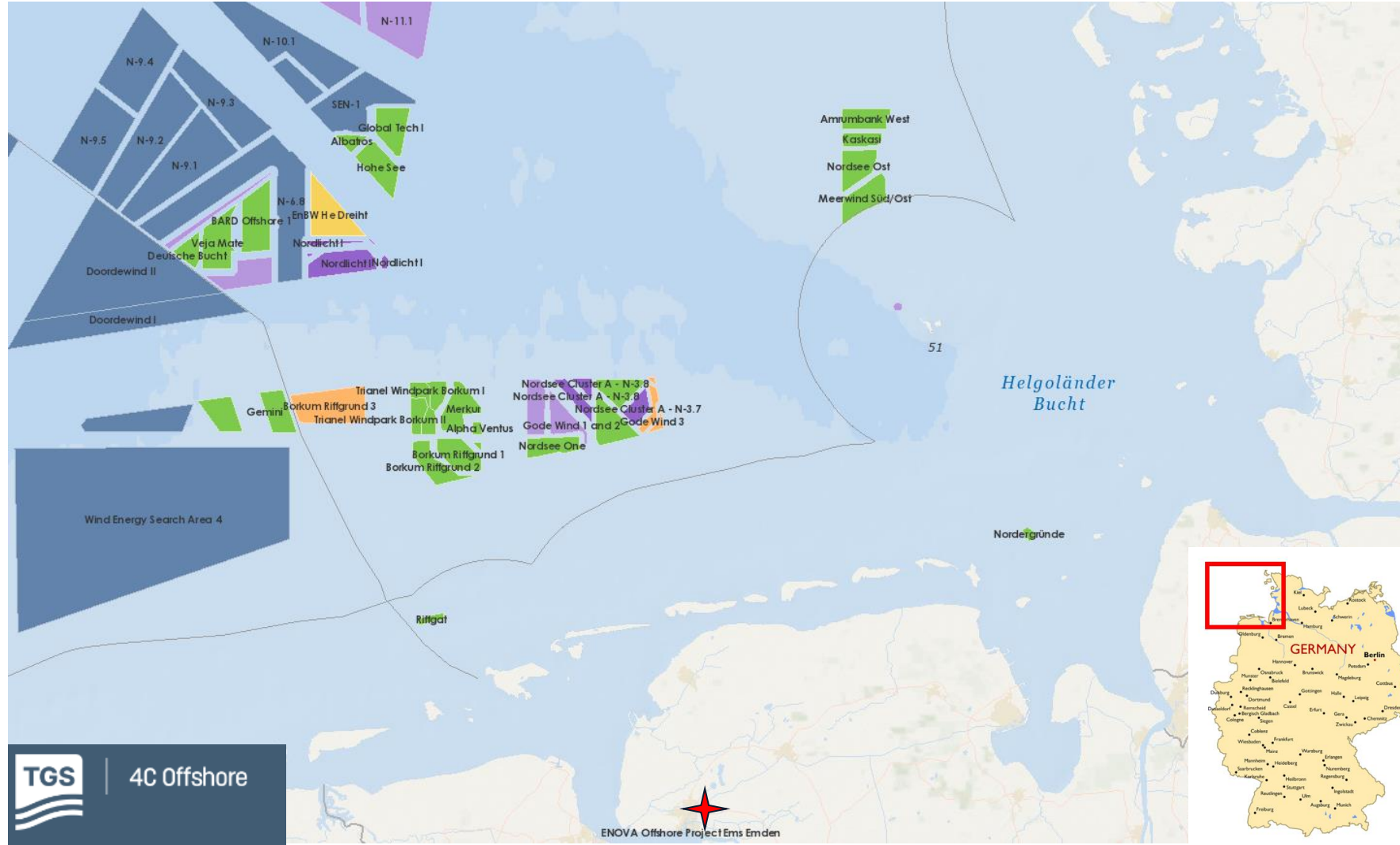




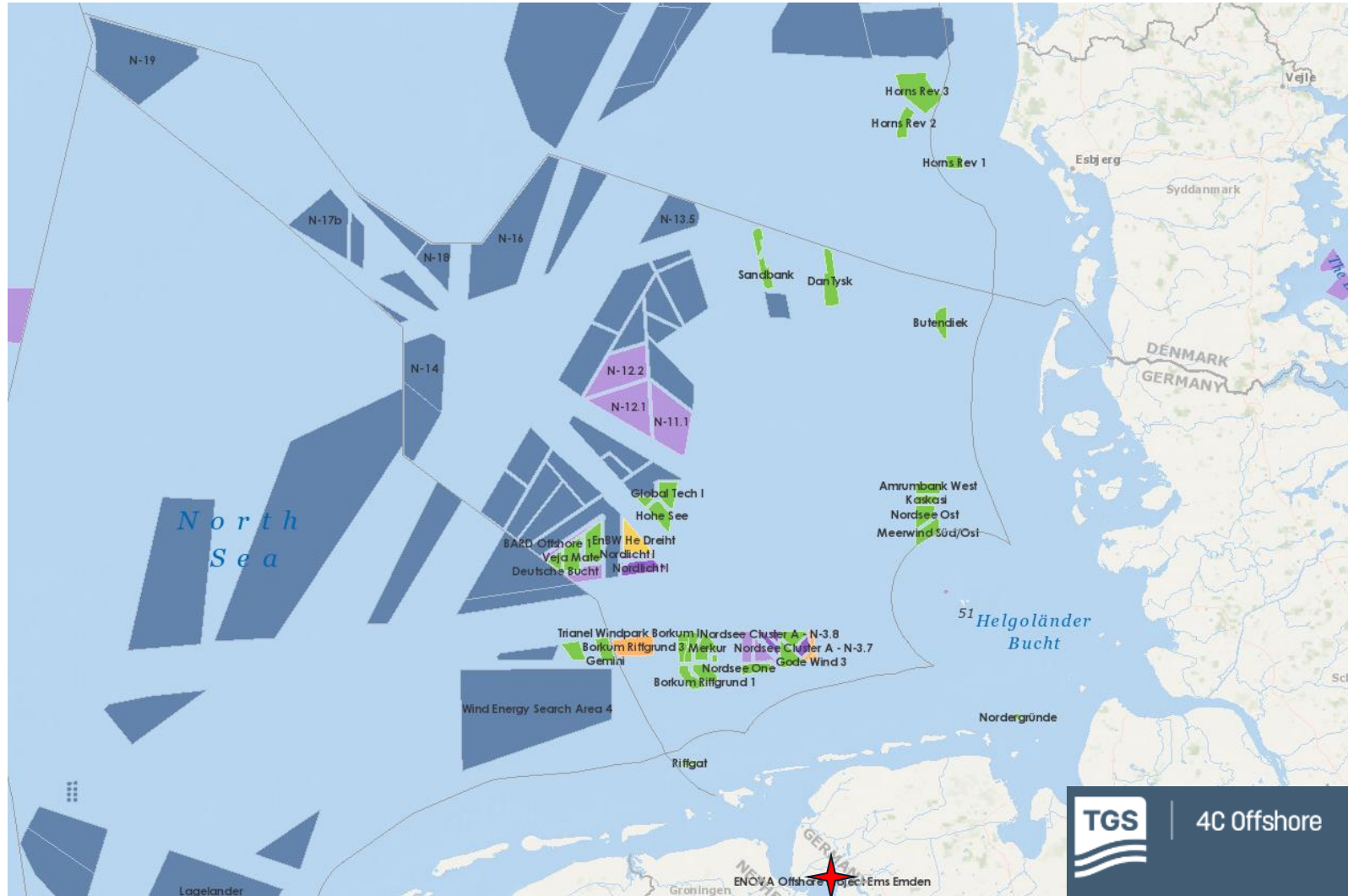
# Flight Volume Emden



# Windfarms German Bight



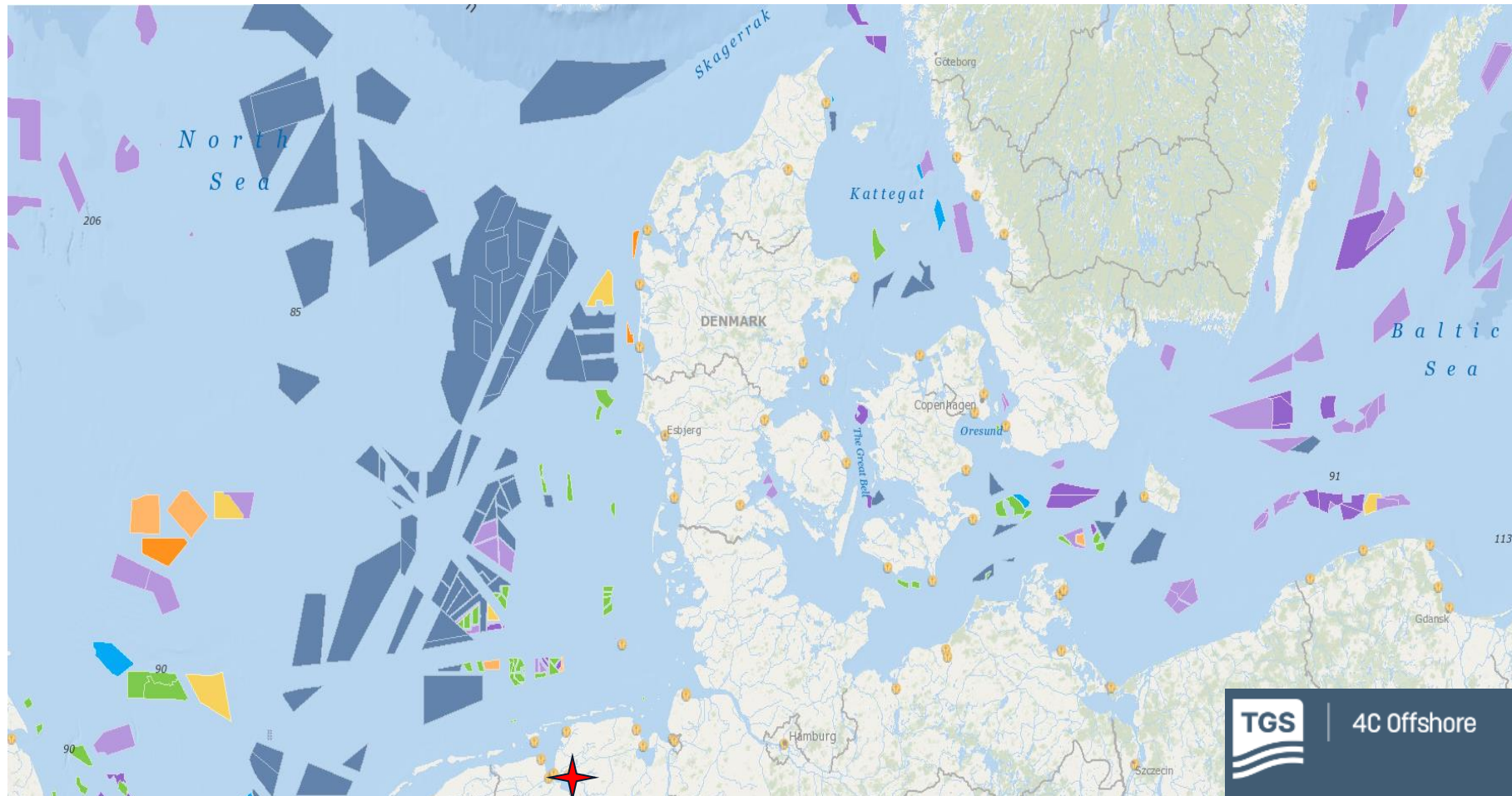
# Windfarms: GER, NL, DK



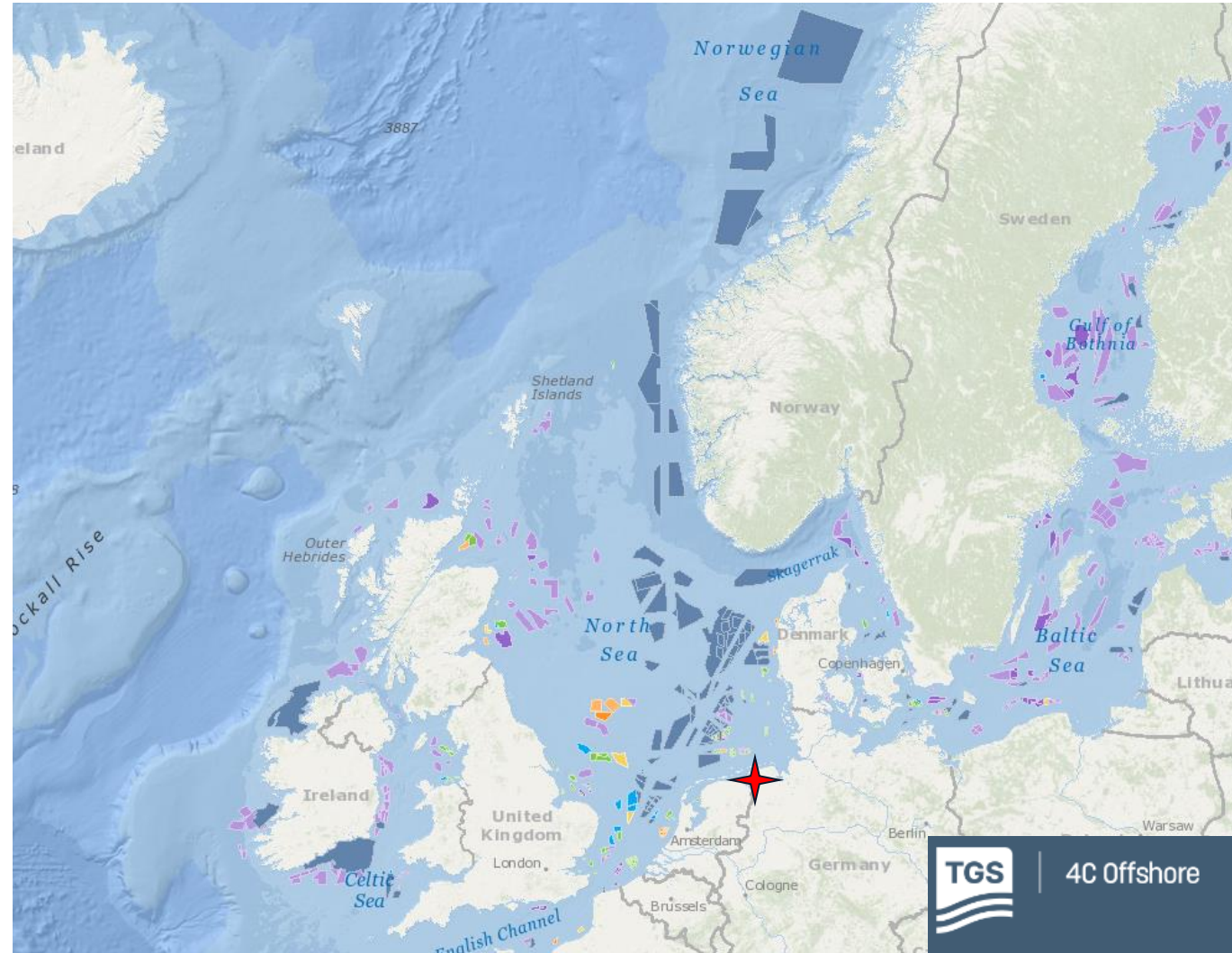
4C Offshore



# Windfarms: North Sea, Baltic Sea

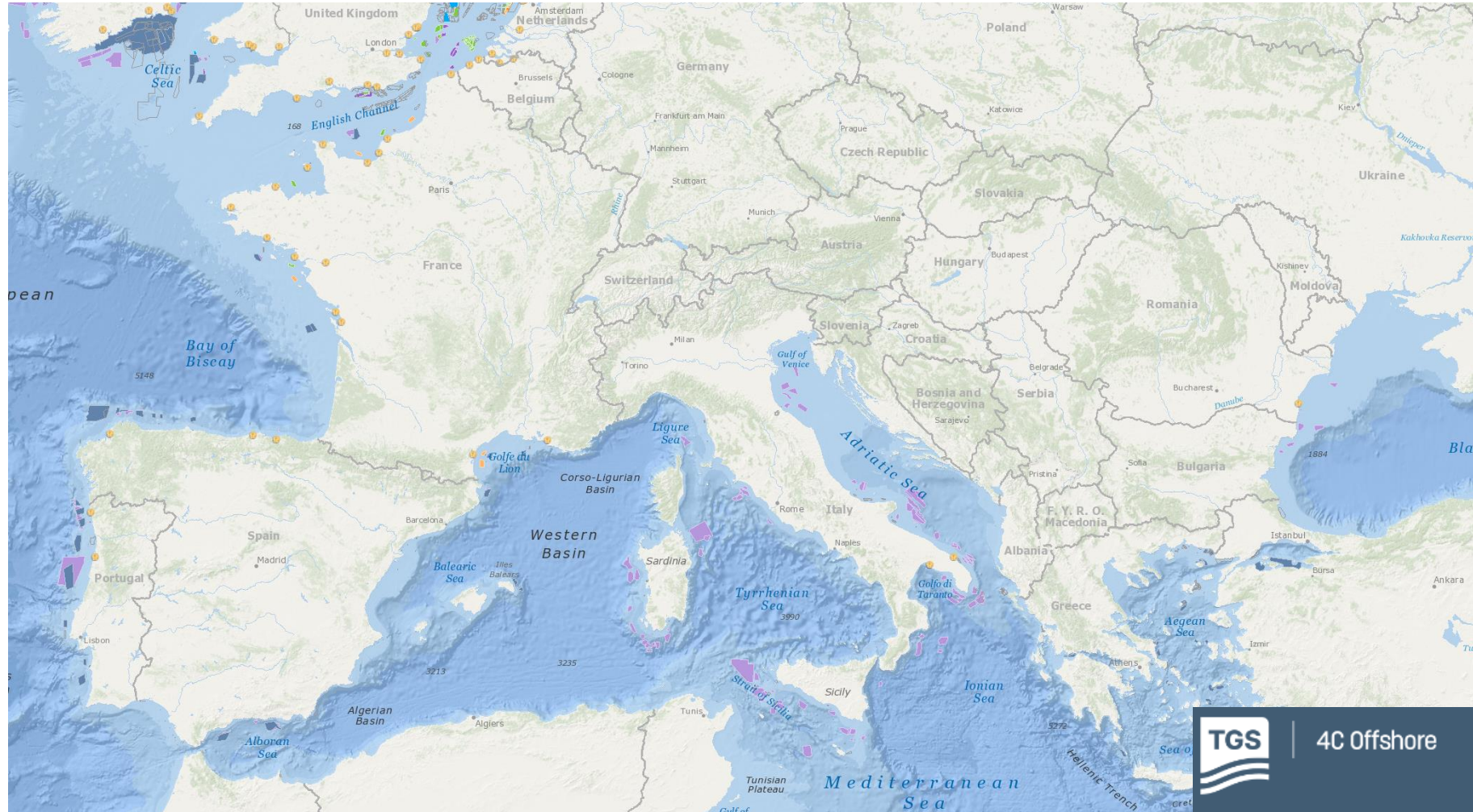


# Windfarms: Northern Europe





# Windfarms: Southern Europe



# Installation Ships





# Installation Ships



# Installation Ships





# Installation Ships



# Installation Ships





# Onshore Wind Turbines



# Offshore Windfarm





# Offshore Windfarm



# Windfarm Cluster of 290 Wind Turbines






# Flight Planning Offshore (VFR)


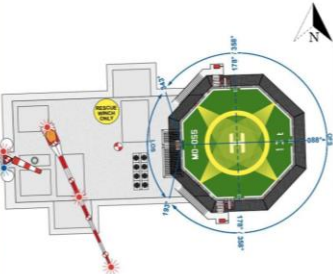


# Offshore Windfarm Information Plate


**FO\_FO\_005**  
**Helideck Information Plate**


Version 1  
 Page 2 from 3


Merkur		Position: N 54° 02,24' E 006° 33,65'		
Deck height:	Deck Heading:	ICAO code:	Highest Obstacle 5NM:	Deck ident:
146 ft	088°	EDYO	580ft, WTG	MO-OSS
FMS ident:	MCC Merkur/HLO:	Weather Freq:	Light Freq:	Day/Night:
MOOSS	151,350	131,565 (7x)	131,565 3x100%, 4x30%, 5x10%	VFR day only
D-Value:	T-Value:	Operator:	Installation type:	Side ident:
22,2 m	13 t	Merkur Offshore GmbH	Fixed, usually unmanned	MO OSS
Fuel:	GPU:	Inspection date:	Inspected by:	Next due:
NO	YES	N/A	N/A	HSI FleetPlan
Highest obstacle on installation:		Additional info:		Status Light:
192ft, antenna mast		See remarks, next page		Mag° variation
				2,8° E (2023)

