Marine Conservation Zone Assessment

Site name:	Torbay MCZ UKMO 20130025
Protected feature(s):	Subtidal mud

Fishing activities assessed at this site:

Stage 1 Assessment

Towed (demersal): Beam trawl (whitefish); Beam trawl (shrimp); Beam trawl (pulse/wing); Heavy otter trawl; Multi-rig trawls; Light otter trawl; Pair trawl; Anchor seine; Scottish/fly seine.

Devon & Severn IFCA Inshore Fisheries and Conservation Authority

D&S IFCA Reference
TOR-MCZ-001
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Contents

Version	Date	Author(s)	Comments	Reviewer(s)
1	November 2016	Stephanie Davis	First version with towed (demersal) and dredges (towed combined.	Sarah Clark
2	January 2019	Lauren Parkhouse	Towed (demersal) and Dredges (towed) have been split into separate assessments due to different management measures for each gear type. New evidence provided in this update.	Sarah Clark – July 2019

1. Introduction

This assessment has been undertaken by Devon & Severn Inshore Fisheries and Conservation Authority (IFCA), in order to document and determine whether management measures are required to achieve the conservation objectives of marine conservation zones (MCZs). The IFCA's responsibilities in relation to management of MCZs are laid out in Sections 124 to 126, & 154 to 157 of the Marine and Coastal Access Act 2009.

2. MCZ site name and location

Torbay MCZ (0 - 6nm) is an inshore site located in the south west of the UK. The site covers an area of coastline in South Devon between Oddicombe Beach and Sharkham Point, protecting a total area of 19.8 km^2. Beginning at the coastline, the boundary extends between 1 – 2.5 km out to sea, to a depth of 30m encompassing Hope's Nose near Torquay and Berry Head near Brixham.

Further information regarding the MCZ and its protected features can be found in the Torbay MCZ Factsheet[1].

3. Feature(s) / habitat(s) of conservation importance (FOCI/HOCI) and conservation objectives

Table 1 - Protected features relevant to this assessment

Feature	General management approach
Subtidal mud	Recover to favourable condition

The conservation objectives for these features are that they are brought into, and remain, in favourable condition.

For each protected feature, favourable condition means that, within a zone:

1. its extent is stable or increasing
2. its structure and functions, its quality, and the composition of its characteristic biological communities (including diversity and abundance of species forming part or inhabiting the habitat) are sufficient to ensure that its condition remains healthy and does not deteriorate

4. Gear/feature interaction in the MCZ categorised as 'red' risk and overview of management measure

- Seagrass beds were categorised as "red" risk against towed demersal gear. In January 2014, D&S IFCA introduced the Mobile Fishing Permit Byelaw, which prohibits the use of towed gear in certain areas of Torbay MCZ.

5. Activities under consideration

- Towed (demersal): Beam trawl (whitefish); Beam trawl (shrimp); Beam trawl (pulse/wing); Heavy otter trawl; Multi-rig trawls; Light otter trawl; Pair trawl; Anchor seine; Scottish/fly seine.

[1] MCZ Factsheet http://publications.naturalengland.org.uk/category/1721481

6. Is there a risk that activities are hindering the conservation objectives of the MCZ?

Yes,
Evidence:
To determine whether each pressure is capable of affecting (other than insignificantly) the site's feature(s), the sensitivity assessments and risk profiling of pressures from the advice on operations section of the Natural England conservation advice package were used (Natural England, 2015). Table 2 shows the fishing activities and pressures included for assessment. The justifications for the pressures chosen for inclusion in this assessment can be seen in Annex 3: Pressures audit trail.

Table 2 - Fishing activities and pressures included in this assessment.

Activity	Pressures
Demersal trawls	Abrasion/disturbance of the substrate on the surface of the seabed
	Changes in suspended solids - water clarity
	Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion
	Removal of non-target species
	Removal of target species

The relevant targets for favourable condition were identified within Natural England's conservation advice supplementary advice tables (Natural England, 2015). Table 3 shows which targets were identified as relevant to the activity assessed. The impacts of pressures on features were assessed against these targets to determine whether the activities causing the pressures are compatible with the site's conservation objectives.

Table 3 - Relevant favourable condition targets for identified pressures.

Feature	Attribute	Target
Subtidal mud	Distribution: presence and spatial distribution of subtidal mud communities	Recover the presence and spatial distribution of subtidal mud communities
	Structure: sediment composition and distribution	Maintain the distribution of sediment composition types across the feature
	Structure: species composition of component communities	Recover the species composition of component communities
	Supporting processes: water quality - turbidity	Maintain natural levels of turbidity (e.g. suspended concentrations of sediment, plankton and other material) across the habitat.

