

Terms & abbreviations

| Term or abbreviation | Definition |
|------------------------------------|---|
| MU | Multi-Use |
| MU Area | The Multi-Use demarcated and exclusive area within the wind farm that is permitted and specifically designated for multi-use activities. This area includes any combination and amount of Multi-Use Systems |
| Multi-Use Mooring System | The mooring system of a multi-use production system. This includes everything from the anchor point up to the connection point of the production part of the MU System (MUPS) |
| Multi-Use Operator | Any permitted user of a multi-use field within a wind farm |
| Multi-Use Production System | The production part of the Multi-Use System. For seaweed, shell fish, tidal energy and solar energy production production these are independent floating elements. They are kept in place by the MUMS (Multi-Use Mooring System) For nature and passive fishery these are immersed units on the seabed, either self mooring or kept in place by a MUMS |
| Multi-Use System | A Multi-Use system in general sense and as a whole. This includes any possible combination of a MUMS and a MUPS |
| MUMS | Multi-Use Mooring System |
| MUO | Multi-use Operator |
| MUPS | Multi-Use Production System |
| MUPS Rigid | A multi-use production module that is rigid as opposed to flexible. For example a solar panel-pontoon based system (moored) versus a seaweed rope-based system |
| MUPS-Flexible | A multi-use production module that is flexible as opposed to rigid. For example a seaweed rope-based system versus a solar panel-pontoon based system |
| MUPS-Submerged | A submerged MUPS, typically nature development (e.g. oyster reef) or passive fishery (lobster cages) |
| MUS | Multi-Use System |
| WFO | Wind farm Operator |
| Wind Farm Operator | Operator of the wind farm, responsible for the operational availability of the wind farm as well as all operations/activities that take place in the wind farm |



Hazard table

| Hazard | Clarification |
|---|---|
| 01: Fixed structures offshore | |
| 02: Moored multi-use assets within a wind farm | This includes any form of multi-use. Flexible and rigid structures as well as temporary moored assets such as |
| 03: Multi-use area operation | Any activities associated with MU-farms in the wind farm. This excludes the any MU-farm assets themselves |
| 04: Offshore transportation | In the broadest sense, everything to do with vessel transportation to, in and from the wind farm/ multi-use |
| 05: Offshore weather conditions | |
| 06: Operation in a complex industrial zone/ area | Many people have indicated that a wind farm is a complex industrial complex (e.g. oil&gas factory). Where |
| 07: Operation of high voltage facility | |
| 08: People passing through the wind farm area | |
| 09: Personnel working in multi-use area | These are multi-use area related activities. In principle not supposed to be active outside of these areas |
| 10: Personnel working in wind farm area | These are wind farm area related activities. I.e. not restricted to the multi-use areas and therefore more in |
| 11: Wind farm operation | |
| 99: Not applicable | |

Severity index table

| Severity index number | Human consequences | Assets | Environmental | Reputation | Direct cost | Indirect cost |
|-----------------------|--|------------------|------------------|----------------------|-------------|---------------|
| 0 | Not injured | No damage | No effect | No impact | 0 | 0 |
| 1 | Injured + no acute help needed (back in harbour/onshore) | Slight damage | Slight effect | Slight impact | <10k | <10k |
| 2 | Injured + help needed offshore / directly going back to harbour | Minor damage | Minor effect | Limited impact | <50k | <50k |
| 3 | Acute danger to life + help needed offshore / directly going back to harbour | Localised damage | Localised effect | Considerable impact | <250k | <250k |
| 4 | Death of one person | Major damage | Major effect | National impact | <1mln | <1mln |
| 5 | Death of multiple persons (>1) | Extensive damage | Massive effect | International impact | >1mln | >1mln |

Probability index table

| Probability index number | Probability classification |
|--------------------------|----------------------------|
| 1 | Extremely unlikely |
| 2 | Very unlikely |
| 3 | Unlikely |
| 4 | Likely |
| 5 | Very likely |