Approach Sector:	Limitations:
178°/358°	- VFR day only
Non-Compliant:	Firefighting equipment:
- NIL	<div style="display: flex; justify-content: space-between;"> <div> <b>DIFFS</b>            AUTO + MAN + REMOTE  <b>CO<sub>2</sub></b>            2x 10kg         </div> <div> <b>2x HYDRANT</b>            SEMI-RIGID HOSES (25m)  <b>DRY POWDER</b>            2x 25kg         </div> </div>

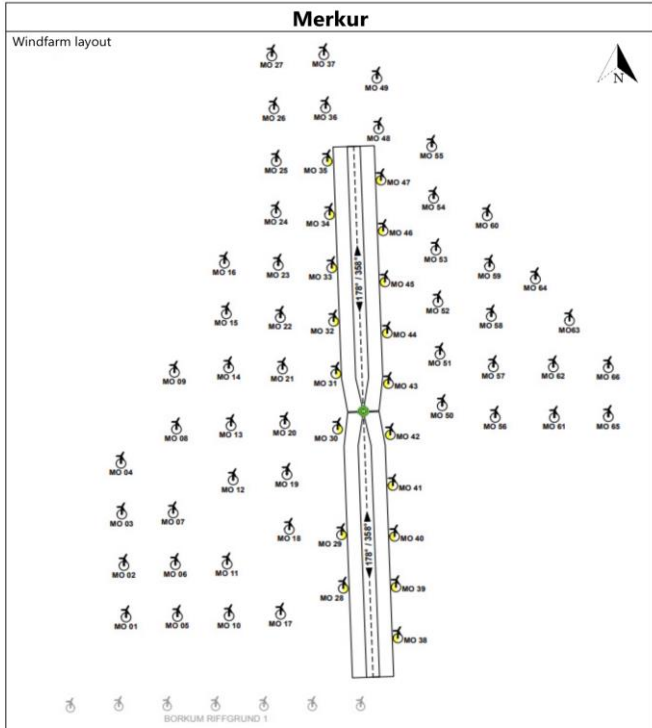
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**FO\_FO\_005**  
**Helideck Information Plate**

Version 1  
 Page 3 from 3


**Merkur**  
 Windfarm layout



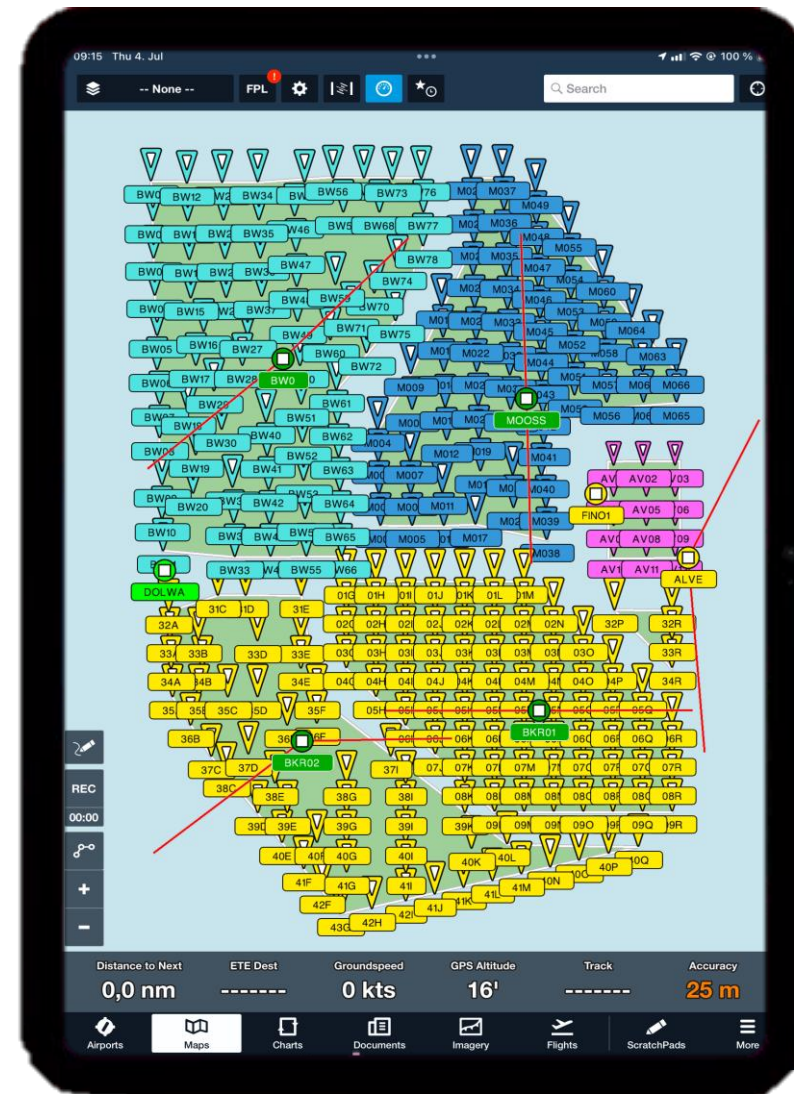
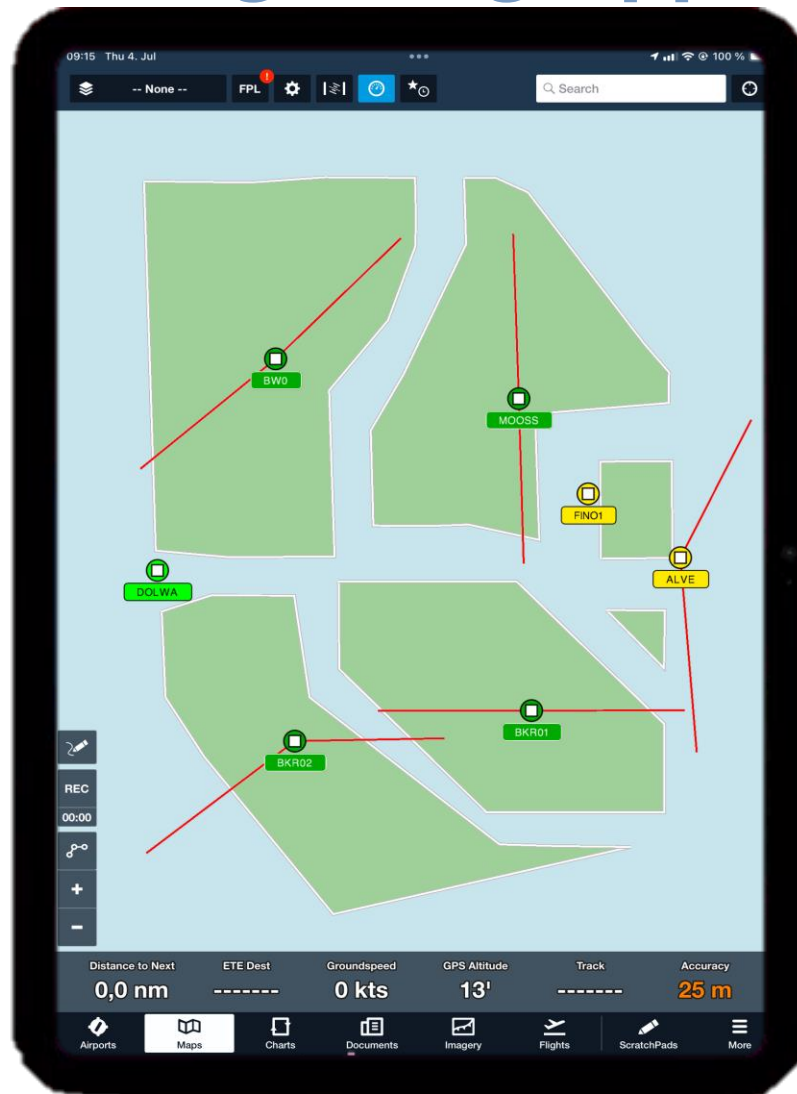
Remarks:
 

- Contact MCC Merkur prior to entering OWF and for further clearances;
- Be aware of WTG in close proximity to helideck;
- OSS Limited to max. 12 persons;
- OSS Wx data for information only.

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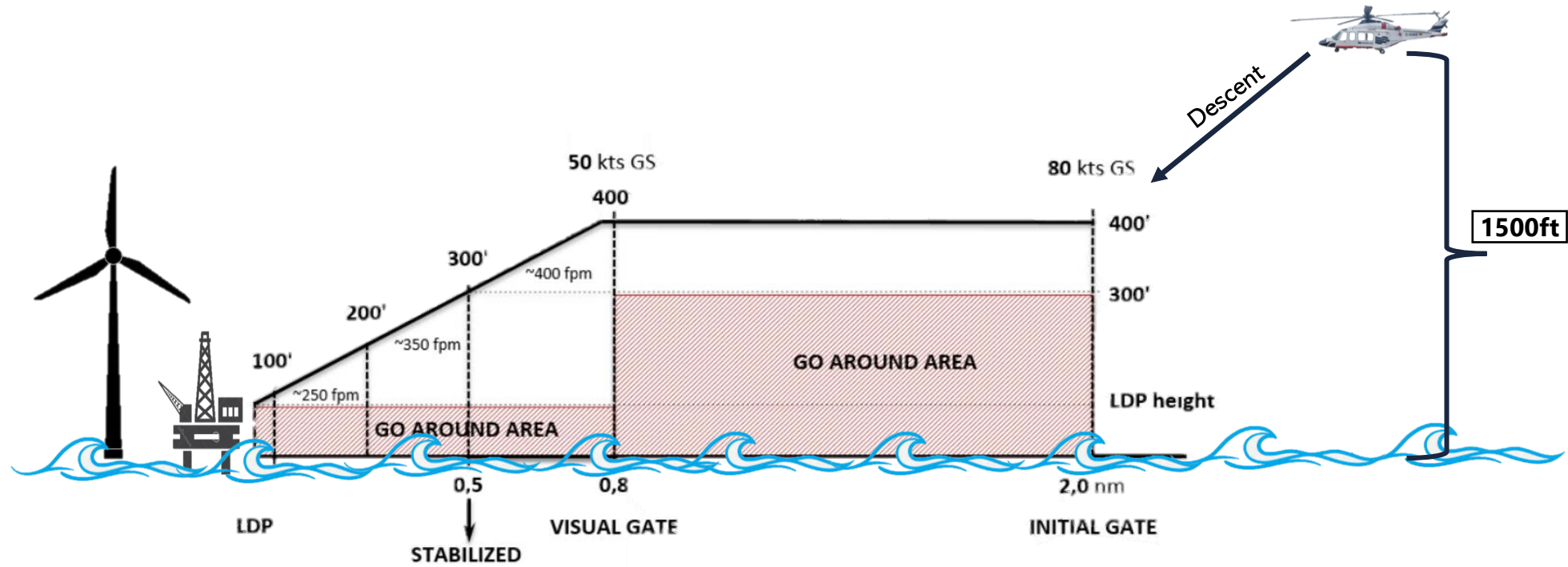


# Electronic Flight Bag Application





# VFR Approach Offshore to Substation



# Windpark Weather Data Online

Feature

Status

Weather

Clear

Storm

OK, Wind Speed under 22 m/s

Gust

OK, no Gust

Visibility

OK, Visibilty over 3000m

Precipitation

OK, no Heavy Rain

Wave Height

OK, Wave Height under 5.5 m

Wind

Wave

Wind

0

45

90

135

180

225

270

315

285°


15,06 m/s

Parameter	Value
Windspeed (m/s)	15.06
Windspeed (kts)	29.274
Air Temperatur (°C)	13.3
Air Humility (%)	66
Air Pressure QNH (hPa)	997.8853
Air Pressure QFE (hPa)	993.91
Cloud Ceiling low (m)	1476
Cloud Ceiling low (ft)	4842.52
Brightness (<= 750 lux)	0
Visibility (m)	22096
Dew Point (°C)	0
Wave Height (m)	2.23
Wave Period (s)	6.2
Level 1 Min (m)	0

04.07.2024 09:30:01

Cloud Chart

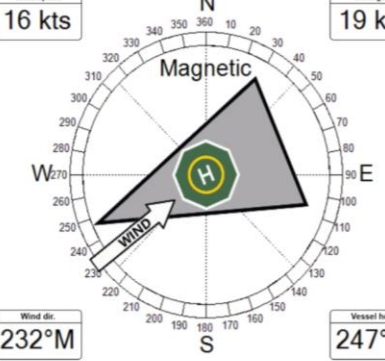
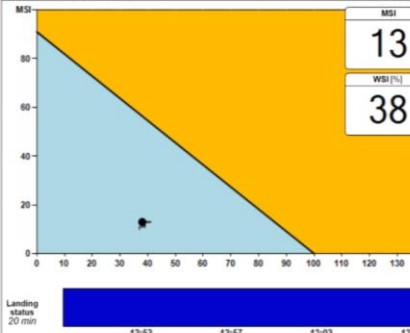
Time	Cloud Ceiling (low) [m]	Cloud Ceiling (mid) [m]	Cloud Ceiling (high) [m]
9:14 AM	1650		
9:15 AM	1600		
9:16 AM	1500		
9:17 AM	1500		
9:18 AM	1000		
9:19 AM	1000		
9:20 AM	1000		
9:21 AM	1000		
9:22 AM	1000		
9:23 AM	1000		
9:24 AM	1000		
9:25 AM	1400		
9:26 AM	1150		
9:27 AM	1000		
9:28 AM	1000		
9:29 AM	1200		
9:30 AM	1000		
9:31 AM	1050		
9:32 AM	1500		



**HeliService**  
Offshore | Maintenance | HEMS

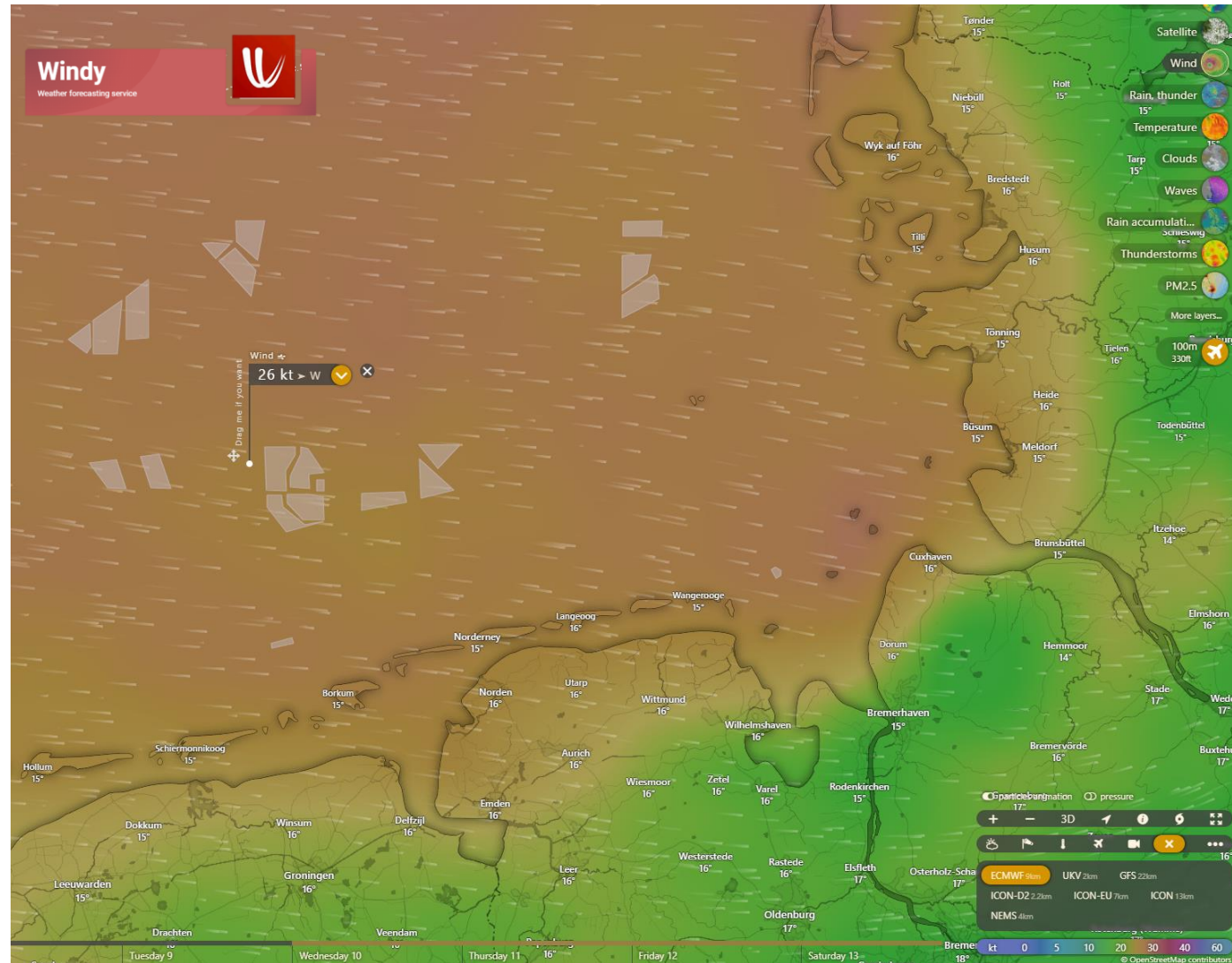
# Ship / Vessel Data

Name	Thialf		Vessel heading	247°M	
Date	23/05/2024		Time	09:49	
Latitude	54°22.354'N		Longitude	006°07.933'E	
Restricted sector	from <input type="text"/> degrees		to <input type="text"/> degrees		
Wind Direction	210°M	Speed	17 kts	Gust	18 kts
Visibility	20000 m+		Lightning present	<input type="checkbox"/> No	
Present weather	00 Clear				
Cloud layer 1 (lowest)	Amount	FEW010	Height	No Base	
Cloud layer 2	Amount	SCT016	Height	No Base	
Cloud layer 3 (highest)	Amount	////	Height	No Base	
Air temperature	14.1 °C		Dewpoint	12.0 °C	
QNH	1012.1 hPa		QFE	1007.6 hPa	
Significant wave height	<input type="text"/> m				
Max. pitch	0.2° Down	0.3° Down	Max. roll	0.2° Right	0.6° Right
Significant heave rate	0.0 m/s		Max. inclination	0.7°	
Fuel Serviceable	<input type="checkbox"/> Yes	amount	<input type="text"/> litres	Rescue & recovery available	<input type="checkbox"/> Yes
Radio Traffic freq.	123.450	MHz	Log freq.	<input type="text"/> MHz	Marine Channel <input type="text"/> 16
NDB Serviceable	<input type="checkbox"/> Yes	Freq.	410.0 kHz	Identity	3EAA4
Cold flaring	<input type="checkbox"/> No				
Unserviceable sensors	Any	<input type="checkbox"/> No	Details Max. 3 lines Include dates.		
Remarks	Inbound payload with 12 pax = 1134 Kgs (#bags 21 pcs) 934 kgs - Pax weight including helisuit 200 kgs - Bag weight				
Report prepared by	R/O Adolfo Abrugar				

<b>USER INPUTS</b> Helicopter selected <b>AgustaWestland AW139, CatB, Day, Cat1</b> On touchdown, input helicopter heading [°M] Heading 1 to 360 <input type="text"/> Enter heading	<b>LANDING STATUS</b> <input type="radio"/> <input checked="" type="radio"/>	<b>HELIDECK WIND &amp; HEADING</b> Wind speed <b>16 kts</b> Wind gust <b>19 kts</b> Magnetic  Wind dir: <b>232°M</b> Vessel hdg: <b>247°M</b>
<b>ON DECK STABILITY LIMITS - MSI/WSI</b> MSI  WSI [%] <b>13</b> <b>38</b>		
<b>TOUCHDOWN LIMITS</b> Max pitch: 0.4° Down / 0.6° Down / Limit >4.0° Max roll: 0.6° Right / 1.0° Right / Limit >4.0° SHR: 0.0 m/s / Limit ≥1.3 m/s Max inclination: 1.1° / Limit >4.5°		
<b>METEOROLOGICAL DATA</b> Present weather - WMO text 1 min: <b>00 Clear</b> Vessel hdg. (True) 1 min: <b>250°T</b> Air temp. 4 min: <b>13.8 °C</b> Visibility 1 min: <b>20000 m+</b> Mag declination 1 min: <b>2.8°</b> Dew point 4 min: <b>10.8 °C</b> Cloud height 1 min: Layer 3: //// 0/8 Oktas No Base Layer 2: //// 0/8 Oktas No Base Layer 1: SCT012 4/8 Oktas No Base BP QNH 4 min: <b>1013.6 hPa</b>		

