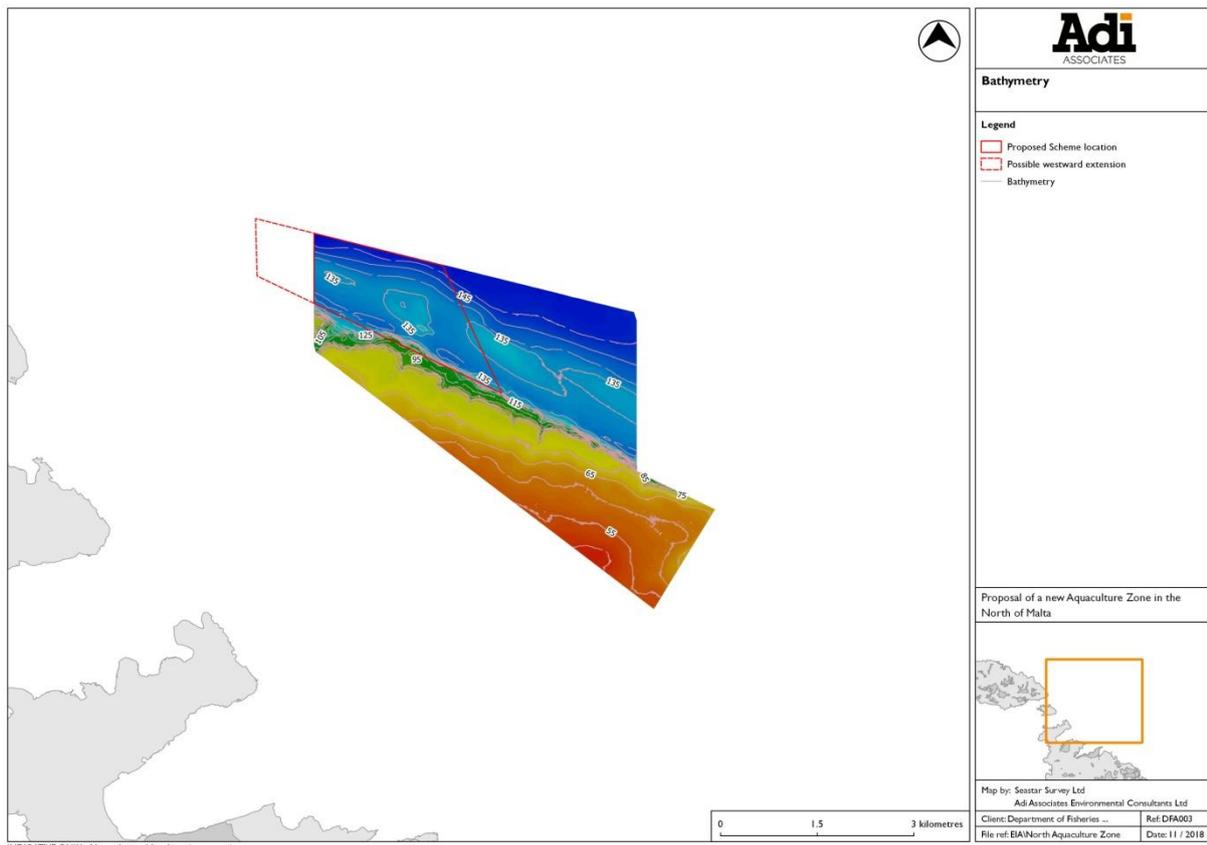


GF00250/07: PROPOSAL FOR A NEW AQUACULTURE ZONE IN THE NORTH OF MALTA, ZONE OFFSHORE MALTA

ADDENDUM TO ENVIRONMENTAL IMPACT ASSESSMENT REPORT



Version 2: October 2019



Report Reference:

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Quality Assurance

GF00250/07: Proposal for a new aquaculture zone in the North of Malta, Zone offshore Malta
Addendum to Environmental Impact Assessment Report
 June 2019

Report for: **Department for Fisheries and Aquaculture**

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CONTENTS

1.	ERA Comments	1
2.	Consultees' Comments	21
3.	Comments received from the public following public hearing	24

APPENDIX

Appendix 1: Civil Protection Department Comments: Fire Safety Measures in Aquaculture Industry

Appendix 2: North Aquaculture Zone Quadrant measurements

Appendix 3: Clarification on impacts on Avifauna

Comments on the Environmental Impact Assessment (EIA) and Appropriate Assessment (AA)

12th March 2019

GF 00250/07: Proposal for a new aquaculture zone in the North of Malta

1. ERA Comments

A. Environmental Impact Assessment Report

No.	Page	Para.	ERA Comment 12/03/2019	Response from EIA Coordinator 25/03/2019	ERA reply (30/04/2019)
General	/	/	Kindly state the exact biomass that the zone will cater for. There are instances where the EIA Report makes reference to both 4,500 and 5,000 tonnes. Additionally the Marine Method Statement stated that "the proposal that is being assessed comprises the development of an aquaculture zone that would be able to house a total biomass of 6,000 tonnes of tuna within a 1.5km x 3km quadrant".	The biomass can only be indicative as it depends on the stocking density. The EIA assumes a stocking density of approximately 132 tonnes per cage. Assuming a total of approximately 34 cages, this would give a total biomass of 4,500 tonnes; however, if the stocking density increases or decreases, the total biomass will vary. Para 3.21, 3.22 and 3.35 refer.	The EIA report must assume the worst case scenario, (i.e the maximum biomass (at caging) of a particular area/zone). Kindly provide the exact area and maximum carrying capacity (at caging) of the zone.
Response from EIA Coordinator 08/05/2019					ERA reply (19/06/2019)
The area of the zone is as indicated in the EIA (see Figure 1.5 for example). As explained (see below), this was reduced from the original intention of having a 1.5 km x 3 km zone due to sea use restrictions (in particular the AFM zone). If the DFA would want to increase the size of the zone, a possible location is shown in the EIA as well, but, as explained, this was not directly assessed although the seabed in this area is expected to be identical to the area surveyed. In agreement with the DFA, the possible future extension is not subject of this EIA.					Noted. Kindly provide quadrant dimensions (from each point) (in km) of the proposed aquaculture zone. EIA Coordinator response (30/06/2019): Quadrant dimensions provided in Appendix 2.

No.	Page	Para.	ERA Comment 12/03/2019	Response from EIA Coordinator 25/03/2019	ERA reply (30/04/2019)
<p>In such a zone, it is expected that the biomass would range between 4,500 and 5,000 tonnes. This will depend on the amount of tuna caught, their size at caging, their rate of growth, and rate of harvesting. The biomass therefore changes regularly. One cannot talk of “maximum biomass at caging” – the biomass at caging will change from year to year (depending on the catch) and also vary over a number of weeks as caging is not a one time affair. The number of tuna / biomass is reported to the DFA annually. In addition, the “maximum biomass” for the zone / individual farm for any particular year will also vary and will not be the one at “caging” but more likely prior to the start of harvesting.</p> <p>For these reasons, and especially for the hydrodynamic analysis, the EIA assumes a total of 34 cages with an average stocking density of 132 tonnes per cage, which translates into approximately 4,500 tonnes of biomass. The more important issue is stocking density; if more fish are stocked in the cages, the impact would be that their growth rate would reduce and hence the biomass does not increase as rapidly as when a lower stocking density is maintained (this was experienced in 2017 by local farms following the revocation of permits). This being a farming operation, optimum stocking densities that lead to higher growths are more important; hence, the stocking density proposed is a lower one on which the biomass calculations have been made. This is the same stocking density used for the EIA for development permit application PA/02175/18. This biomass is the basis of the assessment of the EIA and is the considered assumption with the information available to date. It is further noted that regulation of biomass will be done through operational and aquaculture permits.</p>					
1	17	Figure 1.5	<p>Kindly provide the coordinates for the area marked in red dotted line.</p> <p>Additionally kindly mark the distance of the proposed aquaculture zone (including the red dotted line) from the nearest coast (Gozo, Comino and Malta).</p>	<p>The coordinates are not provided precisely because this is only an indicative area for future extension and does not form part of the current proposal. The dotted area is shown to indicate a possible future extension to accommodate the full 4.5 km² zone requested by the Department of Aquaculture and Fisheries. The area bound by a solid red line amounts to 3.4 km². The only way that a 4.5 km² zone can be accommodated (if the DFA stick to this proposal) is to extend the zone</p>	<p>This means that an area for the currently proposed aquaculture zone (i.e for which the EIA was carried out) is 3.4km², with a biomass of 4,500, at caging.</p> <p>EIA Coordinator response (30/06/2019): Correct. The biomass could potentially be smaller as it would depend on the number of cages and the origin of the tuna. 4,500 tonnes is the worst-case situation.</p>

No.	Page	Para.	ERA Comment 12/03/2019	Response from EIA Coordinator 25/03/2019	ERA reply (30/04/2019)
				<p>westwards (to the east is the AFM target shooting exclusion zone and northward the water increases greatly in depth). This is explained in Para 1.29. This and other figures in the EIA Report are intended to indicate this; however, the development permit application is solely for the smaller area bound with a solid red line.</p> <p>The distance of the proposed Aquaculture Zone from the nearest coastlines is given in Chapter 8:</p> <ul style="list-style-type: none"> (1) Rdum tal- Madonna = c. 5.1 km (2) Qawra Point = c. 7.8 km (3) Comino = c. 6.5 km (4) Qala Point = c. 4 km <p>The dotted red line is not considered for the reasons explained above. Any westward extension would need to be the subject of a separate application and possibly an EIA.</p>	<p>With respect to Qala, this does not conform with the minimum distance (4.5 – 5km) set by the PA as stated in Para 1.28 of the EIA.</p> <p>EIA Coordinator response (30/06/2019): The distance of the application site to Qala Point is actually 4.56 km; 4 km is the distance of the “potential westward extension” to Qala Point. The error is regretted.</p> <p>Noted.</p>
Response from EIA Coordinator 08/05/2019				ERA reply (19/06/2019)	
<p>See response for General comment above.</p> <p>As regards the distance from Qala point, while it is correct to say that the plan distance is short of the 4.5 – 5 km distance indicated, the zone could not be located further to the east due to the AFM restriction zone and seeing that Qala point is not an inhabited area, and the distances from other shorelines are well above the 5km indicative limit, it was deemed to be acceptable (subject to the Authorities’ agreement).</p>				<p>It has been noted that a Planning application has been submitted to the Planning Authority with reference number PA/04811/19. The site plan (document 1a), the distance of the NAZ</p>	

No.	Page	Para.	ERA Comment 12/03/2019	Response from EIA Coordinator 25/03/2019	ERA reply (30/04/2019)
					<p>(point 4) from Qala is 4.56km. in view that it is stated that the distance from Qala is c.4 km, kindly clarify discrepancy.</p> <p>EIA Coordinator response (30/06/2019): The distance of the application site (Point 4) to Qala Point is actually 4.56 km; 4 km is the distance of the “potential westward extension” to Qala Point. The error is regretted.</p> <p>Kindly submit a copy of the said agreement.</p> <p>EIA Coordinator response (30/06/2019): There is no “Agreement”; what our response of 08/05/2019 states is that subject to agreement by the Authorities (ERA, PA, TM, etc), in this EIA we deemed that the shorter distance to Qala Point was not considered to be material.</p>
2	29	3.15	It is noted that the zone should be assessed in terms of biomass and not cages. Is the assumption that 34 cages will be present on site presenting the worst case scenario?	As explained above, the 34 cages is an assumption based on the assumed stocking density of 132.35 tonnes per cage.	The EIA report must assume the worst case scenario, (i.e the maximum biomass (at caging) of a particular area/zone).

No.	Page	Para.	ERA Comment 12/03/2019	Response from EIA Coordinator 25/03/2019	ERA reply (30/04/2019)
			If no, the amount of fish oil released should be on tonnes of baitfish fed to the tuna to reach harvesting and not according to the number of cages.	It is the same thing – the amount of oil released is calculated on the amount of baitfish fed to the tuna assuming the above stocking density and the data available on the amount of oil released as per current operations. If the method of feeding is changed so that more oil is removed from the baitfish before this is fed to the tuna, then the amount of oil released would decrease.	<p>EIA Coordinator response (30/06/2019): That's what it does. The worst-case scenario has to be realistic, based on actual operations.</p>
Response from EIA Coordinator 08/05/2019					ERA reply (19/06/2019)
See response for General comment above.					<p>Noted as long as the biomass of the zone is kept to 4,500 tonnes at caging.</p> <p>EIA Coordinator response (30/06/2019): Noted</p>
3	79	5.36	Kindly provide the methodology on how the percentages of the uneaten feed and fish oil per day were calculated.	These are not calculations but assumptions based on several years of observations by local tuna farmers. As explained in Para 3.14 and footnote 16 of the EIA Report, there are no specific studies on this issue. These data have been counter checked with different operators and are based on the worse case scenario of herring rather than sardine / mackerel, which are more often used locally.	<p>ERA acknowledges the fact that the calculations are based on assumptions, and thus a degree of possible human error is introduced. Ideally the assessment would be based on scientific data, thus monitoring and data collection in this regard would be required.</p> <p>EIA Coordinator response (30/06/2019): Agreed</p>

No.	Page	Para.	ERA Comment 12/03/2019	Response from EIA Coordinator 25/03/2019	ERA reply (30/04/2019)
Response from EIA Coordinator 08/05/2019					ERA reply (19/06/2019)
Data for existing farms is already being collected through the active environmental monitoring programme approved and supervised by the ERA through their environment permits. This information will, in the long run, help to further refine these assumptions. Data to date seem to corroborate the information provided by the farmers and used in the models.					Noted, such data should be made available in the monitoring reports. EIA Coordinator response (30/06/2019): Noted
4	86	5.54 Table 5.4	Some values provided for Phosphorus and Nitrogen may be incorrect.	Data checked. Units quoted in Para 5.54 are switched round. So they should read: 91.89 kg N/cage/day; and 6.84 kg P/cage/day. All other data are correct	Noted.
5	90	5.63	<i>'After 30 days of simulation, the uneaten feed deposit remains located under the tuna pens and its thickness is less than 0.1 cm (Figure 5.14). This result is explained by the settling rate. For a water depth of 100 m, the time necessary for a particle to reach the bottom is 24 minutes. These results do not take into account the natural degradation of the feed.'</i> A clarification is requested on how the 0.1cm deposit thickness was calculated.	This is all part of the mathematical model, which considers the size of the particle and the environmental conditions. At each time-step, the uneaten feed deposited at the seabed is calculated, depending on the uneaten feed concentration at the bottom layer and the water velocity. As explained, the model does not take into account any natural degradation and hence the impact might actually be smaller. The modelling results are corroborated by actual monitoring of farms. The deeper waters at the scheme site will result in a smaller impact than that show at current operating sites. See Para 5.61 – 5.63.	Noted.

No.	Page	Para.	ERA Comment 12/03/2019	Response from EIA Coordinator 25/03/2019	ERA reply (30/04/2019)
				<p>Note: Though reported as 0.1 cm in the baseline report, the maximum value for the uneaten feed accumulated at the bottom on Figure 33 in Technical Appendix 3 is actually 0.0017 m or 0.17 cm at the end of the simulation (or after 30 days of simulation). Therefore more precisely the thickness is less than 0.17 cm.</p>	
6	122	5.157	<p>"In the event that the mooring blocks remain proud of the seabed, they might experience scour on the side of the block under the action of the prevailing bottom currents and accumulation on the opposite side." Sentence is not clear.</p>	<p>If the mooring blocks do not get embedded in the muddy sand on the seabed (i.e. they remain proud of the seabed), then they could be subjected to sediment scour and accumulation on different sides, with the side facing the direction of the prevailing current experiencing scour and the opposite side experiencing accumulation. On the other hand, if the mooring block gets embedded in the seabed sediment, then none of this happens.</p>	Noted.
7	122	5.160	<p><i>'Obviously good practice and measures to reduce loading of the water column with nutrients and organic matter will be important.'</i></p> <p>Further elaboration of what such good practices would consist of is required. These should be reflected in Tables 5.11 and 9.1</p>	<p>This refers to organic loading (see also Para 5.158 & 5.159). Hence, the main good practice measure would be the control of the stocking density and not rate of feeding.</p> <p>Information already included in Tables 5.11 and 9.1.</p>	Noted.