This document - The Multi-Use Procedure Risk Register - is an extract of a dynamic risk register that is currently being maintained by North Sea Farm Foundation (NSF). This Multi-Use Risk Register is for information only, NSF takes no responsibility whatsoever for its accuracy, completeness or the way it is used by any user/reader of this information. For more information visit www.noordzeeboerderij.nl/en/projects/multi-use-procedure or contact Noordzeeboerderij: eef@noordzeeboerderij.nl



Multi-Use Procedure Risk Register - 04 Mar 2020

| Consequence | Hazard | Damage category | Affected stakeholder | Severity | Direct cost [€] | INDirect cost [€] | Probability | Risk | Phase | Type of Multi-use activity | Mitigation | Mitigated severity | Mitigated probability | Mitigated Risk | Residual Risk/ Action | Action owner | Action status | Close-out statement |
|---|--|-----------------|----------------------|----------|-----------------|-------------------|-------------|----------|------------------------------------|---|---|--------------------|-----------------------|----------------|--|---------------------|---------------|--|
| ▼ 01: Fixed structures offshore | | | | | | | | | | | | | | | | | | |
| ▼ 1-HIGH | | | | | | | | | | | | | | | | | | |
| Collision between multi-use vessel and wind farm structure causing damage to the wind farm foundation | 01: Fixed structures offshore | Assets | WFO | 4 | > €1m | € 0,00 | 4 | 1-HIGH | Operation & maintenance (offshore) | Multi-use Operation | MuO aligns fully with operational procedures of wind farm MCC | 4 | 3 | 2-MEDIUM | | | | |
| Collision between multi-use vessel and wind farm structure causing damage to the wind farm infield cables by sinking and/or dropping items on the seabed | 01: Fixed structures offshore | Assets | WFO | 5 | > €1m | > €1m | 3 | 1-HIGH | Operation & maintenance (offshore) | Multi-use Operation | MuO aligns fully with operational procedures of wind farm MCC | 5 | 2 | 2-MEDIUM | | | | |
| Collision between multi-use vessel and wind farm structure causing the vessel to sink leading to human fatalities | 01: Fixed structures offshore | Human | WFO | 5 | < €50k | > €1m | 3 | 1-HIGH | Operation & maintenance (offshore) | Multi-use Operation | MuO aligns fully with operational procedures of wind farm MCC | 5 | 2 | 2-MEDIUM | | | | |
| ▼ 02: Moored multi-use assets within a wind farm | | | | | | | | | | | | | | | | | | |
| ▼ 1-HIGH | | | | | | | | | | | | | | | | | | |
| WFO vessel inadvertently sails through MU Area and collides with MU Assets leading to damage/failure of MU Assets | 02: Moored multi-use assets within a wind farm | Assets | MUO | 5 | < €1m | > €1m | 4 | 1-HIGH | Operation & maintenance (offshore) | Multi-use Operation | 1. The anchoring system could be made suitable to prevent critical failure due to collision with most frequently used service vessels 2. Adequate navigational aids systems installed on MU Area and MU Area 3. Close cooperation by MUO with the MCC of the wind farm area/operator 4. Adequate training of all personnel of the wind farm | 4 | 3 | 2-MEDIUM | | WFO | Action open | |
| Wind farm assets covered in seaweed, shellfish and/or other living biomass due to proximity of MU Systems leading to slipping/ falling and thus fatality of wind farm personnel | 02: Moored multi-use assets within a wind farm | Human | WFO | 5 | < €50k | > €1m | 3 | 1-HIGH | Operation & maintenance (offshore) | Shellfish cultivation, Fish aquaculture, Seaweed production, Nature restoration | 1. Cultivation technology design ensures limited to no biomass transport from farm to wind farm assets 2. Regular WTG Foundation maintenance to remove any marine growth to ensure compliance with design life requirements | 3 | 2 | 2-MEDIUM | Compare marine growth thickness before and after installation of seaweed farms. In case of additional growth it is recommended to update the marine growth removal frequencies | WFO | Action open | Marine growth on boat landings is a regular problem in wind farms that personnel is trained in and experienced in. Even if it would be true that proximity of a MU System leads to additional growth, this will be clearly visible to the personnel. They can thus take precautionary measures or abort the transfer if deemed unsafe |
