Marine Conservation Zone Assessment document: AlnMCZ-SRA 016

Marine Conservation Zone:	**Aln Estuary MCZ**
Generic sub-feature(s):	**Intertidal mud**
Gear type(s):	**Crab tiling**
NIFCA MCZ Assessment type:	**Detailed**
Gear/feature interaction reference(s):	**ALNMCZ-155.**

Revision history		
Date	***Revision***	***Editor***
07/06/2018	Document created	AA
03/04/2022	Document revised	BH
25/07/2022	Updated Section 2.	BH
28/10/2022	Updated Section 5 and added Appendices with most recent evidence from UAV survey; added further information on impacts and updated conclusions.	BH

Test for Likely Significant Effect (LSE)

ALNMCZ-159: Intertidal mud

1. Is the activity/activities directly connected with or necessary to the management of the site for nature conservation?	No
2. What pressures (such as abrasion, disturbance) are potentially exerted by the gear type(s)? Pressures listed are all those for which the feature is deemed to be sensitive. Pressures in bold are Medium-High Risk. The sensitivities	**Abrasion/disturbance of the substrate on the surface of the seabed** **Penetration and/or disturbance of the substratum below the surface of the seabed, including abrasion** **Habitat structure changes - removal of substratum (extraction)** **Removal of non-target species** **Removal of target species** Introduction or spread of invasive non-indigenous species (INIS)

listed are based on the 2022 conservation Advice for Aln Estuary MCZ available on Natural England's Designated Site System.	
3. Is the feature potentially exposed to the pressure(s)?	Yes
4. What are the conservation objectives for the feature? Conservation Objectives which may be impacted by Crab tiling are underlined.	The conservation objectives for Intertidal Mud are to **Maintain*:** - <u>the presence and spatial distribution of intertidal mud communities</u>. - the total extent and spatial distribution of intertidal mud. - [Maintain OR Recover OR Restore] the abundance of listed species*, to enable each of them to be a viable component of the habitat. - the distribution of sediment composition types across the feature. - <u>total organic carbon (TOC) content in the sediment at existing levels.</u> - <u>the species composition of component communities</u>. - the presence of topographic features, while allowing for natural responses to hydrodynamic regime, by preventing erosion or deposition through human-induced activity. - the natural physical energy resulting from waves, tides and other water flows, so that the exposure does not cause alteration to the biotopes and stability, across the habitat. - the natural physico-chemical properties of the water. - sediment transport pathways to and from the feature to ensure replenishment of habitats that rely on the sediment supply. - the dissolved oxygen (DO) concentration at levels equating to Good Ecological Status [(specifically ≥ XX mg per litre (at 35 salinity) for 95 % of the year)], avoiding deterioration from existing levels. - water quality at mean winter dissolved inorganic nitrogen levels where biological indicators of eutrophication (opportunistic macroalgal and phytoplankton blooms) do not affect the integrity of the site and features, avoiding deterioration from existing levels. - <u>natural levels of turbidity (eg concentrations of suspended sediment, plankton and other material) across the habitat.</u> **Restrict or reduce:** - the introduction and spread of non-native species and pathogens, and their impacts. - surface sediment contaminants (<1cm from the surface) to below the OSPAR Environment Assessment Criteria (EAC) or Effects Range Low (ERL). - aqueous contaminants to levels equating to High Status (according to Annex VIII and X of the Water Framework Directive), avoiding deterioration from existing levels.