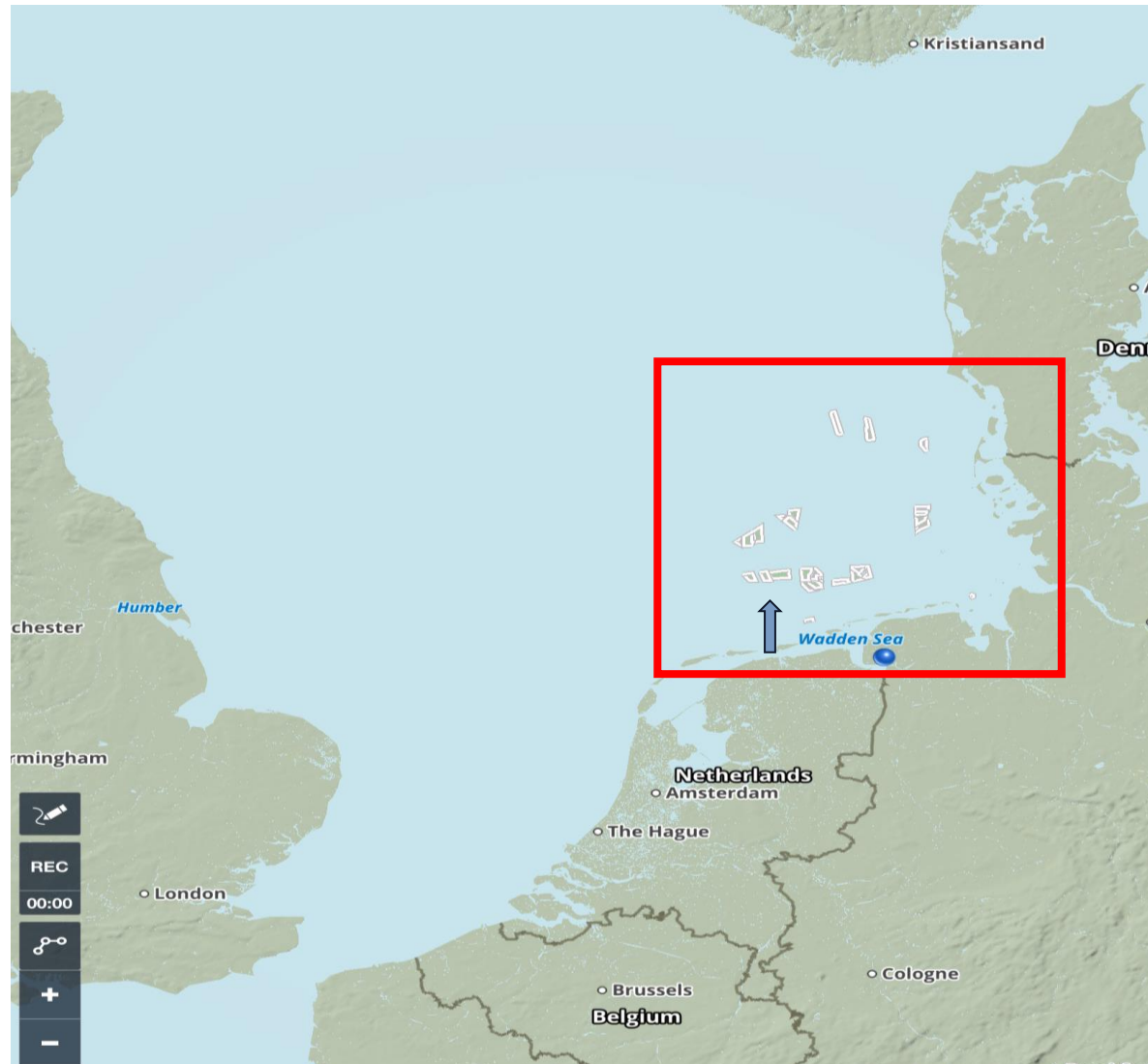


# Wind Forecast



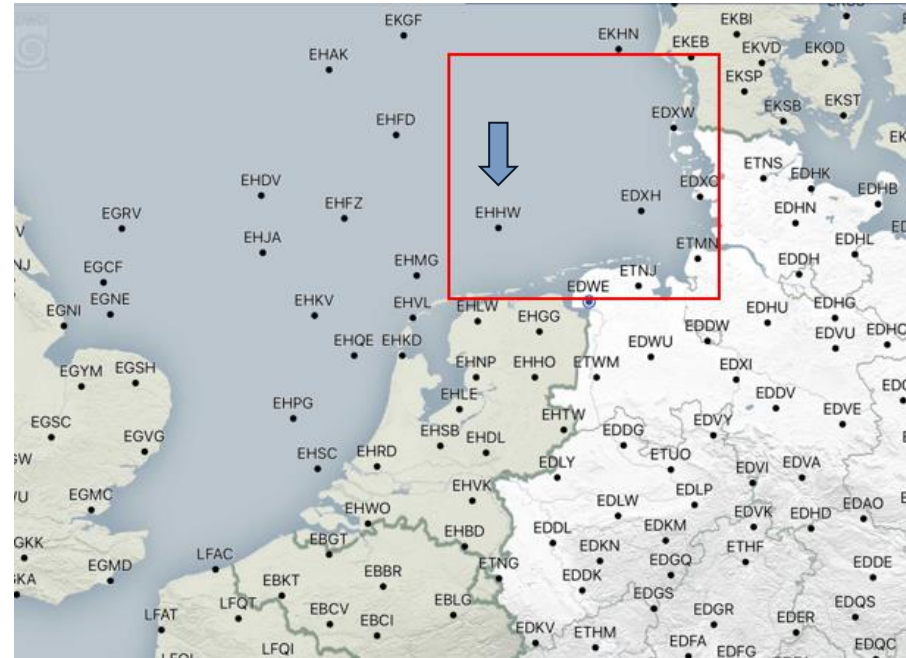
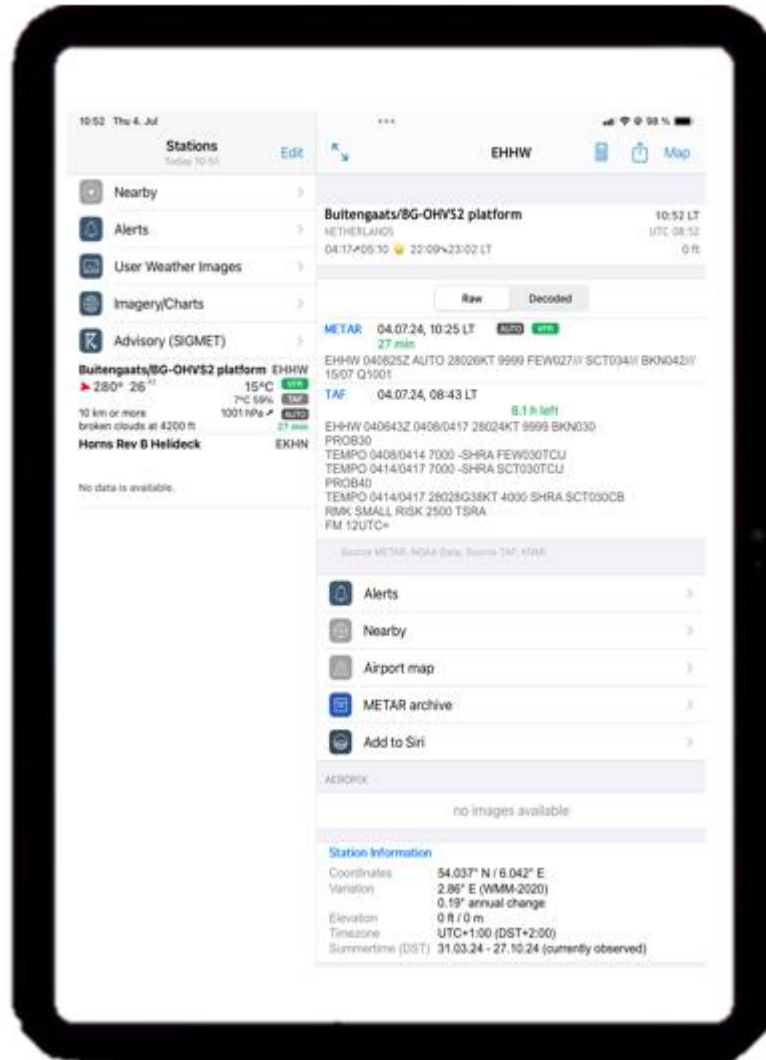


# TAF Weather Source in German Bight

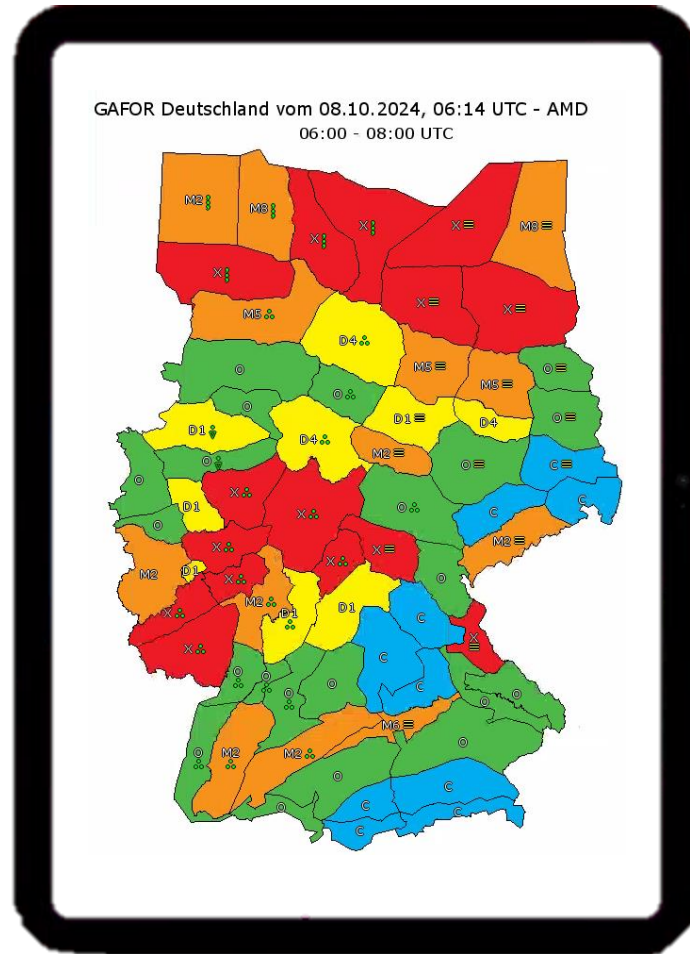




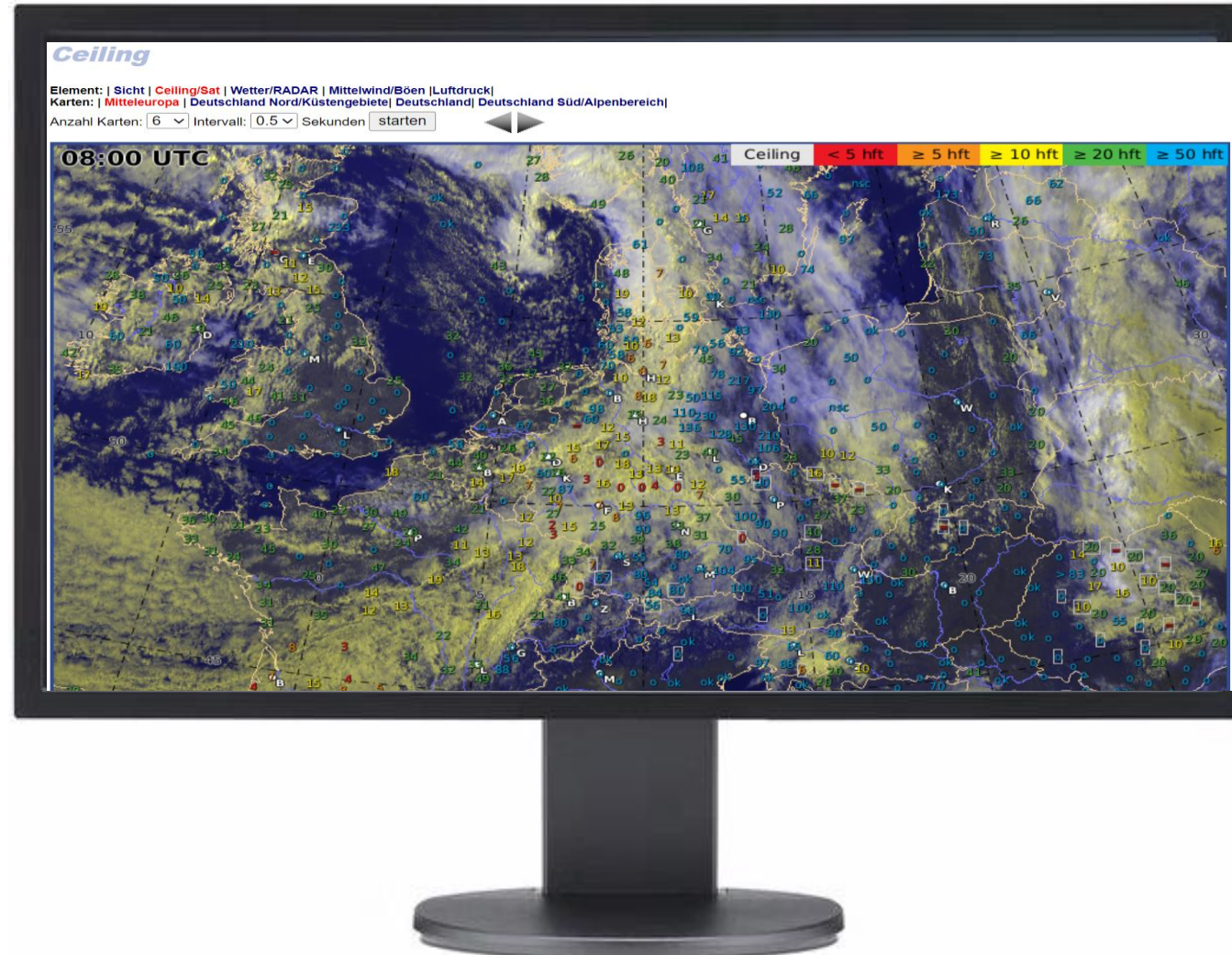
# AeroWeather APP



# EFB DWD WX App

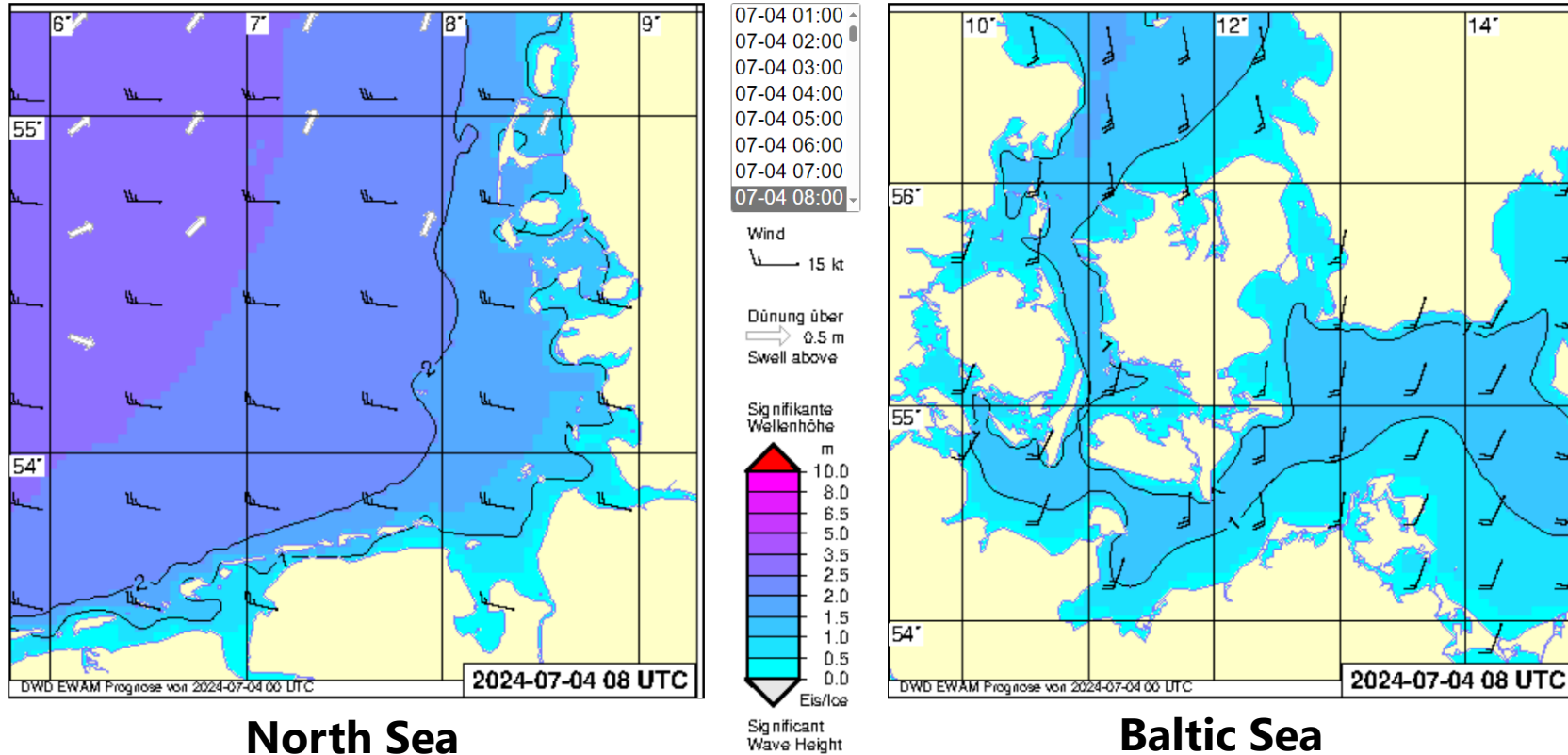


# DWD Weather / Flugwetter Online

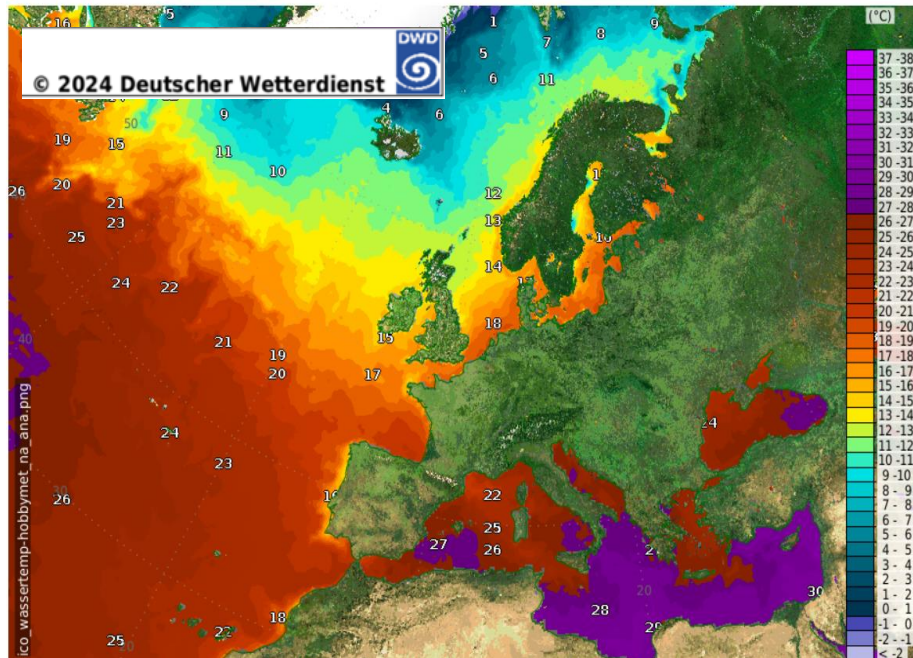




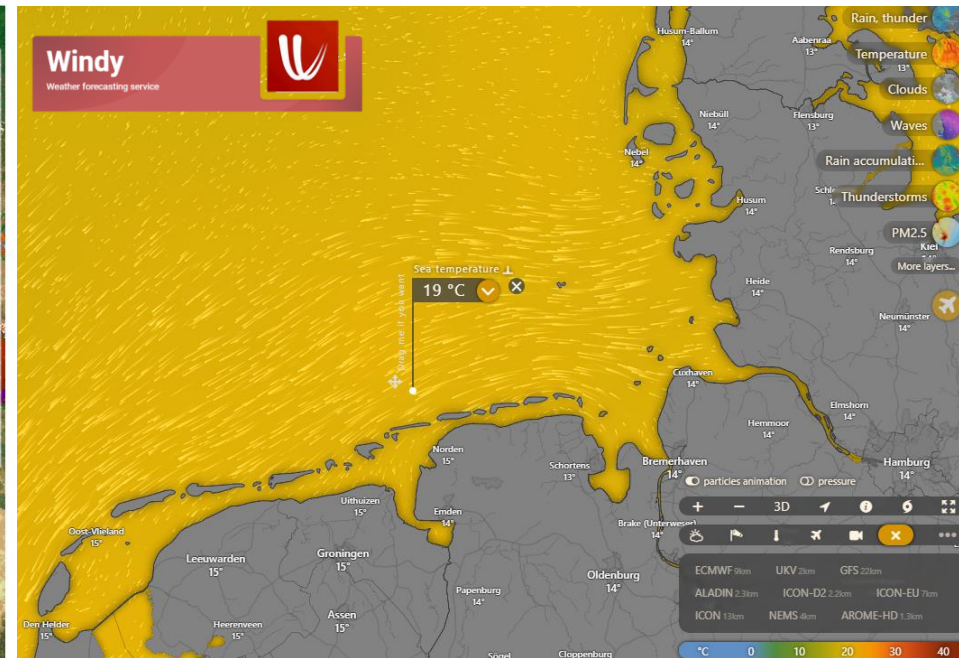
# Offshore Wave Height Sea State Forecast