| MUPS-Rigid goes adrift due to mooring failure and collides with vessel leading to fatalities | 02: Moored multi-use assets within a wind farm | Human | Both WFO & MOU | 5 | < €50k | > €1m | 3 | 1-HIGH | Operation & maintenance (offshore) | Multi-use Operation | 1. Include design mitigations such as redundant mooring solutions (e.g. at least 2 (two) anchor points) and early failure warning systems (e.g. weekly inspection or remote connected break-detection sensors) 2. Include identification measures on MUPS such that in case of failure and drifting, the assets will be clearly visible | 4 | 2 | 2-MEDIUM | | | | Mooring is a critical component of any MU System, therefore failure would lead to undesirable behaviour and effects. Nevertheless, mooring is a tried and tested technology for decades with off-the-shelf solutions and predictable results. Furthermore, most - if not all - MUPS will be moored with redundant mooring. That means, if one element fails, the other anchors/chains will be able to keep the MUPS inside its operation perimeter. If that would be combined with an early warning system (of such a partial failure) then adverse consequences due to falling mooring should become very unlikely. |
| ▼ 2-MEDIUM | | | | | | | | | | | | | | | | | | |
| Wind farm assets covered in seaweed, shellfish and/or other living biomass leading to reduced design life of wind farm assets | 02: Moored multi-use assets within a wind farm | Assets | WFO | 3 | < €50k | > €1m | 3 | 2-MEDIUM | Operation & maintenance (offshore) | Shellfish cultivation, Fish aquaculture, Seaweed production, Nature restoration | 1. Cultivation technology design ensures limited to no biomass transport from farm to wind farm assets 2. Regular WTG Foundation maintenance to remove any marine growth to ensure compliance with design life requirements | 3 | 2 | 2-MEDIUM | Compare marine growth thickness before and after installation of seaweed farms. In case of additional growth it is recommended to update the marine growth removal frequencies | WFO | Action open | |
| MUPS-Rigid goes adrift due to mooring failure and collides with vessel leading to vessel damage | 02: Moored multi-use assets within a wind farm | Assets | Both WFO & MOU | 3 | < €250k | € 0,00 | 3 | 2-MEDIUM | Operation & maintenance (offshore) | Multi-use Operation | 1. Include design mitigations such as redundant mooring solutions (e.g. at least 2 (two) anchor points) and early failure warning systems (e.g. weekly inspection or remote connected break-detection sensors) 2. Include identification measures on MUPS such that in case of failure and drifting, the assets will be clearly visible | 3 | 2 | 2-MEDIUM | | | | Mooring is a critical component of any MU System, therefore failure would lead to undesirable behaviour and effects. Nevertheless, mooring is a tried and tested technology for decades with off-the-shelf solutions and predictable results. Furthermore, most - if not all - MUPS will be moored with redundant mooring. That means, if one element fails, the other anchors/chains will be able to keep the MUPS inside its operation perimeter. If that would be combined with an early warning system (of such a partial failure) then adverse consequences due to falling mooring should become very unlikely. |
| MUPS-Rigid goes adrift due to mooring failure and collides with wind farm structure leading to WF foundation damage | 02: Moored multi-use assets within a wind farm | Assets | WFO | 3 | < €1m | € 0,00 | 3 | 2-MEDIUM | Operation & maintenance (offshore) | Multi-use Operation | 1. Include design mitigations such as redundant mooring solutions (e.g. at least 2 (two) anchor points) and early failure warning systems (e.g. weekly inspection or remote connected break-detection sensors) 2. Include identification measures on MUPS such that in case of failure and drifting, the assets will be clearly visible | 3 | 2 | 2-MEDIUM | | | | Mooring is a critical component of any MU System, therefore failure would lead to undesirable behaviour and effects. Nevertheless, mooring is a tried and tested technology for decades with off-the-shelf solutions and predictable results. Furthermore, most - if not all - MUPS will be moored with redundant mooring. That means, if one element fails, the other anchors/chains will be able to keep the MUPS inside its operation perimeter. If that would be combined with an early warning system (of such a partial failure) then adverse consequences due to falling mooring should become very unlikely. |
