

Emergency Response Plan

Port of IJmuiden

OFFSHORE WINDPARK EGMOND AAN ZEE (OWEZ)

Client:
NoordZee Wind
Parent: Nuon and Shell

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1.0 Scope of Document

The scope of this document is to consolidate emergency response arrangements for operations stage of the project.

This document is owned by Bouwcombinatie Egmond (BCE), held live for update and revision as work progresses and protocols mature.

2.0 Project Overview

The Offshore Windpark Egmond aan Zee (OWEZ) is located off the west coast of IJmuiden, NL. It comprises of 36 wind turbines (See Appendix A for wind farm position).

Each turbine consists of a tubular steel tower supporting a nacelle approximately 68m above MHWS with 3 blades each 45m long. The maximum blade tip height is 115m above MHWS and the blade clearance (air gap) is approx. 20m at MHWS. At sea level each turbine presents a steel jacket 4.3 m in diameter. Additionally, there is a meteorological tower 80 m high. The turbines are connected within the farm and to the shore by submarine cables buried to a nominal depth of 1.5m throughout. The cable landfall is at Wijk aan Zee.

3.0 Reference Documents

Attention is drawn to the following reference documents:

Document Reference	Document Title	Status
BCE-HS-HB-001	HSSE Plan	Live – issued for construction
BCE-HS-PP-009	Port Control	Live – issued for construction
BCE-HS-PP-005	Access & Egress Procedures	Live – issued for construction
BCE-HS-HB-003	Marine Pollution Contingency Plan	Live – issued for construction & commissioning
4-OWEZ2.6-9.1.1-21-006-MS Commissioning & Final Testing	Wind Turbine Commissioning and Testing Procedures	In Preparation
BCE-HS-PP-006	MOB Procedure	Live – issued for construction
BCE-HS-PP-020	Emergency Evacuation V90 (Vestas doc 967967)	Live – issued for construction

4. Overview of Wind Farm Operations

BCE has a service contract with the Wind Farm owner, NoordZee Wind (NZW) to operate and maintain the Wind Farm for a period of 5 years. After this time, the responsibility for O&M is likely to pass to the Owner.

The aspects of operations relevant to emergency response are summarised as follows:

- **Construction Phase:** Installation of foundations, and turbines, pre-assembly, onshore electrical sub station & transformer, Vessel Traffic Movements on wind farm, Commissioning & Testing, Crew Changes.
- **Operations Base.** The operations base is in IJmuiden Harbour, where the Control Room is situated. . The control room would normally be un-manned out of hours.
- **Wind Turbine Servicing.** The wind turbines are scheduled to have two services per year, at six-monthly intervals. However, the wind farm will be visited much more frequently (as often as daily) for ad hoc visits.
- **Cable testing.** Part of the commissioning procedure is the testing and approval of all cables within the wind farm
- The crew vessels will visit the wind farm for ad-hoc situations, for example for reliability testing, troubleshooting or the failure of a minor component,
- Replacement of components in excess of the capability of crew vessels will be performed on an as-required basis using vessels with larger crane capacity.
- Individual wind turbines are shut down as standard during maintenance visits. Service technicians will be deployed at various wind turbines in pairs and therefore several turbines may have personnel on them at any one time during normal working hours.

It is envisaged that teams of 2 technicians will be deployed at various turbines during the course of a working day by the service crew vessel TBA. The vessel will stay within 20 minutes rendezvous time with the wind farm. There will also be a support R.I.B available for the operations staff. The Wind Farm Operation staff will not be working at the Wind farm site during inclement weather (sea state above significant wave heights for the vessel (1.5m)).

Access to the turbines is via a purpose built boat landing. There is currently no physical restriction/barrier in place where the ladder meets the gantry platform for reasons of safety.

Third Party trespassers or those seeking refuge using the turbine structure during bad weather / boat capsize will be warned of trespass and dangers by appropriate signage.

There is no public access right to the turbine structure, and the entrance door at the base of each tower is locked.

5. Consideration of Possible Scenarios

The possible scenarios that may require intervention / support of emergency services are numerous, and therefore is it considered prudent to analyse worse case scenarios.

Examination of the list of work activity yields the following possible scenarios, split in to internal and external issues.

During Operation		
Substation	Fire, Accident, Electrocutation, lightning strike	Arson, terrorist activity.
Land cable route	Accident / Electrocutation through maintenance work	Accident / Electrocutation through interference or future road excavation.
Sub-sea cable route	Accident / Electrocutation / vessel incident through maintenance work	Accident / Electrocutation / vessel incident through maintenance work involving sea users, anchors etc.
Turbines	Fire, Accident, Electrocutation or stranding in turbine	Vessel or aircraft collision with turbine, unauthorised access related injury, arson, and terrorist activity.
Crew Vessel	Fire, Accident, vessel incident involving personnel/vessel crew	Accident, vessel collision
Divers	Accident involving divers, bends	Accident involving Third Party survey team divers

In the event of a collision, emergency services would be required to respond, and communications protocols require to be established with the wind farm operator to cover such issues as switching off power.

For the purposes of this document, the full range of collision scenarios is not discussed as emergency responses will follow similar protocols regardless, and therefore the procedure has been kept simple and generic as recommended by the emergency services.

Appendix K sets out the procedure for a helicopter rescue in the event that an emergency response / third party intervention is required under the scenarios listed in the Emergency Response Procedure and the likely requirements needed in terms of Wind Turbine Generator design to facilitate such rescue. The coastguard will decide if a helicopter will be required.

All WTGs must be marked with numerals clearly identifying the turbine number on the roof and sides of the nacelle.

The nacelle must be fitted with an emergency access door or hatch to the top of the nacelle where stranded/injured staff can exit on top the roof of the nacelle and be airlifted to safety. In addition the hatch must be fitted with a catch that can be operated externally by the helicopter winch man in the event that staff could be inside the nacelle trapped or unconscious.

The top of the nacelle should be coated/finished with a non-slip abrasive surface and fitted with protective low level guide rails around the edges of the nacelle roof to enable BCE Personnel or helicopter winch man to attach themselves via a harness or rope and karabiners.

The blades must be locked off and positioned accordingly at a 45-degree angle to enable safe helicopter approach to the nacelle.

6. Summary of Emergency Scenarios and Response Procedure

The OWEZ emergency procedures will comprise the following:

- Summary of Emergency Response Procedures

The summary of emergency response procedures presumes that all vessels have their own emergency response procedures.

6.1 Summary of Onshore Emergency Scenarios

Hazard	Risk Scenarios	Procedure
Fire & Smoke	Switchroom Fire Cable Fault Transformer Fault	Evacuate Staff Call 112 Fire Brigade Call BCE HSSE Manager, +45 41 26 90 30 Report incident to the BCE ProjectDirector +31 (0)653 645 810 SCADA fire detection system automatically alerts Duty Engineer by SMS/E-MAIL Call Corus HSSE Manager Call Gas Production Company
Explosion	Transformer, Switchroom, Fault	Evacuate Staff Call 112 Fire Brigade Call BCE HSSE Manager, +45 41 26 90 30 Report incident to the BCE Project Director +31 (0)653 645 810 SCADA fire detection system automatically alerts Duty Engineer by SMS/E-MAIL Call Corus HSSE Manager Call Gas Production Company