# Offshore Water Temperature



Europe



German Bight

# HHO Flight Crew PPE

## Required:

- Sea Temp.  $\leq 10^{\circ}\text{C}$
- Flying at Night
- Rescue Time  $>$  Survival Time



## Required:

- All Offshore Flights





# Offshore Hoist Operation



# Offshore Personal Protective Equipment

## Technicians



- Helmet, Certified
- Eye protection
- Ear protection (optional integrated radio)
- Lifejacket, EASA FORM 1
- Emergency Breathing System (EBS)
- Personal Locator Beacon (PLB)
- Hoist Extension
- Safety Harness
- Hand gloves
- Immersion Suit, EASA FORM 1
- S2 Safety Boots

## Hoist Operator



- EVO 252 Helmet, (DOI 4.3 certified)
- Clear and Dark Visor
- David Clark Microphone
- Chin strap
- Rank Stripes
- CREW ID Card
- Safety Harness
- OP Gloves
- Checklist
- Knee Pads
- VIKING Immersion Suit, PS4043 (EASA FORM 1)
- S2 Safety Boots



# HHO 2.5min OEI Performance Calculation

### Maximum Payload Calculator AW139 OEI HOGE

Calculate the maximum payload and mass of the AW139 helicopter that allows maintaining an out of ground effect hover for 2.5 minutes in case of a single engine failure.  
Please find the instructions [here](#).

Dry Operating Mass (kg):

Fuel at site (kg):

Hover Height above MSL (ft):

QNH (hPa):

Temperature (C):

Headwind (kt):

Wind Benefit (%):

Flight ID:

PIC/SIC:

## Helicopter Performance.com

# HHO 2.5min OEI Performance Calculation

Section 9  
Supplemental Performance  
Information

AW139 - RFM - 4D  
Document N°  
139G0290X002

**AW139**

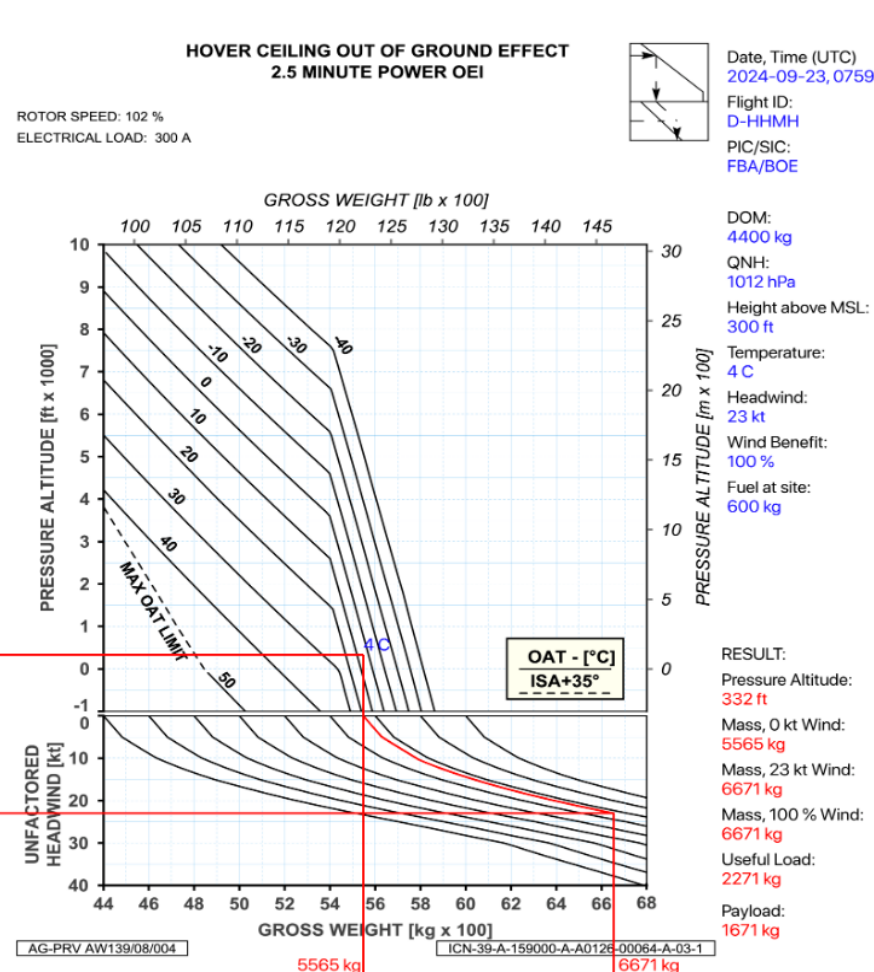
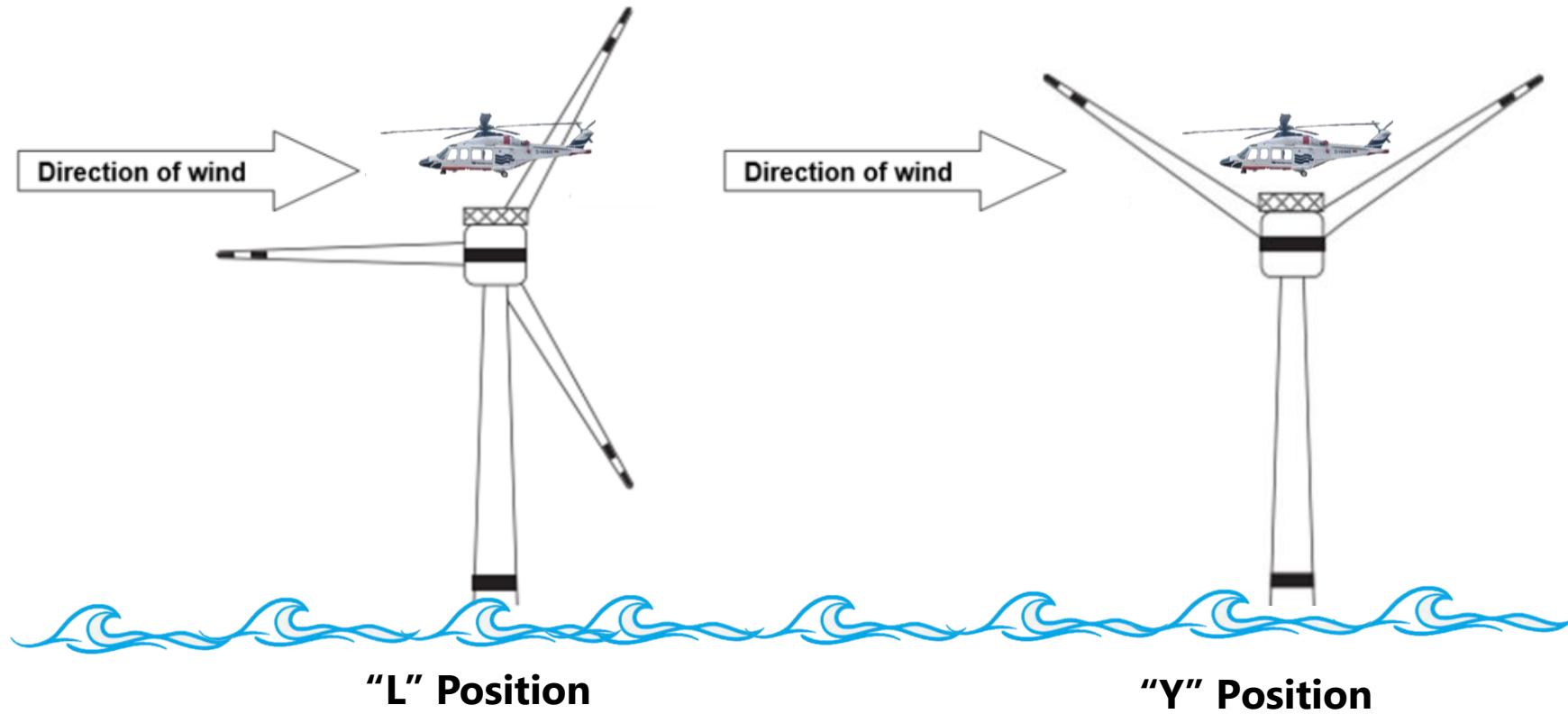


Figure 9-115 Hover Ceiling OGE, OEI 2.5 Min Power, Clean Intake with Unfactored Headwind Benefit

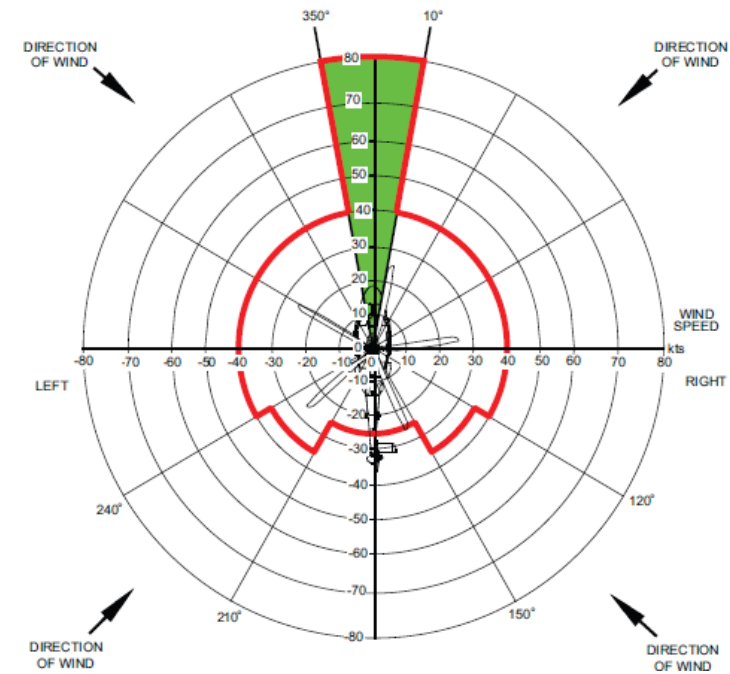
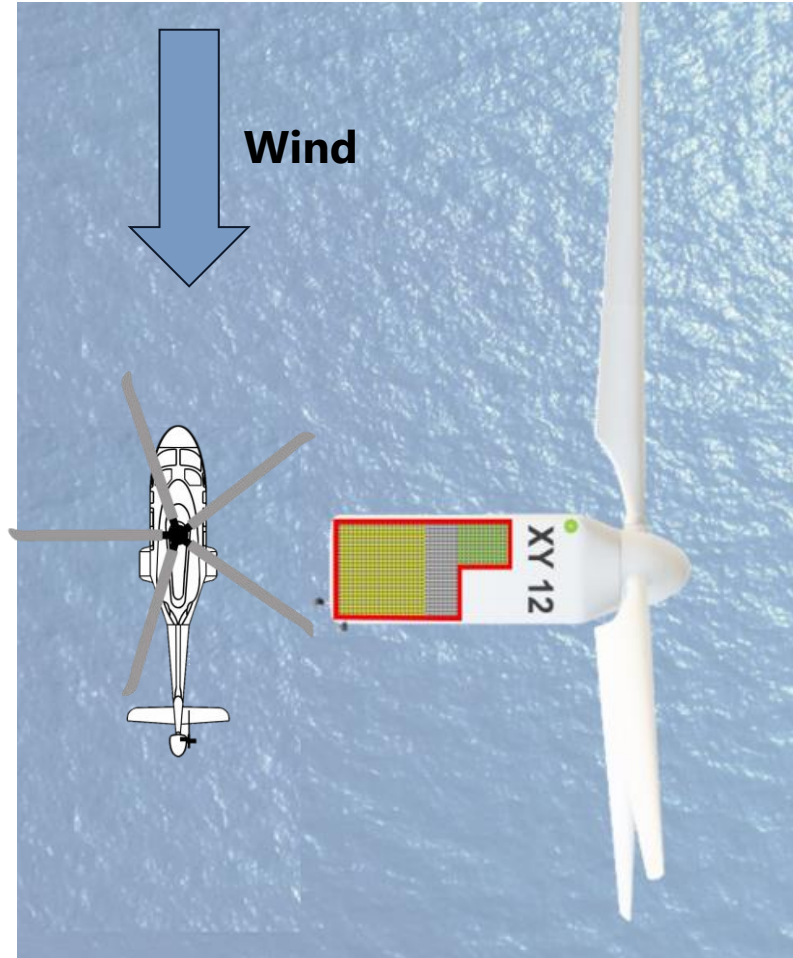
**Helicopter  
Performance.com**

# Standard Turbine Position During HHO

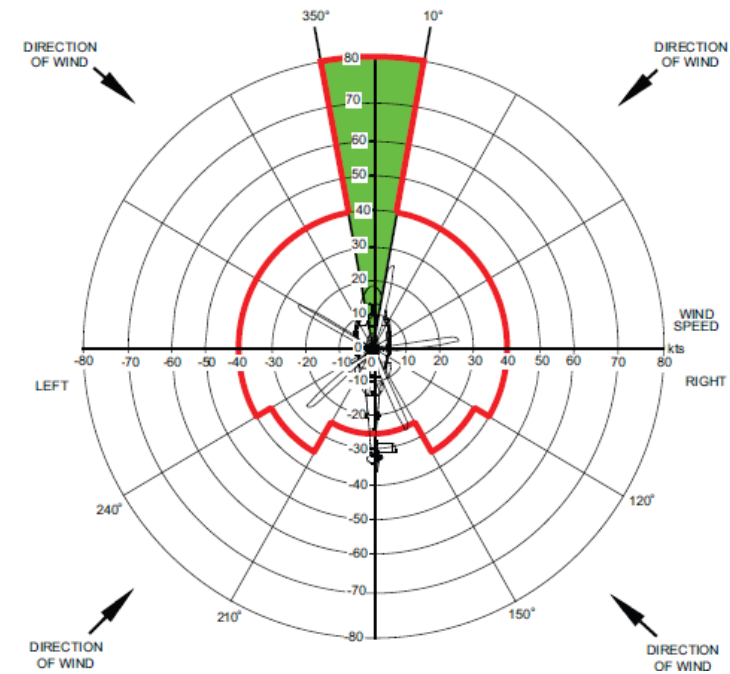
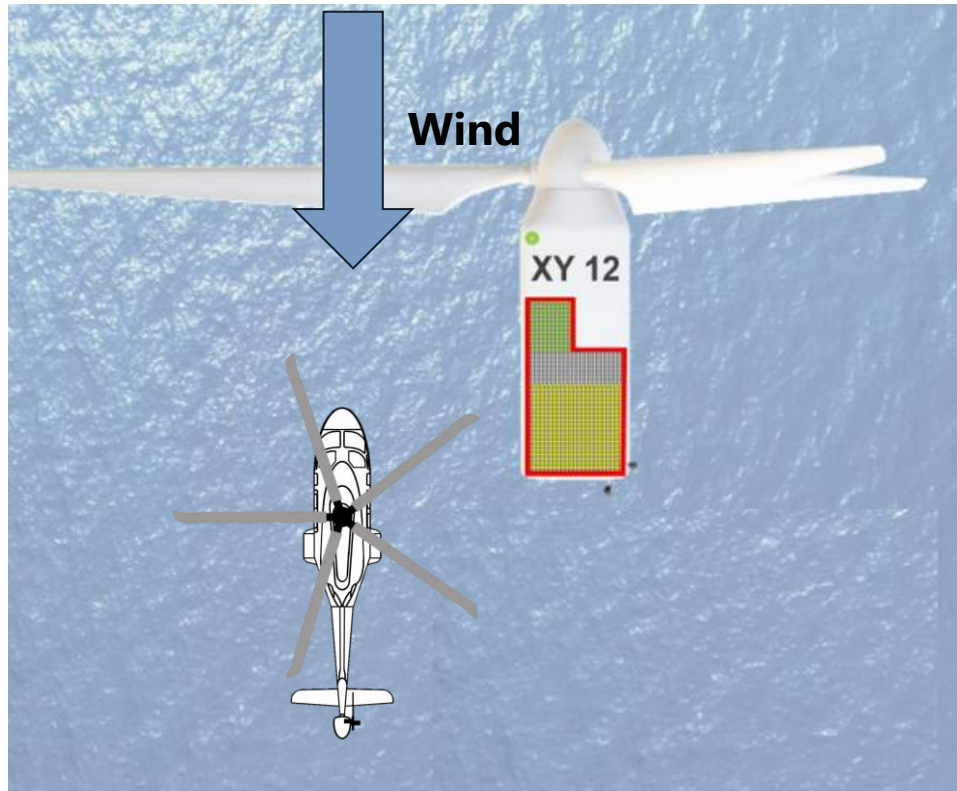




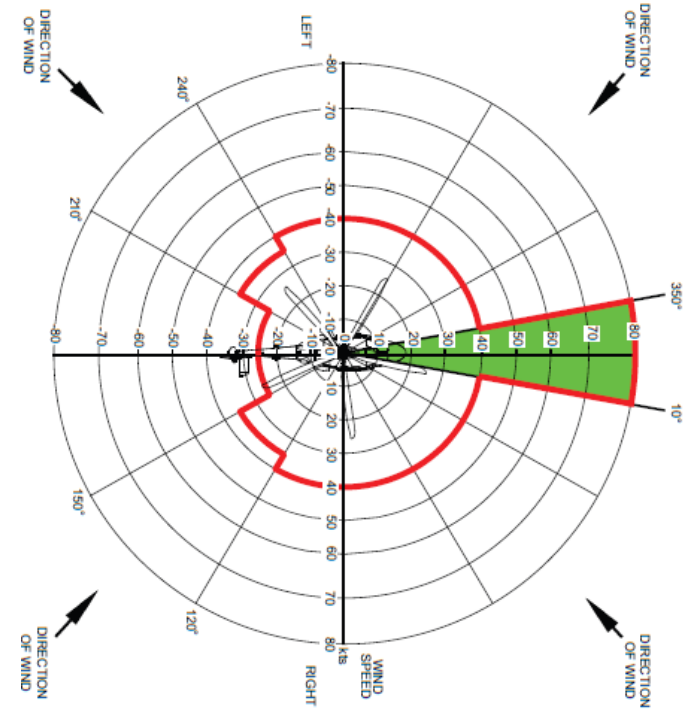
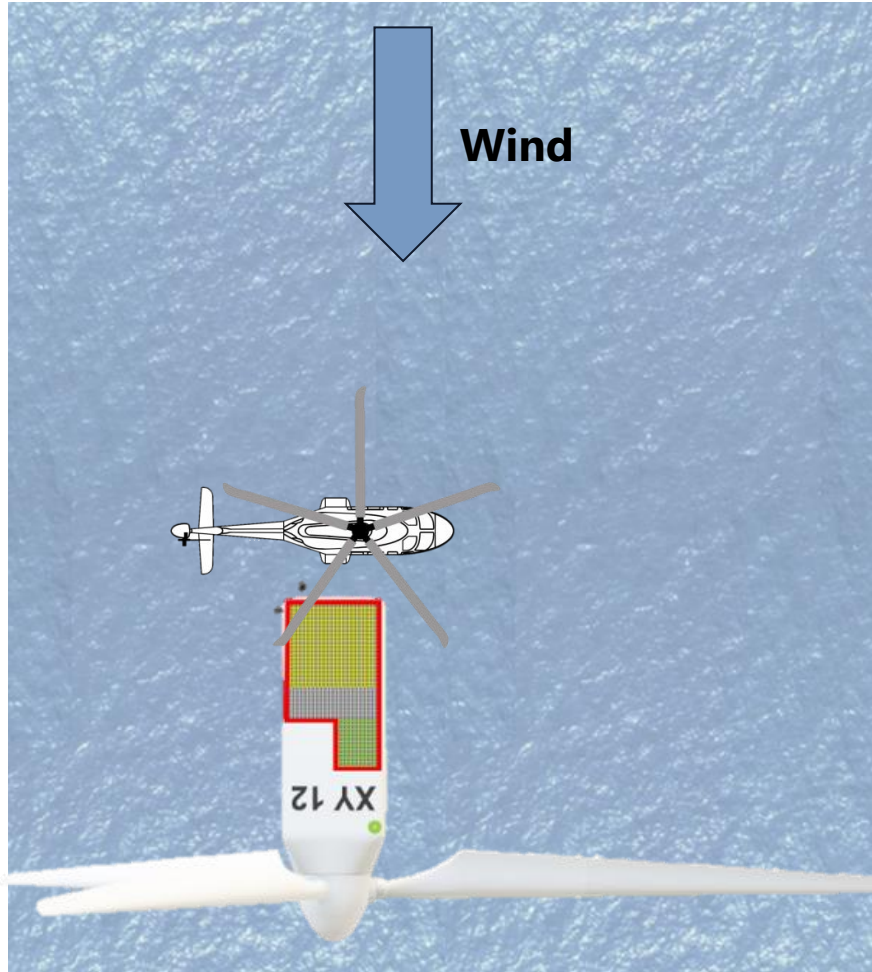
# Standard Turbine Hoist Position