Section 8 provides detail on the activity and a literature review to support this assessment.

The D&S IFCA Mobile Fishing Permit Byelaw prohibits the interaction of bottom-towed gear in 75% of the MCZ. From 1st January 2014, access was limited to small areas of the MCZ (Annex 1, Figure 1). These measures have protected some areas of the subtidal mud against the potential impacts or effects of towed demersal fishing gear and allow for the conservation objectives of the site to be met.

Otter trawling is known to occur occasionally in the MCZ at springtime targeting cuttlefish when they come into the district to breed. Beam trawling is not thought to be occurring as the vessels are too large to fish within the district.

Version one of the MCZ assessment recommended a closure of the mud feature to towed gear. A consultation was carried out by D&S IFCA on the proposed change to permit conditions of the Mobile Fishing Permit Byelaw, to include a closure of the mud to demersal towed gear. After

reviewing the responses and other evidence, the D&S IFCA Byelaw and Permitting Sub-Committee decided against a complete closure of the mud feature to towed demersal gear. For the inshore cuttle fishery to be able to operate in this area, a temporal closure has been put in place. There is access to the area for demersal trawl vessels from 1st April to 30th of June (Annex 2).

The condition for keeping an area open for three months for the cuttle fishery is that, D&S IFCA carries out a Monitoring and Control Plan (M&C plan) and a BACI study to gather more evidence on the impact of the fishery. The results of BACI study can be seen in section 8 of this assessment.

7. Can D&S IFCA exercise its functions to further the conservation objectives of the site?

Yes,
Evidence: Monitoring and Control Arrangements

- Enforcement of the Mobile Fishing Permit Byelaw closed areas through reporting, patrols and iVMS
- Restriction to areas, which are not protected under the Mobile Fishing Permit Byelaw through extending areas of existing byelaw.

8. Referenced supporting information to inform assessment

The main mechanisms of impact and effects of demersal towed gear are; mortality of benthic organisms; habitat alterations; and release of nutrients and chemical substances from disturbance of sediments. Numerous studies have documented the physical impact towed demersal fishing gear can have on benthic habitats.

Otter trawling is carried out to target cuttle fish within the MCZ. This fishery is limited by spatial and temporal closures, with a section of the mud feature being open to the activity from 1st April until the 30th of June (Annex 2). No other towed (demersal) fishery takes place within the site.

Subtidal mud is widespread throughout Torbay MCZ. Four biotopes have been recorded within the site associated with the subtidal mud (Figure 3). A5.334 *'Melinna palmata* with *Magelona* spp. and *Thyasira* spp. in infralittoral sandy mud' appears to be the most prevalent across the southern part of the bay. North of Paignton to Torbay Harbour, A5.241 '*Echinocardium cordatum* and *Ensis* spp. in lower shore and shallow sublittoral slightly muddy fine sand' and A5.242 '*Fabulina fabula* and *Magelona mirabilis* with *venerid* bivalves and amphipods in infralittoral compacted fine muddy sand' occur. Patches of A5.261 '*Abra alba* and *Nucula nitidosa* in circalittoral muddy sand or slightly mixed sediment' have been recorded in various locations around the site (Natural England, 2017). The biotope types making up this feature generally occur in areas of low wave energy, a high level of sediment disposition and not exposed to high levels of natural disturbance. Benthic invertebrates are effective indicators of certain types of disturbance, and Infaunal Quality Index (IQI) data from grab samples within the MCZ in 2014 indicated good to high (0.64 to >0.80) status (Figure 4). The average IQI for inside the MCZ was high (0.76 SE ±0.01). The IQI does not suggest damage has occurred, although it is not clear if it would detect impacts from fishing activity (Natural England, 2017).

A survey commissioned by D&S IFCA in 2017, in the area that is open to the fishery, indicated that the location is characterised by muddy sand habitats and communities typical of such habitats; marcobenthic assemblages that are dominated by the bivalves *Spisula subtruncata* and *Fabulina fabula* and to a lesser extent the polychaetes *Euclymene oerstedii, Melinna palmata* and *Ampharete lindstroemi. Nephtys* spp. and *Magelona filiformis* are also present in the locations in

smaller numbers. The biotopes that best characterise the conditions in the areas fished therefore appears to fall somewhere between EUNIS Habitat A5.244 *Spisula subtruncata* and *Nepthys hombergii* in shallow muddy sand and EUNIS Habitat A5.242 *Fabulina fabula* and *Magelona mirabillis* with venerid bivalves and amphipods in infralittoral compacted fine sand (Ocean Ecology Ltd, 2018).