| MUPS-Rigid goes adrift due to mooring failure and collides with wind farm structure leading to infield cable damage | 02: Moored multi-use assets within a wind farm | Assets | WFO | 5 | > €1m | > €1m | 2 | 2-MEDIUM | Operation & maintenance (offshore) | Multi-use Operation | 1. Include design mitigations such as redundant mooring solutions (e.g. at least 2 (two) anchor points) and early failure warning systems (e.g. weekly inspection or remote connected break-detection sensors) 2. Include identification measures on MUPS such that in case of failure and drifting, the assets will be clearly visible | 5 | 1 | 2-MEDIUM | | | | Mooring is a critical component of any MU System, therefore failure would lead to undesirable behaviour and effects. Nevertheless, mooring is a tried and tested technology for decades with off-the-shelf solutions and predictable results. Furthermore, most - if not all - MUPS will be moored with redundant mooring. That means, if one element fails, the other anchors/chains will be able to keep the MUPS inside its operation perimeter. If that would be combined with an early warning system (of such a partial failure) then adverse consequences due to falling mooring should become very unlikely. |
| MUPS-Flexible goes adrift due to mooring failure and becomes entangled in vessel leading to fatalities | 02: Moored multi-use assets within a wind farm | Human | Both WFO & MOU | 5 | < €50k | > €1m | 1 | 2-MEDIUM | Operation & maintenance (offshore) | Multi-use Operation | 1. Include design mitigations such as redundant mooring solutions (e.g. at least 2 (two) anchor points) and early failure warning systems (e.g. weekly inspection or remote connected break-detection sensors) 2. Include identification measures on MUPS such that in case of failure and drifting, the assets will be clearly visible | 4 | 1 | 3-LOW | | | | Mooring is a critical component of any MU System, therefore failure would lead to undesirable behaviour and effects. Nevertheless, mooring is a tried and tested technology for decades with off-the-shelf solutions and predictable results. Furthermore, most - if not all - MUPS will be moored with redundant mooring. That means, if one element fails, the other anchors/chains will be able to keep the MUPS inside its operation perimeter. If that would be combined with an early warning system (of such a partial failure) then adverse consequences due to falling mooring should become very unlikely. |
| MUPS-Flexible goes adrift due to mooring failure and becomes entangled in vessel leading to vessel damage | 02: Moored multi-use assets within a wind farm | Assets | Both WFO & MOU | 2 | < €50k | € 0,00 | 3 | 2-MEDIUM | Operation & maintenance (offshore) | Multi-use Operation | 1. Include design mitigations such as redundant mooring solutions (e.g. at least 2 (two) anchor points) and early failure warning systems (e.g. weekly inspection or remote connected break-detection sensors) 2. Include identification measures on MUPS such that in case of failure and drifting, the assets will be clearly visible | 2 | 2 | 3-LOW | | | | Mooring is a critical component of any MU System, therefore failure would lead to undesirable behaviour and effects. Nevertheless, mooring is a tried and tested technology for decades with off-the-shelf solutions and predictable results. Furthermore, most - if not all - MUPS will be moored with redundant mooring. That means, if one element fails, the other anchors/chains will be able to keep the MUPS inside its operation perimeter. If that would be combined with an early warning system (of such a partial failure) then adverse consequences due to falling mooring should become very unlikely. |
| MUPS-Flexible goes adrift due to mooring failure and becomes entangled in WF structure leading to damage to the WF foundation | 02: Moored multi-use assets within a wind farm | Assets | WFO | 2 | < €250k | € 0,00 | 3 | 2-MEDIUM | Operation & maintenance (offshore) | Multi-use Operation | 1. Include design mitigations such as redundant mooring solutions (e.g. at least 2 (two) anchor points) and early failure warning systems (e.g. weekly inspection or remote connected break-detection sensors) 2. Include identification measures on MUPS such that in case of failure and drifting, the assets will be clearly visible | 2 | 2 | 3-LOW | | | | Mooring is a critical component of any MU System, therefore failure would lead to undesirable behaviour and effects. Nevertheless, mooring is a tried and tested technology for decades with off-the-shelf solutions and predictable results. Furthermore, most - if not all - MUPS will be moored with redundant mooring. That means, if one element fails, the other anchors/chains will be able to keep the MUPS inside its operation perimeter. If that would be combined with an early warning system (of such a partial failure) then adverse consequences due to falling mooring should become very unlikely. |