# Non Standard Turbine Hoist Position

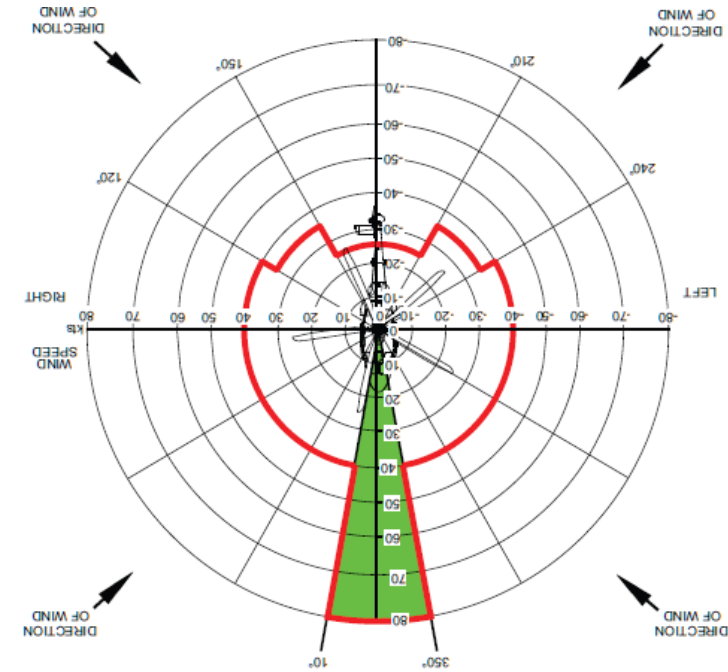
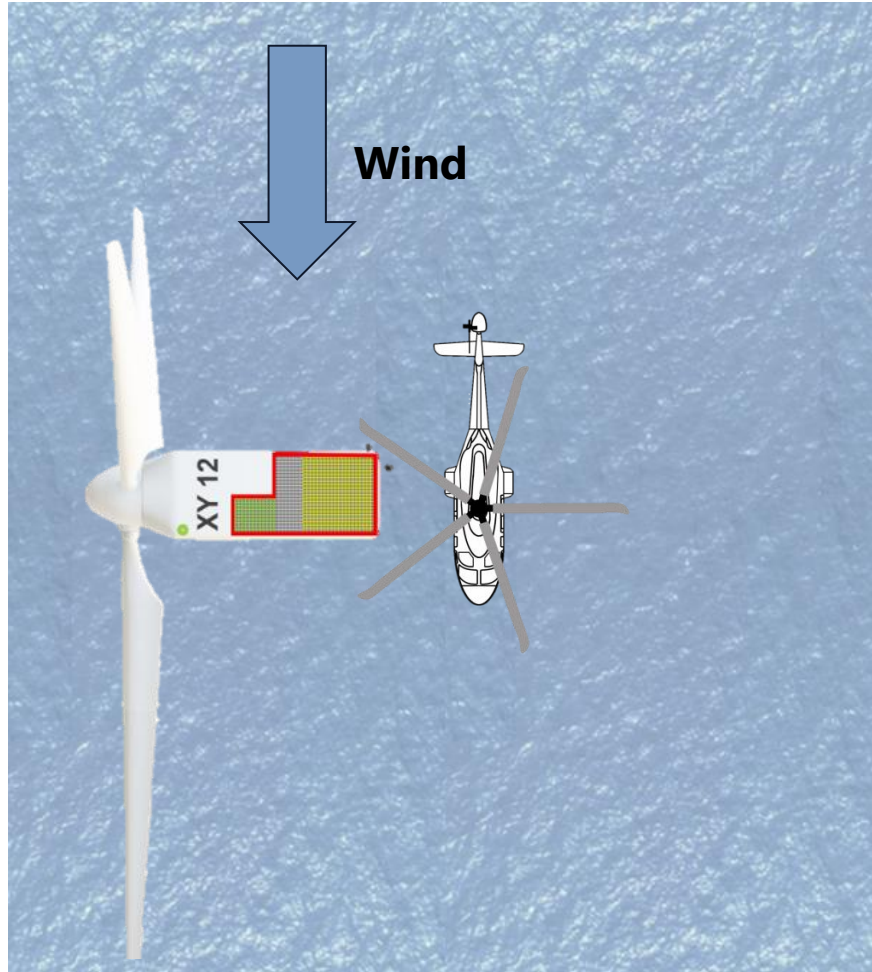


# Non Standard Turbine Hoist Position





# Non Standard Turbine Hoist Position



# Goodrich Hoist Variants



**AW139 ( Dual Hoist )**

Manufacturer and type:	Goodrich Double External Hoist P/N 4G2591F00111
Maximum hoist load:	OAT > 0°C: 249 kg (550 lbs) each
	OAT ≤ 0°C: 227 kg (500 lbs) each
Maximum cable length:	88.4 m (290 ft) each
Reeling speeds:	variable between 45 - 74.4 m/min (0.75 - 1.24 m/s, depending on load)

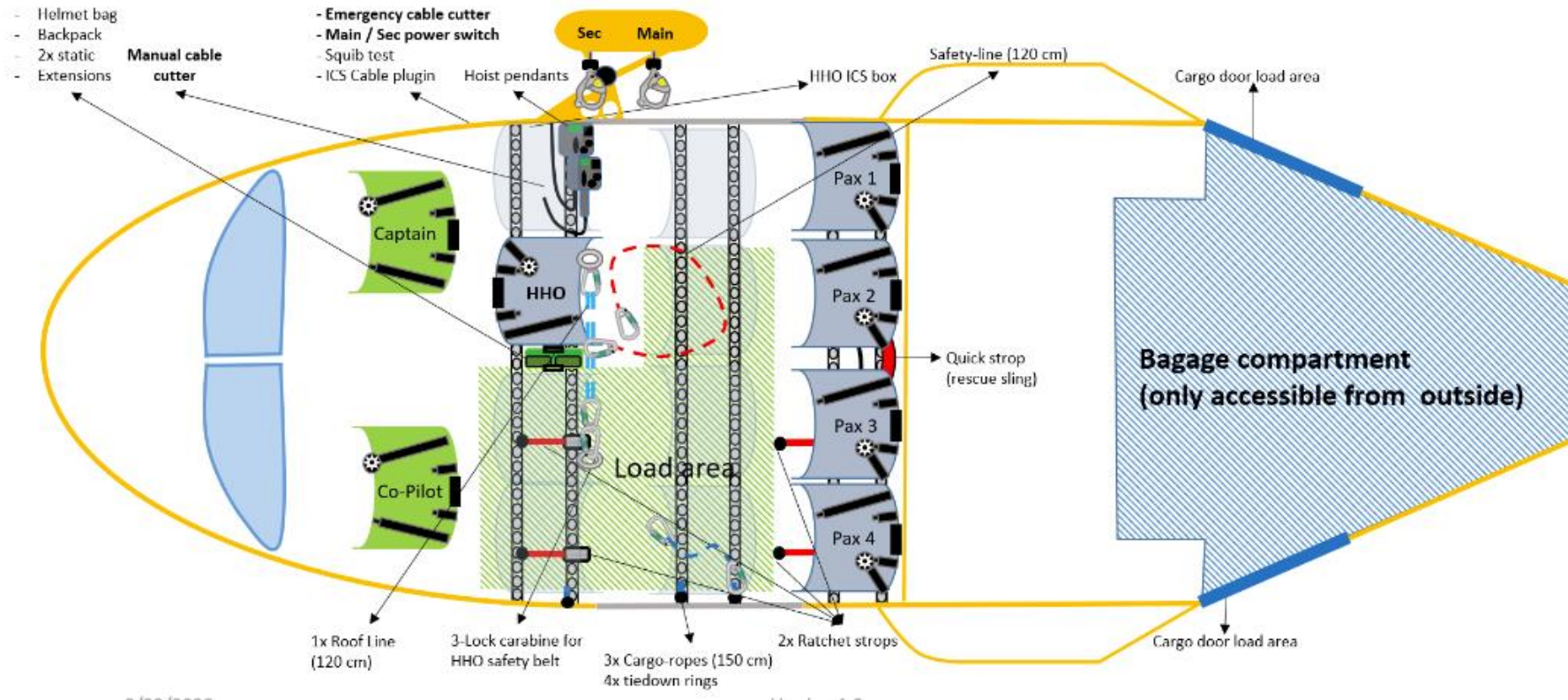


**AW169 / AW139 ( Single Hoist )**

Manufacturer and type:	Goodrich External Hoist P/N 6F2591F00111
Maximum hoist load:	OAT > 0°C: 249 kg (550 lbs)
	OAT ≤ 0°C: 227 kg (500 lbs)
Maximum cable length:	88.4 m (290 ft)
Reeling speeds:	variable up to 76 m/min (1.27 m/s)

# AW139 Cabin in HHO Config

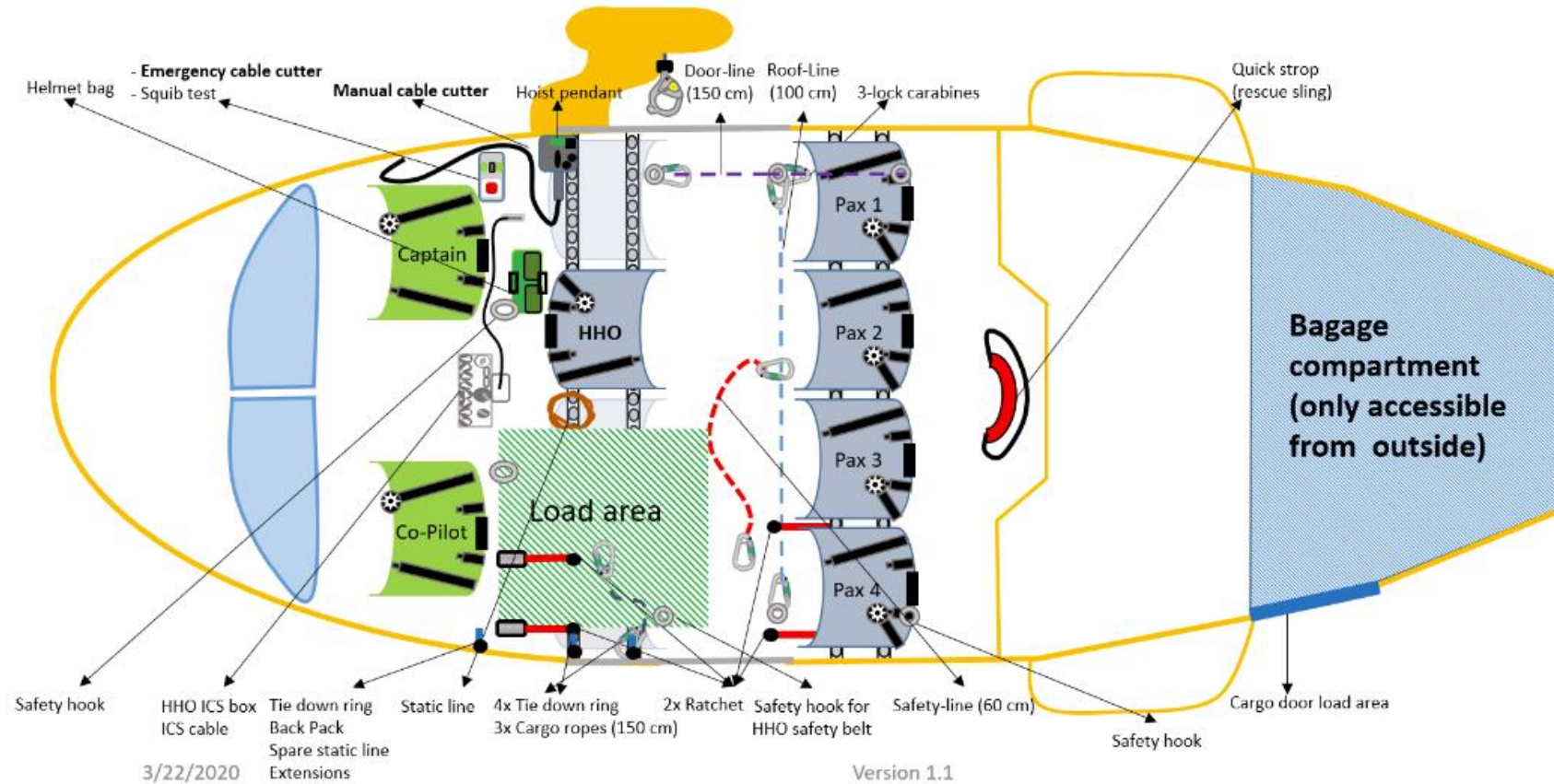
Standard hoist cabin layout AW139





# AW169 Cabin in HHO Config

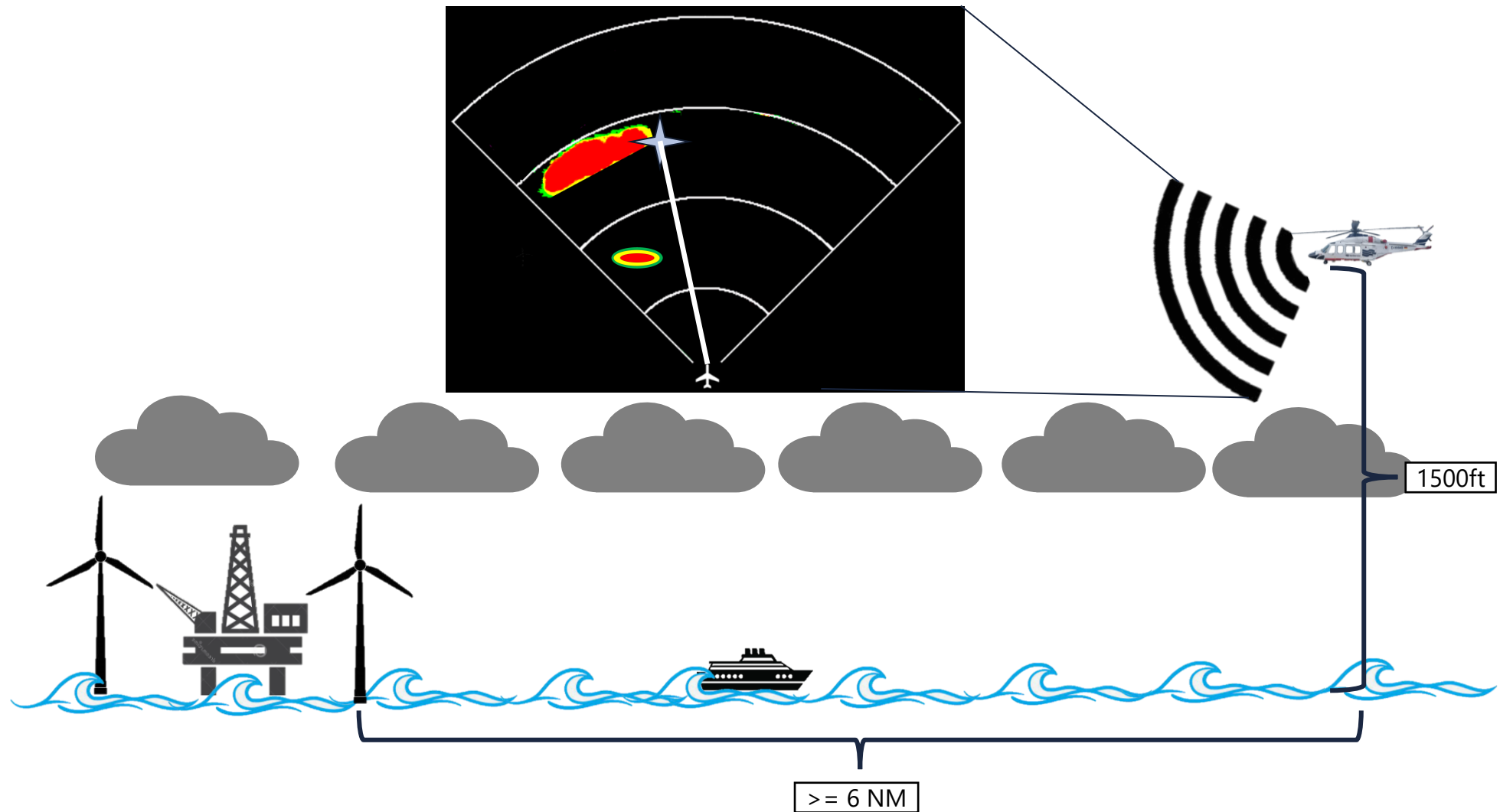
Standard hoist cabin layout AW169



# IFR Ops Offshore



# Airborne Radar Approach / IFR Arrival



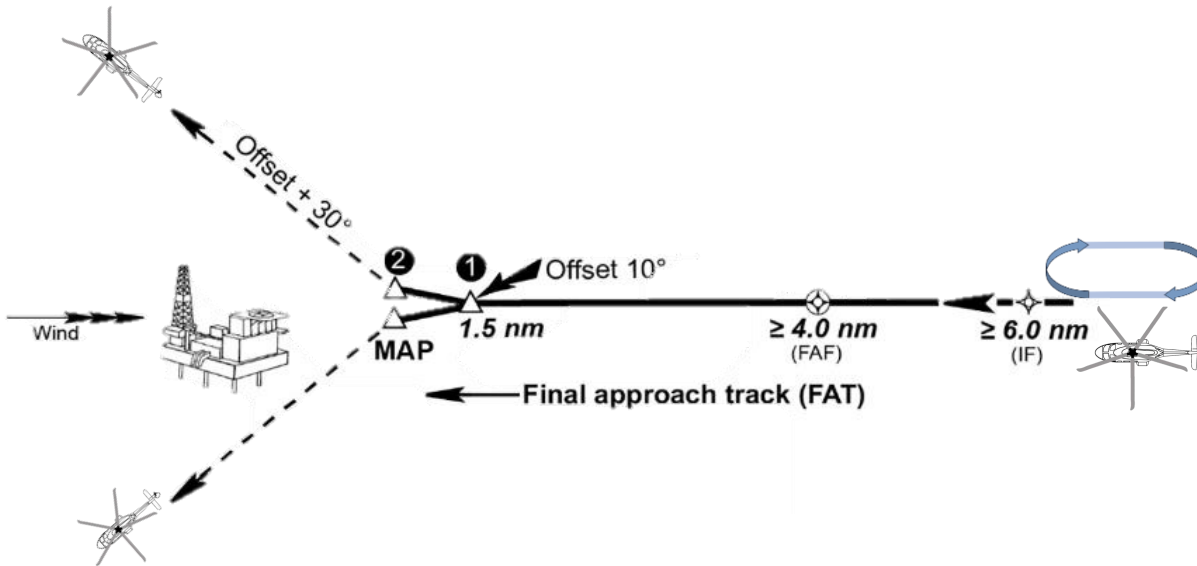


# Aircraft Weather Radar



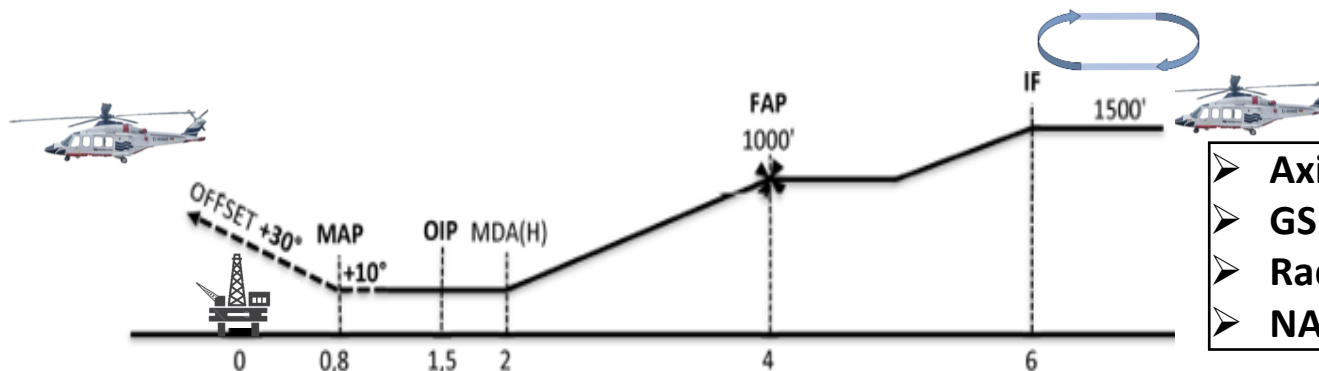


# Airborne Radar Approach (ARA)



## Segments

- Arrival
- Intermediate (IF)
- Final Approach (FAF)
- Offset Initial Point
- Missed Approach (MAP)