When combining resistance and resilience, the biotope sensitivity for A5.244 is classified as low to the effects of abrasions/disturbance of the surface of the substratum or seabed. Abrasion is likely to damage epifauna and flora and may damage a proportion of the characterizing species, biotope resistance is therefore assessed as medium. Resilience is assessed as high as opportunistic species are likely to recruit rapidly and some damaged characterizing species may recover or recolonize (Tillin, 2016). The biotope sensitivity for the effect of penetration and disturbance is also low. The biological assemblage present in this biotope is characterized by species that are relatively tolerant of penetration and disturbance of the sediment. Either, species are robust or buried within sediments or are adapted to habitats with frequent disturbance (natural or anthropogenic) and recover quickly. The results of studies suggest that a reduction in physical disturbance may lead to the development of a community with larger, more fragile species including large bivalves. Biotope resistance is assessed as medium as some species will be displaced and may be predated or injured and killed. Biotope resilience is assessed as high as most species will recover rapidly and the biotope is likely to still be classified as the same type following disturbance (Tillin, 2016). The same was concluded for EUNIS habitat A5.242 when looking at both abrasion and penetration (Tillin & Rayment, 2016).

Subtidal mud is one of the habitats of the site which supports the native oyster (*Ostrea edulis*), another designated feature within the MCZ (Natural England, 2015). There are currently 11 records of individual native oysters which are generally located in the intertidal and all records are within the closed area, there are no known subtidal native oyster reefs in the MCZ.

A meta-analysis conducted by Collie et al. (2000) looking at different towed gear fishing methods on different habitats found, when looking at the effects on total number of individuals and total number of species, no statistically significant effects. However, larger impacts were observed in the mud and gravel habitats than in sand. Otter trawling was found to have the least impact on species richness when comparing all towed gear methods on biogenic, mud, gravel and sand habitats (Collie et al, 2000). When considering the effects on populations from all towed gear methods the meta-analysis concluded that the least impact was observed in mud habitats, which was not consistent with the findings for total number of individuals or species richness. They put this down to the fact that most studies were done with otter trawls, and if data were available for the effects of dredges a more negative response may have been observed (Collie et al, 2000). The method used in the cuttle fishery is otter trawls.

Kaiser et al (2006) carried out a meta-analysis of 101 different fishing impact manipulations. It was found that otter trawling had a significant initial effect on muddy-sand and mud habitats. There were no recovery data available for muddy-sand however, they found the effects were short-lived with an apparent long-term, positive, post trawl, disturbance response for mud habitats (Kaiser et al, 2006). This positive response may represent an increase in the abundance of smaller-bodied fauna, but a possible overall decrease in biomass in response to trawling (Kaiser et al, 2006). Large, slow growing epifauna such as sponges, and soft corals tend to be much more sensitive to damage than faster growing infauna such as polychaete worms (Kaiser et al. 2006). Marine benthic invertebrates generally have planktonic larval stages during their lifecycle and recruitment usually occurs in the spring/summer months. Foden et al (2010) found recovery time for otter trawling on muddy sand habitat to be 213 days. Ball et al. (2000) found long-term impacts of otter trawling depended on the intensity of the activity, rather than direct impact from passage of the gear. Therefore, the impact may be less severe where fishing pressure is low.

Palanques et al. (2001) undertook observations of the effects of otter trawling on a sheltered area of Mediterranean mud prodelta, at a water depth of 30-40m off the coast of Barcelona, Spain. The prodelta forms a “mud belt” with a clay and silt content of over 80%. The trawl net was found to have disturbed the sediment to a depth of 2-3cm. The disruption of the surface layers of the sediment led to elevated levels of tidally re-suspended sediment for up to 5 days after the trawl disturbance event. The furrows made by the otter boards remained evident for at least one year after the initial disturbance. It was suggested that the muddy seabed of the study area was not affected by waves or currents strong enough to rework the surface sediment and erase the tracks quickly (Palanques et al. 2001). This area of the Mediterranean has different hydrographic processes than Torbay MCZ, with the MCZ being more dynamic in nature in winter months and during certain environmental conditions, such as during easterly winds which visibly disturb the muddy sediment across the whole bay. Sanchez et al. (2000) used one of the study components of the Palenques et al (2001) experiment to investigate the impact of different components of the otter trawl on mud communities and found the otter doors caused the main physical disturbance to the seabed. Univariate analyses of species richness and diversity indicated that the infaunal community did not alter during the first 102 hours after trawling (Sanchez et al, 2000). The results suggest that sporadic episodes of trawling in muddy habitats may cause relatively few changes in community composition however, it does not look at impacts of longer-term fishing events.