No.	Page	Para.	ERA Comment 12/03/2019	Response from EIA Coordinator 25/03/2019	ERA reply (30/04/2019)
8	126 205	5.176 9.22	<p><i>'Good practice during the deployment of moorings to ensure against dragging of blocks on the seabed;'</i></p> <p>Further elaboration of what such good practices would consist of is required. These should be reflected in Tables 5.11 and 9.1</p>	<p>This refers to the method of deployment of the mooring blocks and is explained in the same sentence. Deployment to avoid dragging on seabed. Also optimise design to ensure drifting does not happen. All included in Tables 5.11 and 9.1.</p>	Noted.
9	127 206	5.176 9.22	<p><i>'Good practices aboard ships to minimise discharges, noise, light, and littering;'</i></p> <p>Further elaboration of what such good practices would consist of is required. These should be reflected in Tables 5.11 and 9.1</p>	<p>These are standard practices on marine vessels to avoid unnecessary impacts on the marine environment, including loss of material overboard, discharges, noise and light emissions. See also Chapter 6 re: mitigation of noise and light effects</p>	Noted.
10	128	5.177	<p><i>'As regards impacts on the benthic ecology, the location of the Scheme in deep waters over muddy detritic bottoms and completely avoiding the rhodolith beds results in residual impacts of mostly minor significance, some of which may also be beneficial to benthic communities.'</i></p> <p>Considering that the rhodolith bed is still located in close proximity to the proposed site, further details should be provided to describe the potential impact, indicated to be of 'minor significance' on this benthic habitat.</p>	<p>The comment has been misunderstood. The location of the Scheme away from the rhodoliths means that the latter are not impacted. The impact of "minor significance" refers to the effects on the benthic ecology of the muddy detritic bottoms. Indeed, the comment continues that the impacts might actually be beneficial on these communities.</p> <p>The rhodolith beds are not located in close proximity to the proposed site.</p>	Noted.
11	163	6.38	<i>'However, although the Scheme occurs at a</i>	The assessment is deemed to be	Kindly explain why data from overseas

No.	Page	Para.	ERA Comment 12/03/2019	Response from EIA Coordinator 25/03/2019	ERA reply (30/04/2019)
			<p><i>new site, the proposed degree of operation is not new as the North Aquaculture Zone will most likely be occupied by cages relocated from the temporary zone currently occupied by AJD Tuna Ltd some 2.1 km south-east of the Scheme site. However, the additional cages will introduce additional capacity for subsidising the diet of gulls and subsequently potentially increasing their breeding / population success. The conservation status assessment of the breeding colonies along the east coast of the north of Malta and Comino, as described in the respective Management Plans, does not indicate an increase in gull populations that could be threatening to the other seabird populations. Therefore, with the data currently available, the actual impact is considered to be uncertain.'</i></p> <p>The impacts from increasing gull populations is still plausible upon the establishment of the NAZ especially in view of the increasing capacity. Such impact should be considered in terms of cumulative impact over the years.</p> <p>Additionally, whilst noting data gaps, a risk-based approach is recommended for the revision of the 'uncertain' impact. Reference to experience in overseas farms can be referred to, to compensate data gaps from the local scenario.</p>	<p>correct as per available data and information. Data from overseas will not necessarily be applicable to the local scenario. There are several instances where data from overseas locations do not tally with the experience locally.</p> <p>At this stage we deem the assessment as presented to be the best possible with the information available and the impact therefore remains uncertain.</p>	<p>on do not tally with the scenario experienced locally.</p> <p>Would data from existing farms in the Mediterranean be useful in this case?</p> <p>Examples from overseas can be considered and lessons from the regional scale can be applied locally. Discrepancies in these cases in relation to the Maltese context can be noted and expounded upon in an analysis.</p> <p>EIA Coordinator response (30/06/2019): Further discussions and analysis with the avifauna consultant on this point has clarified the matter further on the basis of existing data and anecdotal inference. A separate note is provided in Appendix 3.</p>

No.	Page	Para.	ERA Comment 12/03/2019	Response from EIA Coordinator 25/03/2019	ERA reply (30/04/2019)
Response from EIA Coordinator 08/05/2019					ERA reply (19/06/2019)
			<p>This comment is referring to the potential increase in the gull population. Conditions at different locations would be different leading to different impacts and scenarios. There may be too many new and possibly unknown variables that may be affecting the gull population. In many cases, even different locations in the same country could result in different impacts or scenarios, let alone data from other countries where the additional country-specific variables would be important aspects. Even in the case of Malta, the location of the waste landfill at Magtab is a much bigger attraction to the gull population as can be evidenced on a daily basis. Gulls (and other seabirds) are also attracted to other marine activities, including trawling. As explained above on the data that is available the impact remains uncertain.</p> <p>For this reason, the environmental monitoring programmes approved by the ERA for existing tuna farms include data collection on bird species. The collection of these data would help to refine the impact assessment in future years. The EIA includes a number of mitigation measures for this impact, which have been discussed and agreed with Birdlife Malta to try to get to a situation where relevant local data are available on the impact of the farming activities.</p> <p>If ERA has any relevant data that has not been referred to and that can be fully corroborated we would be happy to include it.</p>		<p>Through data collected from environmental monitoring programmes and other data from BirdLife Malta, is likely to determine the impact significance and associated mitigation measures, as applicable.</p> <p>EIA Coordinator response (30/06/2019): Further discussions and analysis with the avifauna consultant on this point has clarified the matter further based on existing data and anecdotal inference. A separate note is provided in Appendix 3.</p>
12	163	6.39	<p><i>'Further data is required locally to provide a better understanding of the extent of this problem for the populations of breeding seabirds in the Maltese Islands. Consultant John J. Borg has noted that no such incidences have yet been reported (personal communication). Impact is considered to be not significant to minor with the limited data available.'</i></p> <p>Whilst noting data gaps, a risk-based approach is recommended for the revision of the 'uncertain' impact. Reference to</p>	<p>The impact is considered to be not significant to minor (and not "uncertain").</p>	Noted.

No.	Page	Para.	ERA Comment 12/03/2019	Response from EIA Coordinator 25/03/2019	ERA reply (30/04/2019)
			experience in overseas farms can be referred to, to compensate data gaps from the local scenario.		
13	166	Table 6.3	Proposing 'Relocation outside of priority areas for Procellariiformes' is not a proper mitigation measure given the location of the proposal.	The sentence says "if feasible".	<p>The proposal is to permanently set up a zone in the north for aquaculture purposes.</p> <p>EIA Coordinator response (30/06/2019): Agreed. If not feasible to relocate the zone, then the impact remains minor.</p>
Response from EIA Coordinator 08/05/2019					ERA reply (19/06/2019)
<p>This refers to the impact related to "Competition for space". Since the Scheme is located in an area that lies within the seaward boundary of the <i>P. yelkouan</i> breeding colony but not within a priority area for <i>C. diomedea</i> and <i>H. Pelagicus</i>, and that the Scheme occupies a very small part of the IBA surface area, the assessment concludes that the the presence of the Scheme is not expected to disrupt the behaviour of <i>P. yelkouan</i> to such an extent that could affect the breeding success of the identified colonies on the coast. The impact is therefore deemed to be of minor significance.</p> <p>The proposal to relocate the Scheme outside of the priority area for the breeding Procellariiformes (which might still need to be formally confirmed), was indicated only if feasible. If this is possible in future, then the impact would be reduced to not significant. Otherwise it remains minor. However, we reiterate that there is no evidence of impacts on the <i>P. yelkouan</i> populations from the tuna farms at the moment.</p>					Noted.
14	219	Table 9.1	Proposing 'Relocation outside of priority areas for Procellariiformes' is not a proper mitigation measure given the location of the proposal.	The sentence says "if feasible".	The proposal is to permanently set up a zone in the north for aquaculture purposes.
Response from EIA Coordinator 08/05/2019					ERA reply (19/06/2019)
See response to comment 13 above.					Noted.

B. Technical Appendices

Comment No.	PDF. Page	Section	ERA Comment 12/03/2019	Response from EIA Coordinator 25/03/2019	ERA reply (30/04/2019)
1	81	Table 2	Northings and Eastings are inverted. Additionally the coordinates for point 1 are incorrect.	Typo. Headings are inverted. In Table 1. There is also a typing error in the coordinates for point 1 in Table 2 – 47262.11 should read 447262.11	Noted.
2	164	Table 8	Some values provided for Phosphorus and Nitrogen may be inverted.	No. Values are correct	Noted.
3	202	2	The ecological assessment report states that as part of the technical requirement the cages must be 'in water deeper than 50m but not exceeding 100m". However, the EIA state that the maximum depth of 100m was not retained in view that technological options for the anchoring or mooring of tuna cages in waters deeper than 100m do exist.	Comment in baseline study referred to an earlier position as explained in Chapter 1 of the EIA Report.	Noted.
4	205	Figure 2	Missing text in the legend.	There is nothing missing. The red and green areas are the subject of the current study. The blue area had been surveyed previously.	Noted.

C. Environmental Risk Assessment

Comment No.	Page	Section	ERA comments 12/03/2019	Response from EIA Coordinator 25/03/2019	ERA reply (30/04/2019)
1	14	1.34	'The oil will then be collected by means	Decanted water is discharged back to	Noted. As long as any waste streams

			of surface skimmers and transferred to IBCs, from where the water phase will be decanted and the oil phase sold to waste recycling contractors.' Kindly identify location of disposal for both water and oil.	sea; the oil is transferred to waste recycling contractors. Operations are governed by the environmental permit. We understand that the oil so collected is exported to Italy for recycling.	during operation are dealt with through the environmental permit. EIA Coordinator response (30/06/2019): Noted. Operations at the NAZ will be governed by environmental permit/s.
Response from EIA Coordinator 08/05/2019					ERA reply (19/06/2019)
The operation of the NAZ and the individual farming operations therein will be governed by an Environmental Permit issued by ERA.					Noted.

D. Appropriate Assessment

Comment No.	Page	Section	ERA comments 12/03/2019	Response from AA Coordinator 25/03/2019	ERA reply (30/04/2019) – Version 2 of the AA
1	General		Kindly state the exact biomass that the zone will cater for. There are instances where the AA makes reference to both 4,500 and 5,000 tonnes.	The biomass can only be indicative as it depends on the stocking density. The EIA assumes a stocking density of approximately 132 tonnes per cage. Assuming a total of approximately 34 cages, would give a total biomass of 4,500 tonnes; however, if the stocking density increases or decreases, the total biomass will vary. Para 1.34, 1.35 and 2.2 refer.	The EIA report must assume the worst case scenario, (i.e the maximum biomass (at caging) of a particular area/zone) AA Coordinator response (30/06/2019): That's what it does. The worst-case scenario has to be realistic, based on actual operations.
Response from AA Coordinator 08/05/2019					ERA reply (19/06/2019)
The area of the zone is as indicated in the AA (see Figure 1.6 for example). As explained in the EIA (see below), this was reduced from the original intention of having a 1.5 km x 3 km zone due to sea use restrictions (in particular the AFM zone). If the DFA would want to increase the size of the zone, a possible location is shown in the EIA and AA as well, but, as explained, this was not directly assessed although the seabed in this area is expected to be identical to the area surveyed. In agreement with the DFA, the possible future extension is not subject of this AA.					Noted. Kindly provide quadrant dimensions (from each point) (in km) of the proposed aquaculture zone. AA Coordinator response (30/06/2019): Quadrant dimensions provided in

<p>In such a zone, it is expected that the biomass would range between 4,500 and 5,000 tonnes. This will depend on the amount of tuna caught, their size at caging, their rate of growth, and rate of harvesting. The biomass therefore changes regularly. One cannot talk of “maximum biomass at caging” – the biomass at caging will change from year to year (depending on the catch) and also vary over a number of weeks as caging is not a one time affair. The number of tuna / biomass is reported to the DFA annually. In addition, the “maximum biomass” for the zone / individual farm for any particular year will also vary and will not be the one at “caging” but more likely prior to the start of harvesting.</p> <p>For these reasons, and especially for the hydrodynamic analysis, the EIA assumed a total of 34 cages with an average stocking density of 132 tonnes per cage, which translates into approximately 4,500 tonnes of biomass. The more important issue is stocking density; if more fish are stocked in the cages, the impact would be that their growth rate would reduce and hence the biomass does not increase as rapidly as when a lower stocking density is maintained (this was experienced in 2017 by local farms following the revocation of permits). This being a farming operation, optimum stocking densities that lead to higher growths are more important; hence, the stocking density proposed is a lower one on which the biomass calculations have been made. This is the same stocking density used for the EIA and AA for development permit application PA/02175/18. This biomass is the basis of the assessment of the EIA and the AA and is the considered assumption with the information available to date. It is further noted that regulation of biomass will be done through operational and aquaculture permits.</p>				<p>Appendix 2.</p>	
2	126	5.54	As per requirements of Article 6 of the Habitats directive, the Appropriate Assessment has to conclude whether an impact is significant or not.	Though data available currently does not indicate a significant negative impact, the assessment remains uncertain with the information available.	<p>If the impacts remain ‘uncertain’ the worst case scenario should be assumed.</p> <p>AA Coordinator response (30/06/2019): Further discussions and analysis with the avifauna consultant on this point has clarified the matter further based on existing data and anecdotal inference. A separate note is provided in Appendix 3.</p>
<p>Response from AA Coordinator 08/05/2019</p> <p>This comment is referring to the potential increase in the gull population.</p>				<p>ERA reply (19/06/2019)</p>	

<p>As explained in the AA, although the Scheme application occurs at a new site, the proposed degree of operation is not new and therefore, the Scheme does not introduce additional capacity for subsidising the diet of gulls and subsequently increasing their breeding / population success. The conservation status assessment of the breeding colonies along the east coast of the north of Malta and Comino, as described in the respective Management Plans, does not indicate an increase in Gull populations that could be threatening the other seabird populations. The impact can be therefore considered to be “unlikely”; however, without actual data, it remains uncertain.</p> <p>For this reason, the environmental monitoring programmes approved by the ERA for existing tuna farms include data collection on bird species. The collection of these data would help to refine the impact assessment in future years. The EIA/AA includes a number of mitigation measures for this impact, which have been discussed and agreed with Birdlife Malta to try to get to a situation where relevant local data are available on the impact of the farming activities.</p>				<p>Through data collected from environmental monitoring programmes and other data from BirdLife Malta, is likely to determine the impact significance and associated mitigation measures, as applicable.</p> <p>AA Coordinator response (30/06/2019): Further discussions and analysis with the avifauna consultant on this point has clarified the matter further based on existing data and anecdotal inference. A separate note is provided in Appendix 3.</p>	
3	14	1.24	<p>It is stated that ‘Different operators take different approaches to feeding, some using feeding cages, whereas others directly pump the baitfish into cages.’</p> <p>The EIA also mentions alternative method of feeding, whereby the baitfish is nearly completely thawed and is placed in the cages by the spadeful through the use of a feeding tube.</p> <p>All operators in the zone must utilise a feeding method that is the least environmentally damaging.</p>	<p>This issue is being addressed through the environmental permitting procedure.</p>	<p>Noted.</p>
4	14	1.25	<p>‘The oil will then be collected by means of surface skimmers and transferred to</p>	<p>Decanted water is discharged back to sea; the oil is transferred to waste</p>	<p>Noted. As long as any waste streams during operation are dealt with through</p>

			IBCs, from where the water phase will be decanted and the oil phase sold to waste recycling contractors.' Kindly identify location of disposal for both water and oil.	recycling contractors. Operations are governed by the environmental permit. We understand that the oil so collected is exported to Italy for recycling.	the environmental permit. AA Coordinator response (30/06/2019): Noted. Operations at the NAZ will be governed by environmental permit/s.
Response from AA Coordinator 08/05/2019					ERA reply (19/06/2019)
The operation of the NAZ and the individual farming operations therein will be governed by an Environmental Permit issued by ERA.					Noted.
5	15	1.28	It is noted that the zone should be assessed in terms of biomass and not cages. Is the assumption that 34 cages will be present on site a worst case scenario? If no, the amount of fish oil released should be on tonnes of baitfish fed to the tuna to reach harvesting and not on the number of cages.	As explained above and in the EIA, the 34 cages is an assumption based on the assumed stocking density of 132.35 tonnes per cage. It is the same thing – the amount of oil released is calculated on the amount of baitfish fed to the tuna assuming the above stocking density and the data available on the amount of oil released as per current operations. If the method of feeding is changed so that more oil is removed from the baitfish before this is fed to the tuna, then the amount of oil released would decrease.	The EIA report must assume the worst case scenario, (i.e the maximum biomass (at caging) of a particular area/zone) AA Coordinator response (30/06/2019): That's what it does. The worst-case scenario has to be realistic, based on actual operations. The AA considers a 3 km x 1.5 km zone and 4,500 tonnes of fish as originally required by the DFA. The application is for a smaller area (as explained earlier) and hence likely a smaller biomass too. 4,500 tonnes would be the worst-case situation.
Response from AA Coordinator 08/05/2019					
See response to comment 1 above.					Noted as long as the biomass of the zone is kept to 4,500 tonnes. AA Coordinator response (30/06/2019): Noted

6	43	Table 1.2	Some values provided for Phosphorus and Nitrogen may be inverted.	Data checked. All data in Table 1.2 are correct; however, there were errors in the units in Para 1.89 and 1.90	Revisions in revised AA are being noted. AA Coordinator response (30/06/2019): Noted
7	110	5.7	<i>'Good practice and measures to reduce disturbance to a minimum are the only mitigation measures to reduce potential adverse impacts.'</i> Further elaboration of what such good practices would consist of is required.	This section refers to disturbance from vessel activity around the pens. Good practice here refers to normal maritime activity and measures to minimise disturbance such as from accidental loss of items / marine litter overboard, minimising operational discharges, reducing activity to a minimum, limiting lighting to navigational requirements, etc	Noted.
8	111	5.11	<i>'Therefore, good practice and measures to reduce spillage into the marine environment will be important to mitigate potential adverse impacts.'</i> Further elaboration of what such good practices would consist of is required.	These are normally measures that are to be adopted on any vessel out at sea to minimise operational discharges and spoilage, including use of bunded containers, keeping chemical containers or similar inside the hold to eliminate the possibility of accidental overboard losses, general housekeeping on deck, etc.	Noted.
9	119	5.42	<i>'It is reported that most of the local tuna farms import baitfish from outside the Mediterranean. This could be a source of algal material as well as parasites or viruses from a different region. One event in South Australia that resulted in</i>	We are not aware of any specific preventative measures in this regard.	Noted.