Accident	Switchroom Accident Electrical Fault Cable Route Quayside fall into Harbour	Person on site performs own assessment of situation Call 112 Ambulance Call BCE HSSE Manager, +45 41 26 90 30 Report incident to the BCE Project Director +31 (0)653 645 810
Road Traffic Accident	Cable Route Wijk Aan Zee	Person on site performs own assessment of situation Call 112 Ambulance/Police Call BCE HSSE Manager, +45 41 26 90 30 Report incident to the BCE Project Director +31 (0)653 645 810
3 rd Party Injury	Trespass into Switchroom Tampering with Cable	Person on site performs own assessment of situation Call 112 Ambulance/Police Call BCE HSSE Manager, +45 41 26 90 30 Report incident to the BCE Project Director +31 (0)653 645 810
Electrocution	Tampering with Cable Testing / Repairing Switchgear	Person on site performs own assessment of situation Call 112 Ambulance Call BCE HSSE Manager, +45 41 26 90 30 Report incident to the BCE Project Director +31 (0)653 645 810
Arson	Generic Risk	Call 112 Police Call BCE HSSE Manager, +45 41 26 90 30 Report incident to the BCE Project Director +31 (0)653 645 810 SCADA fire detection system automatically alerts duty engineer by SMS/E-MAIL Call Corus HSSE Manager Call Gas Production Company
Terrorist Activity	Generic Risk	See Bomb Threat Management, Appendix L Call 112 Police Call BCE HSSE Manager, +45 41 26 90 30



		Report incident to the BCE Project Director +31 (0)653 645 810 Call Corus HSSE Manager Call Gas Production Company
EOD Device Discovery	Generic Risk	See EOD Guidance Document Appendix N – Call 112 Police
Environmental Contamination	Oil leakage from electrical transformer during installation and/or during O&M activities.	Isolate the source Call BCE HSSE Manager, +45 41 26 90 30 Observer to report to BCE Project Director +31 (0)653 645 810
Exposure to Substances Hazardous to Health (SF6) – Asphyxiation / Toxic / Irritant	SF6 (odourless) gas escape If SF6 is subjected to an electric arc or high temperatures the heat causes the to decompose into potentially toxic by-products.	Evacuate all staff from the electrical sub station. Call 112 Ambulance Call BCE HSSE Manager, +45 41 26 90 30 Report incident to the BCE Project Director +31 (0)653 645 810 Report incident to Miliem Dienst Ijmond VHF Ch. 61 +31 (0)255 547 042
Fire & Explosion (Third Party Risks)	Fire and/or explosion at neighbouring Corus Site or on the fuel gas pipe line.	Evacuate all staff from the electrical sub station. Call BCE HSSE Manager, +45 41 26 90 30 Report incident to the BCE Project Director +31 (0)653 645 810 Report incident to Miliem Dienst Ijmond VHF Ch. 61 +31 (0)255 547 042 Call Corus HSSE Manager Call Gas Production Company SCADA automatic fire detection system automatically alerts duty engineer by SMS/E-MAIL if fire detected in the sub station.

The risk scenarios for the onshore works would be covered by conventional onshore call-out procedures, i.e. call 112. In all cases the BCE Port Control must be informed. Follow up calls will be made to the Client by the BCE Project Directors.

6.2 Summary of Offshore Emergency Scenarios

*****THERE WILL BE NO LONE WORKING – TWO PERSONS MINIMUM ON ANY OPERATION.**

Hazard	Risk Scenarios	Procedure
Fire	Fire – No personnel on WTG. Fire – Personnel on WTG.	Appendix C Appendix D
Accident	Injured Person (Walking Casualty Stretcher Casualty inc. unconscious	Appendix E Appendix F & Appendix K
Oil pollution	Oil spill by turbine or Service vessel Oil spill by 3 rd party floating into the OWEZ site	Appendix O
Contamination – Oil Spillage environmental impact, damage to the marine eco system.	Oil leak from wind park facility and/or shipping vessels together with oil drifting into the OWEZ from a third party pollutant.	Refer to Marine Pollution Contingency Plan (BCE-HS-HB-003). Observer to Report to BCE Port Controller & Call + 31 (0) 255 561 929 and BCE HSSE Manager & Call + 45 41 26 90 30
Cable break & damage (sub-sea)	Entanglement. The Sea Cable doesn't contain any substances hazardous to health or the marine environment such as oil which could contaminate the sea and damage the eco system. Damage or breakage of the OWEZ sub-sea cable, depending on the source will result in the isolation of the power supply by tripping the turbine breakers and/or electrical sub station switch gear circuit breakers, depending on the location of the cable break.	Person on site performs own assessment of situation. Observer to Report to BCE Port Controller & Call + 31 (0) 255 561 929 Call BCE HSSE Manager, +45 41 26 90 30 Call BCE Project Manager, + 31 (0) 643 98 33 16
Cable break & damage (sub-sea) continued.	A Sea Cable fault will be detected by the safety control system and warn the Responsible Installation Eng.	

Stranded by Weather	Weather conditions turning rapidly severe	Appendix G
Man in water	Man Overboard Fall from Turbine into Water	Appendix H
Uncontrolled Fall	Unconscious / trapped person outside turbine structure	Appendix F Appendix K
Confined space in Monopile	Asphyxiation	Separate working in confined spaces HSE guidelines / procedures
Terrorist Activity	Bomb Threat	Appendix N
Stranded Vessel	Incapacitated Vessel	Appendix I
EOD Discovery	Explosion / Fire	Appendix N

In any of the above circumstances, Client contacts should be kept fully aware of situation.

7. Communications with the Coastguard in the Event of an Emergency Incident

Communications will be via an agreed single point of contact within the operations team – this has been identified as the Port Controller who is on 24 hour coverage.

The Coastguard control centre established to deal with protracted emergencies to co-ordinate the overall response, deal with ongoing resource and logistical requirements and provide facilities for senior command functions will be based at the Coastguard Control Centre, Tel +31 (0)223 542 300, Alarm +31 0900 0111.

For helicopter rescue communication should be initiated by the operative with the casualty inside the WTG to the support vessel and then via the Port Controller or emergency incident representative. In the event that the sea state worsens, making docking with the boat landing unattainable, and visual /radio contact has been lost with the WTG crew on the turbine over a prescribed and agreed time period; the vessel master should initiate the call out.

In the event of an emergency call out the Coastguard will initiate a call out for helicopter rescue.

8. Emergency Service Contacts

All Offshore Emergency calls should be to relayed immediately to the Coastguard in the first instance who will co-ordinate the deployment of the necessary emergency services. For onshore incidents dial 112. Refer to Appendix L for direct contact details of the Emergency Services in the event that the BCE Port Controller has to set up dialogue for a protracted emergency. A memorandum of understanding exists between the Port of IJmuiden and Port of Amsterdam that the Coastguard should assume all responsibility for co-ordinating an emergency response in NL waters under the NL Search and Rescue Regulations.

The Coastguard recommends that Helicopter rescue remain open as an option for an emergency scenario therefore the following provides detail on the nearest SAR to OWEZ. Mobilisation of the Dutch Air Force SAR would be at the discretion of the Coastguard. Dutch Navy Search and Rescue Squadron is based at the Dekooy airfield in Den Helden. They fly Lynx helicopters. The Lynx is equipped with VHF, Marine FM, UHF and short-wave radios. In the event of an emergency they would be co-ordinated through the Coastguard.

9. Summary, Conclusion & Next Actions

The full support of the Coastguard and associated emergency services is required for the Offshore Windpark Egmond Aan Zee project during operations.

Continuity of search and rescue services for wind farms offshore generally has not reached maturity, and this project requires testing for robustness of systems and procedures. It is hoped to engage with the European Wind Energy Association (EWEA) to ensure harmonisation between Emergency Plans between different wind farm operators occurs using this plan as a benchmark standard.

Fire fighting is not recommended unless personnel are trapped or require to be evacuated from the nacelle.

Good lines of communications between crew vessels, PC and the coastguard are required to ensure good coordination during emergency actions.