Hinz et al. (2009) results indicated that long-term otter trawling lead to profound changes in benthic macrofauna communities on fine sand and muddy sediments. Ball et al. (2000) saw decreased diversity in fine sand and silt-clay sediment type from otter trawling. Tuck et al. (1998) showed that the effects of continuous disturbance by otter trawling became significant after approximately five months of fishing. In comparison the cuttle fishery in Torbay is open for three months.

Ragnarsson & Lindegarth (2009) investigated the short and long-term effects of otter trawling on a macrobenthic infauna community in shallow (32-35m) subtidal mud and muddy sand area, which had been closed to trawling for 39 years. Samples were taken immediately after trawling, and subsequently two and seven months later. No significant treatment effects could be detected on total abundance or on multivariate structure, and tests for individual species revealed only a single short-term effect. However, trawling affected several aspects of diversity with significant short-term reduction in species richness (Ragnarsson & Lindegarth, 2009).

Re-suspended sediment as a result of bottom-towed gear may release nutrients held in the sediment, exposure of anoxic layers, release of contaminants, increasing biological oxygen demand and smothering of species. The quantity of sediment re-suspended by trawling depends on sediment grain size and the degree of sediment compaction, which is higher on mud and fine sand than on coarse sand (Kaiser et al. 2002). The re-suspended sediment may have an indirect effect on species some distance from the fishing activity if they are smothered and there can be detrimental effects on seagrass beds (Sewell & Hiscock, 2005), which is a feature of Torbay MCZ. D&S IFCA officers carry out biennial surveys of the seagrass beds in Torbay. The 2016/2017 survey saw an increase of 10% for the seagrass beds compared to 2014 (Davis, 2017). This would indicate that the nearby otter trawling is not having a detrimental effect on the seagrass beds.

In 2017 D&S IFCA was awarded Defra Impact Evidence Group (IEG) funding to carry out a before-after-control-impact (BACI) study to investigate any possible impacts of the otter trawling carried for the cuttle fishery, which takes place for three months a year, has any significant impact on the mud feature of the Torbay MCZ. This evidence gathering was part of the condition of keeping this area of the mud feature open from 1st April to 30th June for the important fishery. Ocean Ecology Ltd was commissioned to carry out the grab sampling, analysis and reporting. Two locations on the mud feature within the Torbay MCZ were identified to carry out the BACI study. In each location three impact (trawled) sites and two control (un-trawled) sites 1200m in length and >75m apart were sampled. Five experimental trawl tows of the full 1200m were carried out in each

of the impact sites to replicate fishing effort during the cuttlefish season, while control sites were unimpacted by trawling. Location A was fished using a “heavy” box trawl and Location B was fished using the “light” wing trawl, which is normally used for the cuttle fishery. Each site was sub-divided into three 400m sections and two grab samples were taken at random within each section, with a total of 30 samples taken in each location before and after trawling. Samples were taken 24-48 hours before and after the experimental trawling. Location A was also sampled six months after trawling, in April 2018, to investigate any long-term impacts or recovery.

There was evidence of natural and temporal variation in traditional diversity indices and ecological quality indicators, as well as faunal assemblages and individual species, although, the results show no impact of trawling on any of these responses (Ocean Ecology Ltd, 2018). PERMANOVA results suggest no detectable impact of either gear types on either sediment composition or the microbenthic community assemblage across BACI groups. The temporal differences in a number of responses that were evident in April 2018 compared to October 2017 are most likely a result of natural seasonal variation in benthic communities (Ocean Ecology Ltd, 2018). In April 2018 the board scale habitat in Location A changed from muddy sand to slightly gravelly muddy sand, with a loss of finer sediment fractions and a corresponding increase in gravel and sand content. This effect was observed across both control and impact sites and is likely a result of increased physical disturbance throughout the winter months due to winter storms and easterly winds. Storm disturbance causes sediment resuspension and the release of particulate organic matter which may be similar to trawling effects (Ocean Ecology Ltd, 2018). Although there were no statistical differences, ecological quality as indicated by mean Infaunal Quality Index (IQI) values dropped in April 2018 in trawled sites from “high” to “good” status, while no change was evident in control areas. This was for Location A with the heavy trawl, rather than the regular light trawl (Ocean Ecology Ltd, 2018). There were some limitations to the study, one being that there were only five tows carried out on each of the sites and this may not fully represent the fishing effort. Another possible limitation was sampling so soon after the impact, this may not have given enough time for impacts to be realised as dead or damaged fauna may have been taken within the sample. However, no increase in the proportion of damaged taxa were observed in the results (Ocean Ecology Ltd, 2018).