5. What are the potential effects/impacts of the pressure(s) on the feature, taking into account the exposure level? ***(reference to conservation objectives)***	Crab tiles are artificial fisheries aggregation devices (FAD) such as roof tiles, guttering, drainpipes, chimney pots and tyres. All types of FADs will be referred to solely as crab tiles for the purpose of this document. The method of crab tiling is a form of intertidal shore-based shellfish harvesting that targets shore crabs (*Carcinus maenas*) for use as fishing bait by anglers. The activity is carried out both recreationally and commercially. Shore crabs moult their shells at intervals during their life cycle, during which they seek a refuge from predators. Crab tilers exploit this behaviour by providing artificial shelters. Whist sheltering under the tiles, the crabs are in the 'soft shell' state i.e. the hard shell has been shed and the new shell has not yet hardened. It is in this state that the crabs are collected for bait when the tiles are exposed during low water. <u>Level of activity in the Aln estuary</u> In June 2022, FADs in the Aln estuary were surveyed with an Unmanned Aerial Device (UAV), a more accurate method of identifying and counting tyres. 129 tyres were found in the estuary with the majority in four lines of tyres placed on intertidal mud (Annex 1). These show signs of trampling (footprints) surrounding the tyres and to and from access points. A higher number of tyres were found than in a previous ground-based survey in 2020 which found 50 tyres in two lines. Satellite images in 2016 and 2020 show there were none in 2016, and two lines in 2020, corroborating the ground-based survey (Annex 2). The tyres themselves cover 103m^2 of the total area of intertidal mud in the MCZ (143,167m^2) which is 0.07%. Including access routes and trampling of the sediment around the tyres, the total impacted area by trampling was 2160m^2 or 1.5% of intertidal mud in the estuary, as calculated from UAV images. <u>Impacts of crab tiling</u> A study by Sheehan (2010) investigated the impacts of crab tiling on intertidal mud and muddy sand by experimentally manipulating sites with different treatment regimes. This included tiled only, trampled only, tiled and trampled and control sites. The practice of crab tiling was simulated 3 times a week for one month using black PVC guttering as if by one individual. Infaunal assemblages were significantly affected by simulated crab tiling, with a significant reduction in abundance compared to controls. There was reduced species diversity at fished sites, but this was due to trampling activity rather than the presence of crab tiles. The stability of the sediment was modified at fished treatment sites, this was also due to trampling. Total organic content and sediment grain size were unaffected by tiling and associated trampling. The study by Sheehan (2010) shows an impact of crab tiling as a result of trampling, however it should be noted experimental treatments were

	only 50cm apart from control treatments, so impacts were very localised. The study shows that crab tiling can have detrimental impacts on infaunal communities, however only directly where the tiles are placed. In the Aln estuary the coverage of tyres over a small proportion of the intertidal mud in the estuary (0.07%), access points from land are relatively low and they are only collected by one individual (anecdotally). Moreover, unlike in the south of England where warm temperatures allow shore crabs to moult year-long, here they only moult or 'peel' in the summer months therefore typically are collected from tyres for three months of the year. A study investigating recovery from trampling associated with crab tiling found rapid recovery of meiofauna communities 12-36 hours after trampling, and no significant differences in sediment physical parameters (Johnson et al. 2007). During the months of the year no collection is occurring, complete recovery of the infaunal communities from adjacent sediment is therefore highly likely. The lack of crab tiling occurring in winter means that availability of prey for overwintering birds will be unaffected, and the activity itself will not cause bird disturbance.Tyres in the marine environment may also leach chemicals or heavy metals, for example Zinc, as they degrade. Studies in this area are relatively limited. Collins et al. (2002) found an increase in Zinc concentrations near an artificial reef made of 500 tyres, though not of cadmium, coper, chromium or lead. They also found zinc and cadmium in hydroids and bryozoans near tyre reefs. One study found that over time tyres may release more zinc due to decomposition from UV light and wetting and drying cycles, however all the cadmium content was released in 84 days (Fenner & Clarke, 2006). Leaching from whole tyres in a (relatively) static environment is a relatively slow process meaning contaminants are likely to be dispersed (Turner & Rice 2010) however this depends on the rate of water movement and therefore water replacement occurring and preventing build-up of heavy metals (Fenner & Clarke, 2006). They recommended limitations on their use in small water bodies with low flush-through rates. In conclusion, the impacts of trampling are unlikely to significantly impact the intertidal mud feature considering just 1.5% of the feature is impacted; the localised impacts shown in the literature; high recovery rates of infaunal communities and the fact they are uncollected for most of the year. Chemicals or heavy metals leached from the tyres are likely to be more dispersed than small water bodies due to the tidal nature of the estuary, though some localised increases in concentrations and potential impact to infaunal communities may occur. Considering the large area overall of intertidal mud communities, these local impacts are unlikely to hinder the conservation objectives of the feature. However, the number of tyres in the MCZ has increased over time and should this

	trend continue these conclusions may be re-evaluated. NIFCA propose regular monitoring of the number of tyres for any further increases.	
6. Condition and Conservation Objective Inferences	No information on the condition of the Aln Estuary MCZ features is available on Natural England's Designated Site System.	
7. Is the potential scale or magnitude of any effect likely to be significant?	**Alone:** **No**	**OR In-combination** **No**
8. Have NE been consulted on this LSE test? If yes, what was NE's advice?		

Conclusion

Is the proposal likely to hinder the conservation objectives of the MCZ either 'alone or in combination' on the Aln Estuary MCZ?