		<p><i>the decimation of the population of pilchards by a virus, was blamed on the importation of pilchards as baitfish for tuna farms (Earthbeat, 2002), although the connection was not conclusively proven. WWF (2005) also sounded the alarm on the potential impacts of this practice and called on the European Union to ban the use of non-Mediterranean fish as feed in tuna farming (WWF, 200561).</i></p> <p><i>Should such an event occur, the significance of this impact could be major, in particular if the introduced species is invasive.'</i></p> <p>Are there any mitigation/prevention measures in place to avoid such scenarios?</p>		
10	Conclusion	<p>The AA should include a conclusive statement which provides an overall assessment of the proposal and its implications on the Natura 2000 sites.</p>	Included.	<p>As per requirements of Article 6 of the Habitats Directive, the Appropriate Assessment has to conclude whether an impact is significant or not.</p> <p>With regards to light pollution, the assessment carried out is based on unshaded white shades, while according to Transport Malta (PA05858/17/152a), for aquaculture purpose, and with regards to Navigation, the subject, in this case, the zone should be well marked by yellow marker navigational</p>

					<p>buoys, equipped with yellow flashing lights. The assessment should be based on the type of lighting use on site.</p> <p>If the impacts remain 'uncertain' the worst case scenario should be assumed.</p>
<p>Response from AA Coordinator 08/05/2019</p>					<p>ERA reply (19/06/2019)</p>
<p>The assessment concludes that no significant negative impacts are expected from the operation of the aquaculture zone that would affect the integrity of the SAC. Localised impacts are likely from uneaten feed settling on the seabed, but these will be restricted in space and time and will not affect the overall integrity of the SAC.</p> <p>As regards the impact on bird species and the SPA, the AA concludes that there is a degree of uncertainty from certain impacts including light pollution and increased litter and on the potential increase in Yellow-Legged Gulls that may secondarily pose a threat to smaller seabirds of conservation interest, in particular, the Storm Petrel. However, the AA does not identify any significant negative impacts on the Annex I seabirds and the SPA; however, monitoring would be required to ensure that significant negative impacts are truly not incurred during Scheme operation.</p> <p>It is noted that the Conclusion is the same as that in the equivalent AA for development permit application PA/02175/18, which has been approved by ERA.</p> <p>Re: Lights, it is not clear how ERA concluded that the assessment was based on unshaded white shades. The AA</p>					<p>Noted.</p> <p>Through data collected from environmental monitoring programmes and other data from BirdLife Malta, is likely to determine the impact significance and associated mitigation measures, as applicable.</p> <p>AA Coordinator response (30/06/2019): Further discussions and analysis with the avifauna consultant on this point has clarified the matter further based on existing data and anecdotal inference. A separate note is provided in Appendix 3.</p> <p>The application was for a temporary permit.</p> <p>AA Coordinator response (30/06/2019): Temporary permit until the NAZ is set</p>

<p>refers to navigational lights, as well as other lights on farm vessels, in addition to the lights on ships in the adjacent bunkering zone and lights on the mainland. The AA (and the EIA) recommend that lighting be kept to the minimum required for navigational safety and that if the farm adds to these lights (e.g. lights on cages), these will be kept to a minimum and a lighting plan adopted to switch off lights on specific cages when harvesting is completed and on vessels only use downward facing an shaded lights to minimise spill.</p>		<p>up. If the NAZ is not setup, then the permit for PA/02175/18 will remain valid.</p> <p>Reference is made to Appendix 2: Avifauna Baseline Report; Section 7, in which the "specific intervention leading to impact are un-shaded white shades spilling over and beyond the area of influence"</p> <p>AA Coordinator response (30/06/2019): That is a generic statement referring to lighting (at land or sea). The type of light used on marker buoys is standard and required under specific navigational rules. As referred to earlier, this is typically flashing yellow light.</p>		
11	Appendices	The AA is a standalone document; therefore all appendices have to be included in full in the final AA.	Added.	Noted.

2. Consultees' Comments on EIA Report (7th January 2019 – 6th February 2019)

A. Department for Health Regulation – Environmental Health Directorate (Email dated 17th January 2019)

Comments	Response from EIA Coordinator – 25/03/2019
<p>With reference to Environmental Impact Assessment dated January 2019 regarding subject indicated in caption, kindly be informed that this Directorate would like to submit the following comments/recommendations regarding this proposal.</p> <p>The location for the proposed New Aquaculture Zone will be situated in the North of Malta located off east of Comino and Qala Point and north of is-Sikka l-Bajda. The proposal will occupy an area of 4.5 km² to consolidate all tuna farming operation in the North of Malta. Hence it is made sure that this operation is located as far as possible from shoreline to reduce as possible adverse effects on the coastline. The Directorate has no objection with this regard. However the Directorate is concerned with the effects that this project might have on the bathing areas present opposite the NAZ. It is of high importance that all the mitigation measures identified are to be implemented to prevent the risk that any contamination from the fish farm reaches the coastline.</p> <p>Should this proposal be accepted, the applicant is to adopt best practice methods together with good site practices and ensure compliance with international and national legislation related to this project. Moreover, applicant is to implement all proposed mitigation measures so as to cause least nuisance and mitigate adverse effects on the sea water quality. Hence the importance of drawing up and implementation of a Environmental Management Plan to ensure adherence to proper site management practices so as to address sea water quality and water pollution, to mitigate other adverse deployment impacts, including potential oil pollution from maritime traffic and reduction in bottom water transparency due to re-suspension of sediment in particulates by mooring blocks. Monitoring during the deployment phase is also highly recommended so as to ensure implementation of all necessary mitigation measures and adherence to work practices.</p> <p>During the operational stage it is important to adopt Good Feed Management System and implements all proposed mitigation measures so as to cause least nuisance and mitigate adverse effects on the sea water quality caused by the uneaten feed and nutrient loadings in the water column. These include monitoring and stop feeding tuna once they are satisfied. Check the bottom of the fish cage, to avoid the overload of deposit of uneaten fish, bones and other organic</p>	<p>Noted</p> <p>Noted</p> <p>Noted. The environmental permit of each individual operator will include a requirement for an environmental management system and environmental monitoring and reporting.</p> <p>Noted. Environmental monitoring and operational management are part of the environment permit of individual operators.</p> <p>Noted</p>

Comments	Response from EIA Coordinator – 25/03/2019
<p>waste that might be a source of foul smells once these decompose and release gases that are not soluble in water.</p> <p>It is highly recommended that fish bait is defrosted at land to avoid unnecessary release of oil slick at sea. However, the fish bait should be transported in jumbo bags and leak proof containers that prevent any thaw water leaches out of them during the transportation both at land and sea. Oil booms are to be present at all stages of the project and where necessary oil skimmers are to be used to prevent the dispersal of oil slick in sea that may reach the coastline and cause nuisance in the bathing areas. All the mentioned mitigation measures in the EIA are to be adopted by the operator regarding the fish bait to reduce the risk of impact that it may have on the sea water quality and Area of Influence.</p> <p>With regards to waste generated during the deployment and operational phase the applicant is to follow a waste management plan and waste handling procedures as per the current Waste Management Policy. It is recommended that all proposed mitigation measures, including those proposed for the, deployment operation and decommission phase, are to be strictly implemented by the applicant so as to mitigate to the maximum any possible adverse impacts and any negative impacts on the Area of Influence. Discharge of offal, sewage and other waste that will be dump at sea should be carried out under the supervision of the competent authorities once the necessary permits are obtain. It is highly recommended that all mitigation measures established in the EIA are followed to reduce any adverse impact that the may result from said action. Any other unpredicted impacts and nuisances which may arise and that may have a significant adverse effect on bathing zone should be immediately addressed by the developer and/or operators and the necessary mitigation measures taken.</p> <p>Further explanation needed form operators that do not have a land base operation. How they will store feed and packing material? How they will carry out operations that are normally done on land?</p> <p>All the vehicles that will be used in relation to the NAZ have to be in good working condition and adopt good working practices to prevent any oil, fuels and lubricants reach the sea water. Adequate preventive measures are to be taken regarding the potential oil spill from machinery used during the operation.</p>	<p>Training is a requirement of the environmental permit of individual operators.</p> <p>Noted</p> <p>Noted</p> <p>Such a system is part of the environmental permit requirements.</p>

Comments	Response from EIA Coordinator – 25/03/2019
<p>Operators are to make sure that good practice and the necessary measures are taken in account to prevent any littering from anthropogenic materials and/or remain in the sea from this operation. Monitoring and mitigation measures are to be adopted.</p> <p>It is recommended that as part of the Environmental Management Plan training is provided to all personal working at the tuna farm to adhere to all international and national regulations. Furthermore, they can gain the right knowledge of their responsibilities and the mitigation measures that they have to adopt.</p> <p>In the case that fish nets/cages are taken on land to be cleaned, the water that it used for cleaning of these nets is not to be discharged at sea.</p> <p>All operators are to obtain all the necessary permits prior operating in the farm and adhere to all Local and International regulation related to fish farming.</p> <p>A pollution incident control plan should also be in place. Records of all pollution incidents, especially regarding potential pollution of the surrounding environment, are also to be kept and reported to the respective authorities accordingly. Operators should also made responsible for the cleaning of any oil slick that may reach the shoreline especially at the official bathing areas during the official bathing season.</p> <p>A Decommissioning plan is recommended for the North Aquaculture Zone to be set up. A full decommissioning plan should be prepared for approval by the relevant competent authorities.</p> <p>Complaints lodged by the public regarding any adverse impacts/nuisances should be immediately addressed by the applicant/operator. All complaints lodged and actions taken are to be recorded and such records are to be readily available to the Competent Authorities when requested.</p>	

3. Comments received from the public following the public hearing (12th February 2019 – 19th February 2019)

Individual	Comments	Response from EIA Coordinator -
<p>Individual 1</p> <p>(Email dated 15th February 2019)</p>	<p>May I please make my comments and objections regarding the proposed NE Aquaculture Zone.</p> <p>I am against this proposal for the following reasons.</p> <p>1. I see no scope to increase the biomass of Bluefin Tuna (As only Bluefin tuna could be kept 4/5 kilometers out at sea) from the current 3000 tons to 5000 tons before we come to a situation where the impact of oil slime is practically eliminated from all farms. Adding more biomass of tuna which would need to be fed on this side of the Island which caters for 80% of our tourism establishments is not a good idea.</p> <p>2. As accurately explained during the public hearing held last Tuesday it is irrelevant if a farm is situated 4 kilometers 5 kilometers or 8 kilometers offshore, if there is a run off of slime from the farm the current will deposit this slime on to the shore anywhere from Gozo to Zonqor Point. Assuming that the current is running towards the shore. If the current is running outwards the farm could be merely 1 kilometre offshore as no slime will make land.</p> <p>3. As expressed during the public hearing the way forward to achieve a near zero run off, of oil slime sits squarely with how the tuna farm operator does his daily routine including having booms and the use of oil skimmers. If we want this to be achieved as best as possible by the operator we must provide the tuna operator with an environment which he can manage and cope with in spite of when one is working out at sea, it is Mother Nature which dictates the agenda. By placing any tuna farm further out at sea and exposed to much more currents as is</p>	<p>The proposal is to set up an aquaculture zone in the north of the island not to increase biomass. Such aquaculture zones also cater for potential future developments, which may involve different species or an increase in quotas. Even if the current biomass is retained (3,300 tonnes), the temporary farm needs to be relocated to a proper aquaculture zone. The current temporary site is not currently considered to be an aquaculture zone under the Aquaculture Strategy.</p> <p>This would be the case with any farm, including the existing ones (whether they are in the north or south) if no mitigation measures are put in place. In actual fact, the modelling exercise shows that for the same conditions from the NW, slime released from the outer location (where the NAZ is proposed) will take longer to reach the coast if not collected, than it would if released from the temporary location occupied by the cages currently.</p> <p>Agreed. The control of slime is only possible with greater effort from the operators and enforcement by the authorities. Collaboration by all parties will go a long way to improve the situation. However, the same situation applies whether the aquaculture zone is set up in the location being proposed or the existing temporary farms remain in their current location. The conditions at the two sites are practically identical – both are exposed to the same currents.</p>

<p>the case with the proposed NE Aquaculture zone working is harder.. The proposed site is now open and affected by both the Malta/Comino channel and the Comino/Gozo channel.</p> <p>4. During the hearing there was a safety concern arising from the AFM shooting range. To avoid a wild shot coming from the AFM shooting range the farms need to be situated out side this firing zone. This is all good although this could be just a very remote incident, but I see a greater safety concern imposed on all Tuna farm divers that now have to deal with 120 - 140 meters of water below the farm. These depths are very hazardous and extremely risky. I have been diving for 43 years and in the past have experience working in deep waters. Had spent 1 year on The Oil rig Penrod 70 working at depths ranging from 104 - 112 meters, The diving drill is very rigorous, this is commercial diving at its best with back up support as used by the off shore oil industry having diving Bells, Gas supply to divers via an umbilical and the 24 hours decompression was done first from the Diving Bell and thereafter transferred to a decompression chamber.</p> <p>It is possible that with todays technology, Experience Technical divers can descend to 120 meters for a sight seeing tour on shipwrecks, Every experienced technical rebreather diver tries his best to eliminate physical exertion. So much so to avoid running against a deep sea underwater current Technical Divers use powerful underwater scooters.</p> <p>I had done a few 118 meter dives of the wreck of HMS Russel some years back. For a bottom time of 18 - 20 minutes a diver needs at least 4 hours to ascent to the surface safely.</p> <p>This is a very difficult depth to cope with and as far as I know there is not one single Maltese Technical diver who have</p>	<p>Operating at greater depths will require a different approach to the operations. The anchoring system would need to be different and the caging arrangement as well. Divers would not need to necessarily dive to the bottom for inspections – these can be done using cameras and remote vehicles. Most of the maintenance would be on equipment located in shallower waters. This is standard fair but the system would need to be properly designed and deployed.</p> <p>Farmers cannot expect to operate in the same way they have operated in shallower waters. This was the same experience when farms were moved from 20 m to >50 m in the past. Operators would need to adapt to the new situation and use the right tools and technology for the job.</p>
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	<p>ventured beyond the 120meters let alone nearing 140 meters. For most Technical Divers including myself 120 meters is the Everest.</p> <p>Needless to say that Insurance underwriting may request periodical check ups of the moorings securing the farm. Its one thing doing this survey in 50 meters or even 80 meters as some tuna pen operators in the SE Aquaculture zone have to cope with and the depth operators have to face in the proposed NE Aquaculture zone now situated in 120 -140 meters.</p>	
<p>Professional Diving Schools Association</p> <p>(Email dated 19th February 2019)</p>	<p>The Professional Diving Schools Association, as representative of the diving Industry would like to object to the application to increase the Tuna stock capacity from 3000 tons to 5000 tons on these grounds:</p> <p>The oil slick from feeding is still excessive, this is clearly visible from the correct look out point.</p> <p>The present feeding protocol needs to be improved. This has been an issue from the start and has not been sufficiently addressed.</p> <p>Increases in capacity will only aggravate this further. The industry has to show an improvement with the present capacity</p>	<p>The proposal is not to increase the biomass but to establish an aquaculture zone which could potentially contain a maximum of 4,500 tonnes. The zone, which will be managed by the Department of Fisheries, needs to cater for possible future developments, including in farming of new species. In the case of tuna, the amounts that can be farmed depend on the ICCAT quotas. At the moment the biomass that needs to be located in the NAZ is 3,300 tonnes; however, there could also be a situation with biomass relocation from the SAZ to the NAZ if required. Any increase in biomass numbers would have to be approved by ICCAT.</p> <p>The oil slick is controlled through various measures. Greater effort will be required year in year out to sustain this and ensure better results.</p> <p>The feeding methods have been the subject of scrutiny by ERA throughout the last summer and efforts are being made to look into possible alternatives. That said, the application is for the establishment of a zone and not the setting up of a farm. If the zone is established, as proposed, the farms will still operate until their permit expires.</p> <p>The proposal is not for an increase in capacity but to establish the zone. If the NAZ is set up, currently the only biomass to be located in it would</p>