9. In-combination assessment

Table 4 - Relevant activities occurring in or close to the site

Plans and Projects		
Activity	**Description**	**Potential Pressure**
Brixham Sea Farm	Existing mussel farm in Torbay. The farm site is to the west of Brixham Harbour between Fishcombe Cove and Elberry Cove, measuring 300m by 100m. The long lines are set 2m below the surface supported by 200 litre plastic floats. Ropes to encourage seed mussel to settle are attached to the long lines and hang down clear of the seabed.	Siltation rate changes, including smothering
Scallop ranching	Scallop nursery area for growing on spat up to 40 mm in pearl nets and lantern nets before seeding them on the seabed. The longlines will be suspended in the water column approximately 3-5m under the water and supported with floats. The lantern nets are tied to the longline and hang beneath it with the scallops in them.	NE advised that the site was to be located 200m south from the MCZ boundary to avoid the operation causing damage or disturbance to the designated features of the site.
Other activities being considered		

Fishing Activities	Description	Potential Pressure
Dredges (towed)	In July 2017, changes to the permit conditions were brought in under the D&S IFCA Mobile Fishing Permit Byelaw to prohibit the use of dredges on the mud feature of the of the MCZ. Therefore, no in-combination effect possible.	Abrasion/disturbance of the substrate on the surface of the seabed. Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion. Removal of target species. Removal of non-target species.
Digging with forks	Activities occurring on the intertidal, therefore no in-combination effect possible.	
Handworking		
Static pots/traps	Potting and netting do occur on the mud feature but at current levels it is thought that no-combination effect is likely to occur.	
Static and passive nets		
Commercial diving	Commercial diving is occurring at low levels and divers will have minimal contact with the seabed, therefore no in-combination effect likely.	

10. NE consultation response

Natural England was consulted on Version One of the MCZ assessment and gave formal advice.

NE Formal Advice for Torbay MCZ_tow

11. Conclusion

Version One of the MCZ assessment recommended a closure of the mud feature to all towed demersal gear including dredges. A consultation was carried out by D&S IFCA on the proposed change to permit conditions of the Mobile Fishing Permit Byelaw, to include a closure of the mud to demersal towed gear and dredging. After reviewing the responses and other evidence, the D&S IFCA's Byelaw and Permitting Sub-Committee decided to close the feature to dredging however, decided against a complete closure of the mud feature to towed demersal gear. For the inshore cuttle fishery to be able to operate in this area, a temporal closure has been put in place. There is access to the area for demersal trawl vessels from 1st April to 30th of June (Annex 2), during the recognised inshore cuttlefish season.

D&S IFCA has carried out a BACI study on the site, which is discussed in section 8, to determine if the cuttlefish trawl fishery should continue for three months of the year within the MCZ. The results of this study suggest little detectable impact of either of the gear types used, on sediment composition or marcobenthic communities within the study area after five passes of a trawl.

Taking into account the evidence detailed in this assessment, and the temporal and spatial management currently in place, D&S IFCA concludes that the activity is unlikely to have a significant impact on the mud feature of the site and therefore will not hinder the achievement of the conservation objectives.

However, a condition for keeping the area open for three months a year for the cuttle fishery is that D&S IFCA carries out a Monitoring and Control Plan (M&C Plan). The M&C Plan states that D&S IFCA will monitor the fishing activity within the site. This will be done using iVMS which became operational under a permit condition of the D&S IFCA Mobile Fishing Permit Byelaw in August 2018. This will allow the IFCA to determine if the activity and effort is increasing and take appropriate management action if this is the case. Mobile Fishing Permit conditions are flexible

and could be used to introduce further management measures, after consideration by Authority members and full consultation.