- Axis AP Engaged
- GS 70 kts
- Radar Height
- NAV Mode



# Airborne Radar Approach (ARA)

ANY PLATFORM  
COPTER ARA/FMS



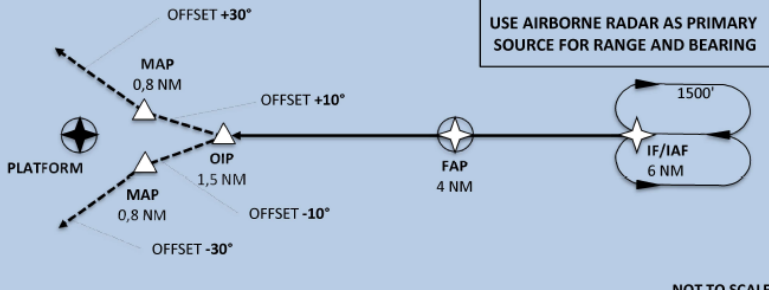
Radio:		Dest: <b>ANY</b>		FMS Wpt Name:	
Appr. Point	Final Appr. Track	DATE: <b>17.02.2020</b> REV.3	MDA (H)	Deck Elevation	<div style="border: 1px solid black; border-radius: 50%; padding: 10px; text-align: center;"> <b>MSA</b> 1500'         </div>
<b>MISSED APPR:</b> Climb to at least <b>1500'</b> on offset <b>TRACK</b> 1. Alt Set: QNH hPa; Below 1500' ref RADALT 2. Select RNP 0,3 and WX RDR GMAP before IF 3. On final approach GS at or below 70 KTS 4. Before reaching OIP, select the HDG bug to the offset 10° and at OIP engage HDG mode. 5. When visual contact is established, continue visual, keep clear of obstacles, perform final checks 6. If visual contact is established before 500 ft, intercept stabilized approach procedure					

**CAUTION**

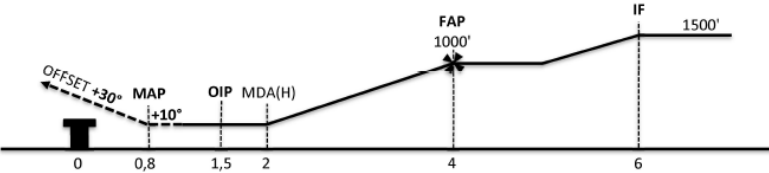
CHECK YOUR TRAJECTORY FOR  
OBSTACLES BEFORE DESCENDING

FLY MAGNETIC COURSE

USE AIRBORNE RADAR AS PRIMARY  
SOURCE FOR RANGE AND BEARING



NOT TO SCALE



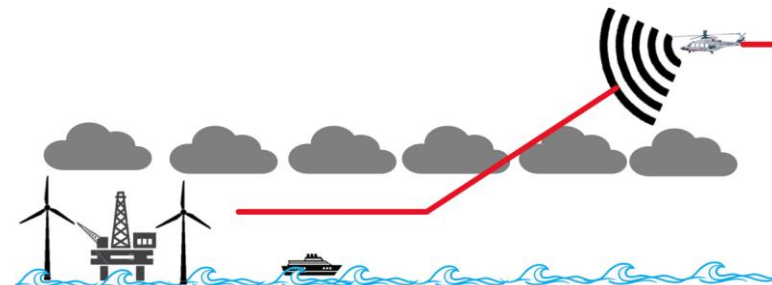
Straight in landing		Circle to land	
DAY	NIGHT	DAY	NIGHT
MDH	MDH	MDH	MDH
<b>DE + 50'</b>	<b>300'</b>	<b>300'</b>	<b>500'</b>
min. 200'			

If RH is unserviceable add 200' to appropriate MDH

Before landing checks shall be finished before reaching the IF  
**Final checks** shall be done when visual contact is established or according stabilized approach procedure

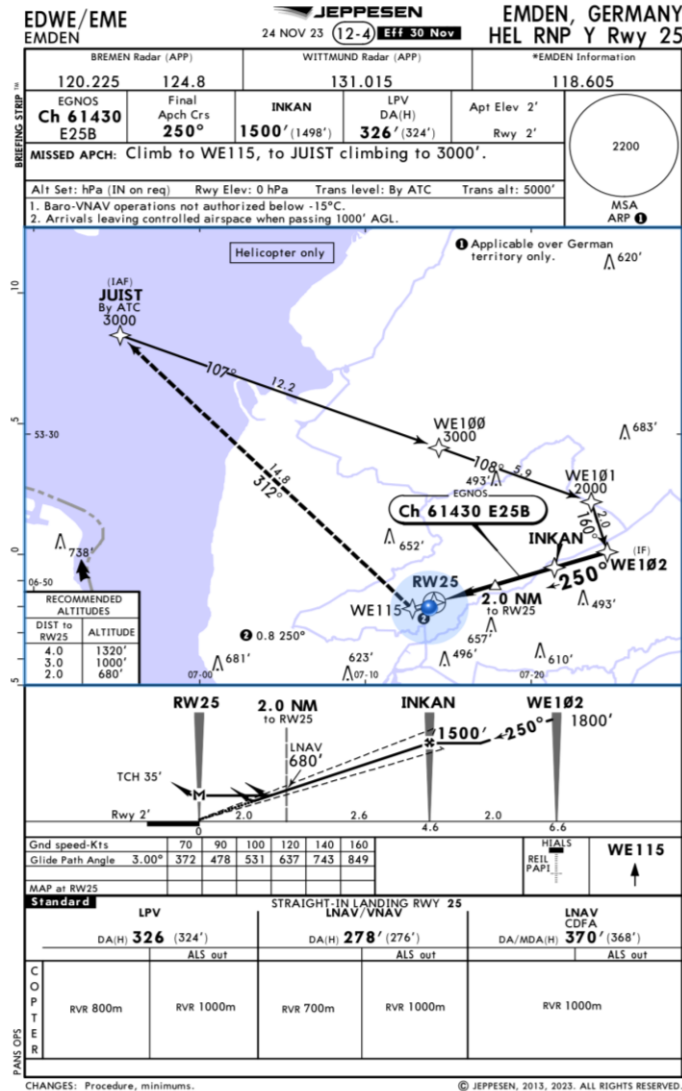
## Segments

- Arrival
- Intermediate (IF)
- Final Approach (FAF)
- Offset Initial Point (OIP)
- Missed Approach (MAP)



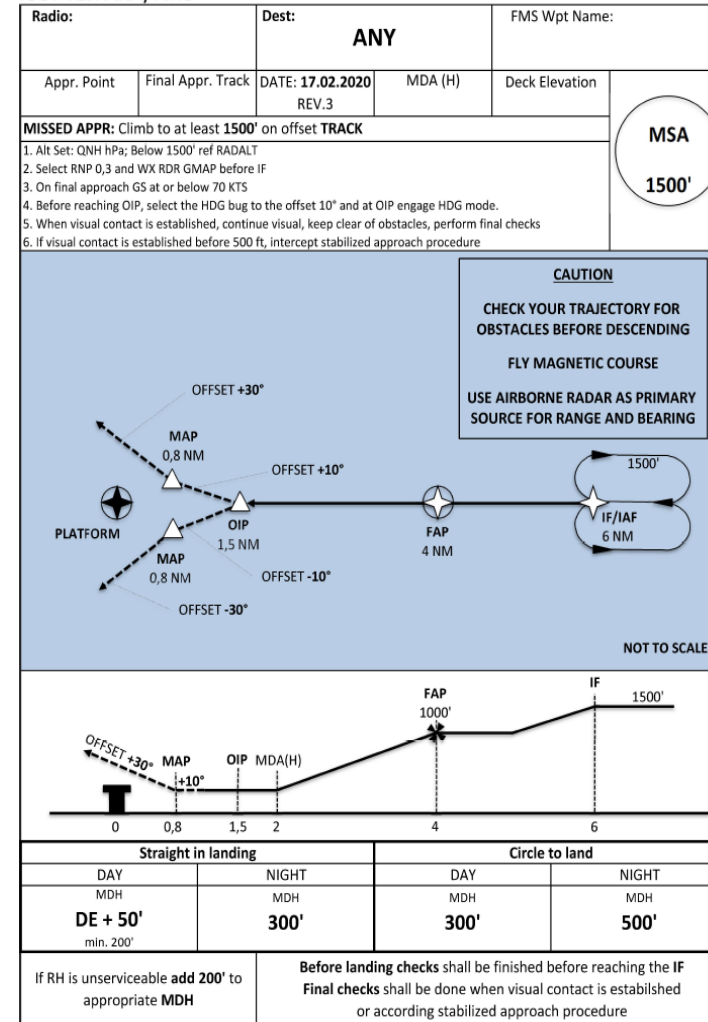
# IFR Onshore Plate

# IFR Offshore Plate



ANY PLATFORM  
COPTER ARA/FMS

HeliService

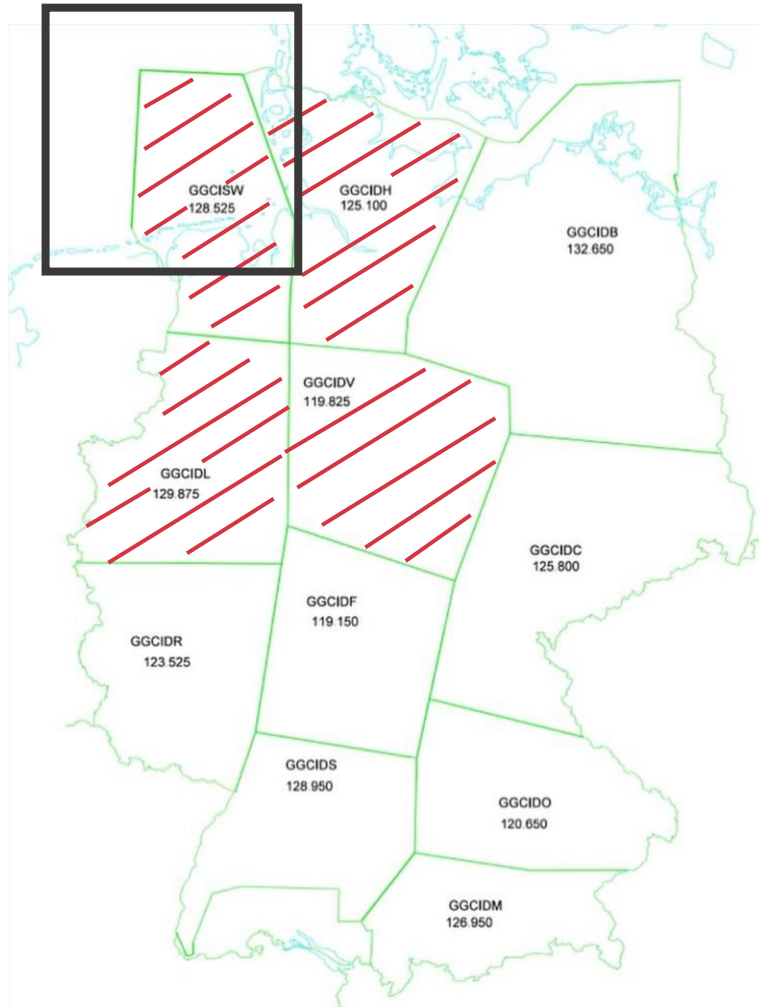


# Helicopter Synthetic Vision System (SVS)



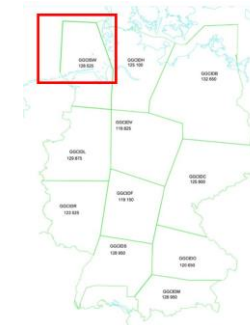
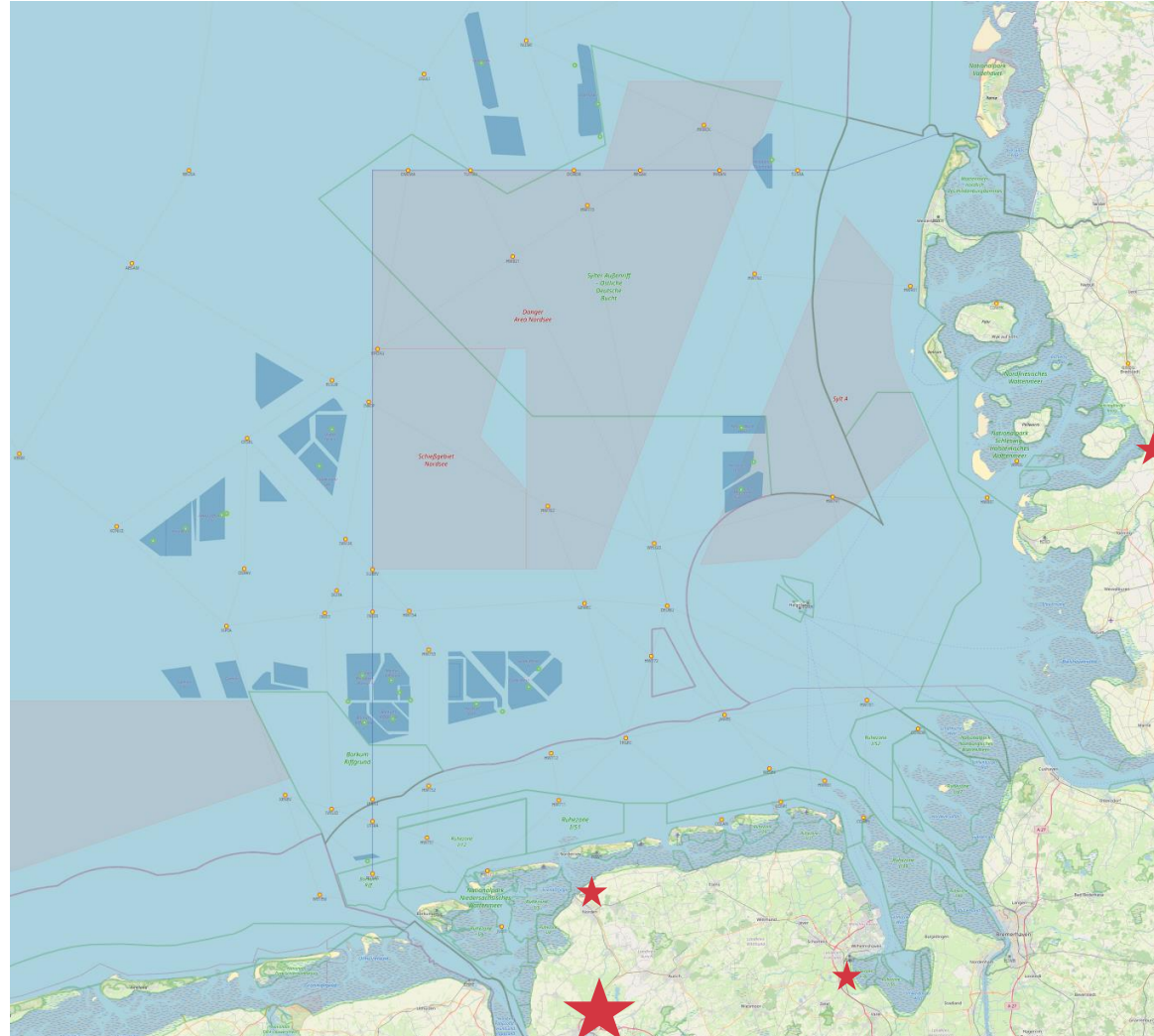


# Situation over the German Bight

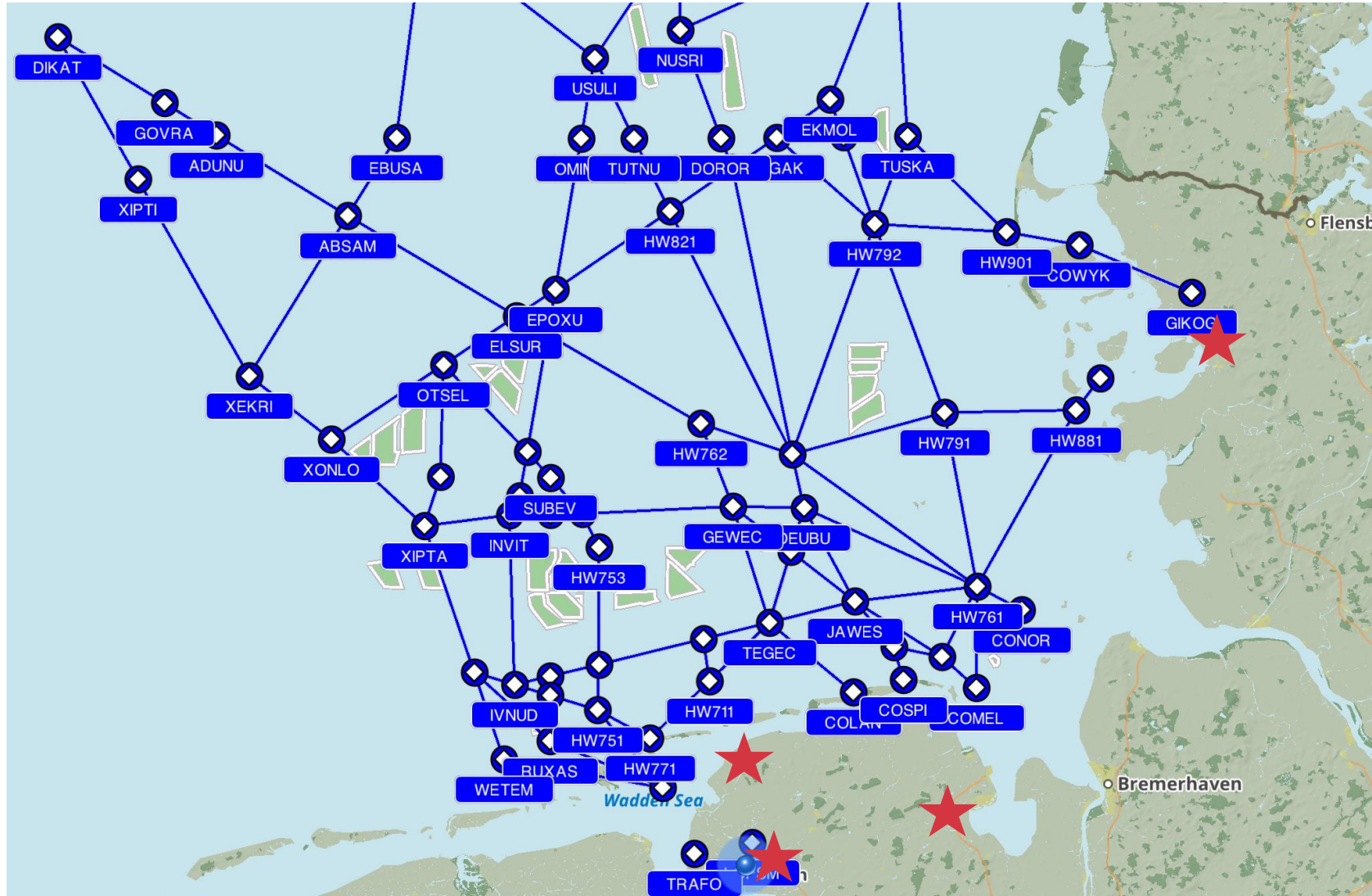


- **ATC Frequency is Overloaded**
  - Controller unable to provide traffic separation
  - Pilots unable to reach ATC over the radio
  - Increase in TCAS RA incidents
- **Reduced to No Radar Coverage**
  - Below 1000ft
- **High GA Traffic Volume**
  - Vacation / Tourist Islands
- **No IFR offshore in Class „G“**