| MUPS-Flexible goes adrift due to mooring failure and collides with wind farm structure leading to infield cable damage | 02: Moored multi-use assets within a wind farm | Assets | WFO | 5 | > €1m | > €1m | 1 | 2-MEDIUM | Operation & maintenance (offshore) | Multi-use Operation | 1. Include design mitigations such as redundant mooring solutions (e.g. at least 2 (two) anchor points) and early failure warning systems (e.g. weekly inspection or remote connected break-detection sensors) 2. Include identification measures on MUPS such that in case of failure and drifting, the assets will be clearly visible | 5 | 1 | 2-MEDIUM | | | | Mooring is a critical component of any MU System, therefore failure would lead to undesirable behaviour and effects. Nevertheless, mooring is a tried and tested technology for decades with off-the-shelf solutions and predictable results. Furthermore, most - if not all - MUPS will be moored with redundant mooring. That means, if one element fails, the other anchors/chains will be able to keep the MUPS inside its operation perimeter. If that would be combined with an early warning system (of such a partial failure) then adverse consequences due to falling mooring should become very unlikely. |
| MUPS-Flexible goes adrift due to mooring failure and becomes entangled on WF foundation boat landing leading to unaccessible wind farm assets | 02: Moored multi-use assets within a wind farm | Assets | WFO | 2 | < €250k | < €50k | 3 | 2-MEDIUM | Operation & maintenance (offshore) | Multi-use Operation | 1. Include design mitigations such as redundant mooring solutions (e.g. at least 2 (two) anchor points) and early failure warning systems (e.g. weekly inspection or remote connected break-detection sensors) 2. Include identification measures on MUPS such that in case of failure and drifting, the assets will be clearly visible | 2 | 2 | 3-LOW | | | | Mooring is a critical component of any MU System, therefore failure would lead to undesirable behaviour and effects. Nevertheless, mooring is a tried and tested technology for decades with off-the-shelf solutions and predictable results. Furthermore, most - if not all - MUPS will be moored with redundant mooring. That means, if one element fails, the other anchors/chains will be able to keep the MUPS inside its operation perimeter. If that would be combined with an early warning system (of such a partial failure) then adverse consequences due to falling mooring should become very unlikely. |
| ▼ 03: Multi-use area operation | | | | | | | | | | | | | | | | | | |
| ▼ 1-HIGH | | | | | | | | | | | | | | | | | | |
| During vessel operations in the MU Area the MU vessel collides with MU Assets due to inadvertent navigational error | 03: Multi-use area operation | Assets | MUO | 4 | < €250k | < €1m | 4 | 1-HIGH | Operation & maintenance (offshore) | Multi-use Operation | 1. Adequate training and briefing of MU personnel on the layout of the MU Area 2. Clear and standardised identification markers for each MU System in the MU Area 3. Work restrictions in case of 3-LOWer visibility conditions | 4 | 3 | 2-MEDIUM | O&M plan to be setup for this type of activities in the MU Area. Careful consideration to be given to the aspect of navigation in between complex infrastructure | MUO | Action open | |
| MUO goes bankrupt leading to unattended assets and potential unpaid cost for WFO | 03: Multi-use area operation | Other | WFO | 4 | < €50k | > €1m | 4 | 1-HIGH | Contractual-Financial-Legal | Multi-use Operation | A legal measure/guarantee to be agreed with the national government to deal with multi-use parties going into default due to excessive (consequential) damage or inadvertent bankruptcy | 2 | 4 | 2-MEDIUM | This approach to be discussed and agree with the government | MUO | Action open | |