Emergency services require familiarisation, training and for risk assessments to be prepared to enable them to provide continuity of service at the project site.

Training for O&M crews and helicopter search and rescue crews is essential.

A set of proposed call-out procedures has been drafted, and is appended.

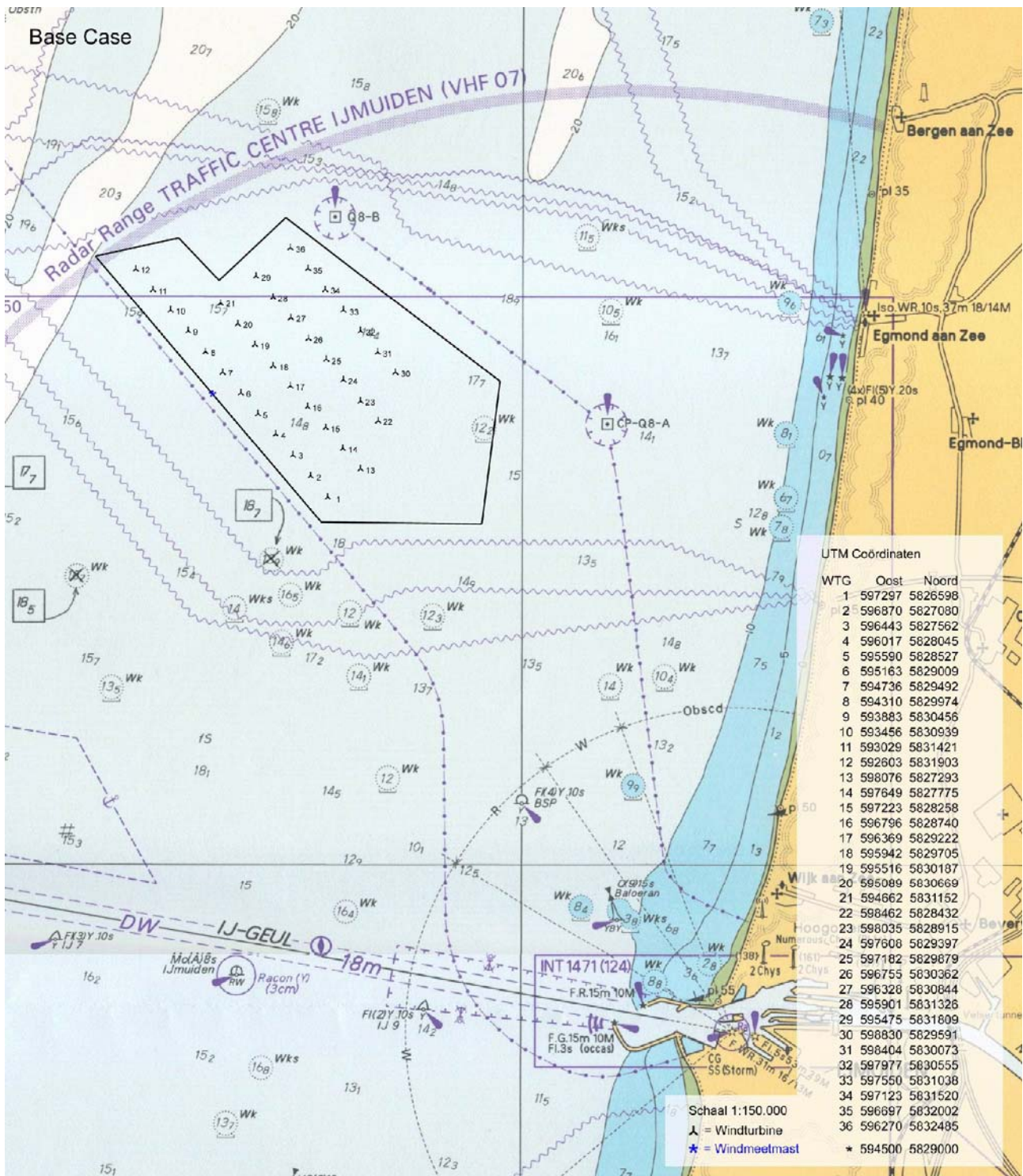
10. Appendices

- A - Wind Farm Location
- B - Crew Vessel
- C - Fire – No Persons on WTG
- D - Fire- Personnel on WTG
- E - Walking Casualty
- F - Stretcher Casualty
- G - Stranded by Weather
- H - Man Overboard
- I - Bomb Threat Management



- J - Incapacitated Vessel
- K - Casualty requiring helicopter rescue
- L - Emergency Supplies
- M - Emergency Services Contacts
- N - EOD Discovery
- O - Oil pollution**
- P – Evacuation from On Shore Electrical Sub Station

Appendix A – Wind Farm Location



Appendix B – Crew Vessel



Call Sign	
Classification	
Dimensions	
Fabrication	
Max permitted draught (m)	
Max Passenger Capacity	
Min Crew Requirement	
Engines	
Fuel Type and Capacity	
Fuel Consumption	
Max speed	
Range at Max Speed	
Navigation/Communication Equipment	
Safety Equipment	
Means on board intended to be used to rescue people from the sea or from WTG's or other vessels	
Firefighting Equipment	

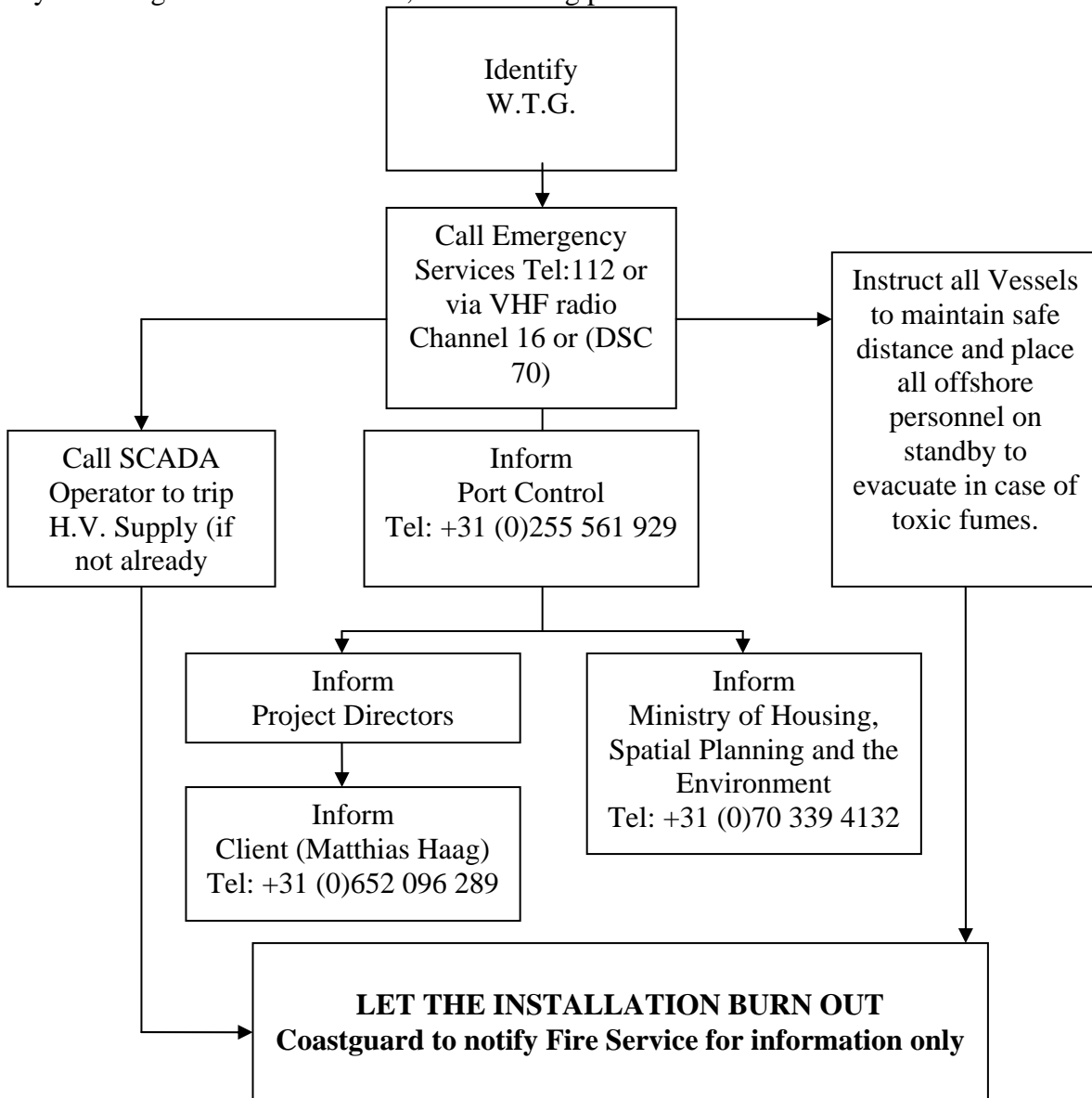
Vessel has full first aid kit and life saving equipment as required by the above code