# Helicopter Routes Usage



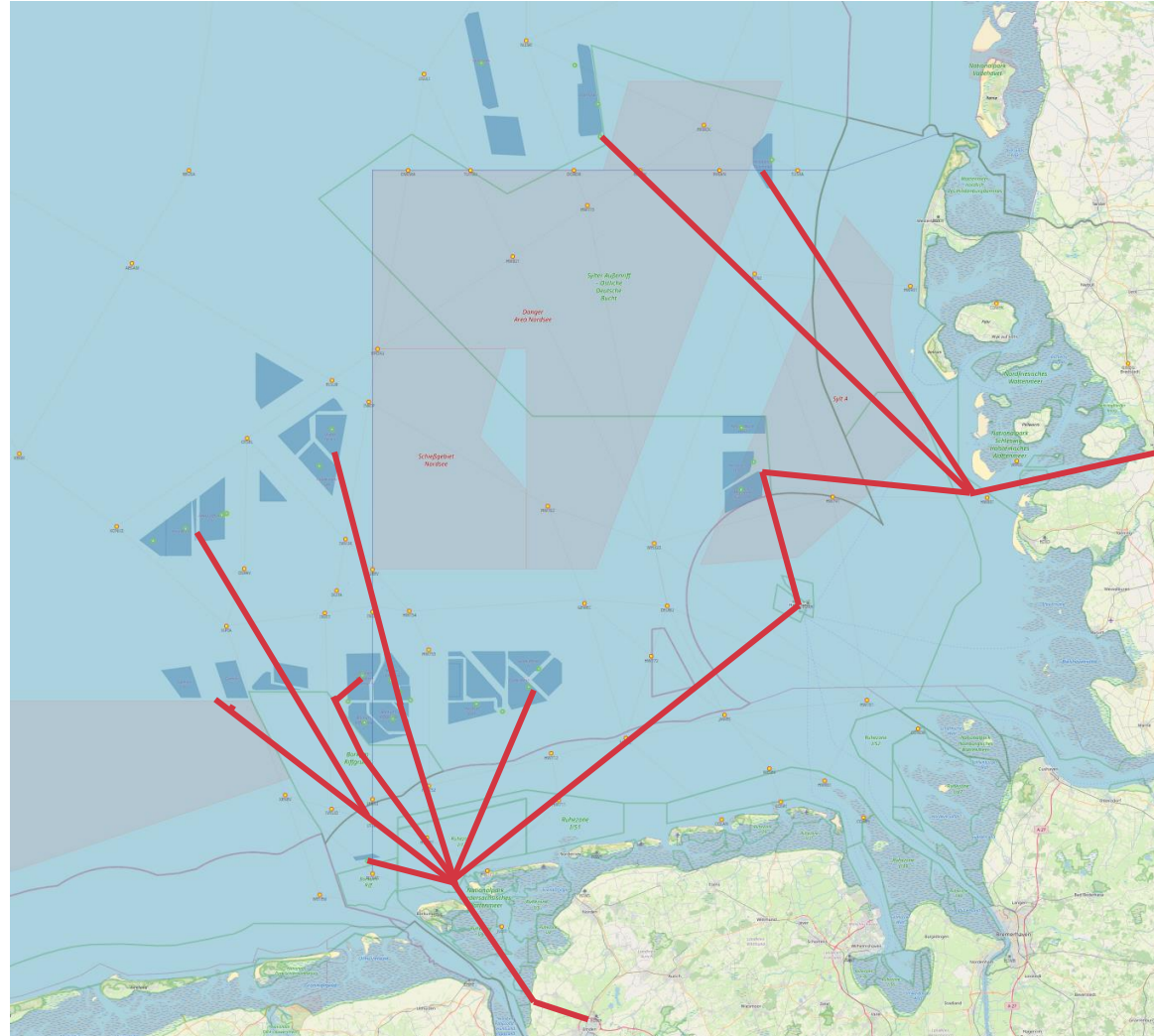
# Helicopter Offshore Routing System





# Helicopter Routes Usage

— HSI



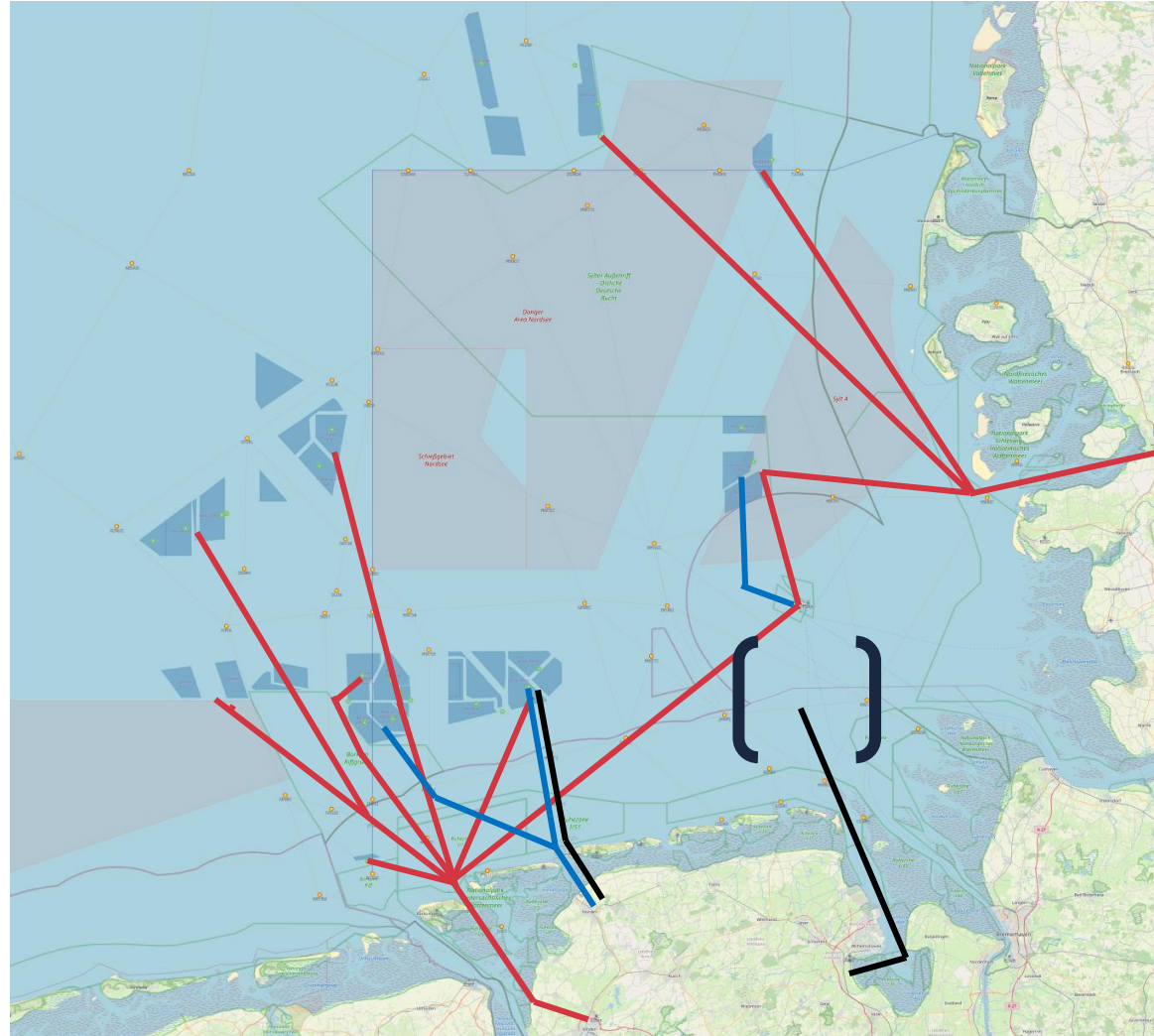
# Helicopter Routes Usage

— HSI  
— HTM



# Helicopter Routes Usage

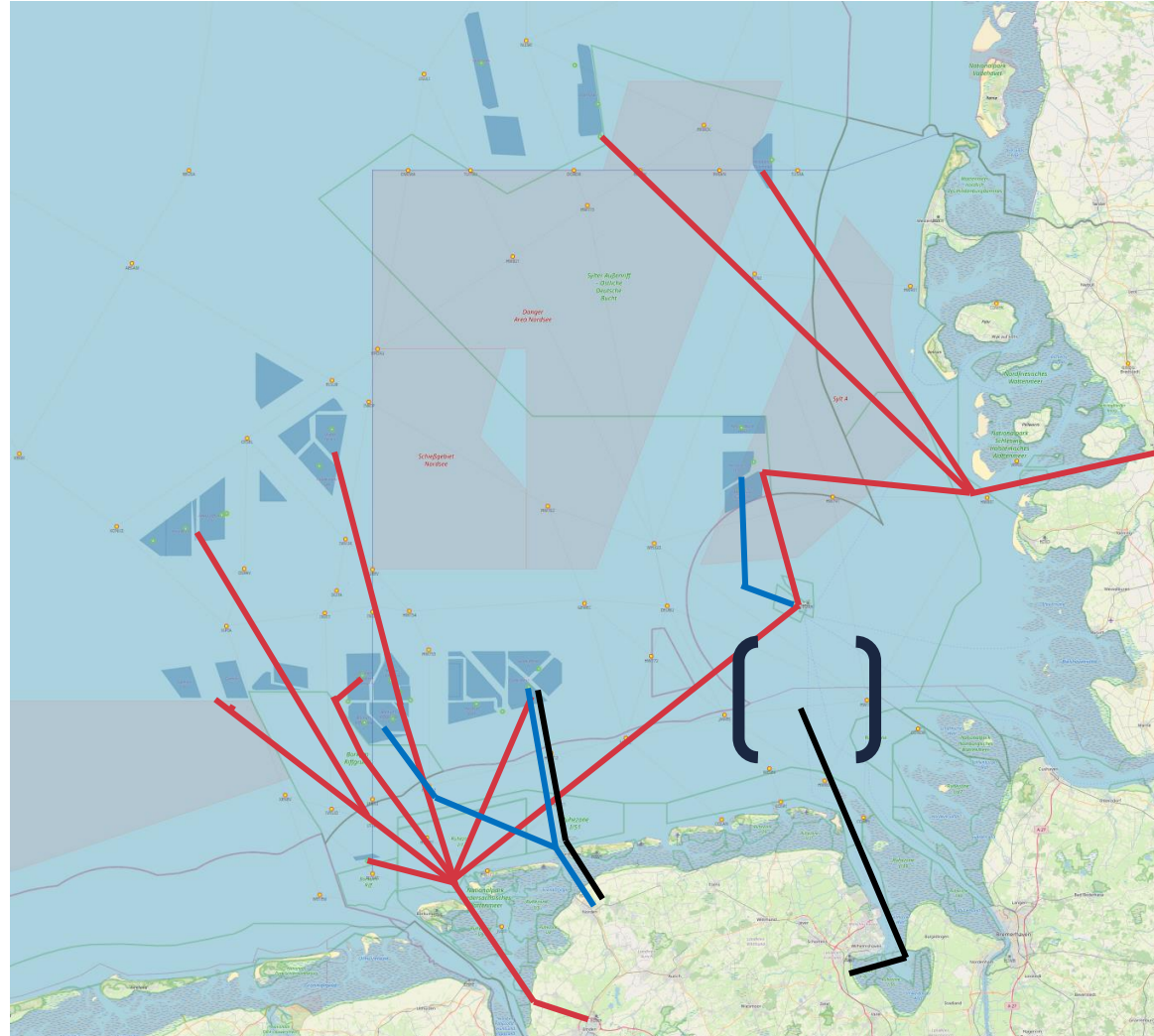
— HSI  
— HTM  
— NHC





# Helicopter Routes Usage


— HSI  
— HTM  
— NHC

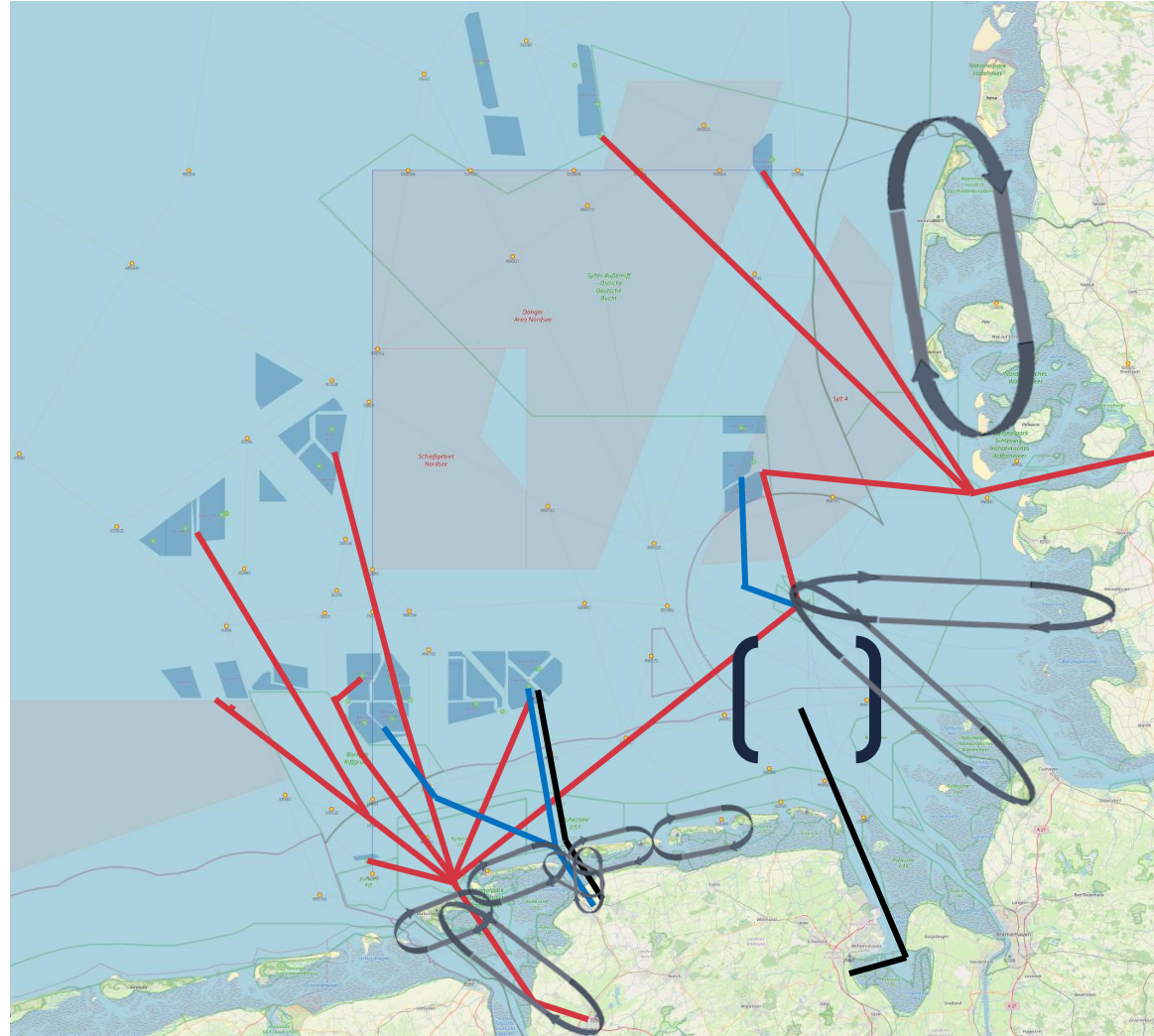


# GA Traffic Around the Islands



# Traffic Hotspots

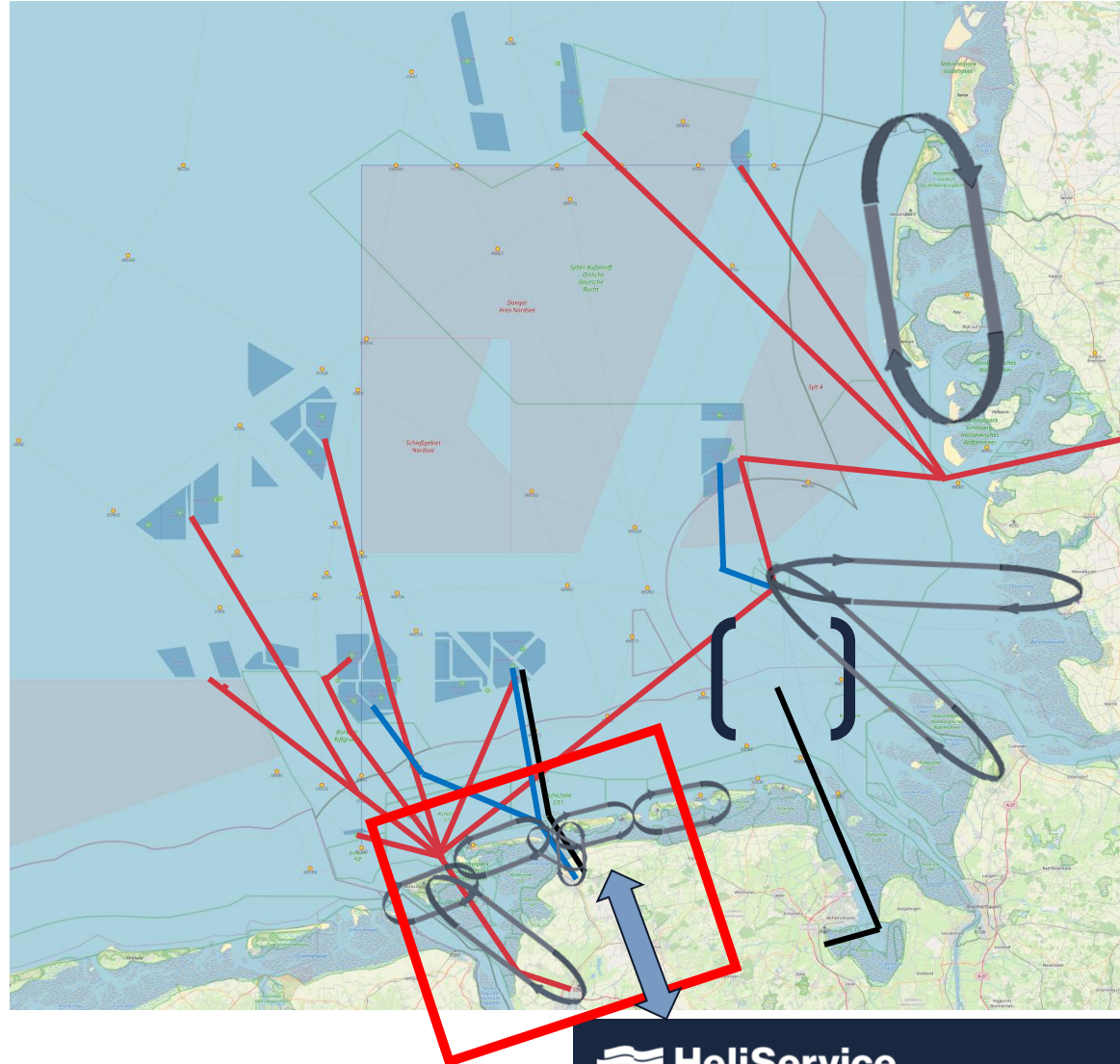
- HSI
- HTM
- NHC
-  GA



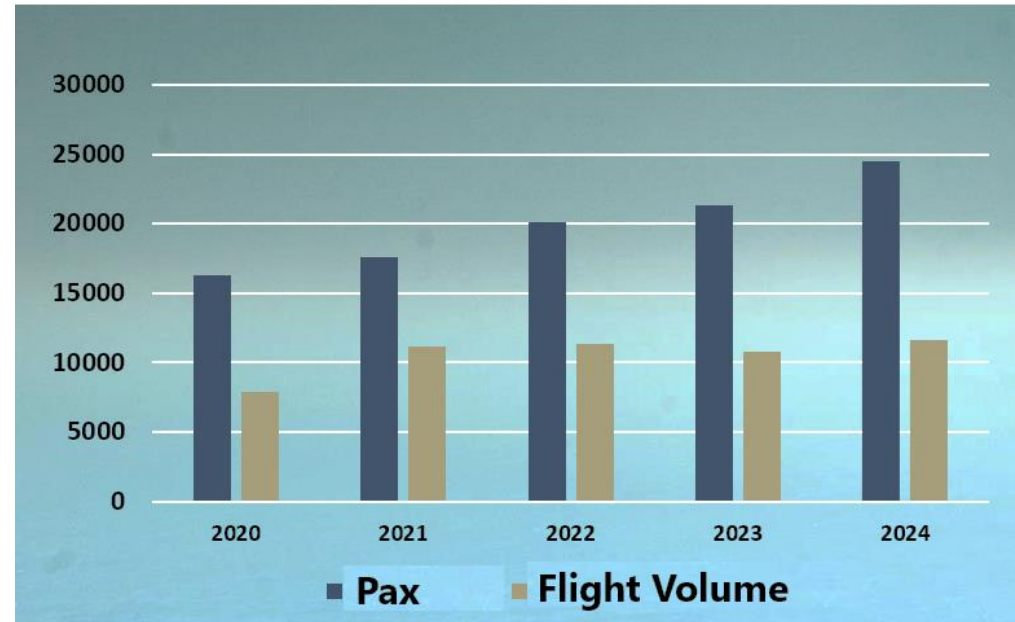
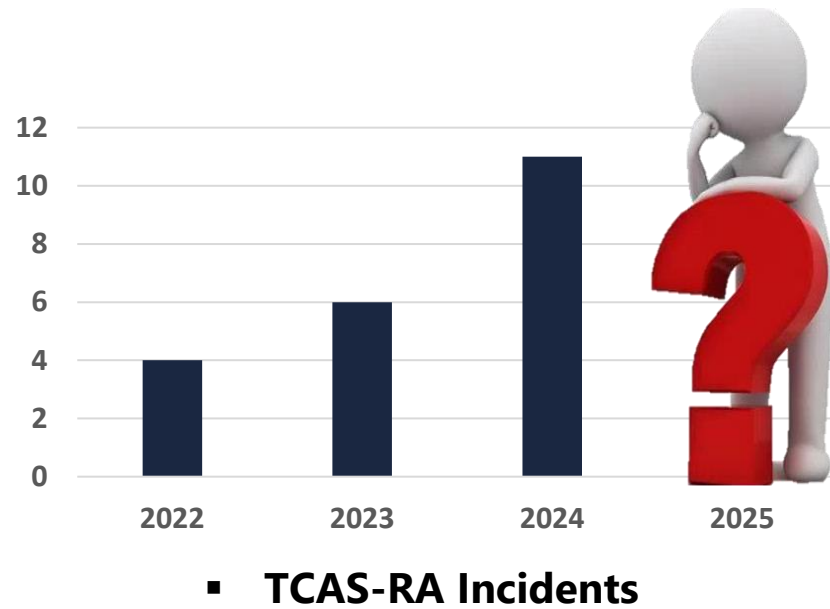


# Airprox Hotspot

- HSI
- HTM
- NHC
- GA



# TCAS RA / Airprox Data



# Airprox Hotspot

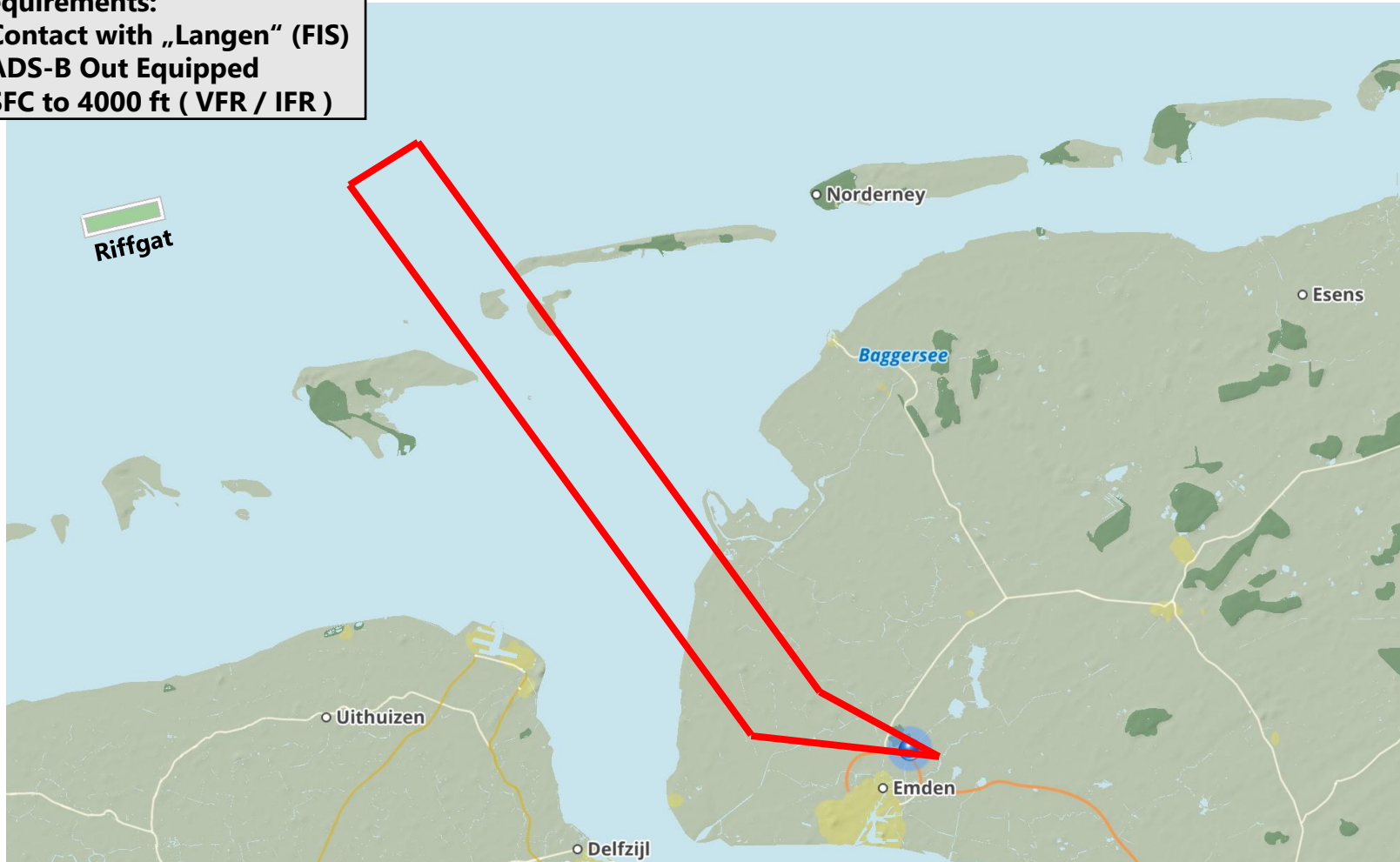




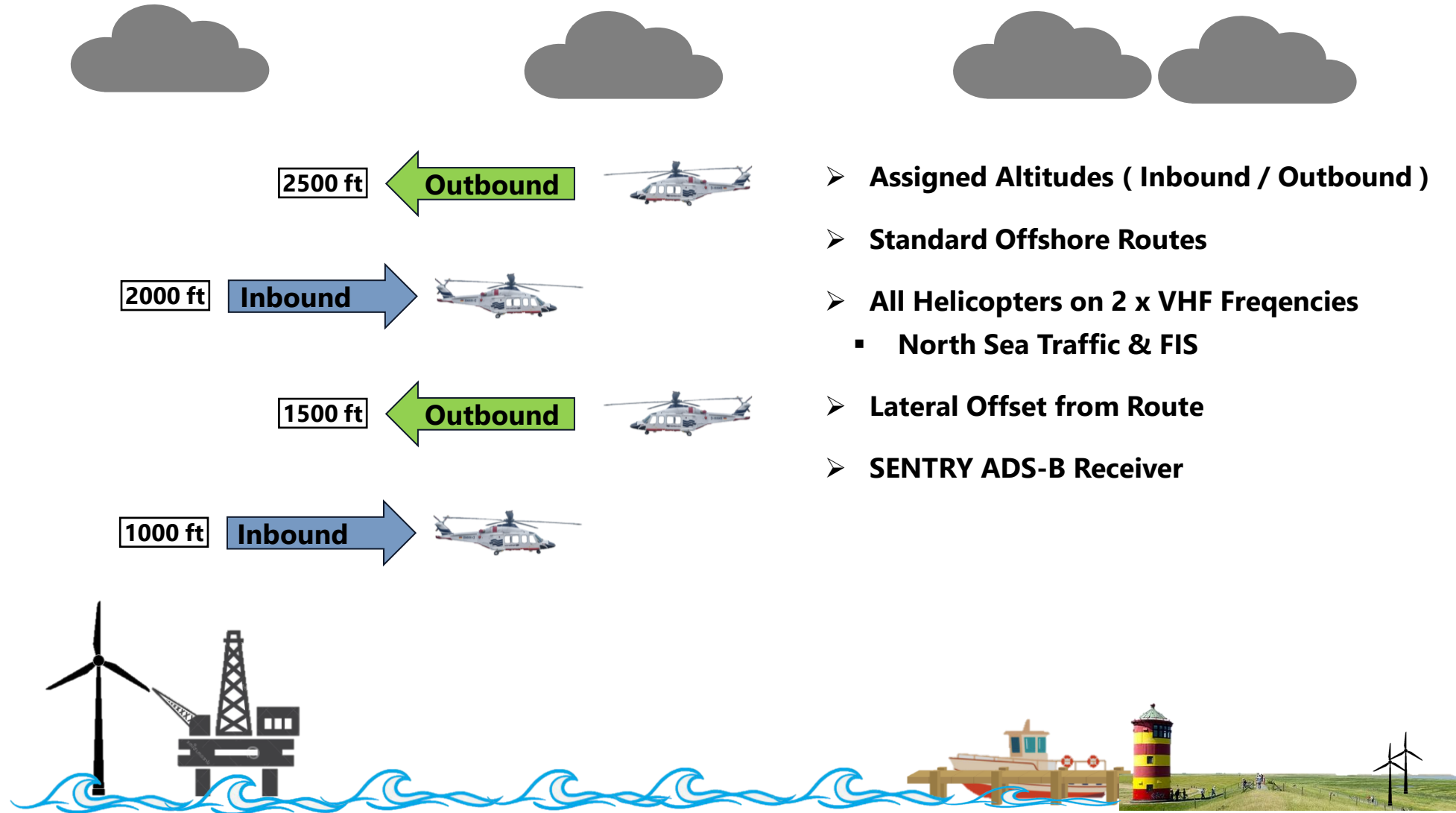
# Helicopter Protected Zone (HPZ) Proposal

**Requirements:**

- Contact with „Langen“ (FIS)
- ADS-B Out Equipped
- SFC to 4000 ft ( VFR / IFR )



# Risk Mitigation



# SENTRY ADS-B Receiver

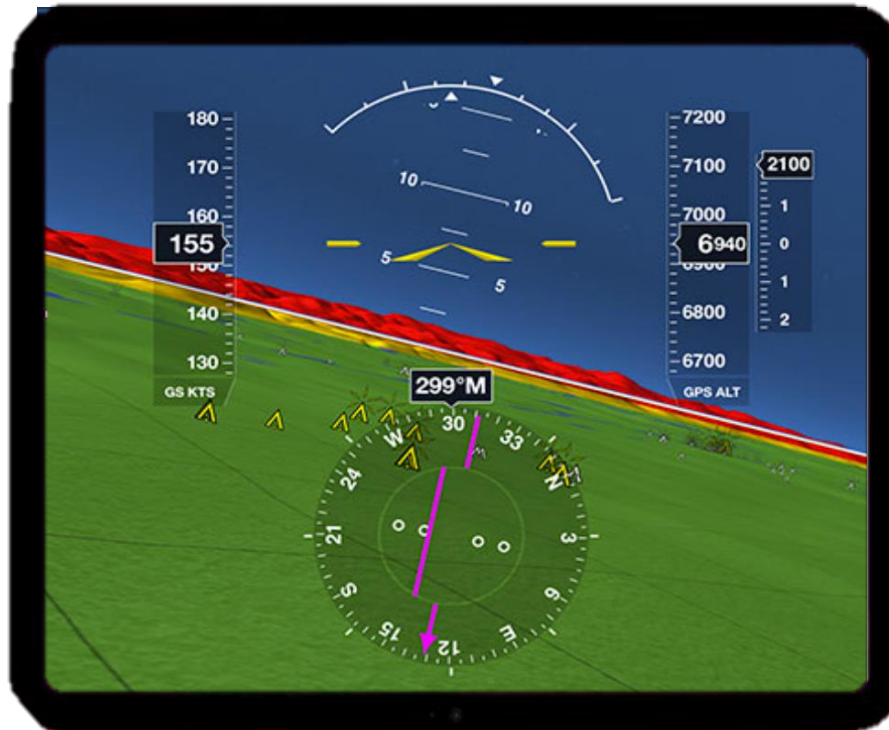


- **FLARM**
- **Traffic (Dual Band ADS-B)**
- **Backup AHARS**
- **WAAS GPS**

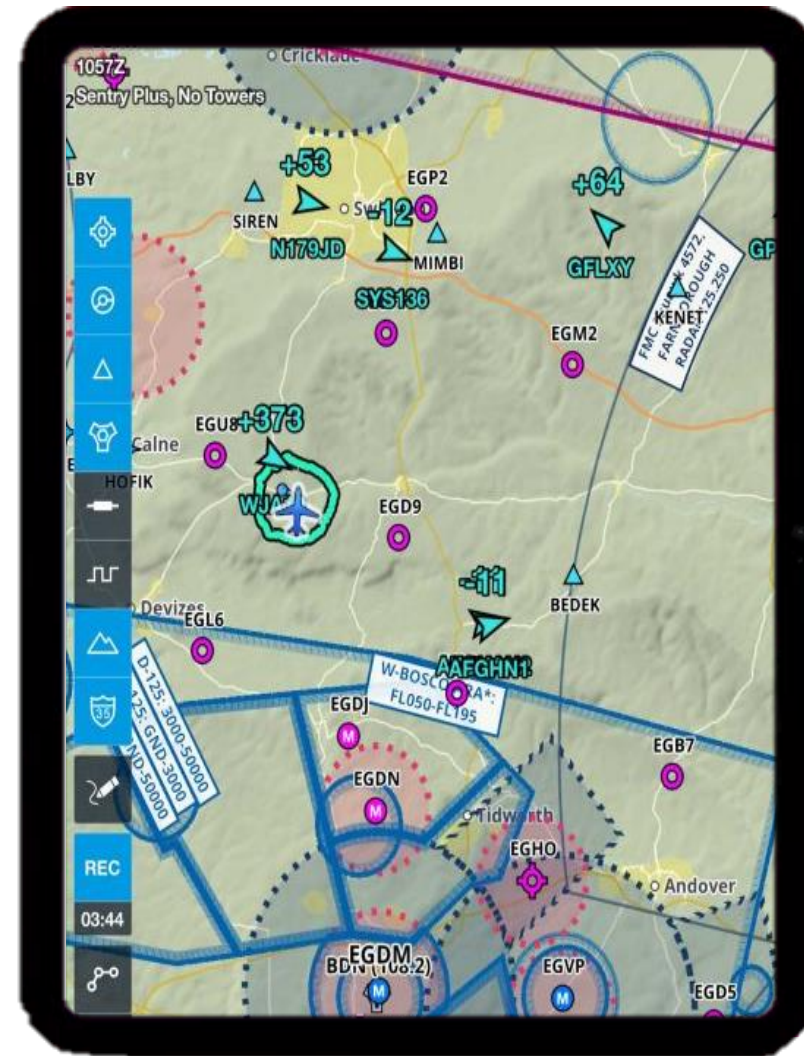
- **FIS-B Weather**
- **18 hrs Battery Life**
- **Flight Tracking**



# SENTRY ADS-B Receiver



- **FLARM**
- **Traffic (Dual Band ADS-B)**
- **Backup AHARS**
- **WAAS GPS**