12. Summary table

Feature or habitat of Conservation interest	**Conservation objectives/ Target attributes** (Natural England, 2015)	**Activity**	**Potential pressures from activity and sensitivity of habitats to pressures.** (Natural England, 2015)	**Potential exposure to pressures and mechanism of impact significance**	**Is there a risk that the activity could hinder the achievement of conservation objectives of the site?**	**Can D&S IFCA exercise its functions to further the conservation objectives of the site?** **If Yes, list management options**
Subtidal Mud	Distribution: presence and spatial distribution of subtidal mud communities (recover) Structure: species composition of component communities (recover) Structure: sediment composition and distribution (maintain) Water quality – turbidity (maintain)	Commercial fishing - bottom-towed gear (trawls)	• Abrasion/ disturbance of the substrate on the surface of the seabed (sensitive) • Changes in suspended solids - water clarity (sensitive) • Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion (sensitive) • Removal of non-target species (sensitive) • Removal of target species (revised pressure – no sensitivity available)	Otter trawling for cuttlefish occurs annually in the MCZ at springtime. Evidence from section 8 indicates that there can be a decrease in biomass, diversity and species composition due to trawling activities. Fishing intensity is a major factor in deterring recovery, which varies between studies and site specific. Low levels of otter trawling may not cause changes in community composition. The results of a BACI study carried out by D&S IFCA in the site suggest little detectable impact of	Unsure, The stable nature of subtidal mud in Torbay makes it susceptible to disturbance. Infaunal Quality Index (IQI) data indicated good to high status, with an average of high including the area where the fishery occurs (Annex 1; Figure 3). The habitat has a recover objective, and if a significant level of activity occurs, it could pose a risk of physical damage on the feature.	Yes, 53.5% of subtidal mud is already protected under the current byelaw (Annex 1; Figure 1) A temporal closure has been put in place for the remaining open area of the mud feature (Annex 2). Permit condition 4.3 states that “a permit holder or named representative is only authorised to use demersal trawl gear within Area 1,2 and 3 as defined by the coordinates set out in the Annex between 1st April and 30th June (inclusive).” A M&C Plan has been developed to monitor the activity levels in the site. If levels increase, management measures can be brought in via the Mobile Fishing Permit

				either of the gear types used on sediment composition or marcobenthic communities within the study area after five passes of a trawl.		conditions.

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Annex 1: Site Map(s)