All skippers and crew members have full qualifications in:-

- First aid
- Fire fighting
- Sea survival
- Full skipper's license to pilot the vessel.

Appendix C - Fire – No Personnel on WTG Procedure

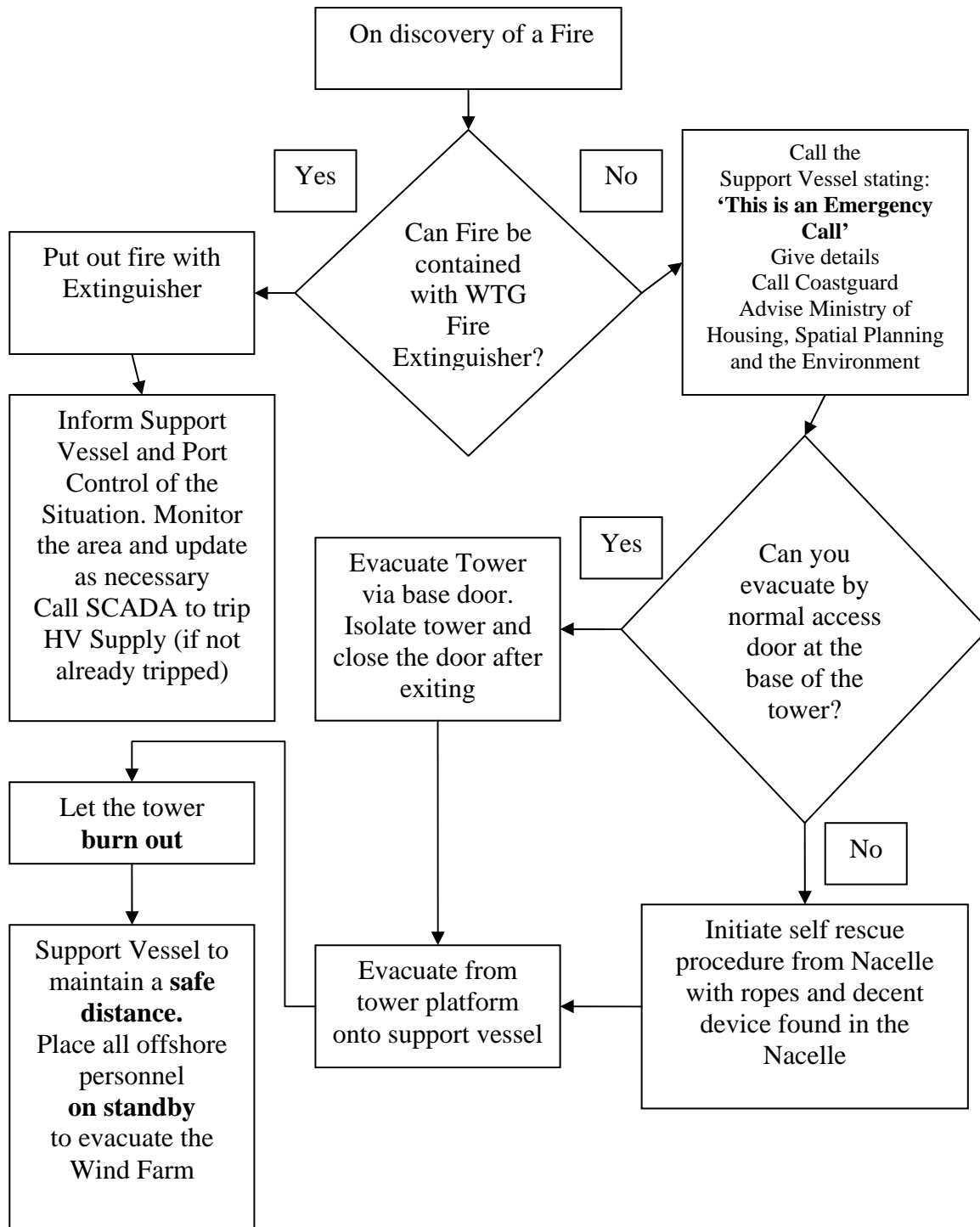
If you see signs of fire on a WTG, the following procedure must be followed.



BEWARE OF TOXIC FUMES AND FALLING DEBRIS.

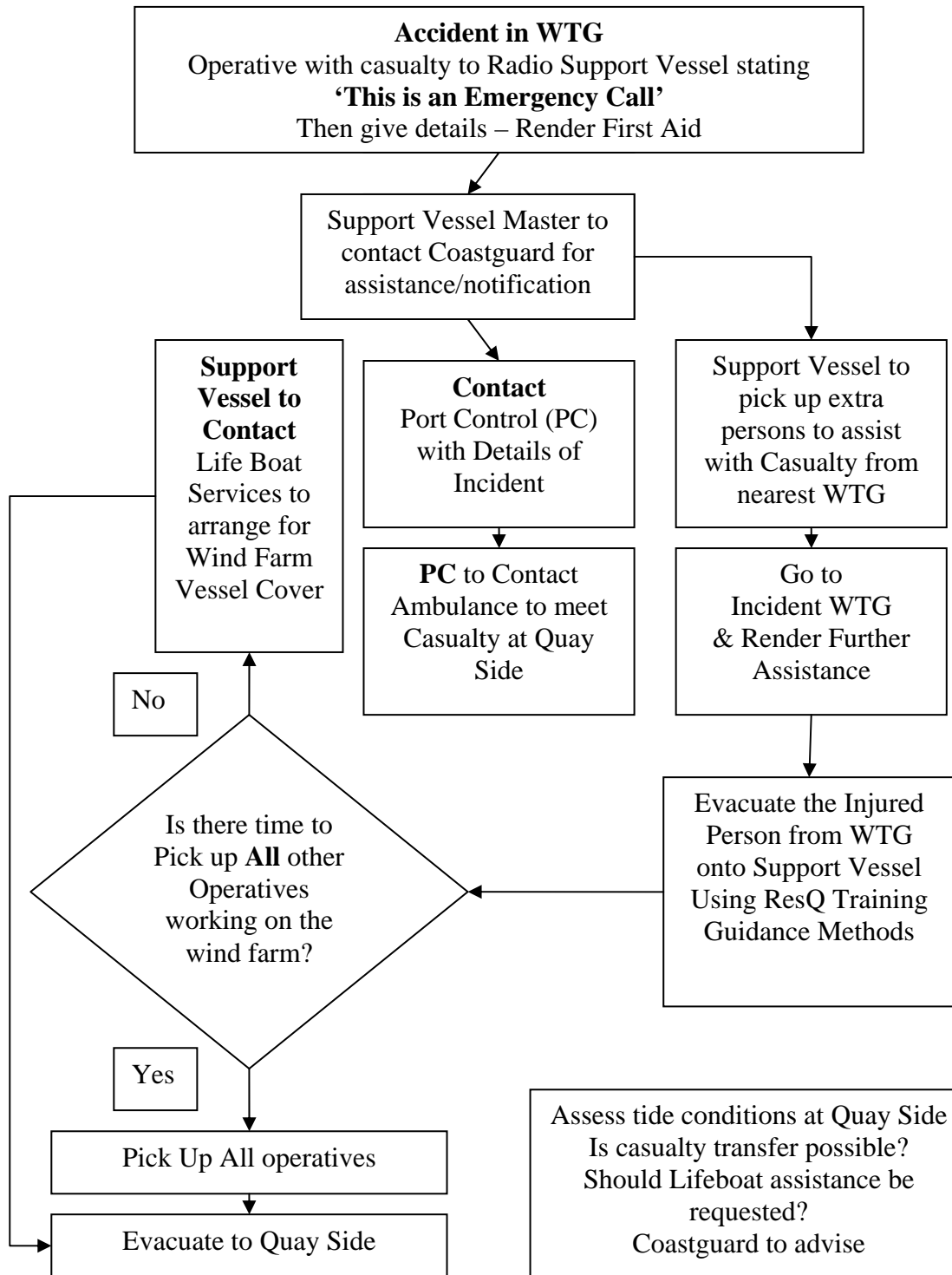
KEEP OTHER VESSELS CLEAR AND UP-WIND OF FIRE.