	<p>before any increases are allowed.</p> <p>Increase in usage of access points of Tuna farms will be detrimental to other users. These access points are public areas.</p> <p>Xemxija jetty has been permanently taken over by a local Tuna farm. Increased capacity will see this area deteriorate further.</p> <p>Whereas we are not against the positioning of the cages further out at sea, we do feel that supervision, checks and controls of the industry activities will be more difficult to oversee. The Industry does not have a good reputation for adhering to proper protocol. Positioning the cages further out will place further strain on the authorities to carry out its obligations.</p>	<p>be that approved at the temporary site (i.e. 3,300 tonnes). The area currently applied for is only 3.4 km²; the westward extension to increase the area to 4.5 km² would require a new application.</p> <p>Access points are used by all users as per license / permits.</p> <p>The use of the Xemxija jetty by a tuna operator is done under license/ permit from the relevant authorities.</p> <p>Throughout last year ERA has stepped up its enforcement and inspection activities on all tuna farms. ERA visited the farms regularly (several times per week) and is likely to continue to do so wherever the NAZ will be set up. In addition, with the NAZ, the management responsibility will lie with the Department of Fisheries rather than an individual operator.</p>
<p>Civil Protection Department</p> <p>(Email dated 21st February 2019)</p>	<p>See Appendix 1</p>	<p>Noted; while an interesting document, this mainly relates to safety at sea, which is outside the scope of the EIA.</p>

APPENDIX 1

CIVIL PROTECTION DEPARTMENT COMMENTS

FIRE SAFETY MEASURES IN AQUA CULTURE INDUSTRY

09/01/2019 GF 00250/07 - Proposal for a new aquaculture zone in the North of Malta, Zone Offshore Malta.

The Civil Protection Department have the following comments to make. I went through the method statement prepared by Adi Associates regarding the proposals kindly find our comments for subject in question. If for any reason the TM considers that these recommendations made do not comply with its fire and safety recommendations made, the rules and recommendations applied by Transport Malta will supersede this report.

This information is intended to provide the aquaculture industry and their employees with an overview fire and safety measures during their day-to-day operation/s. Although every attempt is made to ensure that information provided is correct, the report is not intended to be strictly adhered, provided that TM has its own fire safety regulations.

One other topic, which is not directly under the Civil Protection Department responsibility is if the proposals is going to directly or indirectly cause pollution into the RO installations intake that could cause nuisance or disruption into such installations.

INTRODUCTION

The aquaculture industry is a varied workplace with multiple worksites – indoors, on the water. Many situations in the workplace have the potential to cause serious injury or death.

Aquaculture operation owners must take seriously their responsibility to ensure a healthy and safety environment. The loss of workers due to accident and injury can pose serious consequence; require training of new and in-experienced worker.

Risk management strategy might not prevent all accidents but, it will assist in the demonstration of due diligence.

Equipment and machinery manufacturers and chemical suppliers provide manuals and safety sheets. These materials, along with fishery practice, might help to identify the hazards and specify the precautions that need to be taken for the safe operation of equipment and tools and the safe handling of substances (fuel, chemicals,) on board their vessels.

RESPONSIBILITIES

It is the legal responsibility of every contractor and workers alike to ensuring the safety of the aquaculture workplace. Everyone working on the aquaculture farm is responsible, to the extent of their capacity, for the health and safety of all persons at the workplace.

Employers must also:

- Provide and maintain machinery, equipment and materials in a safe condition
- Provide adequate information, instruction and training to enable workers to work safely
- Ensure workers are adequately supervised
- Ensure workers are familiar with the task at hand
- Ensure workers are familiar with the proper use of all personal protective equipment and devices (e.g., guarding) required for their health and safety
- Consult with workers on health and safety matters employers must also post in a prominent place the following information:
 - All chemicals in the workplace.
- Employers must prepare a list of all chemical substances in the workplace which may be a hazard to the health and/or safety of the worker.

Workers' Responsibilities:

Workers (including independent contractors) must take reasonable care to protect their own health and safety, as well as that of others on or near the aquaculture operation.

To ensure health and safety, workers must:

- Cooperate with their employer and use all protective devices, equipment and clothing issued and required by the employer
- Consult and cooperate with the employer and other workers on workplace health and safety issues
- Comply with local maritime Health and Safety regulations
- Cooperate with TM Health and Safety officials
- Report any potential workplace hazards or dangers to a supervisor

Self-Employed Persons:

A self-employed person is required to take the same precautions that a worker would take to protect themselves and others who may be affected by their activities.

Suppliers' Responsibilities:

A supplier is any person who manufactures, supplies, sells, leases, distributes or installs tools, equipment, machinery, devices or biological, chemical or physical agents.

Suppliers are responsible to ensure that anything they supply is in safe condition and properly labeled.

A good health and safety plan should include:

1. A method of identifying hazards
2. Safe work procedures
3. A program for training workers in safe work procedures
4. A method of monitoring workers for safe work procedures
5. A progressive disciplinary policy to ensure compliance with safety policies
6. Documentation of the steps of the health and safety plan as proof of due diligence

Aquaculture Safety Planning

Safety Practices should include:

- The work environment (inclement weather, heat, cold, sun)
- Machinery and equipment (hydraulics, boat stability)
- Navigation
- Diving
- Fish handling (needle-stick injuries, cuts)
- Electricity
- Workplace layout (ladders, decks)
- Combustible materials (gas, diesel)
- Working alone

The following steps are a practical and effective way of controlling hazards:

Identify the Hazard

All tasks, equipment and substances should be examined. When listing hazards use:

- Information from past incidents and workplace injuries
- Product literature and information from suppliers
- Best industry practices
- Sight, smell, touch and hearing senses
- Employers need to obtain and read the manuals and safety sheets that are provided by equipment, machinery, and chemical manufacturers.
- Employers should also develop and implement communication and emergency plans to allow for a timely response in the event of an incident.

BOAT, DECK & NAVIGATIONAL

The size and type of boat depends on the size of the operation, the type of activities to be carried out, the distance the lease is from shore, the depth of water available and the amount of product or material being transported. Regardless of the size of the boat or operation, every worker is exposed to many of the same hazards.

Common Boating Hazards are:

- Grounding
- Mechanical difficulties
- Flooding
- Capsizing
- Loads shifting
- Persons falling overboard
- Weather related injuries such as sunburn, sunstroke, hypothermia or lightning
- Drowning
- Entanglement in gear or hauling equipment
- Cuts from knives, lines, socks, tongs etc.
- Hearing damage due to loud noises

General Safety Precautions:

The key components for vessel safety are:

- A stable, seaworthy vessel
- A properly trained crew
- Appropriate lifesaving/rescuing equipment and procedures

- Safe navigation practices, equipment and operating procedures
- Protection against fire and explosion
- Proper maintenance of all engines and equipment
- A communications system
- Written procedures for the safe operation of every vessel type must be provided and the crew trained on the procedures.
- Aquaculture crews must be aware of small boat safety issues/regulations and have the appropriate TM approved training.

Personal Protective Equipment:

- Each vessel must, at a minimum, have the appropriate TM approved personal flotation device in sufficient quantity for each crewmember. When the water is cold and the risk of falling in is high, a floater suit or other survival gear is to be worn.
- Wear the appropriate clothing for the season and task. Don't wear loose-fitting clothing or jewelry around moving equipment, lines, etc.
- Wear gloves for hand protection.
- Wear foot protection with good traction.
- Protect eyes with safety glasses or goggles when the activity requires eye protection (e.g., hauling lines covered with bio-fouling).
- All boats must have a first aid kit stored in a dry place. Replace used and outdated contents regularly.
- Each vessel must be outfitted with the appropriate safety equipment according to TM and/or Fishing Vessel Safety Regulations and/or Fisheries department for detail on the equipment for your vessel size and voyage type.

Loading/Unloading the Vessel:

- Steps must be taken to ensure the safety of persons loading or unloading the vessel.
- Equipment and product should be loaded evenly throughout the boat and the capacity and weather conditions must be considered to prevent overloading or capsizing.
- The load and equipment should be kept as low as possible and secured to keep it from shifting or affecting the boat's stability and buoyancy.
- Always have one hand holding a railing or another piece of the boat when reaching over the side or stern (e.g., to grab a line or wharf).
- Use the provided means of boarding/exiting the boat (e.g., ladder). Keep the ladder in good condition (i.e., well constructed, secured and maintained).
- Take care not to get jammed between the boat and the dock or wharf when boarding or exiting the boat or when tying off.

Hauling Equipment:

- Visually inspect equipment and gear and replace anything that is worn, broken, has excessive wear and tear, or is otherwise unable to properly serve its purpose.
- Stand clear of the hauler unless you are the operator.
- Keep hands clear of the line as it is going over the hauler and star-wheel.
- Stay clear of the gear (e.g., line, cages, buoys) as it goes over the hauler to avoid being hit.
- Keep a sharp knife available to cut jammed lines (e.g., sinker or buoy lines). Store the knife in a sheath or on a rack with the blade pointing down.

- Never stand under a load or in areas where overhead equipment may swing or drop and cause serious injury.

Navigation:

- Crews must avoid high-speed operation near shorelines, other leases or fishing gear and respect any boating restrictions in place.
- At least one member of the crew must have knowledge of shipping routes, navigational markers and hazards as well as the prevailing navigational conditions (e.g., currents, weather patterns) to ensure the safe operation of the boat.
- At least one crewmember must know the rules of navigation and be able to identify the common aids to navigation used in the areas they are traveling.
- All navigational safety equipment (sound-signaling devices, radar reflectors, navigation lights, etc.) must be in good working condition and placed in the appropriate location.
- To determine a safe boating speed, consider the visibility conditions, wind/water conditions and currents, maneuverability of the boat, boat traffic in the area, and the proximity of any navigational hazards.

Weather Conditions:

- Activities on the water that will require long periods of good weather should only be undertaken when the long-range forecast is suitable to ensure the safe completion of the task.
- When carrying out activities on the lease, the boat captain or mate should be watching for signs of approaching bad weather and must monitor weather updates until returning to port.
- In the event of inclement weather, boat captains must be aware of the appropriate precautions to take in order to protect the crew (e.g., nearest shelter, return to port procedures).

Chemical, Fuel and Lubricant Safety

Chemicals, fuels and lubricants can pose a hazard to both the environment and the persons using them. Proper handling, transport and storage are critical for maintaining the health and safety of anyone coming into contact with these substances. The majority of chemicals, fuels and lubricants used on aquaculture operations are associated with the routine use of vehicles, vessels and equipment. However, materials used for cleaning fouling from gear (e.g., hydrated lime) pose similar hazards and therefore require workers to exercise many of the same health and safety precautions.

Recognize that long-term exposure to some substances can cause chronic health problems while other chemicals can cause immediate and acute symptoms, for both the boat crew and on land environment, with all the associated hazard mentioned in the Adi Consultants report.

Safe Procedures

Chemical Storage:

- All chemicals must be properly stored in a well lit and well ventilated area, separate from other chemicals that may cause them to react dangerously.
- Chemicals should be stored in the original containers with the labels intact. Damaged labels must be replaced.

- Chemicals must not be put into food or beverage containers.
- Post warning signs and emergency numbers on any pesticide storage area(s).
- Obtain and keep Material Safety Data Sheets (MSDS) on file for all chemicals that are in the workplace (Note: suppliers of these chemicals are required by law to supply you with the MSDS sheet upon request).
- Keep absorbent materials to clean up spills (e.g. lime and/or sand, absorbent pillows) near the chemical storage area and the area where the product is being used.
- Only reasonable quantities of fuel, oil and chemicals to carry out the operations should be stored on site.

Chemical Applicators:

- Chemicals must be used in the manner for which they were intended and under the appropriate conditions.
- Crew members who have contact with hazardous materials (chemicals, cleaners, fuels) must be trained in the handling of these Hazardous Materials.
- All workers must have the appropriate personal protective equipment (refer to the Material Safety Data Sheets) and be trained in the safe handling of the chemicals they will be required to use.

Disposal of Chemical Containers:

- Empty and clean containers to remove all traces of the chemical.
- Return all empty containers call the Environment Regulations Authority, for information on safe disposal.
- Material Safety Data Sheets provide disposal information.

Transporting of Chemicals:

- Secure hazardous substances/chemicals during transport and do not leave them unattended unless in a locked container.
- Chemicals, and other potentially harmful substances must be secured outside of the enclosed portion of the vehicle in which workers are being transported.
- Keep a record of all chemicals that you are transporting.

Refer to MSDS sheets for important information on the chemical's hazards, personal protective equipment, storage and disposal.

Diving Safety Section

Diving is an integral part of the aquaculture operation, divers often:

- inspect the lines, anchors and general condition;
- assist with double socking and basic crop operations.

While some growers only need to snorkel to check their operations, others must use Self-Contained Underwater Breathing Apparatus (SCUBA) to dive. However, all divers must be knowledgeable about the type of diving they are about to carry out, the conditions at the dive site and the tasks they are about to perform. Diving operations must be well planned and be carried out by experienced divers with the proper knowledge, training and experience to carry out the work they are assigned to do. Only experienced divers trained in the hazards of diving among floating structures, suspended shellfish lines and anchoring systems must be allowed to dive around off bottom aquaculture sites.

Spot the Hazard

Working under the surface of the water can pose special hazards. Divers are always exposed to the risk of drowning, respiratory or circulatory problems, hypothermia or physical injury. Hazards of diving on aquaculture operations include:

- Limited visibility created when sediment is stirred up in the water;
- Divers getting caught away from the boat in inclement weather or strong currents;
- Experiencing mechanical difficulties with the SCUBA gear;
- Getting caught or tangled in the aquaculture gear;
- Getting hit by the dive boat, aquaculture gear or other boat traffic in the area.

Assess the Risk

Consider the task to be carried out and whether it would be more beneficial to have a contracted diver, or a certified diver on your workforce, carry out the activity. Plan the diving operation taking into account the activity to be carried out, the dive area, the level of risk and any precautions that should be undertaken.

Safe Procedure

All divers should have above average swimming ability.

All divers must have valid First Aid certificates, be instructed in the work procedures they will be required to carry out and must know how to safely operate other equipment they are required to use.

Diving operations must never be done alone. Divers can be difficult to see in the water. If you are navigating and see the diving flag, buoy or placard, reduce your speed and keep well clear of the vessel and diving site.

Divers must not dive if they are in any way unfit to do so (e.g., ill, fatigued, impaired, injured, etc.).

Weather and water conditions in the area of the planned dive must be considered and diving must be suspended if weather or water conditions are hazardous or likely to become hazardous.