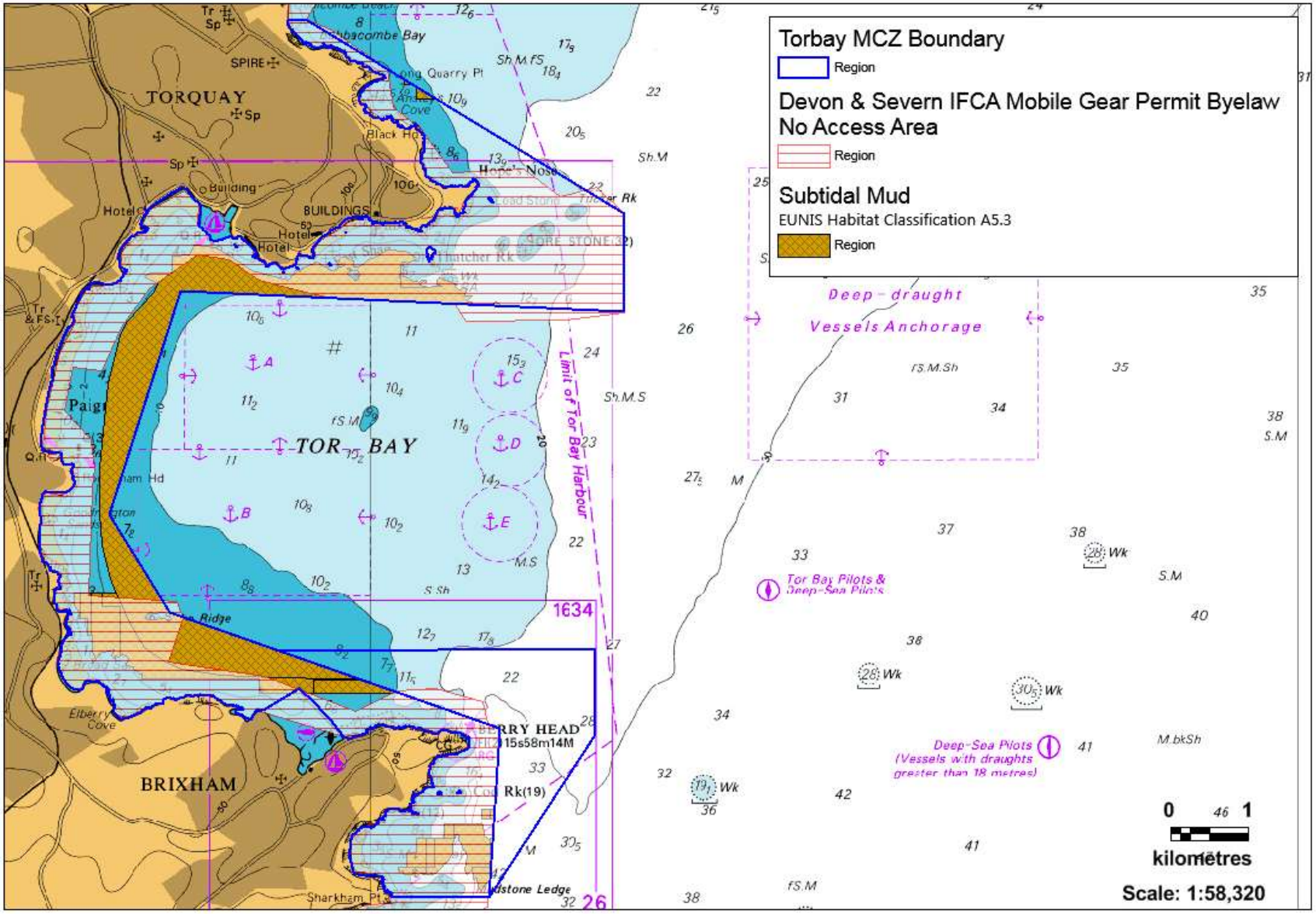


Figure 1 - Map showing Torbay MCZ, subtidal mud and Mobile Fishing Permit Byelaw access areas