- **FIS-B Weather**
- **18 hrs Battery**
- **Flight Tracking**



# IFR in „Class G“ (Netherlands)

## North Sea Area Amsterdam (NSAA)

### ➤ **EASA Regulations**

- SERA.5025 ( IFR outside controlled airspace )
- SERA.6001 ( Classification of Airspace Class G )
- ARA procedure approved by local CAA

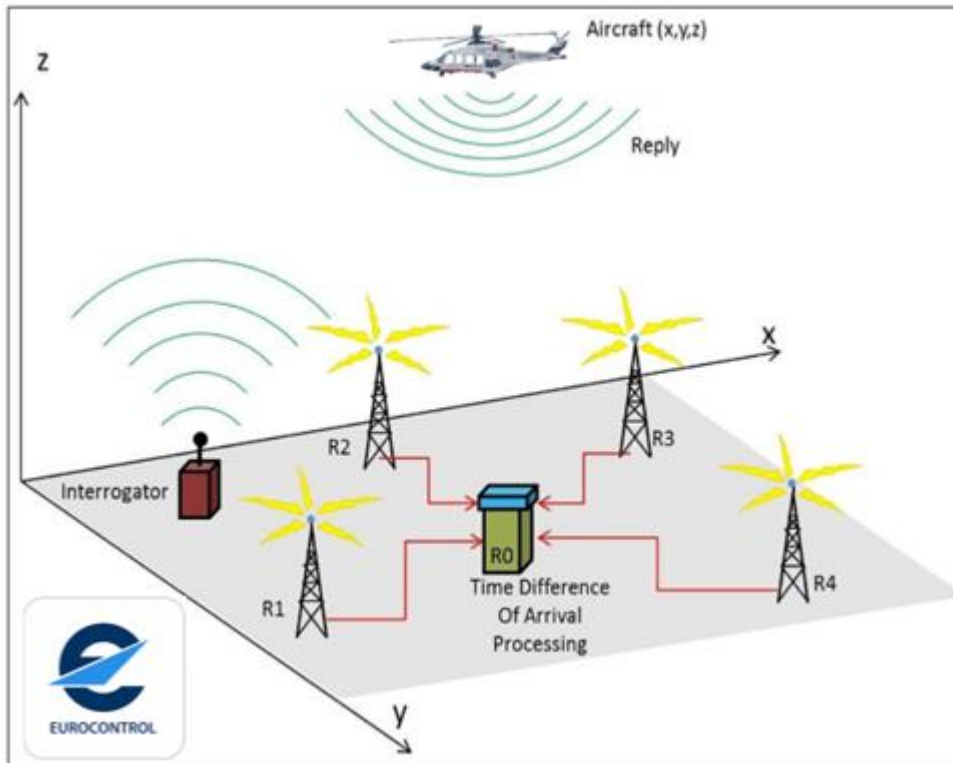
### ➤ **Airspace**

- RMZ & TMZ

### ➤ **Infrastructure**

- ADS-B WAM ( Wide Area Multilateration )
  - Multiple receivers offshore (Oil & Gas Platforms / Windparks)
  - Create accurate location of aircraft

# ADS-B WAM (ARTAS)



## ARTAS System Data Sources:

- Radar
- Mode-S
- WAM
- ADS-B

**ARTAS:** Air Traffic Management Surveillance Tracker and Server



# Wish List for 2025 and Beyond

## North Sea /German Sector

### ➤ **Improve Infrastructure in Support of Offshore Windparks Expansion**

- Applying current EASA Regulations
  - All weather capabilities to reach offshore destinations (IFR in Class G)
- Efficient communication between BMDV / BAF / DFS / LBA & Helicopter Operators

### ➤ **Airspace**

- Offshore RMZ & TMZ
- Helicopter Protected Zone

### ➤ **Infrastructure**

- ADS-B WAM ( Wide Area Multilateration )
- Individual Offshore ATC Sector / Frequency
- More TAF WX Stations Offshore

# Thanks for your attention!

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