A diver must not be forced to dive or be penalized for not diving if, for valid reasons, he or she decides not to enter the water. Un-tethered diving below ice surfaces must not occur, deep diving (depths greater than 10 metres and night diving should be contracted to professional divers knowledgeable of the special procedures and hazards involved with these activities.

In the event that diving operations are contracted out, the aquaculturist must require that the operation is carried out in compliance with all applicable health and safety regulations. Divers must not stray from the posted dive site. Only equipment/vessels that will be used in connection with the dive should be brought within the dive site boundaries. Divers must be provided with a lamp or other suitable device during periods of darkness. The dive site or underwater work site must be adequately illuminated if the nature of the dive permits. Snorkel divers should use the buddy system when diving and be equipped with a whistle, weight belts (if required) with quick release closures, and thermal protection. Cage guards must be placed on all propellers, or props on boats must be disengaged and locked out while being used as a dive base. Divers conducting a dive in open water without a lifeline must carry an audio or visual signaling device.

A dive must not occur if a health or safety hazard may be caused by equipment at or near the dive site, unless the divers are protected from the hazard.

Additional Requirements for Aquaculture Occupational SCUBA Diving. Everyone involved with the dive (divers, lease owner, boat captains, and deck hands) has a responsibility to ensure that this Code of Practice is followed.

DIVING SAFETY SECTION

The Code of Practice must be followed by all and enforced by the person with the most control over the situation.

All SCUBA divers must be medically fit and be declared fit to dive by a medical specialist from the Hyperbaric Chamber of Mater Dei Hospital annually or as proposed by a risk assessor specialized on this type of risks.

“Occupational Safety Code for Diving Operations.”

Competency Standard for Diving Operations for their position and the depths and circumstances of the dive.

Every SCUBA dive site must have present a dive team consisting of at least two certified divers.

When no hazards are identified (i.e., good weather conditions, no appreciable currents, good underwater visibility, no possibility of entanglement, and good way in and out of the dive site), two divers in the water may act as standby for each other providing that each diver is free swimming, the no-decompression limit is not exceeded, each of the divers has been trained to rescue a diver in trouble, and the divers are in close proximity to each other at all times. If the second diver is no longer in the water they must act as a standby diver. A standby diver on the surface may also perform other duties provided they do not compromise their ability to promptly render emergency assistance to the diver(s) in the water. There must be an additional team member at the dive base who is knowledgeable of safe diving procedures on the aquaculture site and has the ability to respond in the event of an emergency.

A written dive plan tailored to the specific dive site must be prepared before a dive is conducted at a dive site. The dive plan must include:

- A description of the tasks to be performed at the site
- Work procedures for each type of dive
- Diving equipment to be used
- Estimated maximum time to be spent at each depth
- Decompression tables and procedures to be used
- Procedures to identify and address health or safety hazards at the dive site
- A list of industrial plants and water control facilities in the immediate area of the dive site
- Instructions for getting medical assistance
- Instructions for evacuating an ill or injured diver from the dive site
- Emergency procedures for responding to any loss of communication
- Emergency procedures for responding to diving equipment malfunction
- Emergency procedures for responding to hazardous weather or water conditions
- Emergency procedures for aborting a dive

DIVING SAFETY SECTION

- Emergency procedures for responding to any difficulties in keeping the dive base stationary. Before the dive, the diving team must be briefed on the following:
- Dive plan including the planned location of all dives

- Work to be carried out
- Possible hazards that may be encountered
- Intended duration and maximum depth of the dive(s)
- Decompression table to be used
- Communication signals to be used
- Planned location of all divers
- Any emergency procedures to be followed in the event of an accident or unsafe conditions. Any individual on the diving team has the authority to restrict, prohibit or suspend any diving operation or diver if the conditions are thought to be unsafe. Divers must keep a logbook that has the name of the diver written on it, is permanently bound and has consecutively numbered pages. The diver logbook must be kept at the dive site at all times during the diving period. The diver must make and sign an entry in the logbook as soon as reasonably practicable after a dive and before leaving a dive site. Another member of the diving team must countersign an entry in the diver's logbook and make note if they disagree. A dive base logbook must be kept to record the name of the diving team, records of all equipment examinations, and an entry for each planned dive or dives conducted by a diver.

An entry in the record must include:

- Date of the dive
- Geographic location of the dive
- Name of each diver
- Unique identifier of any vessel or installation from which the dive was conducted
- Type of diving equipment used
- Weather and water conditions during the dive
- All underwater worksite hazards
- Indication of whether the dive occurred in a contaminated environment,
- Indication that the no decompression limit tables have been followed
- Time each diver started and finished the dive
- Work performed and procedures used during the dive
- Maximum depth of the dive
- Any decompression table used or procedure followed

DIVING SAFETY SECTION

- Any accident or near miss or unusual incident with the potential to affect health or safety
- Any discomfort or illness experienced by a diver
- Any other factor that might be relevant to the health and safety of the divers

(Appendix A)

A signed copy of the diving record must be filed with each employer within seven days of the end of a planned dive or dives.

An employer with whom a diving record is filed must retain the record for at least two years after the date for which the last entry was made. Divers must have a two-way system of communication with the person manning the dive base (voice or pre-arranged communication signals on a lifeline or float). The dive base (e.g., boat, onshore platform) must be stable and large enough to fit all persons and equipment required in order to complete the dive safely. If the dive base is not onshore it must be equipped with a method of evacuating persons. It must also be capable of remaining stationary or moving

without posing hazard to the health or safety of the dive team. Buoys, lights, flags, lamps, barriers or placards must be placed and displayed to define the boundaries of the dive site. A notice clearly setting out the boundaries of a dive site must be posted on each vessel at the dive site. Only equipment to be used in connection with a dive may be brought within the boundaries of a dive site. The dive base must remain on site at all times while a diver is in the water. The dive base must be equipped with a means of immediately bringing an unconscious diver out of the water. Each dive site must have an up to date list of the locations/telephone numbers of the hyperbaric chambers and hospitals nearest to the dive site and a #2 First Aid Kit. All diving equipment that is necessary for the safe conduct of the diving operation must be kept in adequate condition, examined by the diver at least once each day it is used. Malfunctioning diving equipment must be removed from service immediately, clearly identified as malfunctioning and must not be used until it is repaired and tested. Repair records must be kept for two years after the date of repair.

DIVING SAFETY

Diving equipment must be tested in accordance with manufacturer's specifications. The owner of the diving equipment must keep a record of diving equipment testing for at least two years after the date of the test or until the equipment is retested, whichever is longer. Immediately before conducting a dive, the diver must check that they have the required diving equipment and that it is functioning properly. Dive team members who become aware of a diving equipment malfunction or hazard on the dive site must notify the other divers who may be affected by the malfunction immediately. If the malfunction occurs during a dive, and no replacements are available onsite, the dive must be immediately aborted in co-operation with the other diving team members.

Each diver must be equipped with a strong, sharp knife; weights with a quick release mechanism that are sufficient to control buoyancy; a diving suit or other protective clothing; and adequate head protection while conducting a dive that exposes the diver to a hazard of falling objects or head injuries. Any gauge or metering equipment that may affect the health or safety of a person must have been tested by a competent person within the 12 months immediately before it is used.

A dive must not be conducted if a health and safety hazard may be caused by equipment near the dive site, unless the divers are protected from the hazard (e.g., locked out). SCUBA is permitted to be used at commercial aquaculture underwater work sites for diving near unscreened/active underwater intakes less than 10 centimeter in diameter if it is integral to normal operations and the employer has implemented an OHS approved written safe work practice that includes the dive plan.

ELECTRICAL SAFETY

Electricity is an essential component of any aquaculture business. However, it also has the potential to cause serious damage and harm. Proper care and attention should be given to the maintenance and use of electrical units. While the use of electricity can be taken for granted, it is important to appreciate its ability to cause serious harm or death; the necessary precautions need to observe to keep your workplace safe.

Safe Procedures

- Strictly observe the applicable rules under the IEE electrical code.

- LOCK OUT main switches and place locks and tags in them before working on power circuits so that no one else may use them while you are working.
- Have periodic electrical inspections made by qualified persons.
- Allow only qualified individuals to work on electrical repairs.
- Ensure wiring, equipment, leads and plugs are kept in good repair.
- Don't overload your wiring installation.
- Consider every circuit to be live and use proper instruments for testing circuits.
- Ensure that extension cords and devices are properly grounded.
- When replacing a fuse or circuit breaker ensure that its rating is correct for the circuit.
- All bench-mounted power tools should be properly grounded.
- Avoid (to the extent possible) using electrical equipment in wet weather and working conditions. Properly ground electrical equipment that is to be used in wet areas (i.e., plug it into a ground-fault circuit interruption outlet).
- In areas exposed to the elements, or where the presence of moisture could routinely pose a hazard, always use weather-proof outlets and fittings.

The use of electrical equipment in wet conditions can be extremely dangerous. Extreme caution should be used when using electrical devices or equipment in wet weather or working environments.

ELECTRICAL SAFETY

Overhead Power Lines

If it is necessary to operate equipment in any location where overhead lines are present, consider the following points:

- Be aware of overhead power lines. It is imperative that minimum approach distances to overhead power lines be maintained.
- Inspect equipment for operating height and be sure to include extensions or any objects that may add to the overall height.
- Ensure that equipment is put in the lowered position prior to moving under power lines.
- Call an electrical expert if you intend to operate any mobile equipment or machinery that exceeds 4.15 metres when overhead lines are present. Never attempt to measure line heights yourself. Utility representatives can safely determine the height of power lines and recommend steps to be taken.
- Remember that warm, humid weather or other activities such as backfilling may cause a reduction in the distance between the lines and the top of any equipment operating below.

What do you do if you come in contact with outdoor power lines? If equipment does come in contact with electrical lines remain calm and assess the situation. It is always best to stay in or on the equipment. If the equipment is still functional try and move away from the power line to a safe distance of at least 50 feet. Have someone call the local electric utility and warn others to remain clear as the ground may be energized. Stepping off the equipment while it is energized will create a path to ground the electrical current and cause electrocution. Stay in/on the equipment until a representative from the electric utility advises it is safe to exit. Any equipment involved with electrical contact must be thoroughly inspected prior to going back into service. There may be damage to tires, hoses, hydraulics or other components of the equipment.

EQUIPMENT AND MACHINERY SAFETY

Machinery and equipment make work easier for many of the tasks carried out by today's aquaculture farmer. However, if neglected or abused these powerful units can cause serious injury or death.

Common Hazards

Some of the hazards associated with machinery/equipment which can potentially cause injury include:

- Machine components that cut or grind
- Any crushing or shearing points
- Hot parts of any machine where the surface temperature may cause injury, fire or explosion
- Gearing, cables, sprockets, chains, clutches, cams or fan blades
- Rotating PTO drive lines and other shafts
- Projections on rotating parts (e.g., keyways, keys, grease nipples, set-screws, bolts)
- Pressurized air or hydraulic fluid

Safe Procedures

- Ensure that the machinery/equipment is only used for the purposes it was designed.
- Ensure that power-operated machinery/equipment is inspected each day before being used.
- Before starting any machinery/equipment make sure that it is safe to do so.
- Ensure that the operator of any machine/equipment has unimpeded access to the shut off.
- Ensure that the machine/equipment is operated by competent persons.
- Do not get on or off machinery/equipment while it is in motion.
- Do not walk in or under the path of travel of any material being loaded or unloaded.
- Do not ride on the load of a vehicle used for hauling.
- Tools and other potentially harmful equipment must be firmly secured outside of the enclosed portion of the vehicle in which workers are being transported.
- When working around moving parts of machinery wear close fitting clothing, confine head or facial hair and avoid wearing dangling jewelry or rings.
- Protect users, operators against burns caused by hot parts.
- Ensure that there is ample working space, ventilation and lighting when operating, adjusting or repairing machinery/equipment.
- Powered mobile equipment should not be operated in closed areas for prolonged periods of time and must be well maintained to minimize the fumes being introduced into the workplace.
- Ensure that back up alarms on mobile equipment are properly functioning.

EQUIPMENT AND MACHINERY SAFETY

Guarding of Equipment & Machinery:

- Manufacturers of new machinery/equipment are legally required to ensure dangerous parts are safely guarded so that operators and others are protected from injury.
- Original guarding must be left in place and properly maintained.
- All moving parts of machinery should be guarded.
- Have guards designed and fitted for older machinery/equipment. Get rid of machinery/equipment that cannot be made safe.

Maintenance of Equipment & Machinery:

- Ensure that the machine/equipment, its air and hydraulic lines, hoses and components are maintained in safe working condition.
- Ensure that all defective parts are repaired or replaced prior to use.
- Ensure that machinery/equipment is lubricated only when it is at rest (or as directed by the manufacturer).
- Do not repair power-operated machinery/equipment while it is in use (especially when steam, air or hydraulic lines are pressurized).
- When any mechanically operated attachment to a vehicle is elevated for repairs or maintenance, securely block the attachment to prevent movement. When no repair or maintenance is occurring, lower the attachment to a safe rest position. Keep children and bystanders away from those areas where tools, equipment or machinery are being operated or maintained.

ERGONOMICS SECTION

Designing a Healthy Workplace

Ergonomics looks at the relationship between the demands of the workplace and the ability of the worker. Repetitive strain and carpal tunnel injuries are common among aquaculture workers. Redesigning the workplace or reorganizing tasks can increase productivity and lessen down-time due to injury related absences.

Common Hazards

Hazards that contribute to workers experiencing repetitive strain type injuries include, but are not limited to:

- Improperly laid out work areas
- Work that must be completed at a fast pace
- Activities that do not allow workers to change tasks
- Activities that restrict the flexibility of the body's position (e.g., prolonged standing in a stooped position, repetitive reaching and twisting of the body, working with arms elevated)
- Standing on a hard floor and having limited ability to sit down while working,
- Working in excessive or prolonged heat, humidity, cold or vibration
- Working with worn or improperly maintained tools that increase the amount of force required to carry out the task
- Activities that require force to be concentrated on small parts of the body (i.e., wrist)

Safe Procedure

- Mechanical or powered aids (e.g., hand trucks, push carts, conveyors) should be provided, where practical, to assist with carrying or moving materials and articles.
- When mechanical aids are not available or practical, consider the weight and bulk of the object you are about to lift and ensure that an adequate number of persons perform the task.
- Floor mats should be provided in areas where prolonged standing is required.
- The effects of undesirable environmental conditions (e.g., excessive noise, heat, humidity or cold, insufficient lighting) should be minimized to the extent possible.

- Choose power tools and equipment with features designed to control or limit vibration.
- Where possible, fit the work area to the worker's body size and shape in order to decrease the effort required to complete the task.
- Avoid working in one position for long periods of time.
- Use the proper methods for lifting heavy loads.

FIRE PREVENTION SECTION

Fires and explosions on the aquaculture farm can be caused by a number of things including fuels, faulty wiring, overheating equipment and welding. Unfortunately, fires can also occur on the aquaculture boat. These hazards can cause damage to buildings, equipment and machinery as well as serious injury or death.

Common Hazards

Common fire hazards found on aquaculture operations include:

- Improper storage of flammable and combustible materials
- Faulty/damaged electrical wiring (coating on wires are susceptible to salt water and can corrode or rot over time)
- Malfunctioning or overheating equipment/machinery
- Sparks from welding
- Smoking around flammable/combustible materials
- Overloaded outlets
- Ruptured fuel line
- Improper refueling of boats
- Improper ventilation of enclosed spaces that contain fuel (e.g., bilge or gas storage areas)
- Leaking propane or oxygen tanks
- Improper storage of oily rags

Safe Procedure

- Develop and train workers on the emergency plan for responding to fires. Emergency numbers (112) should be posted near all the telephones.
- Inspect all electrical systems annually (more regularly as suggested by the manufacturer or if you are experiencing problems with flickering lights, disruptions of power, etc.).
- Never overload an outlet or a circuit.
- Keep extension cords in good repair.
- Protect light bulbs and heat lamps with a wire cage.

Storage of Flammables/Combustibles:

- Store all flammable and combustible materials away from oxygen tanks and sources of heat (e.g., open flames, engines, equipment, day light).
- Give consideration to the fire characteristics of all flammable and combustible materials prior to storage, handling and piling.
- Store fuel in labeled containers. Store flammable products in their original containers.