Appendix D -Fire – Personnel on WTG Procedure



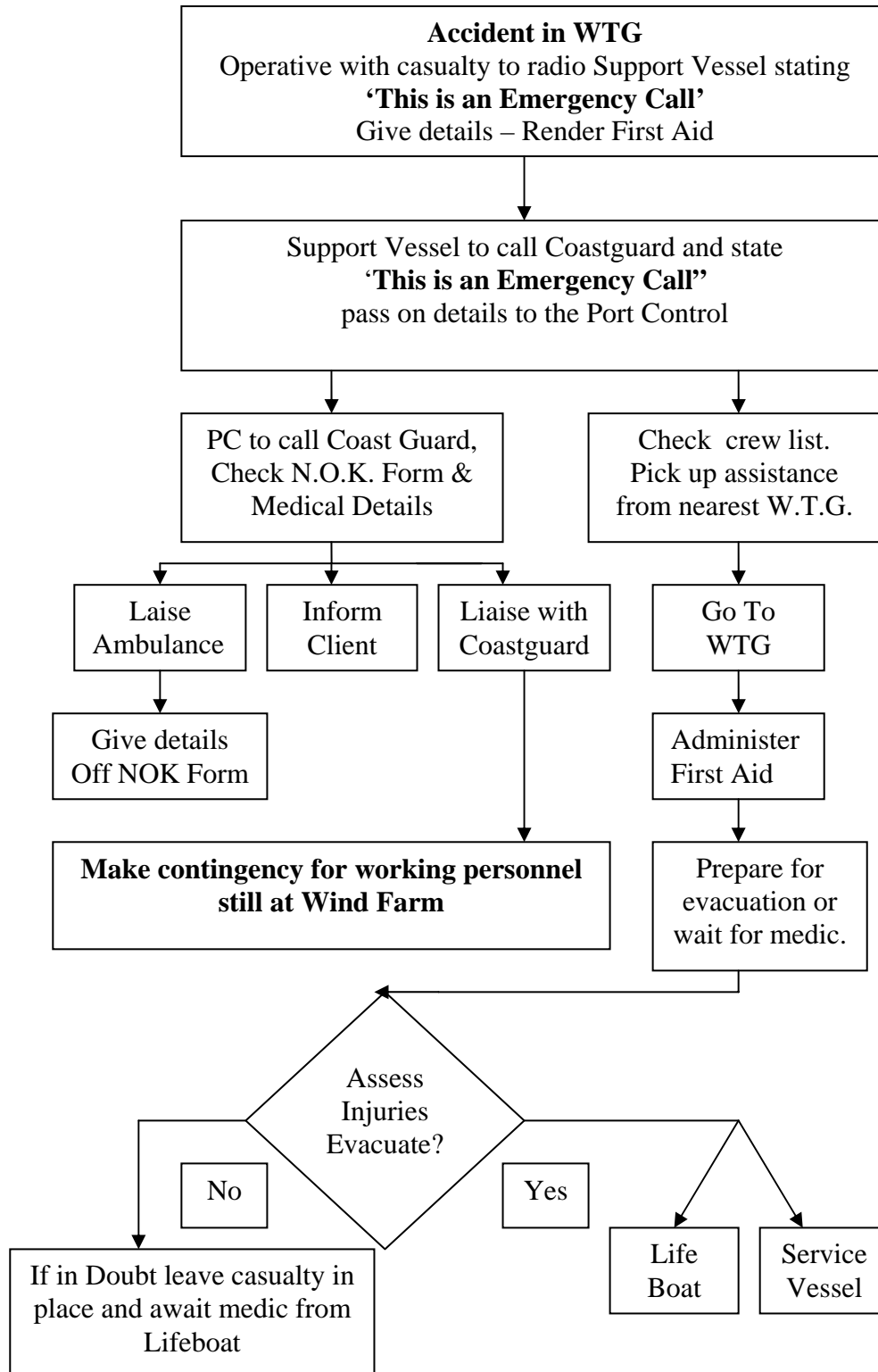
**BEWARE OF TOXIC FUMES AND FALLING DEBRIS.
 KEEP OTHER VESSELS CLEAR AND UP-WIND OF FIRE.
 RELIANCE ON PROCEDURE SHOULD BE PARAMOUNT.**

