

## **APPENDIX D**

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Proposed Wind Turbine Safety Devices and  
Navigation Safety Measures  
Vandenberg Offshore Wind Energy Projects

**APPENDIX D-1 – CADEMO**

**APPENDIX D-2 – IDEOL**

**Appendix D-1 CADEMO Summary of Navigation Safety Measures**

<b>Management Measure</b>	<b>Definition</b>
24-hour Marine Co-ordination Center (MCC)	The CADEMO project will establish a MCC to manage and coordinate all CADEMO offshore activities and communications. The MCC will be responsible for maintaining appropriate safety and emergency management
AIS Provision	All vessels associated with the CADEMO project will carry AIS.
Use of Safety Zones	<p>Application and use of a 600 m (1,968 feet) safety zone around each turbine during operation. When required, a rolling 500 m safety zone will be used around areas of construction, major maintenance, and decommissioning.</p> <p>The operational safety zone will be charted to ensure that the mariner is aware of the risk and advised by law not to enter the area due to the risk of air draft and under keel clearance issues.</p>
Cable Protection	<p>Export cables will be protected appropriately taking into account fishing and anchoring practices. Cables outside of the mooring areas will be buried to a target depth of five feet (1.5m) and appropriate cable protection measures will be implemented for those areas where cable burial is not achievable. Any cable protection used will be risk assessed to ensure it does not present an under-keel clearance risk to vessels transiting over the top.</p> <p>An over-trawl trial will be carried out post installation to ensure that the cable burial/protection safety measures implemented are effective.</p> <p>The positions of the installed cable will be promulgated and charted by appropriate means.</p>
Emergency Response Cooperation Plan	An Emergency Response Cooperation Plan (ERCoP) will be developed for the CADEMO project and implemented for the construction, operations and maintenance, and decommissioning phases. The content and management arrangements within the ERCoP will be consulted and agreed with the relevant regulators and stakeholders before installation operations commence.
Fisheries Liaison	Following offshore wind best practice guidance, a fishing liaison officer will be appointed for the project and a fishing liaison plan will be developed.

<b>Management Measure</b>	<b>Definition</b>
Use of Guard Vessels	<p>Guard vessels will be used during construction, and significant maintenance to both protect the installations and workers on the wind turbines. The guard vessel role will be to alert vessels to the development activity and provide support in the event of an emergency situation.</p> <p>A guard vessel will be present for the entire period of installation of the export cables, inter array cables and mooring structures.</p>
Provision of 'On-Call' Emergency Towage	<p>CADEMO will secure an 'on call' contract with an appropriate local marine contractor to ensure towing assistance is readily available when needed, for example in the event of a vessel breaking down and drifting towards the CADEMO development, and to promulgate information to any third party users</p>
Blade Clearance	<p>The wind turbine will have a constant rotor blade clearance of 82 feet (25m) above the sea in all tidal conditions.</p>
Monitoring	<p>Active monitoring of the CADEMO turbines and infrastructure (managed through the MCC) will be maintained to ensure that the structures and cables do not become a hazard to navigation over time (e.g. cable exposure)</p>
Navigational Marking and Lighting	<p>The floating wind turbine structures will be marked and lit in accordance with International Association of Lighthouse Authorities (IALA) Recommendation O139 on the Marking of Man-Made Offshore Structures, as detailed in section 6 above and in section in 3.1 of the CADEMO Project Report.</p> <p>Turbines T1 and T4 (Figure 1) will be fitted with an Automatic Identification System (AIS) that will transmit continually once commissioning of all turbines are complete. The AIS systems will be classed as IALA Category 3 with a minimum availability of 97 percent. An Aids to Navigation Management Plan will also be developed to effectively manage all lights and marks associated with the site.</p>