FIRE PREVENTION SECTION

- Pile flammable/combustible materials in a manner that will not obstruct exits, will minimize the potential for (or spread of) fire, and will permit convenient access for firefighting.
- Limit the flammable or combustible materials that you keep on board the boat to those that are necessary for the daily maintenance and operation of the boat.
- Carry out work requiring the use of flammable materials in a well ventilated area away from any materials that could be ignited by a spark.
- Never pour gas from a gas container with a spout into a running or hot pump/motor. Implement a “no smoking” policy around machinery operation, fuel or flammable products storage areas, and fueling stations.

Fire Prevention on Boats/Vessels:

- Each vessel must have the appropriate sized fire extinguishers.
- If your boat has a fuel-burning cooking, heating or refrigeration appliance it must have the appropriate sized fire extinguisher mounted by the appliance.
- Fire extinguishers must be kept fully charged and be renewed as specified by the manufacturer.
- Properly secure, protect and ventilate all propane appliances and cylinders. Make sure that all valves are in proper working order and that all connections are tight.
- Keep bilges clean and free from oil and fuel. Keep the bilge pump in good working order.
- Provide the appropriate ventilation and exhaust for boats and machinery in enclosed areas.
- Properly store and maintain batteries.
- Ensure that electrical systems on the boat are installed by a qualified individual.
- Properly lubricate and adjust machinery to minimize friction.

Refueling Safety Precautions:

1. Moor the boat securely.
2. Shut off engines; make sure all passengers are ashore.
3. Don't smoke and extinguish all open flames; close all windows and hatches.
4. Take portable tanks ashore.
5. Don't use electrical switches.
6. Ground nozzle against filler pipe; don't overfill.
7. Wipe up any spillage; turn on blower for at least five minutes.
8. Check for vapour odours.

FIRST AID AND EMERGENCIES

It is important to be prepared for an emergency situation before it happens. Statistics show that workers trained in First Aid are less likely to have workplace incidents and the recovery time of workers who do get injured is generally much shorter. Having a crew trained in First Aid and CPR could be the difference between life and death. Aquaculture and fishing boats are also required to carry a variety of equipment for use in case of emergencies (i.e., boat safety, distress and navigation equipment). Employers should check with TM to determine the requirements for their size/type of vessel.

General Precautions

1. Ensure that the required number of workers hold valid emergency, standard, or advanced First Aid certificates from a recognized training agency.
2. Keep a record of all injuries, even minor ones, and note any First Aid care that was given.
3. Ensure that First Aid service is accessible to all workers during all working hours.
4. Ensure that transportation is available at all times to transport an injured worker.
5. Ensure workers understand the need for First Aid kits, that the kit is adequate for the number of workers and located in the current work area.

Safe Procedure

Prior to beginning an activity ensure that each worker is:

- Instructed in the proper and safe procedures
- Aware of the potential hazards of all job functions
- Instructed in the proper use, care and limitations of protective clothing and equipment
- Instructed in the location of the First Aid supplies
- Aware of the appropriate procedures for obtaining medical attention

FIRST AID AND EMERGENCIES

Level of Training Requirements

Emergency First Aid Certificate At least one person at each workplace (i.e., vessel) (this has to be confirmed with TM)

First Aid Kits are procure according to the number of employees working on site:

- The required number of people must have the appropriate level of First Aid training from a recognized training agency.
- Provide an adequate number of the appropriate First Aid kits.
- Clearly mark the First Aid kits and store them in an accessible area. Workers must know where all First Aid kits are located.
- Keep the First Aid kit(s) current by making sure that the contents have not passed their expiry date and that replacements have been added to the kit after use.
- Transportation must be available at all times to transport an injured worker to a medical facility.
- A means of communication must be available to workers working in isolated locations (i.e., on the water).
- Keep the required distress, boat safety and emergency equipment in a dry, easily accessible area.
- Keep a record of all injuries and note any First Aid that was administered.

Emergency Planning:

Being prepared for an emergency situation can save lives, time and money. The employer must:

- Develop procedures for dealing with emergencies (e.g., sinking, fire, person overboard) and ensure that the crew receives the appropriate training.
- Ensure that all workers are aware of the emergency plan that you have developed for responding to emergencies. They must know how to call 112 or the AFM Maritime Squadron number and be capable of relaying a description of their location (e.g., GPS position, known landmarks to the emergency responders).

HAND AND POWER TOOLS SECTION

Repairs and maintenance of machinery and equipment can often lead to injury if an incorrect or faulty tool is used. It is important to take the time to understand the potential hazards associated with the equipment and tools found on the worksite.

Common Hazards

Often workshop and repair incidents occur because of:

- Inexperienced workers trying to use tools for the wrong task
- Improper working space in a cluttered, poorly lit and unventilated area
- Improperly grounded electrical cords
- Improperly guarded tools and equipment

Take the time to identify potential hazards in all workspaces, and develop safe working procedures for your workshop and repair or maintenance tasks. Ensure that all workers are informed of these procedures and are able to carry out the tasks safely.

Safe Procedure

- Workers must have proper training in the safe use of any tool they will be using.
- Keep tools in good condition and replace or repair defective tools (e.g., cracked, splintered or broken handles on files, hammers and screwdrivers) before using. Do not use tools if the casing is broken or damaged.
- Properly repair or replace any damaged cords or plugs on power tools.
- Do not make adjustments to a power tool without first shutting it off and removing the plug from the outlet.
- Do not use makeshift extension lights. Use a type with a guard around the globe and an insulated handle.
- Keep cutting tools sharp. Cover sharp edges when not in use.
- Point sharp tools (e.g., saws, knives) lying on benches away from the work area and do not allow handles to extend over the edge of the bench top.
- Wear safety glasses or goggles and well-fitting gloves appropriate for the hazards.
- Use tools for the purpose they were intended and do not apply excessive force or pressure on tools.
- Do not cut towards yourself when using cutting tools.
- Do not carry tools in a way that interferes with using both hands on a ladder.
- Do not throw sharp tools or carry them in your pocket.
- Maintain tools. Keep them clean and dry. Store all tools properly after using.

Keep your workshop area clean and tidy to avoid workplace incidents.

HOISTING & CONVEYOR SYSTEMS

Many aquaculture operations use some form of a hoisting system or conveyor on their operations. While some of these machines are found in the warehouse (e.g., conveyor belts, agitators), others can be found on the boat (e.g., hydraulic winches and star-wheels). Because these pieces of equipment are intended to lift or move much heavier loads, they can be dangerous to be around if not given the proper respect.

Common Hazards

General areas that may pose hazards with hoisting systems and conveyors include:

- Improperly trained operators
- Lack of guarding on moving parts (e.g., pinch points, wrap points)
- Improper lock out or block out procedures
- People riding on the load or the equipment

- Workers not wearing the appropriate personal protective equipment
- Worn equipment

Constant vigilance is required when working with machinery or equipment. Hoisting systems and conveyors must be inspected regularly and workers given the appropriate training to ensure that they are aware of the risks involved.

Safe Procedure

Personal Protective Equipment:

- Aquaculture workers must determine if a hard hat or safety shoes are required for the activities being carried out.
- When working near a hoist, boom or conveyor, wear gloves, tie back long hair, and do not wear loose clothing or jewelry.

Operators and Crew:

- Never operate equipment or mechanical systems unless you have been properly trained.
- Stand clear of the load that is to be lifted. Do not pull the load by hand. Push the load if it must be steadied. Never try to help lift the load.
- Do not lift the load from the side. Lift from directly over the load.
- Do not pass a load over the head of workers or stand under the object being lifted.
- Operators should ensure everyone is away from the load before they start the lift, move the controls smoothly and remove slack from the hoisting ropes or cables prior to starting the lift.
- Do not allow anyone to ride on the lifting system or the load that is being lifted.
- Do not raise the load any higher than is necessary for clearance.
- Do not leave suspended loads unattended.

HOISTING & CONVEYOR SYSTEMS

- Everyone working around the equipment should know the communication signals for stop, go, lift the load, etc.
- Only workers involved in the task should be near the lifting system or conveyor while in operation.
- Unless the conveyor is stopped and locked out workers must not stand on the supporting frames of an open conveyor while loading, unloading or clearing blockages.

Equipment:

- Inspect the lifting system prior to lifting a load to ensure that all components are working properly. Replace any worn or damaged components before using.
- All moving parts (e.g., pinch points, rollers) must be guarded.
- When a conveyor is to be used outside or in damp conditions, use weatherproof electrical components.
- All lifting systems should have the safe load limit posted in a prominent position. Do not exceed this limit.
- Lifting devices (e.g., hook, rope loops) must be positioned properly before lifting the load.
- Shut down and lock out the power before making any repairs to any mechanical or hydraulic system. Repair the system according to the manufacturer's guidelines.
- Conveyor type of machinery/equipment should be placed so that hazardous shearing points between moving and stationary parts are avoided.

In the event of an emergency, all workers must know the location of the shutoff and how to use it.

Rope Safety:

- Always inspect the rope that you will be using.
- Check for damage or chafing.
- Don't exceed the safe working load of the rope.
- Avoid sudden strains or jerks that might snap the rope.
- Never expose the rope to chemicals that can weaken its integrity.
- Do not store rope in direct sunlight or damp conditions. Blocks, Sheaves & Other Fittings:
- Blocks should be regularly inspected, lubricated and maintained.
- Sheaves should be properly guarded.
- All bushings, nuts, bolts, etc. should be inspected regularly for signs of wear and replaced as necessary.

HYDRAULIC SAFETY

While hydraulic systems allow us to lift and move large, heavy objects with minimal effort, if they are not properly maintained or adjusted they can cause serious injury or death.

Common Hazards

Hydraulic fluid is extremely toxic and can cause human flesh to deteriorate. Precautions must be taken to keep hydraulic fluids from entering the eyes or being injected into the skin. Hydraulic systems that are improperly blocked can cause the active piece of equipment or the load it is bearing to fall – resulting in damage to equipment or property and serious injury or death to anyone standing under the load or in the area where the equipment may swing. Individuals who perform maintenance tasks should be experienced, and should be knowledgeable in safe procedures for blocking and relieving pressure from the hydraulic system.

Safe Procedure

- Read and follow safety procedures in the manufacturer's manual.
- Never operate equipment or mechanical systems unless you have been properly trained.
- Exercise caution around raised hydraulic cylinders.
- Have an up to date maintenance schedule. Replace defective parts on hydraulic systems immediately to ensure that leaking fluid or faulty parts do not compromise the integrity of the system.
- Check for hydraulic fluid escaping through pinhole leaks by passing a piece of cardboard or wood over the suspected area. Do not check with your hand as the high pressure of pinhole leaks can puncture skin. Have a physician treat any hydraulic skin punctures immediately.
- Before servicing or repairing any hydraulic powered equipment lower it to the ground or block it mechanically, shut off the engine that powers the hydraulic pump, release hydraulic pressure (i.e., move the hydraulic lever back and forth several times), let the system cool down and then follow the manufacturer's servicing procedure instructions.
- Clean up any spilled hydraulic fluid immediately.
- Dispose of used hydraulic fluids in a provincially approved manner.

Pressurized hydraulic fluid will move at the same velocity as a bullet – and flesh punctured with hydraulic fluid will immediately begin to die. Have a physician treat any hydraulic skin punctures immediately!

PERSONAL PROTECTIVE EQUIPMENT

Personal protective equipment (PPE) is any clothing or equipment that helps to protect a worker from injury. The TM Maritime Occupational Health and Safety has specific requirements regarding personal protective equipment including the requirement for:

- Workers to wear protective equipment based on the hazards they are exposed to;
- Employers to ensure that workers are trained in the proper use/care of the personal protective equipment;
- Employers to either provide workers with the necessary equipment or require the workers to provide the equipment themselves as a condition of employment; and
- Employers to ensure that workers wear the equipment properly.

We understand that the TM Maritime Occupational Health and Safety has its regulations, that employers must provide their workers with any water safety equipment that is required.

Common Hazards

Employers and workers are required by the TM Maritime Occupational Health and Safety at Sea to wear safety equipment or clothing whenever they may be exposed to a hazard, and it may be required that, aquaculture workers be required to carry out a diverse list of activities. Examples of common hazards requiring personal protective equipment include:

- If there is a danger to the head
- If the eyes or face require protection
- If the hands and arms require protection
- If the lungs require protection
- If the feet and legs require protection

Assess the level of risk that each of the identified activities pose and then determine the suitable personal protection equipment that will minimize the risk to the worker's health and safety. Contact your local safety equipment or supply store for more information on the types of PPE that are available.

Safe Procedure

- Do a complete review of the operation and determine what activities require personal protective equipment.
- Instruct workers to wear personal protective equipment and either provide them appropriate equipment or require that the worker provides it as a condition of employment.
- Workers must be trained in the proper use and maintenance of their personal protective equipment. Read the instruction information that comes with your personal protective equipment.
- Personal protective equipment must fit properly and be used according to the manufacturer's instructions.

PERSONAL PROTECTIVE EQUIPMENT

The TM Maritime Occupational Health & Safety Code of Practice

- Maintain personal protective equipment properly. Replace any faulty or worn equipment.
- Wear protective glasses, goggles or a face shield when eye or face protection is required.
- Wear hearing protection when using loud equipment or machinery (i.e., if the noise level exceeds 85 decibels). Some of the more common equipment used by aqua-culturists where hearing protection should be used other person is talking and cannot be heard when standing at arm's length away, then hearing protection should be worn.

- Wear work gloves if punctures, abrasions or irritations to the hands and arms except when wearing them may cause a hazard. Rubber gloves can provide protection against the dampness and the cold and are effective when handling gear. Cloth gloves can be worn underneath for comfort and chain mesh gloves provide good protection when dealing with gear or equipment with sharp edges.
- Wear safety boots or footwear with good traction.
- Don't wear jewelry or loose-fitting clothing that can get caught in gears and machinery.

Outdoor Work:

- When working outside, workers should wear a hat that will keep direct sunlight off their head, ears and face.
- Workers should wear safety sunglasses to protect their eyes from direct sunlight or the glare off of the water.
- Each vessel must, at a minimum, have the appropriate TM approved personal flotation device in sufficient quantity for each crewmember. When the water is extremely cold and the risk of falling in is high, wear a floater suit or other survival gear.

Personal protective equipment needs to fit and be worn properly if it's going to work!

RESCUE PROCEDURES

A crew member falling overboard is a serious situation. A crew member can die from exposure in a matter of minutes.

Common Hazards:

- Death by cold-water immersion can occur within minutes in cold waters.
- Many crew members can't swim, so if they're not wearing a Personal Flotation Device, they can drown in a very short time.
- They can be caught in a net or line and need help to get untangled.
- They may be knocked unconscious.

Safe Procedures:

- Vessel operator must put in place procedures for recovering an overboard crew member.
- Equipment for recovering an overboard crewmember must also be kept on board.
- Communication devices should be maintained on board. Communication devices, such as cell phones, should be located on the **Rescue Procedures:**

vessel not on a crew member, in case the crew member falls overboard.

- Throw a life jacket, life ring, or a bright colored floating object into the water to help the person, and to help you return to the spot where the crewmember fell over.
- Tell the wheelhouse what's happened (for example, from which side of the vessel the crew member fell). Have someone continue to verbally direct the vessel operator to the overboard crew member.
- Have one person keep sight of the person in the water at all times.
- Carefully maneuver the vessel to pick the person up. When pulling in the overboard crew member, be careful not to get pulled into the water.

SHARPS SAFETY

Sharps are objects that can penetrate or puncture the skin. The Aquaculture industry – is often exposed to the hazards associated with sharps (e.g., knives, needles). There are simple precautions that can be taken to reduce the risk of injury and health hazards posed by these tools.

Common Hazards

Hazards associated with the use of sharps in the aquaculture workplace include:

- Accidental punctures by needles
- Limb injuries caused by accidental stabbing or cutting with knives and screwdrivers
- Workers injured by improperly stored or disposed of sharps

New workers or maybe young workers tend to have more needle stick injuries than experienced workers. Not recapping needles is one of the most common causes of these injuries. Careful handling of sharp objects and convenient placement of sharps disposal containers are only two steps in preventing needle stick and other sharps-related accidents. Review your operation for potential ways to eliminate or reduce the exposure to needles and other sharps where possible. Try to anticipate the hazards or risks of injury that are posed by sharps in the workplace. Then organize (to the extent possible) the work area with the prevention of sharp related accidents clearly in mind.