Appendix E - Walking Casualty Procedure

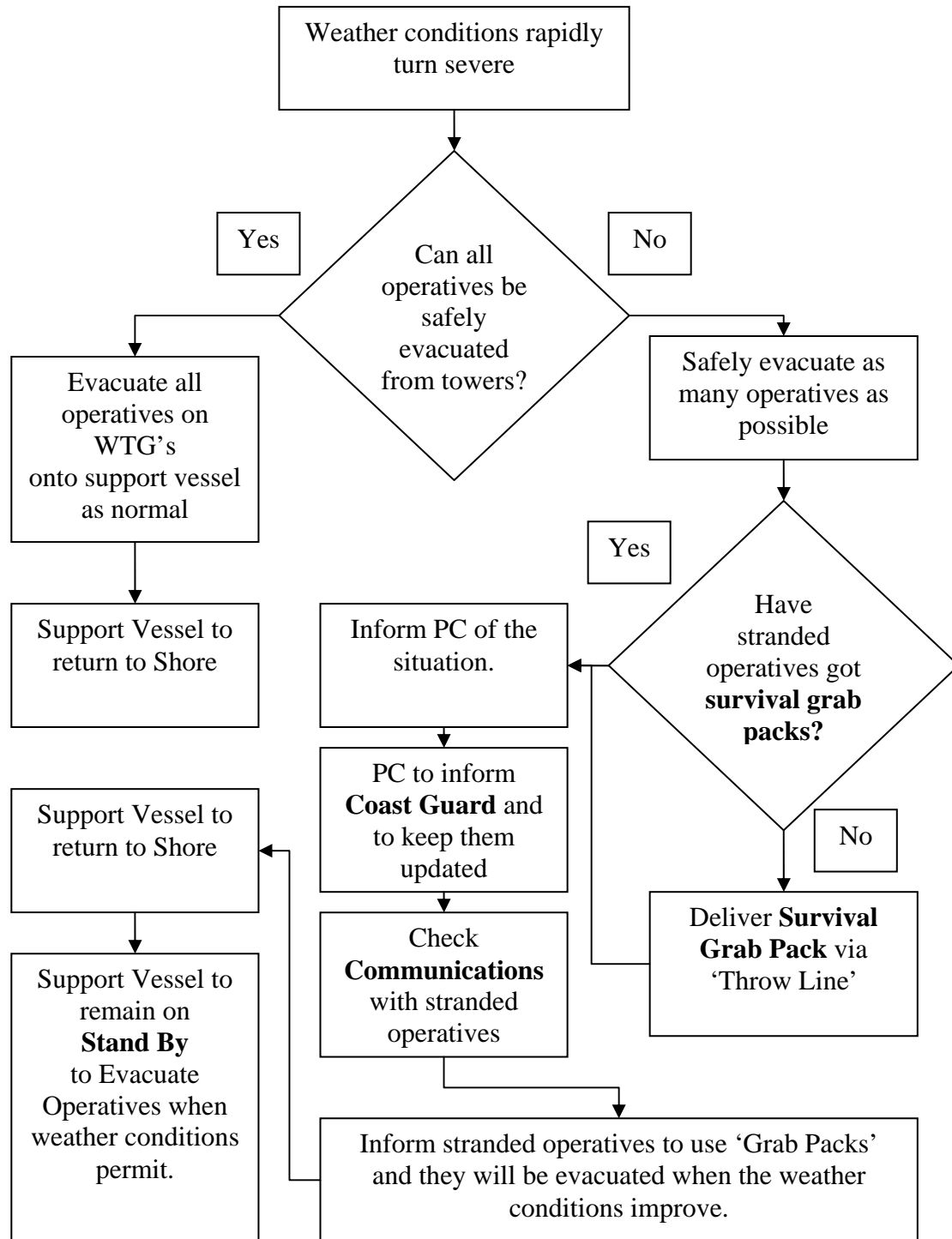


* walking casualty: someone who does not require a stretcher, but may need assistance to safety.

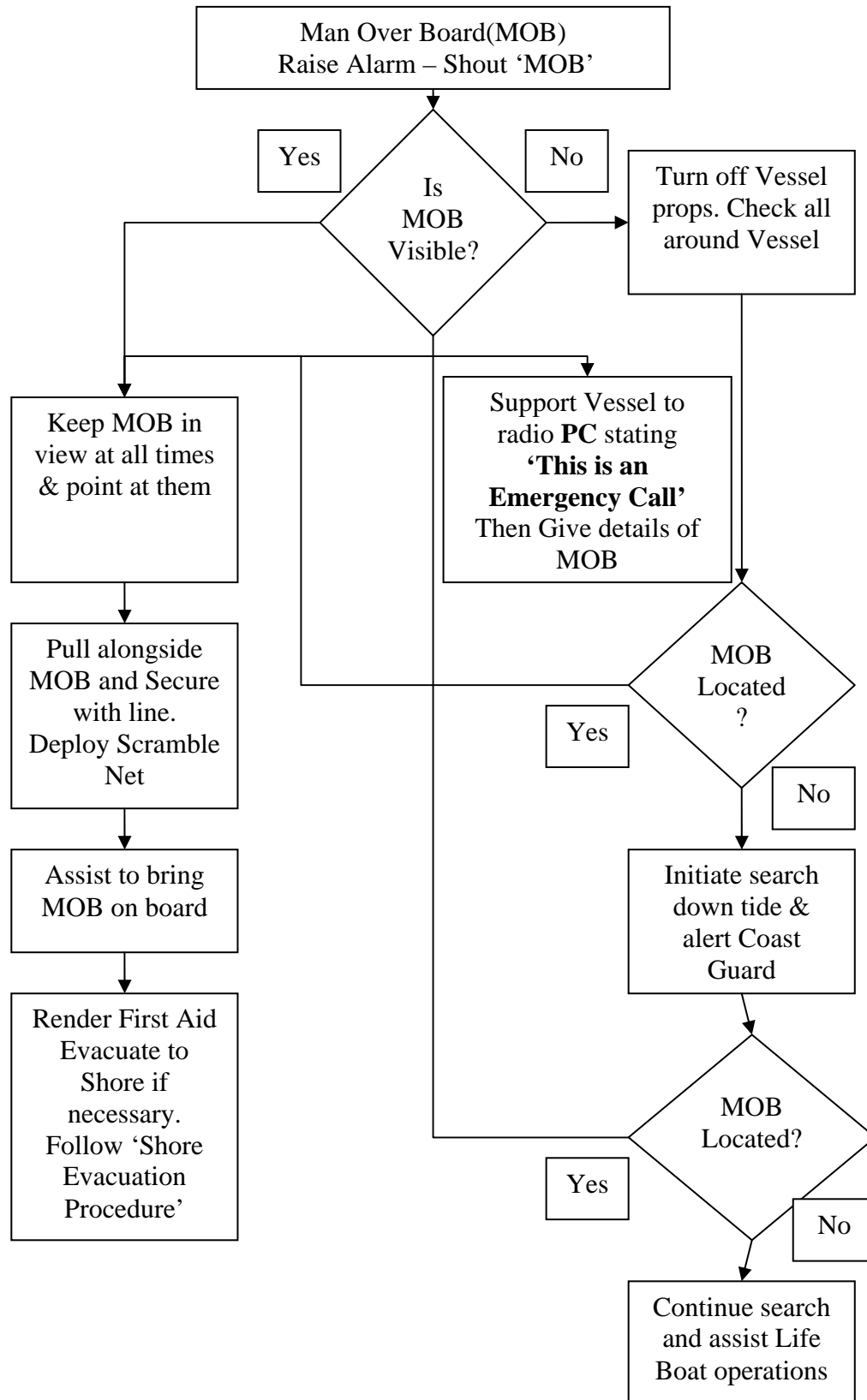
Appendix F – Stretcher Casualty Procedure