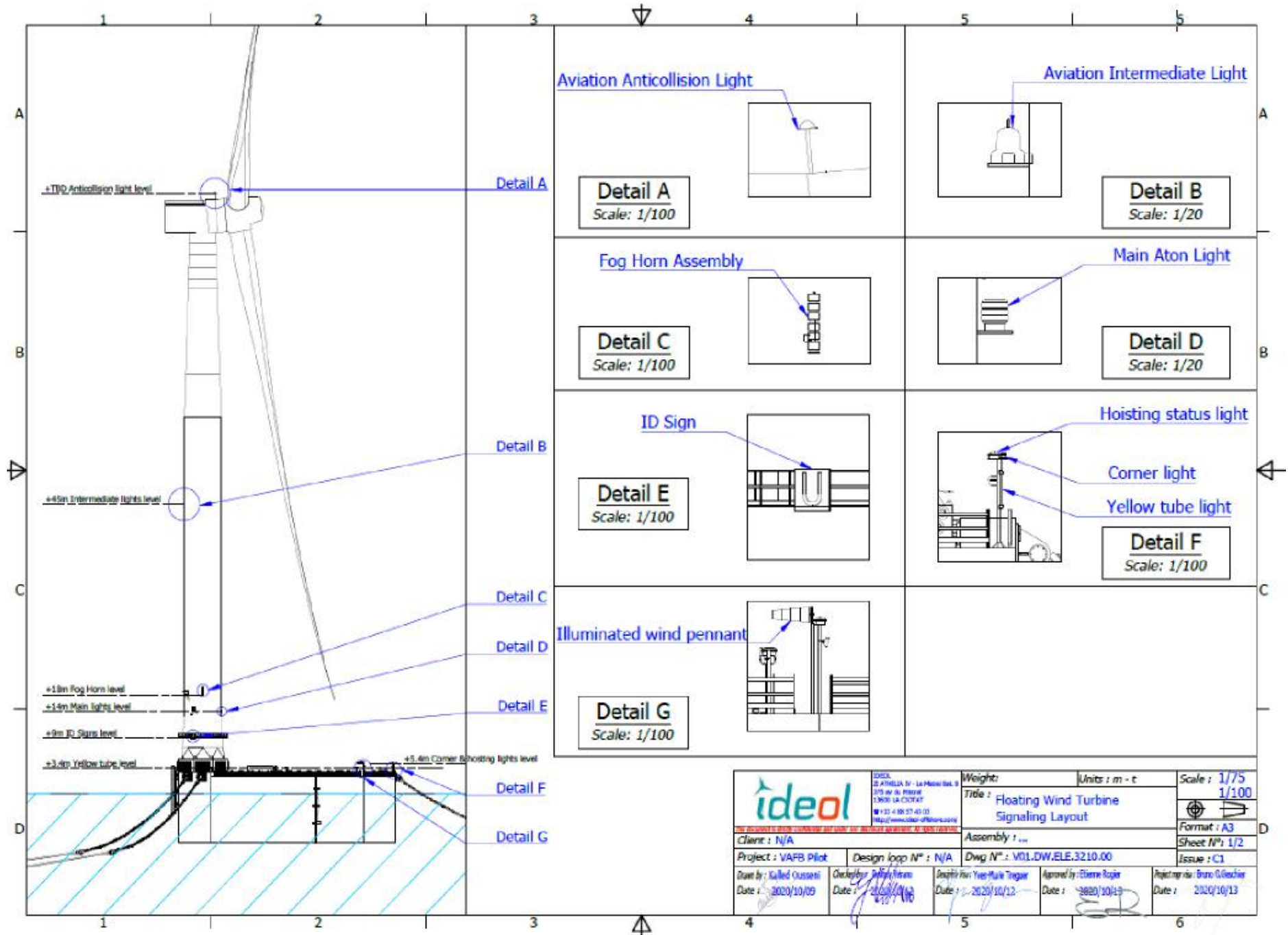
<b>Management Measure</b>	<b>Definition</b>
Promulgation of Information	Appropriate liaison and dissemination of information and warnings through the appropriate notices to mariners and other appropriate media, (e.g., Navigation Charts, fishermen's awareness charts and Pilot Books) would enable vessels too effectively and safely passage plan around the CADEMO turbines and offshore cable corridor. The communication approach will be developed with the appropriate regulators and local commercial fisheries. This activity will also include international promulgation of information.
Fishing Awareness Courses	CADEMO intend to introduce a fishing awareness course for CADEMO work boat operatives to ensure that work boats are aware of the expected fishing activity in the area. It is intended that this course will be developed in consultation with local fishing representative and will include awareness of the relevant safety procedures in the event of an incident associated with a fishing vessel.

## Appendix D-2 IDEOL Floating Wind Turbine Safety, Electrical, Monitoring Equipment

The floating structures and their components will at least contain the following safety, electrical and monitoring equipment.

<b>Utilities Assemblies</b>		
<b>Bilge System</b>		
Portable pumps 20 m <sup>3</sup> /h + flexibles mounted on trolleys	9,0	u
Sensors, supports, cable tray, cabinet and wiring installation	9,0	u
<b>Signaling</b>		
AIS with GPS & VHF antenna	3,0	u
Marine lanterns	9,0	u
LEDs for identification and platform signs	3,0	u
Electrical power backup (typ. fuel cell) & signaling cabinet	3,0	u
Cable trays & supports (AIS, antennas, ML, LED & ID)	3,0	u
Sensors, supports, cable tray, cabinet and wiring installation	3,0	u
Test & commissioning	3,0	u
<b>Lighting</b>		
Corners lights & supports	12,0	u
Deck lights & supports	12,0	u
Accesses lights & supports	12,0	u
TP lights & supports	12,0	u
Cable trays	3,0	u
Deck crossing	36,0	u
Lights, supports, cable trays and wiring installation	3,0	u
Test & commissioning	3,0	u
<b>Genset</b>		
Auxiliary generator 100 KW + fuel tank	3,0	u
Genset installation	3,0	u
Electrical wiring	3,0	u
Test & commissioning	3,0	u
<b>Safety &amp; Security</b>		
Presence detector, smoke & fire detection	15,0	u
Alarm light & siren	3,0	u
Security cabinet, control pad	3,0	u
VoIP phone	3,0	u
3 cameras & CCTV (in monitoring cabinet)	3,0	u
Supports & cable trays	3,0	u
TP wall crossing	12,0	u
Electrical wiring	3,0	u
Configuration, test & commissioning	3,0	u
<b>Instrumentation &amp; Control</b>		
IMU & double antenna GPS & cables	3,0	u
Power supplies, terminals, patch panel, switch, cabinet	3,0	u
UPS	3,0	u
Safety chain PLC	3,0	u
Controller (SCADA interface, sensor interface, wind turbine interface)	3,0	u
Supports & cable trays	3,0	u
Deck crossings	6,0	u
Installation, electrical wiring & integration	3,0	u
Calibration, configuration	3,0	u
Controller software development	1	u
PLC software development	1	u
Motion unit	3,0	u

Layout of the main components regarding lighting and main signaling features.



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