Safe Procedure

- Caution should be used when handling all sharps (needles, knives, screwdrivers, box knives, razors, etc.).
- Where possible, organize the work area so that sharps are located in a safe and convenient manner for the task that will be required.
- Only workers properly trained to assemble, use and disassemble needles should be allowed to handle the needles and perform the required tasks (e.g., inoculate fish).
- Keep needles capped until ready for use.
- Never put your hands into a sharps container unless it is empty.
- Dispose of all sharps in a rigid, wide-mouthed, leak-and-puncture-proof container that has a lid that can be tightly closed. Identify the container as holding sharps.
- Place the sharps disposal container in a convenient section of the work area (e.g., where needles are to be used).
- Replace the sharps disposal container before it is full.
- Dispose of sharps disposal containers in the proper manner.

Take precautions to prevent injuries caused by needles, knives and other sharp objects.

SLIP, TRIP & FALL PREVENTION

Recent workplace injury statistics show that many aquaculture injuries occur as a result of slips, trips and falls. These often can result in muscle strain, broken limbs and contusions and can even cause death.

Common Hazards

In order to prevent slips, trips and falls from injuring workers, it is important to understand what the trouble areas are and eliminate or minimize the hazards. Slips happen when there is insufficient traction between footwear and the surface being walked on (e.g., wet, oily surfaces, slick flooring).

Trips can occur when there is an obstructed view, cluttered or poorly lit working area, uneven walking surfaces or there are lines and cables to walk over. Falls from an elevation (i.e., ladders, stairs, jumping into the boat from the dock) can occur when balance is lost or faulty equipment is used. Take the time to review the operation for potential slip, trip or fall hazards (e.g., obstacles in work area, lack of appropriate lighting or improperly placed switches, slippery walking surfaces, improperly secured ladders). Then correct or minimize the risk by following safe work procedures.

Safe Procedure

- Where appropriate, install resilient, non-slippery flooring or pressure-sensitive abrasive strips.
- Remove any oil, ice or debris from walking surfaces immediately.

- Remove obstacles and debris from the immediate working area.
- Cover lines, cables or ropes that cross the walkway area.
- Keep working areas and walkways well lit (e.g., replace used light bulbs and faulty light switches).
- Select the appropriate anti-slip footwear for the task and working conditions.
- Adjust the pace to suit the walking surface and the tasks being done. Pay attention to task being done.
- Things being carried or pushed should not obstruct the view of any hazards in the walking path.
- All runways, ramps and platforms must be constructed and maintained to safely support all loads that they might reasonably be expected to carry.
- Install a guardrail on at least one side of all runways, ramps or platforms.
- Don't place equipment, tools or other obstructions where they may be hazardous to other workers.

SLIP, TRIP & FALL PREVENTION

Ladder Safety:

- Provide a sturdy, secure ladder for workers to access elevated or sub-level areas.
- Keep all ladders in good working condition. Remove the ladder from service when it has loose, broken or missing rungs, split side rails or other hazardous defects.
- Where possible, secure the top of the ladder to prevent it from moving.
- Three-point contact should always be maintained when climbing ladders (e.g., two feet and one hand always on rungs; two feet plus a safety harness attached to a secured point to prevent free fall).
- Face the ladder when climbing.
- Use the "four-to-one-rule" for straight ladders, setting the ladder base one foot from a wall or building for every four feet in height.
- Avoid jumping down.
- Avoid over reaching. Keep between the ladder side rails
- Do not put one foot on the ladder and the other on an adjacent surface or object.
- If the ground is soft or uneven, place the ladder on a sturdy wooden slab large enough to give ample support.
- Be aware of power lines.
- Avoid working in high places in adverse weather conditions or when ill, tired or taking strong medications.

Keeping the work site tidy, wearing the proper footwear and working at the appropriate pace are all critical for preventing slips, trips and falls.

TRANSPORTATION SAFETY

Aquaculturists depend on various modes of transportation (i.e., boats, trucks, mobile cranes) to carry out their daily tasks. Each of these modes of transportation has specific health and safety requirements.

Common Hazards

Each mode of transportation will have its own specific hazards. Careful review of the operating manual and manufacturer's information will provide a detailed listing of the health and safety information that employers and their workers should be aware of before operating or working with the vehicle, implement or vessel.

Safe Procedure

- Ensure that operators of these vehicles/vessels have been properly trained.

- Ensure operators and/or passengers wear the appropriate personal protective equipment.

- All vehicles should be in proper working order before the unit is used.

- All vehicles must be regularly inspected and maintained. Trailers and Wagons:

When a trailer is being towed behind a vehicle:

- The hitch and safety chains must be properly connected.

- The trailer must be properly loaded for stability and the load must be firmly secured.

- Tires on the towing vehicle and the trailer must be properly inflated and in good operating condition.

- The towing vehicle must have ample brake power to stop the attached load or the trailer/wagon must have brakes.

- The driver must have experience or be properly trained in operating the towing vehicle and attached implements.

ATVs:

When using an ATV:

- Perform pre-ride inspections and periodic maintenance (as outlined in the owner's manual).

- Wear the appropriate helmet, eye protection and other protective equipment (e.g., boots, long sleeved shirt or jacket, long pants, gloves).

- Operate the ATV at a speed appropriate for the terrain, visibility, weather conditions, and level of experience.

TRANSPORTATION SAFETY

Vehicles

- Adjust travel speed to road conditions, activities (i.e., turning and braking) and the type of equipment/load being towed.

- When using a vehicle in dark or inclement weather conditions, it must be properly outfitted with white lights in front and red lights at the rear.

- Do not allow passengers on the tractor, equipment or trailer.

- Read and follow the safety information in the owner's manual.

- Keep all guards in place on all equipment.

- Always attach implements to the appropriate hitch provided by the manufacturer.

- Never hitch implements while the PTO is in motion.

- Never stand on the bucket, forks or other accessories of the tractor (or forklift), especially while it is in motion.

Never consume drugs or alcohol before or during operations of any vehicle or equipment.

WEATHER HAZARDS

In occupations like aquaculture, where much of the work is done outside, the weather can pose many hazards. Exposure to the heat and sun during the hot summer months, and to the cold and wind during the winter months, can cause challenges for any work crew. Working in stormy or inclement weather on the water can also put workers and property at risk.

Common Hazards

- Working in the heat and sun can result in dehydration, fainting, sunburn, heat exhaustion and heatstroke.

- Prolonged exposure to cold weather, particularly in water-soaked clothing or from direct immersion (i.e., a fall overboard or into a hole in the ice) can result in dangerous overcooling of the body (i.e., hypothermia) which affects a person's mental and muscle functions and can ultimately result in death.

- It is important to pay attention to weather updates and to changing local conditions. Summer thunderstorms can strike unexpectedly while increased wind speed and change in wind direction can result in increased wave action. When working, the boat captain or mate should be watching for signs of approaching bad weather (e.g., choppy seas, cloud bank in the distance, a rise in the humidity, and any sudden changes in the atmospheric pressure) and take the appropriate precautions to protect the crew.

Understanding the weather and obtaining current weather information before heading out to begin a task on the water is crucial to the health and safety of the boat crew. A review of the scheduled weather and activities should be carried out each day to determine the level of risk that workers will face. If the planned activities are going to result in prolonged exposure to extreme hot or cold temperatures then the appropriate precautions must be taken to ensure the health and safety of the workers.

Safe Procedure

Marine Forecasts:

- The boat captain must be capable of understanding marine forecasts and have considered recent forecasts prior to setting sail.
- Bad weather signs include choppy seas, cloud bank in the distance, rise in humidity and rapid change in atmospheric pressure.
- Precautions to take if bad weather is a possibility:
 - Batten down the hatches to keep water out.
 - Secure the equipment in its proper place. Shifting cargo and equipment can cause listing.
 - Get out of the storm area as quickly as possible.

WEATHER HAZARDS

Working in Hot Weather Conditions:

- Workers carrying out tasks in hot weather conditions must be provided with ample drinking water, short rest breaks in a cool area and should be wearing the appropriate protection (i.e., sunscreen, hat, sunglasses/goggles).
 - Protect from the hazards of heat and direct sunlight by wearing sunscreen and a hat that keeps the direct sunlight off of the head and face area.
 - Wear sunglasses to protect eyes from direct sunlight or the glare off the water.
 - Drink lots of fluids, especially water. Limit the amount of diuretics (coffee, pop, tea) consumed as they increase fluid loss.
- #### **Working in Cold Weather Conditions**
- Workers should not be required to work in extreme temperatures for prolonged periods of time (e.g., take frequent short breaks instead of infrequent long breaks).
 - When the weather is extremely cold, reduce the chance of hypothermia by wearing warm, protective clothing and keeping the head and extremities (hands, feet, arms, legs) covered.
 - Learn the appropriate methods to stay warm should a fall into the water occur. Heat is lost most rapidly through the head and neck, sides of the chest (including the armpits) and the groin area.

The victims of heat stroke and hypothermia are unable to notice the symptoms. Their survival will depend on their co-workers' ability to identify the symptoms, provide emergency assistance and seek medical help.

WELDING, CUTTING OR SOLDERING SAFETY

The use of gas and arc welding to build and repair machinery are common practices on many Island aquaculture operations. As with the use of any equipment or chemical there are hazards involved and the appropriate care and training should be given to ensure the health and safety of the welder and any bystanders.

Common Hazards

Typical hazards that welders face include:

- Toxic fumes produced by the metal and/or surface paint being heated/welded, when welding galvanized metal and by the welding rods.
- Working with/around flammable and combustible liquids and compressed gases.
- Ergonomic injuries as a result of performing repetitive motions and working in awkward positions.
- Skin and eye damage from the ultra violet and infrared radiation.
- Flying particles that get in eyes and puncture/burn the skin.
- Excessive noise levels.
- Electrical shock from improperly grounded welding machine, poorly insulated leads, etc.
- Burns from sparks, hot surfaces, flames, etc.

The manufacturer's instructions on materials should be reviewed and followed.

Safe Procedures

Facilities:

- Provide adequate ventilation to remove any toxic fumes while welding, cutting or soldering.
- Do not weld, cut or solder in areas containing combustible materials.
- Adequate fire extinguishing equipment must be readily available where any process which uses heat application (e.g., welding, soldering, flame-cutting, heating) is performed.

Personal Protective Equipment:

- When welding or cutting, wear appropriate clothing and adequate eye protection and safety boots.
- Never use bare hands on metal parts of electrode holders or electrodes while the welder is switched on and never rest the electrode against the body.

WELDING, CUTTING OR SOLDERING SAFETY

Welding Equipment:

- Welding and cutting torches, their fittings and regulators, must be kept in good repair.
- Equipment must be repaired or replaced with approved fittings in accordance with the manufacturer's specifications by a competent person.
- If a leak develops in any part of the welding or cutting operation, stop work until the leak is repaired.
- Compressed gas cylinders must be kept in an upright position and secured against falling during storage, transportation and use. They must not be dropped or subject to impact.
- Cylinders containing flammable compressed gas must not be stored in areas where welding or cutting operations are carried out or where oxygen cylinders are stored unless they are separated by an approved fire resistant partition and there is adequate separation between the storage and work areas.

- Screw protective caps on acetylene and oxygen cylinder valves when the cylinders are being moved or not in use.
- If using portable acetylene and oxygen equipment, keep the cylinders a safe distance from all operations which produce flames, sparks or molten metal or result in excessive heating of the cylinder.
- Properly mark the hose lines for conveying acetylene or oxygen from supply piping or cylinders to burners to avoid interchanging the hose.
- Welding and cutting burners must be equipped with reverse flow check valves as close as possible to the regulators.
- Any device for holding the cylinders must allow the cylinders to be quickly removed in case of fire.

Operation of Equipment:

- Do not lay down a welding or cutting torch until the gases have been completely shut off.
- Do not allow the welding or cutting torch to come into contact with the gas cylinder.
- Never weld in wet conditions.
- Avoid awkward body positions and working in one position for prolonged periods of time. Matt paint finishes in the welding area will assist with lighting the area while not reflecting the arc light. However, do not use turquoise or blue paint as these colors reflect ultra violet (UV) light.

WORKPLACE HOUSEKEEPING

Effective workplace housekeeping can help get the job done safely and properly. Workplace housekeeping includes keeping the work area neat and tidy, keeping slip and trip hazards off the travel area, removing fire hazards from the work area and maintenance of buildings, equipment and vehicles.

A good workplace housekeeping system will provide for proper inspection, maintenance, upkeep and repair of tools, equipment, machines and processes. Tasks and the equipment required to carry them out should also be set up in a fashion that minimizes the number of times items have to be handled.

Common Hazards

Poor workplace housekeeping can often lead to workplace injuries from:

- Being hit by falling objects
- Tripping over objects on the floor, stairs and platforms
- Slipping on wet, greasy, dirty or icy surfaces
- Hitting projecting items and stacked materials
- Cutting, puncturing or tearing the skin on projecting nails, wire, etc.

Safe Procedure

- Flammable, combustible, toxic and other hazardous materials should be stored in approved containers in designated areas.
- Materials are to be stored in a safe and orderly manner. If materials are to be piled ensure that the stacking (height, placement) doesn't render the pile unstable.
- Waste should be regularly collected and disposed of in an approved manner. Place clearly labeled containers in suitable locations for the easy collection of recyclable materials and wastes.
- Clean spills as they happen and properly dispose of any absorbent material immediately.
- Replace or fix broken or damaged items at the earliest opportunity.
- Keep areas well lit and replace or clean light fixtures as required.

- All tools should be returned to the designated storage area after use. Do not place any tool or object where it may pose a hazard.
- Where practical, provide/use mechanical appliances for carrying materials and supplies.

SAFETY CHECKLISTS WORKSHEETS

To identify areas of concern, carefully review the checklist and consider all tasks that are performed at the workplace. The following questions will assist in determining the level of safety awareness on an aquaculture operation:

- Are workers aware of their health and safety responsibilities?
- Is there an illness and injury prevention program for new and young workers?
- Have workers been advised of any potential hazards (physical, chemical, ergonomic, health, biological) that they may encounter on the job?
- Have all workers been familiarized with the communication and emergency plans?
- Have appropriate steps been taken to ensure that, technical and First Aid training has been completed to safely accomplish work that needs to be done?
- Are there comprehensive job training and familiarization opportunities for new workers?
- Are only authorized and trained workers allowed to operate tools and equipment or use chemicals?
- After training a new/young worker, are they checked to ensure they are carrying out the work properly?
- Are there experienced and responsible workers to turn to if other workers need assistance?
- Have emergency procedures been developed? Does the crew practice them regularly?
- Are workplace incidents reviewed then discussed with workers so that they will not happen again?

How to Use the Safety Checklist Worksheets:

The check list worksheets have been designed to enable employers and managers to monitor key safety issues on a regular basis and to inform workers of possible hazards. The worksheets cover areas common to most aquaculture farms in Prince Edward Island. Blank charts have been included to allow for areas that are not specifically listed and/or areas that may be of specific concern at individual work sites.

SAFETY CHECKLISTS WORKSHEETS

Boating & Navigational Safety Checklist: Checklist before Leaving Port

Date Inspected:

Inspected by:

OK NO If No, document any deficiencies/irregularities and note any remedial actions and date taken. Is the boat safe and suitable for that day's activities? Is the equipment all in good working order and properly stored?

- Are safety equipment (fire extinguisher, flares, signals, etc.) and First Aid kit up to date?
- Are the radio and other communication devices functioning properly?
- Is there a tool kit on board?

- Does the crew have their personal protective equipment?
- Will the forecasted weather allow ample opportunity to carry out the work in a safe environment?
- Has a voyage plan been prepared and submitted for the day to someone on shore?
- Are crew members in good physical condition for the activities to be carried out?

SAFETY CHECKLISTS WORKSHEETS

Chemical, Fuel & Lubricant Safety

Date inspected:

Inspected by:

OK NO

If No, document any deficiencies/irregularities and note any remedial actions and date taken

- Are the Material Safety Data Sheets (MSDS) or labels readily available to workers?
- Is there a list of all chemicals available to workers?
- Are the containers triple rinsed and returned to the dealership?
- Are containers secured during transport?
- Are all chemicals stored in a marked and secure location?
- Are signs posted next to all chemical storage areas to warn of the potential hazards inside?
- Are chemicals always stored in their original containers with the labels clearly intact?
- Is your chemical mixing area either outside or in an open, well-ventilated area?
- Are non-compatible chemicals in storage always physically isolated from one another?
- Is the required Personal Protective Equipment available and used?