Appendix G - Stranded by Weather Procedure

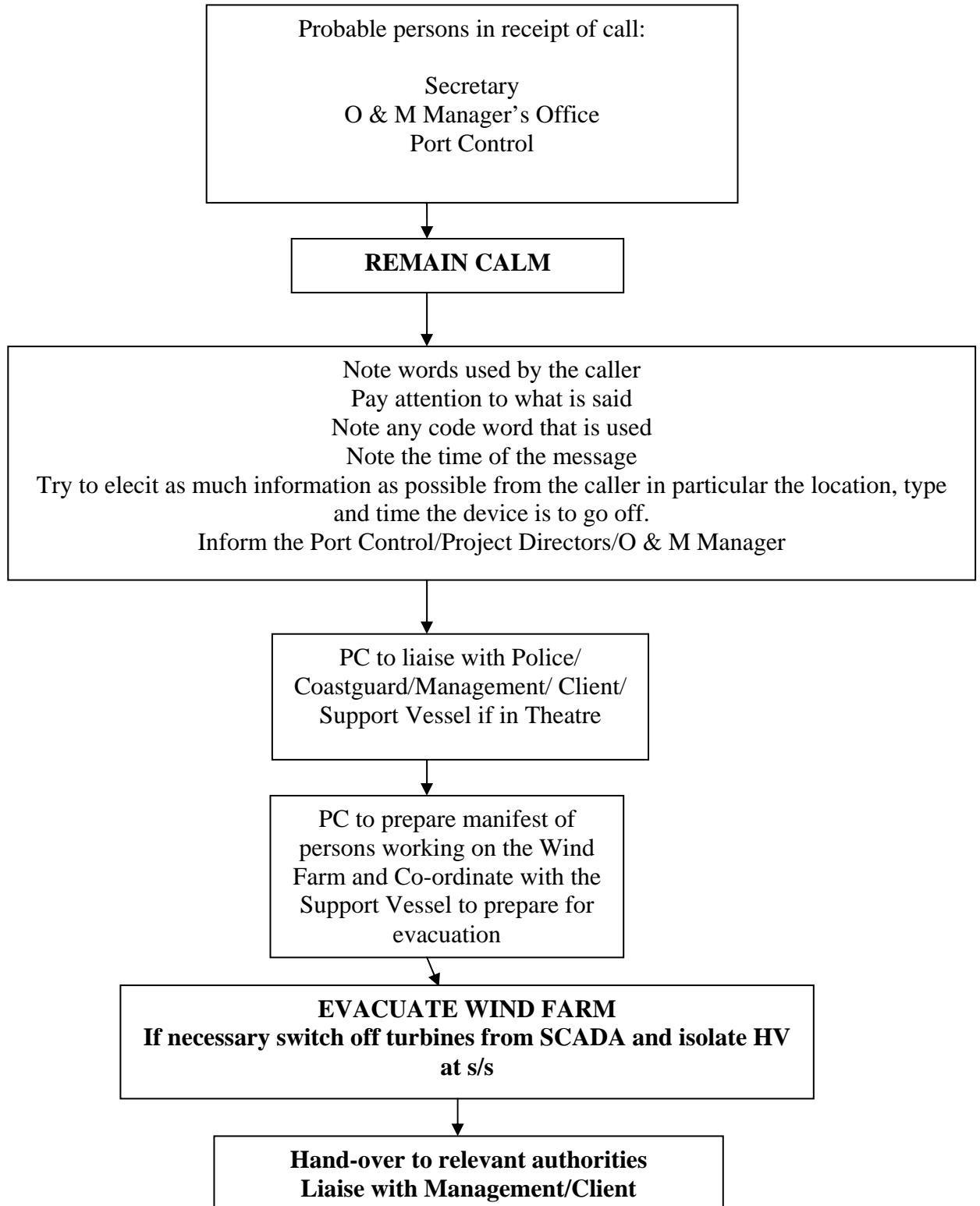


Appendix H - Man Over Board (MOB) Procedure



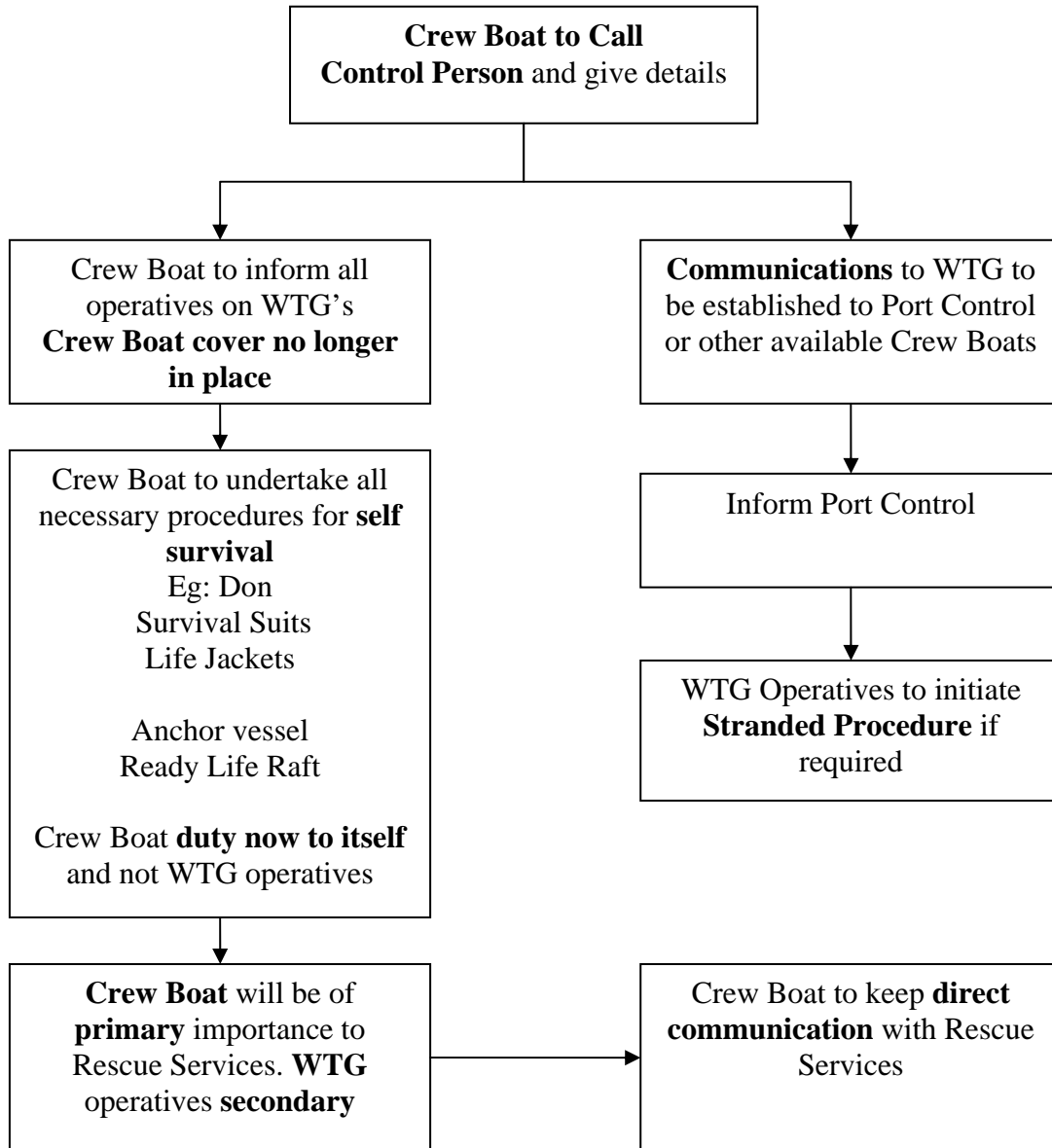
* applies to person falling into water from Turbine structure