No, NIFCA conclude that the impact of crab tiling activity in the Aln estuary MCZ are unlikely to hinder the conservation objectives of the intertidal mud feature. The tyres themselves cover just 0.07% of the feature, while associated trampling may impact 1.5%. Recovery from any localised impacts from trampling will occur in the nine months of the year the activity does not occur. Localised increases in the concentrations of tyre leachates may occur, though the tidal nature of the estuary should mean any major build up of heavy metals is prevented. Ongoing monitoring to assess further increases in the number of tyres should however occur, with the potential to change this conclusion if such increases are seen.

Has Natural England been formally consulted on this Simple MCZ Assessment (and do they agree)?	**Yes**

Date of document completion/'sign-off':	**14/06/2019**

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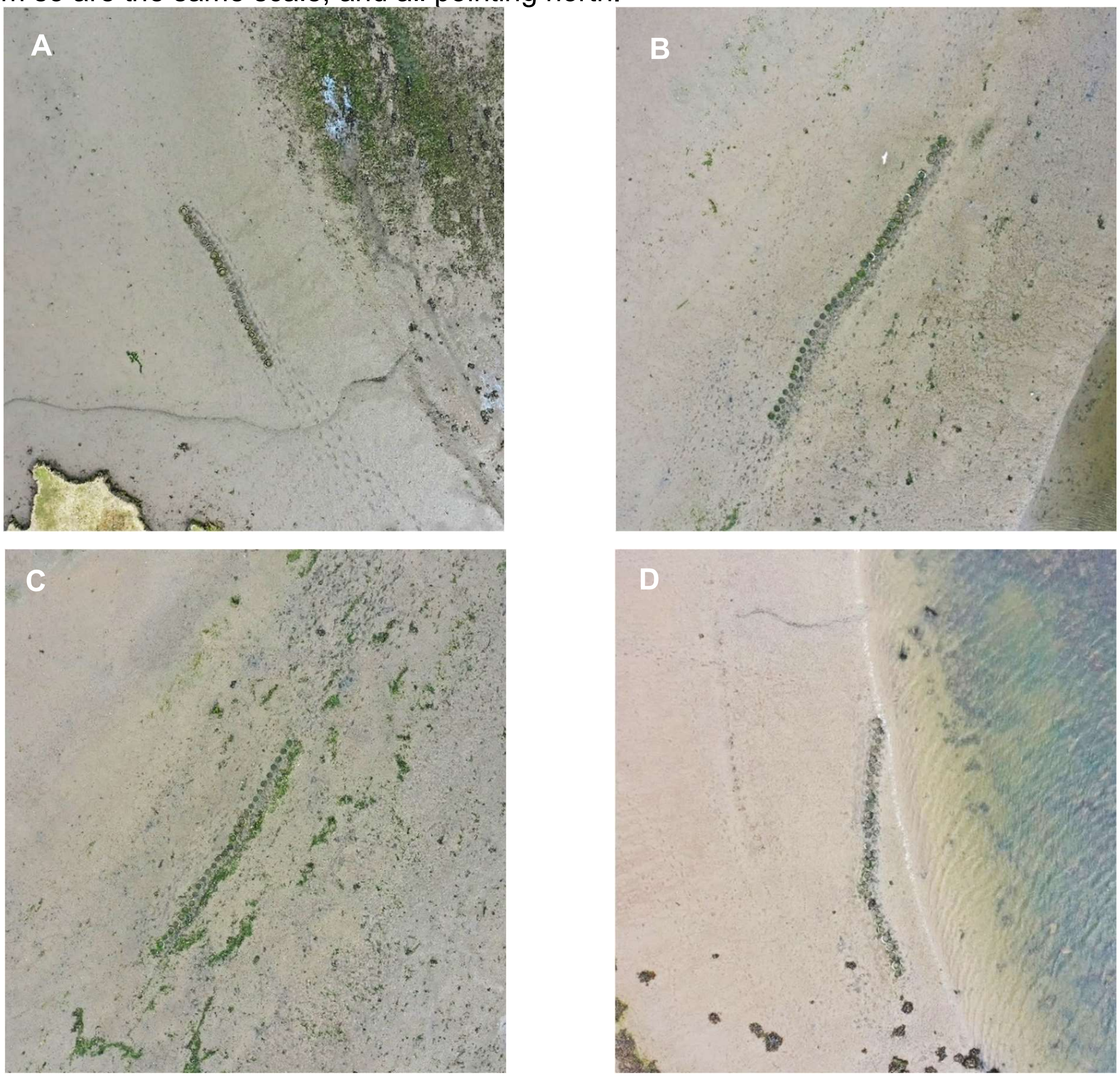
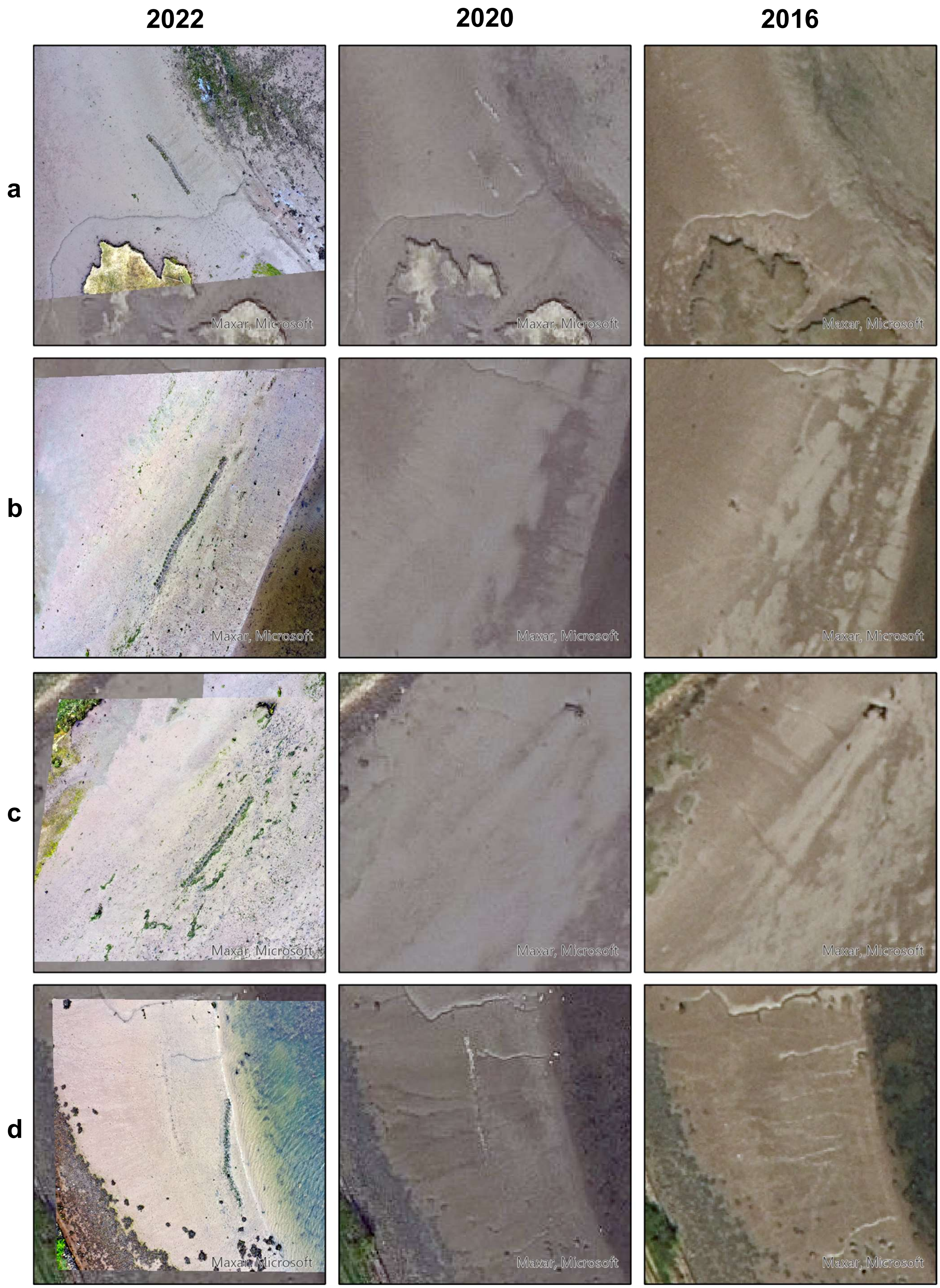
Annex 1 – UAV Survey

Photos taken of the four locations of lines of tyres in the Aln estuary. Photos taken at height of 40m so are the same scale, and all pointing north.



Annex 2 – Tyres over time

Satellite images from 2016 and 2020 and UAV images from 2022 showing the same locations in the Aln estuary.



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