Other:

SAFETY CHECKLISTS WORKSHEETS

Electrical Safety

Date inspected:

Inspected by:

OK NO

If No, document any deficiencies/irregularities and note any remedial actions and date taken

- Are main switches de-energized/locked out before work is started on power circuits?
- Are the applicable rules under the Canadian Electrical Code followed?
- Are overhead wires high enough to adequately clear machinery?
- Are workers aware of the procedure in case of accidental contact with power lines?
- Are all wiring, power cords, plugs and switches in buildings in good condition?
- Does the electrical system have ample capacity to handle all loads?
- Are all electrical circuits equipped with the proper size fuses or circuit breakers?

- Do all main power switches controlling electrically operated equipment have a lock out device to prevent accidental starting of equipment while servicing?
- Are all light bulbs in storage buildings shielded or protected from breakage?
- Are electrical outlets in buildings with high moisture content or where water is sprayed periodically moisture proof?
- Are ground fault circuit interrupters installed and used to prevent electrical shock in all damp work areas

Others:

SAFETY CHECKLISTS WORKSHEETS

Equipment and Machinery

Date inspected:

Inspected by:

OK NO

If No, document any deficiencies/irregularities and note any remedial actions and date taken

- Are shields and guards in place and in proper working order on all powered equipment?
- Do all PTO's have suitable shields and guards in place?
- Are key warning decals on all machinery readable?
- Are shields and guards in place on all belts, pulleys and chain drives?
- Are all rotating augers, belts, pulleys and chains on loading and unloading machinery shielded?
- Are all loading troughs on augers, elevators and conveyors covered with a guard or grating?
- Are hydraulic winches lowered at the end of a task so that suspended loads are never left unattended?
- Are the manufacturer's recommended weight allowances always followed to prevent overloading of systems?
- Do equipment operators know how to stabilize a piece of equipment using jacks and blocks before repairing or servicing the equipment?
- Is hydraulic equipment blocked before maintenance and repairs are started?
- Are proper lockout/tag out procedures used?

Other:

SAFETY CHECKLISTS WORKSHEETS

Fire Prevention

Date inspected:

Inspected by: OK NO

If No, document any deficiencies/irregularities and note any remedial actions and date taken

- Are fire extinguishers or other fire fighting equipment in good working order and placed in each building/vessel?
- Are workers trained to use fire extinguishers?

- Are building entranceways and passages always kept clear of stored material or trash that may catch fire, cause falls or fall on workers?
- Are all heaters installed away from combustible materials and (for those that are fuel-burning) properly vented to prevent carbon monoxide leakage?
- Are aisles, doorways and area around electrical boxes free of debris and equipment?
- Are flammable liquids labeled and stored properly?
- Are “No Smoking” signs posted in all fuel storage and handling areas and other places where combustible materials are located?

SAFETY CHECKLISTS WORKSHEETS

First Aid, Personal and Protective Equipment

Date inspected:

Inspected by:

OK NO

If No, document any deficiencies/irregularities and note any remedial actions and date taken

FIRST AID AND EMERGENCY RESPONSE

- Are the emergency phone numbers posted in prominent places (e.g. by telephones and in main work areas)?
- Are First Aid kits within easy access to workers and are sufficiently stocked?
- Does the proper number of workers hold valid first aid certificates from a recognized training agency?

PERSONAL PROTECTIVE EQUIPMENT (PPE)

- Is properly maintained personal protective equipment available for all hazards present on the worksite?
- Have all workers been instructed to use appropriate personal protective equipment at all times?
- Is personal protective equipment (including gloves, goggles, respirators and aprons) always used by worker when applying or handling chemicals?
- Is hearing protection used when operating noisy machinery and power tools?
- Do machinery operators wear clothing which is tightfitting and not torn or ragged when working near machinery?

SAFETY CHECKLISTS WORKSHEETS

Hand and Power Tool Safety

Date inspected:

Inspected by:

OK NO

If No, document any deficiencies/irregularities and note any remedial actions and date taken. Is access to and from work spaces free of obstructions?

- Are all hand and power tools in proper working order and equipped with proper shields and guards?
- Are all stationary power tools grounded and all portable power tools either double insulated or of the three-wire grounded type?
- Are portable power tools always disconnected when not in use?
- Are all stationary tools such as grinders and saws properly shielded and the shields always in place when in use?
- Are hand tools (especially cutting tools like saws, axes and knives) properly stored so they cannot fall or be brushed against accidentally?
- Are all hand-tools (such as axes, picks and sledgehammers) in good condition such that, for example, they have tight-fitting and splinter free handles?
- Is the welding area well-ventilated?
- Are work areas well lit?

Other:

FIRE PREVENTION

- Pile flammable/combustible materials in a manner that will not obstruct exits, will minimize the potential for (or spread of) fire, and will permit convenient access for firefighting.
- Limit the flammable or combustible materials that you keep on board the boat to those that are necessary for the daily maintenance and operation of the boat.
- Carry out work requiring the use of flammable materials in a well ventilated area away from any materials that could be ignited by a spark.
- Never pour gas from a gas container with a spout into a running or hot pump/motor. Implement a “no smoking” policy around machinery operation, fuel or flammable products storage areas, and fueling stations

Fire Prevention on Boats/Vessels:

- Each vessel must have the appropriate sized fire extinguishers.
- If your boat has a fuel-burning cooking, heating or refrigeration appliance it must have the appropriate sized fire extinguisher mounted by the appliance.
- Fire extinguishers must be kept fully charged and be renewed as specified by the manufacturer.
- Properly secure, protect and ventilate all propane appliances and cylinders. Make sure that all valves are in proper working order and that all connections are tight.
- Keep bilges clean and free from oil and fuel. Keep the bilge pump in good working order.
- Provide the appropriate ventilation and exhaust for boats and machinery in enclosed areas.
- Properly store and maintain batteries.
- Ensure that electrical systems on the boat are installed by a qualified individual.
- Properly lubricate and adjust machinery to minimize friction.

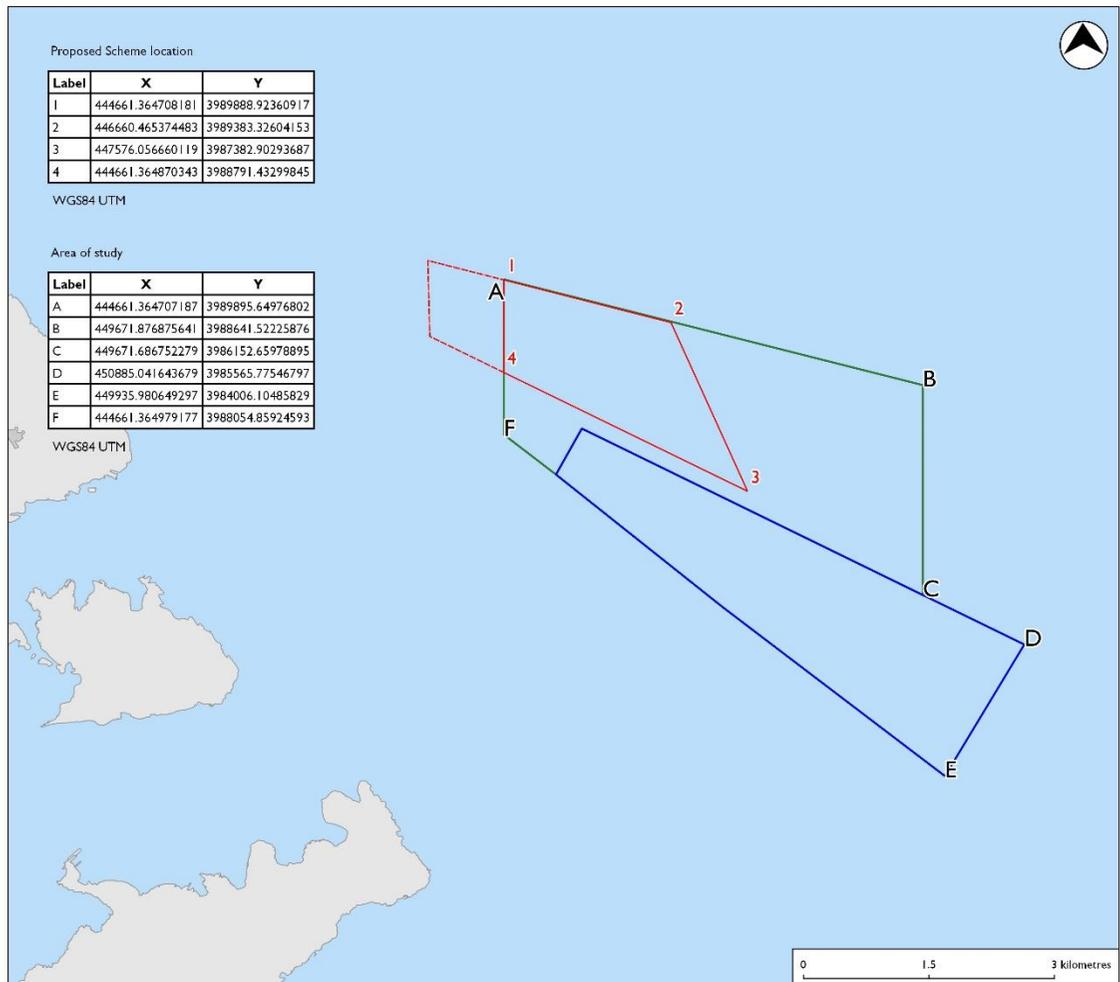
Refueling Safety Precautions:

1. Moor the boat securely.
2. Shut off engines; make sure all passengers are ashore.
3. Don't smoke and extinguish all open flames; close all windows and hatches.
4. Take portable tanks ashore.
5. Don't use electrical switches.

6. Ground nozzle against filler pipe; don't overfill.
7. Wipe up any spillage; turn on blower for at least five minutes.
8. Check for vapour odours

Appendix 2

North Aquaculture Zone Quadrant measurements



Proposed Scheme location

Label	X	Y
1	444661.364708181	3989888.92360917
2	446660.465374483	3989383.32604153
3	447576.056660119	3987382.90293687
4	444661.364870343	3988791.43299845

WGS84 UTM

Area of study

Label	X	Y
A	444661.364707187	3989895.64976802
B	449671.876875641	3988641.52225876
C	449671.686752279	3986152.65978895
D	450885.041643679	3985565.77546797
E	449935.980649297	3984006.10485829
F	444661.364979177	3988054.85924593

WGS84 UTM



Area of Search and final proposed Scheme location

- Legend**
- ▭ Proposed Scheme location
 - ▭ Possible westward extension
 - ▭ Area of survey
 - ▭ Area A
 - ▭ Area B

Proposal of a new Aquaculture Zone in the North of Malta



Map by: Adi Associates Environmental Consultants Ltd

Client: Department of Fisheries ...	Ref: DFA003
File ref: BA/North Aquaculture Zone	Date: 11 / 2018

The Dimensions of the sides of the quadrant 1 – 2 – 3 – 4 are:

1-2 = 2.063 km
 2-3 = 2.201 km
 3-4 = 3.238 km
 4-1 = 1.098 km

INDICATIVE ONLY - Not to be used for direct interpretation

Appendix 3

Clarification on impacts on Avifauna

Clarification Note from Mr John J. Borg, avifauna specialist (21/06/2019)

Light pollution:

The lights at the Zone will be 6 navigational lights for the zone; cages (inside the zone) might have additional lights (maximum one per cage) but proposing to keep these to a minimum and to switch them off when the cages are empty.

Assessment from Avifauna specialist: *Acceptable especially if the latter action is taken (minimizing lights and switching off when cages are empty. Outer navigational lights can remain due to safety reasons.*

Tuna harvesting:

The tuna are caged around mid-July and harvesting starts around November to December/January.

Assessment from Avifauna specialist: *Any activities in or near the pens is to be carried out during daylight hours, thus reducing the use of artificial lighting and boat presence at night.*

Interaction of seabirds with tuna farms:

To date, tuna farms in the north have not recorded any entanglement of seabirds. However, tuna farms do record seabirds close to the farm; especially notorious are the gulls that foul the cage collars. There is evidence from the tuna farms at the South Aquaculture Zone located 6.3 km from shore that the farms act as a secondary source of food.

Assessment from Avifauna specialist: *There is evidence of presence of and feeding behavior of Black Terns and Storm Petrels close to and at tuna farms in the south of Malta. The tuna farms (both through the baitfish and in view of their attraction to other small fish, have been noted to act as a supplementary feeding source for such birds (Borg, J.J., 2012¹). The preliminary study by Borg concludes that “the use of raw, unwashed fish food is fundamental in attracting storm petrels closer to these tuna pens. The same food supply has attracted a constant presence of small fish around the pens which in-turn attract gulls and terns,*

¹ Borg, John, J. (2012). Tuna Farms – a seasonal supplementary food source for storm petrels *Hydrobates pelagicus melitensis*. *Avocetta* 36: 91-94 (2012).

especially the black tern. Observations have shown that the majority of storm petrels frequenting the area are adult birds undergoing primary wing moult, suggesting breeders, probably not venturing far away from the colonies during the chick rearing period. While adult storm petrels regularly fall prey to yellow-legged gulls on Filfla, no interactions between gulls and storm petrels were ever noted near the tuna pens”.

To date there is no evidence from farms in Malta of direct impacts on the seabirds. Main impact would be on fledglings if they happen to fall in the cages; however, in view that the cages are not small (50 m diameter), the birds would have enough length for a “runway” that they would need to gain flight again. Though the birds could visit the farms to feed on the baitfish during feeding at the North Aquaculture Zone (as they do at the South Zone), no major negative impact is expected on the seabirds in general.

Conclusion:

The position and operation of the north aquaculture zone will not significantly affect the seabird population in the SPA concerned, as long as conditions are adhered to.

Monitoring of operations and collection of direct data from the farms themselves is important for future decisions and farm management.

Further comments from ERA following above clarification (06/09/2019)

The information provided by Mr John Borg provides sufficient evidence of the possibility of the Yellow-legged Gull - Yelkouan Shearwater interaction in the form of prey/predator interactions or displacement at the breeding sites.

Based on such evidence, kindly provide a conclusive indication of the likelihood of such impacts on the Yelkouan Shearwater population at proximate terrestrial SPAs (Irdum tal-Madonna, as well as Comino, St Paul’s Islands); factoring in considerations as is: (i) the proximity of the NAZ to this terrestrial SPA, (ii) the possibility of an increase in capacity in the NAZ tonnage, (iii) the presence on the Maghtab landfill (iv) other considerations.

Second Clarification Note from Mr John J. Borg, avifauna specialist (12/09/2019)

“Avian behavior and interactions between different species is no easy matter, studies have been carried out on a global level and yet new information keeps emerging. Stating that X species of bird will impact Y species of bird is incorrect. Individual birds of the same species will behave differently from one another.

For example, predation by Yellow-legged Gulls on Storm-petrels on Filfla Island is carried out by a few individuals who have learned to strategically place their nests near petrel communal nest entrances, therefore it is not the entire YLG colony but a few individuals. To date there have been no interactions noted at sea (e.g. close to the SE tuna pens) between Yellow-legged Gulls and Storm-petrels. Flocks of up to 500 storm-petrels rafting near the pens were unmolested by the Yellow-legged Gulls (pers obs 2019).

The same may or may not happen if Yellow-legged Gulls decide to start nesting at Irdum tal-Madonna. To date we have no records of Yellow-legged Gulls preying on Yelkouan Shearwaters, no shearwater remains were ever found in hundreds of YLG pellets examined. The absence of Yelkouans on Filfla has not yet been conclusively attributed to predation by Yellow-legged Gulls.

At the turn of the 19th Century, the Yellow-legged Gull was more numerous than at present and used to breed in larger numbers in various sites which since then have been abandoned. Some sites are slowly being re-colonized by the gulls (e.g. Comino, Selmunett, and various cliff sites); in all of these, Yelkouans were and still are breeding.

In conclusion, therefore, interactions between different species when out at sea cannot be reflective of same behaviour as on land.”

Conclusion

Hence, from the above we conclude that the likelihood of impacts on the Yelkouan Shearwater population at nearby terrestrial sites from the tuna pens is unlikely.