Appendix I - Bomb Threat Management Procedure

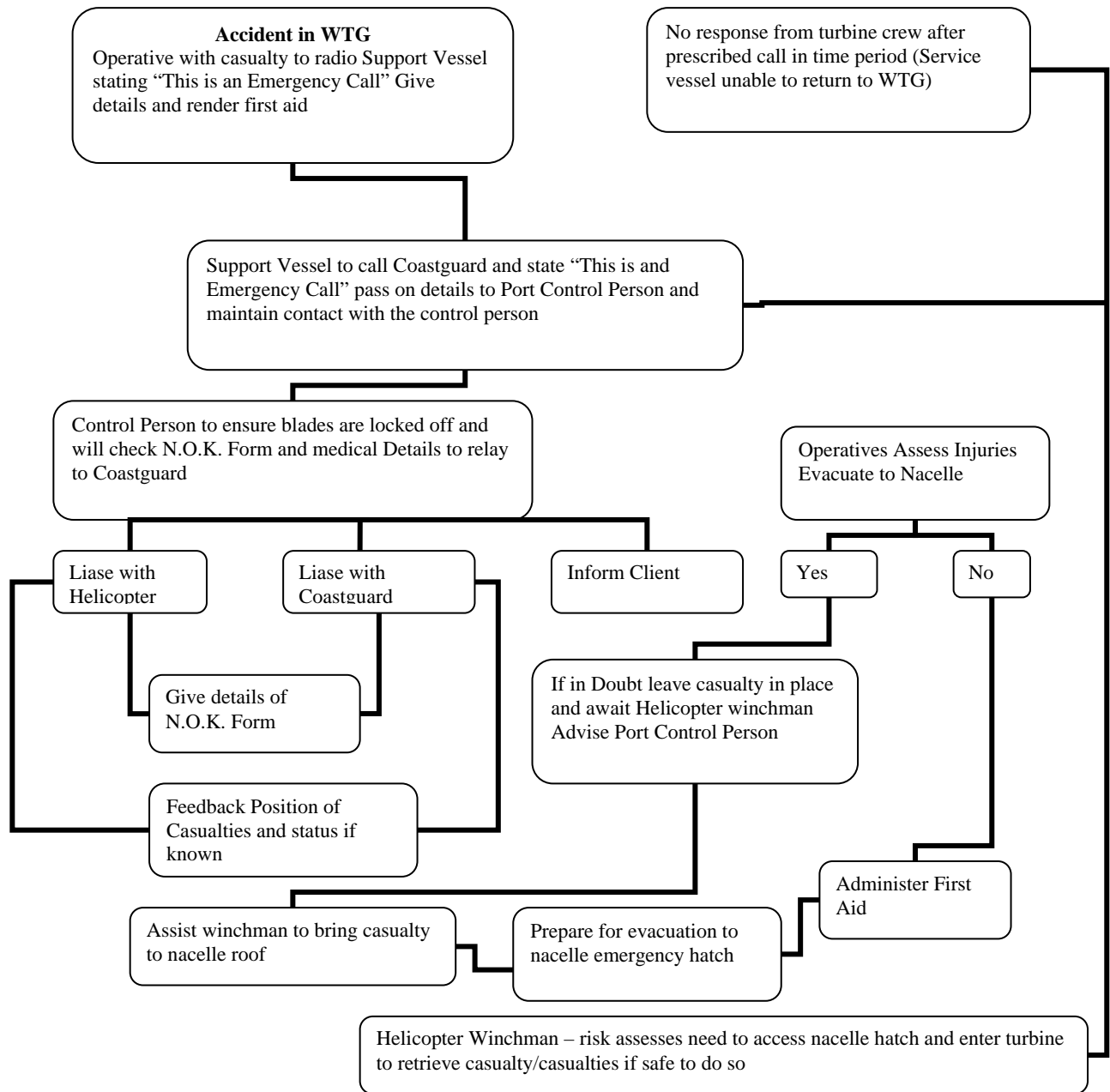


Appendix J - In-capacitated Vessel Procedure

Crew Boat incapacitated – engine failure – hull holed – props fouled



Appendix K - Casualty procedure requiring helicopter rescue





Appendix L - Emergency Supplies

The turbines will be equipped with emergency supplies – the contents and maintenance of these supplies are dealt with in BCE-HS-PP-020 Emergency Evacuation Plan V90.

Appendix M - Emergency Service Contacts

DESCRIPTION	EMERGENCY NUMBER	FURTHER INFORMATION & ROUTINE CONTACT DATA
BCE Emergency Phone Number	+31 (0)255 561 929	Port Control Office Phone Manned 24-7
Ambulance	112	+31 (0)235 319 191 Normal Contact
Coastguard / RCC	+31 (0)900-0111 VHF Ch. 16 or (DSC 70)	+31 (0)223 542 300 Normal Contact (Den Helder)
Fire Department	112	
Police	112	+31 (0)255 547 612 Normal Contact
IJmuiden Harbourmaster	VHF Ch. 61 +31 (0)255 547 042	
BCE Project Director	+31 (0)653 645 810	Dolf Elsevier van Griethuysen
BCE Project Director	+45 40 62 78 50	Esben Schmidt
Port Control	+31 (0)655 797 386	Willem Giljam
Port Control	+31 (0)613 734 522	Han Wonnink
HSSE Manager	+45 41 26 90 30	Craig Hutchinson
Client		Will be notified by Project Director(s)

Appendix N – EOD Procedure

INTRODUCTION

1. A non-intrusive survey and clearance operation has been carried out on selected areas of the Offshore Windpark Egmond Aan Zee (OWEZ) for the construction of the wind farm.
2. There may be a requirement to carry out other engineering works in uncleared and uncertified areas in connection with the wind farm. Activities could include the use of spud legged vessels or the mooring of vessels or additions to the wind farm.

AIM

3. The aim of this document is to identify the risk mitigation strategy for those areas of the wind farm not covered by the survey and clearance operation.

THREAT

4. The explosive ordnance threat to the Offshore Windpark Egmond Aan Zee (OWEZ) remains unchanged from that used to determine the 2004 survey and clearance operation. Essentially the threat is posed by unexploded bombs, sea- and land mines.

RISK MITIGATION STRATEGY

5. While the survey and clearance operation did not result in the discovery of ordnance, this does not infer that there are no items of ordnance in the area.
6. The risk mitigation strategy is to identify the likely activity and relate this to the appropriate risk mitigation measure. The likely engineering activities are:
 - a. Sinking Further Pylons – Therefore before any further piling takes place, a non-intrusive survey and target investigation must be carried out. Only when the area to be piled or used during the piling operation has been certified clear should piling take place.
 - b. Excavating Further Cable Trenches – This activity, when using a plough, is more likely to exert pressure rather than shock into an item of ordnance. However, disturbing an item of ordnance significantly raises the risk of it functioning. If trenching is carried out using an excavator or jetting, the risk then rises to that of a piling operation where direct contact with the ordnance is likely. Irrespective of the trenching methodology, a non-intrusive survey and associated target investigation operation must be carried out when trenching is planned.
 - c. Mooring Vessels – Mooring of boats or further geotechnical/site investigation. The risk is that in dropping an anchor or spud leg, ordnance items, if present, may be struck. In most situations once an anchor has dropped it will be cushioned by the silt and sea bed, and merely present a pressure on the ordnance. Similarly, the sinking of a spud leg imparts pressure, not shock. However, it is not unknown for an item of ordnance to be moved by tidal action and therefore migrate. It is therefore essential that risk assessment is undertaken. Following this a non-intrusive survey and follow up target investigation may need to be carried out where mooring or further SI is planned.

SUMMARY

7. In summary, the threat posed by unexploded ordnance and the consequences of an energetic event are such that proactive risk mitigation measures should be taken in respect of all engineering or associated works. A risk assessment must, however, be carried out to confirm the need for survey and clearance on a case-by-case situation based on the nature of the intrusive engineering works. Typically, a topographical survey which has no intrusive elements will not require any EOD action.

8. All non-intrusive surveys should be carried out using a multi-sensor approach. The use of a single sensor technology will only provide limited data. The use of confirmatory sensors will greatly enhance the quality of the survey and allow more effective target definition, which will result in a more cost-effective investigation operation.

CERTIFICATION

9. Ordnance free certification is only valid at the time of the survey/clearance operation and does not take into account mobile targets, which could migrate into previously cleared areas.

INSTRUCTIONS

10. It is essential that:

- a. All future engineering works involving intrusive work, mooring or trenching should be preceded by a risk assessment.
- b. All intrusive works should be preceded by a multi-sensor non-intrusive survey and clearance operation.
- c. Note is taken of the possible migration of ordnance into recently surveyed and investigated areas when conducting further intrusive work in recently cleared areas.

Appendix O – Oil Pollution

Marine Pollution Contingency Plan – BCE-HS-HB-003