| ▼ 2-MEDIUM | | | | | | | | | | | | | | | | | | |
| During operation an operations vessel goes adrift and collides with installed MUPSs leading to asset damage | 03: Multi-use area operation | Assets | MUO | 4 | < €1m | > €1m | 3 | 2-MEDIUM | Operation & maintenance (offshore) | Multi-use Operation | 1. The design of MUPS could include mooring points for operational vessels 2. Vessels shall have redundant mooring capabilities and emergency drop anchors in case of primary motor failure | 4 | 2 | 2-MEDIUM | 1. Include mooring facility in MUPS design 2. Look into redundancy requirements of multi-use vessels | Multi-use operative | Action open | |
| New multi-use operations attract more birds than anticipated and previously observed in wind farm, leading to increased bird casualties | 03: Multi-use area operation | Environment | Both WFO & MOU | 3 | < €10k | > €1m | 4 | 2-MEDIUM | Operation & maintenance (offshore) | Multi-use Operation | To be determined. First monitoring of bird behaviour due to presence of MU installations is needed. If this then poses a problem then potential mitigations need to be determined. Potentially situation of MU Areas around the edges of wind farm area could prevent birds entering wind farm? In other words, currently no mitigation needed/identified therefore the mitigated risk is the same as the unmitigated risk | 3 | 4 | 2-MEDIUM | Include bird monitoring as part of offshore multi-use operations/pilots | Government | Action open | |
| During the MUMS installation activity, other MU assets in the MU-area are damaged by the installation vessel or (part of) the MUMS | 03: Multi-use area operation | Assets | MUO | 3 | < €250k | < €1m | 4 | 2-MEDIUM | Installation (offshore) | Multi-use Operation | Procedural: ensure that the installation procedure is thorough, well prepared and all involved personnel is briefed in accordance | 3 | 3 | 2-MEDIUM | | | | |
| ▼ 04: Offshore transportation | | | | | | | | | | | | | | | | | | |
| ▼ 2-MEDIUM | | | | | | | | | | | | | | | | | | |
| During transport of the MU Vessel to/from the MU Area items fall of the ship and cause damage to the Infield Cables | 04: Offshore transportation | Assets | WFO | 5 | > €1m | > €1m | 2 | 2-MEDIUM | Operation & maintenance (offshore) | Multi-use Operation | 1. Select suitable weather window 2. Independent review of seafastening design 3. adequate burial of cables 4. potentially avoid longitudinal travel over Infield Cables and preferably transversal | 5 | 2 | 2-MEDIUM | The proposed mitigations, that are procedurally, should be included in the future O&M plans of the MUO | MUO | Action open | |
| ▼ 05: Offshore weather conditions | | | | | | | | | | | | | | | | | | |
| ▼ 3-LOW | | | | | | | | | | | | | | | | | | |
| Adverse offshore weather conditions causing mooring failure and leading to MUPS-WTG Foundation collision [this item is fully covered by the consequences of MUPS - WTG structure collision under Hazard02 - therefore these rest of this line item remains empty] | 05: Offshore weather conditions | | | | | | | 3-LOW | | Multi-use Operation | | | | 3-LOW | | | | Action closed |
| ▼ 06: Operation in a complex industrial zone/ area | | | | | | | | | | | | | | | | | | |
| ▼ 1-HIGH | | | | | | | | | | | | | | | | | | |

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Multi-Use Procedure Risk Register - 04 Mar 2020

| Consequence | Hazard | Damage category | Affected stakeholder | Severity | Direct cost (€) | INDirect cost (€) | Probability | Risk | Phase | Type of Multi-use activity | Mitigation | Mitigated severity | Mitigated probability | Mitigated Risk | Residual Risk/ Action | Action owner | Action status | Close-out statement |
|--|--|-----------------|----------------------|----------|-----------------|-------------------|-------------|----------|------------------------------------|--|--|--------------------|-----------------------|----------------|--|--------------|---------------|---------------------|
| Potential of liability claims by WFO due to consequential damage leads to unavailable finance/insurance for MUO | 06: Operation in a complex industrial zone/ area | Other | MUO | 3 | € 0,00 | < €250k | 5 | 1-HIGH | Contractual-Financial-Legal | | 1. Well documented and fair agreements between WFO & MUO 2. Guarantee from sector fund or government 3. Track record of other operational farms | 3 | 3 | 2-MEDIUM | | MUO | Action open | |
| Liability claim from wind farm operator (as a consequence of damages caused by MUO) exceeds insurance coverage of MUO or generally falls outside of the insurance policy coverage of MUO | 06: Operation in a complex industrial zone/ area | Other | WFO | 5 | > €1m | > €1m | 4 | 1-HIGH | Contractual-Financial-Legal | | | | 0 | 3-LOW | | | | |
| ▼ 3-LOW | | | | | | | | | | | | | | | | | | |
| Lengthy coordination activities cause a delay in WFO response time leading to consequential damage (e.g. additional downtime) | 06: Operation in a complex industrial zone/ area | Assets | WFO | 1 | < €10k | < €250k | 4 | 3-LOW | Operation & maintenance (offshore) | Multi-use Operation | Very clear processes for preventative, corrective maintenance and emergency response procedures between stakeholders in the WF Area | 1 | 2 | 3-LOW | | WFO | Action open | |
| Lengthy coordination activities cause a delay in MUO response time leading to consequential damage (e.g. damaged systems, too late harvest) | 06: Operation in a complex industrial zone/ area | Assets | MUO | 1 | < €10k | < €1m | 4 | 3-LOW | Operation & maintenance (offshore) | Multi-use Operation | Very clear processes for preventative, corrective maintenance and emergency response procedures between stakeholders in the WF Area | 1 | 2 | 3-LOW | | MUO | Action open | |
| ▼ 07: Operation of 1-HIGH voltage facility | | | | | | | | | | | | | | | | | | |
| ▼ 2-MEDIUM | | | | | | | | | | | | | | | | | | |
| MUO personnel enters WTG/OHVS exclusion zone leading to injuries or fatalities | 07: Operation of 1-HIGH voltage facility | Human | MUO | 5 | < €50k | > €1m | 2 | 2-MEDIUM | Operation & maintenance (offshore) | Multi-use Operation, Energy production | 1. The wind farm design should prevent wind farm structure surfaces can become live due to an electrical systems failure 2. MUO to ensure that MUO personnel never enter the exclusion zones of the wind farm 3. In case of inadvertent entering of exclusion zones then MUO shall not enter our touch the wind farm structures 4. The MUO vessel could be fitted with adequate lightning protection systems that could also handle touch/induced potential risk from electrical infrastructure | 0 | 2 | 3-LOW | | MUO | Action open | |
| MU Vessel makes inadvertent contact with live electrical infrastructure (via anchor or moored at MUMS) due to straying out of MU Area leading to MU personnel injuries or fatalities | 07: Operation of 1-HIGH voltage facility | Human | MUO | 5 | < €250k | > €1m | 2 | 2-MEDIUM | Operation & maintenance (offshore) | Multi-use Operation, Energy production | 1. MU Vessel design could have redundant propulsion to avoid having to use anchoring due to inadvertent drifting 2. MU Vessel equipped with adequate 1-HIGH voltage protection system (e.g. lightning protection system) 3. Suitable distance between MU Area and electrical system assets | 0 | 1 | 3-LOW | | MUO | Action open | |
| ▼ 08: People passing through the wind farm area | | | | | | | | | | | | | | | | | | |
| ▼ 1-HIGH | | | | | | | | | | | | | | | | | | |
| Sail-through vessel inadvertently sails through MU Area and collides with MU Assets leading to damage/failure of MU Assets | 08: People passing through the wind farm area | Assets | MUO | 5 | < €1m | > €1m | 4 | 1-HIGH | Operation & maintenance (offshore) | Multi-use Operation, Energy production | 1. The anchoring system could be made suitable to prevent critical failure due to collision with most frequently used sail-through vessels 2. Adequate navigational aids systems installed on MU Area and MU Area 3. Close cooperation with MCC 4. Security surveillance system (Dirkzwager type) 5. Proper information of the public | 4 | 3 | 2-MEDIUM | | Government | Action open | |
| Sail-through vessel inadvertently sails through WF Area and collides with WF Assets leading to damage/failure of WF Assets | 08: People passing through the wind farm area | Assets | WFO | 5 | < €1m | > €1m | 4 | 1-HIGH | Operation & maintenance (offshore) | Multi-use Operation, Energy production | 1. The anchoring system could be made suitable to prevent critical failure due to collision with most frequently used sail-through vessels 2. Adequate navigational aids systems installed on MU Area and MU Area 3. Close cooperation with MCC 4. Security surveillance system (Dirkzwager type) 5. Proper information of the public | 4 | 3 | 2-MEDIUM | | Government | Action open | |
| ▼ 2-MEDIUM | | | | | | | | | | | | | | | | | | |
| MUMS falls, drifting out of MU Area, leading to collision with third party vessel and causing damage to the vessel (MUPS-Rigid is assumed here as worst case) | 08: People passing through the wind farm area | Assets | External stakeholder | 4 | < €250k | < €50k | 3 | 2-MEDIUM | Operation & maintenance (offshore) | Multi-use Operation | 1. Design mitigations such as redundant mooring and early failure warning systems 2. Inform stakeholders to be extra cautious during passing of wind farm area that includes MU Areas | 4 | 2 | 2-MEDIUM | | MUO | Action open | |
| ▼ 09: Personnel working in multi-use area | | | | | | | | | | | | | | | | | | |
| ▼ 1-HIGH | | | | | | | | | | | | | | | | | | |
| During MUPS/MUMS lifting works person is crushed leading to injury or fatality | 09: Personnel working in multi-use area | Human | MUO | 4 | < €50k | > €1m | 4 | 1-HIGH | Operation & maintenance (offshore) | Multi-use Operation | 1. MUMS & MUPS design shall include suitable work method statements that avoid proximity of personnel during lifting works 2. Suitable HSE risk assessments shall be performed and identified measures implemented | 4 | 3 | 2-MEDIUM | Suggested mitigations to be fo3-LOWed up | MUO | Action open | |
| During MUPS/MUMS works person become entangled and fall overboard leading to injury or fatality | 09: Personnel working in multi-use area | Human | MUO | 4 | < €50k | > €1m | 4 | 1-HIGH | Operation & maintenance (offshore) | Multi-use Operation | 1. MUMS & MUPS design shall include suitable work method statements that avoid proximity of personnel during launching works 2. Suitable HSE risk assessments shall be performed and identified measures implemented | 4 | 3 | 2-MEDIUM | Suggested mitigations to be fo3-LOWed up | MUO | Action open | |
| Person falls overboard leading to injury or fatality | 09: Personnel working in multi-use area | Human | MUO | 4 | < €50k | > €1m | 4 | 1-HIGH | Operation & maintenance (offshore) | Multi-use Operation | 1. Suitable HSE risk assessments shall be performed and identified measures implemented | 4 | 3 | 2-MEDIUM | Suggested mitigations to be fo3-LOWed up | MUO | Action open | |
| Person falls ill on vessel leading to injury or fatality | 09: Personnel working in multi-use area | Human | MUO | 4 | < €50k | > €1m | 4 | 1-HIGH | Operation & maintenance (offshore) | Multi-use Operation | 1. Suitable HSE risk assessments shall be performed and identified measures implemented | 3 | 4 | 2-MEDIUM | Suggested mitigations to be fo3-LOWed up | MUO | Action open | |
| Person sustains injury on vessel and cannot be treated or transported adequately/timely leading to injury or fatality | 09: Personnel working in multi-use area | Human | MUO | 4 | < €50k | > €1m | 4 | 1-HIGH | Operation & maintenance (offshore) | Multi-use Operation | 1. Suitable HSE risk assessments shall be performed and identified measures implemented | 3 | 4 | 2-MEDIUM | Suggested mitigations to be fo3-LOWed up | MUO | Action open | |
| Diving operation goes wrong leading to injury or fatality of diving personnel | 09: Personnel working in multi-use area | Human | MUO | 4 | < €50k | > €1m | 4 | 1-HIGH | Operation & maintenance (offshore) | Multi-use Operation | 1. Suitable HSE risk assessments shall be performed and identified measures implemented 2. Adequate diving procedures to be fo3-LOWed 3. Suitable diving support vessel to be present | 3 | 3 | 2-MEDIUM | Suggested mitigations to be fo3-LOWed up | MUO | Action open | |
| ▼ 11: Wind farm operation | | | | | | | | | | | | | | | | | | |
| ▼ 2-MEDIUM | | | | | | | | | | | | | | | | | | |
| Multi-Use permit gets granted without the WFO being able to reject the permit application for a MU operation that has direct effect on the performance of the wind farm | 11: Wind farm operation | Other | WFO | 4 | € 0,00 | > €1m | 3 | 2-MEDIUM | Contractual-Financial-Legal | Multi-use Operation | An adequate Multi-Use Procedure: 1. That takes into account all boundary conditions that will avoid adverse performance impacts for the WFO 2. That is aligned with the "Alvingskader" of the permit-issuing government body. | 4 | 2 | 2-MEDIUM | | Government | Action open | |