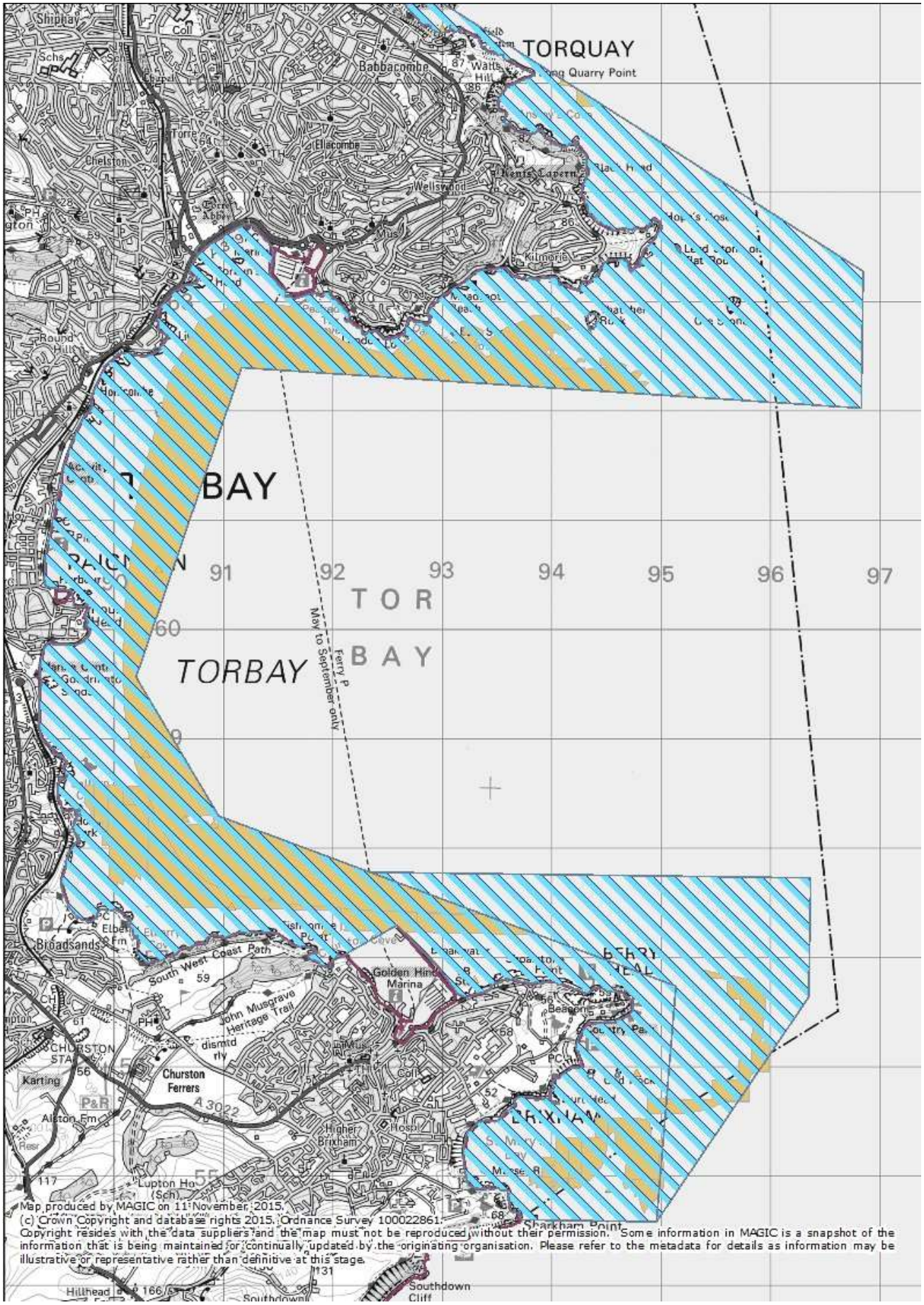


Figure 2 – Magic Map showing Torbay MCZ and the subtidal mud feature

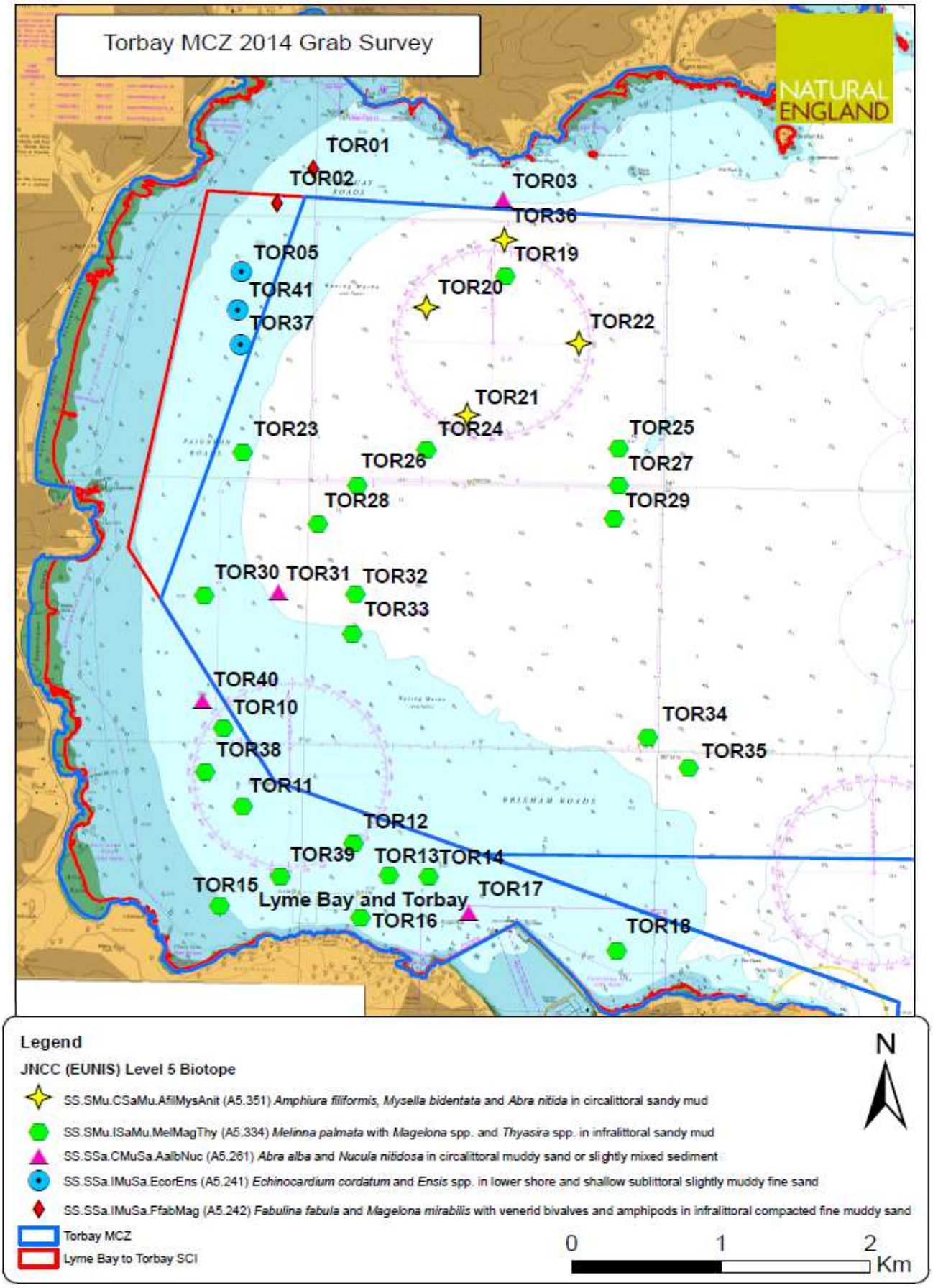


Figure 3 – Torbay MCZ JNCC (EUNIS) Biotope Map ©Natural England

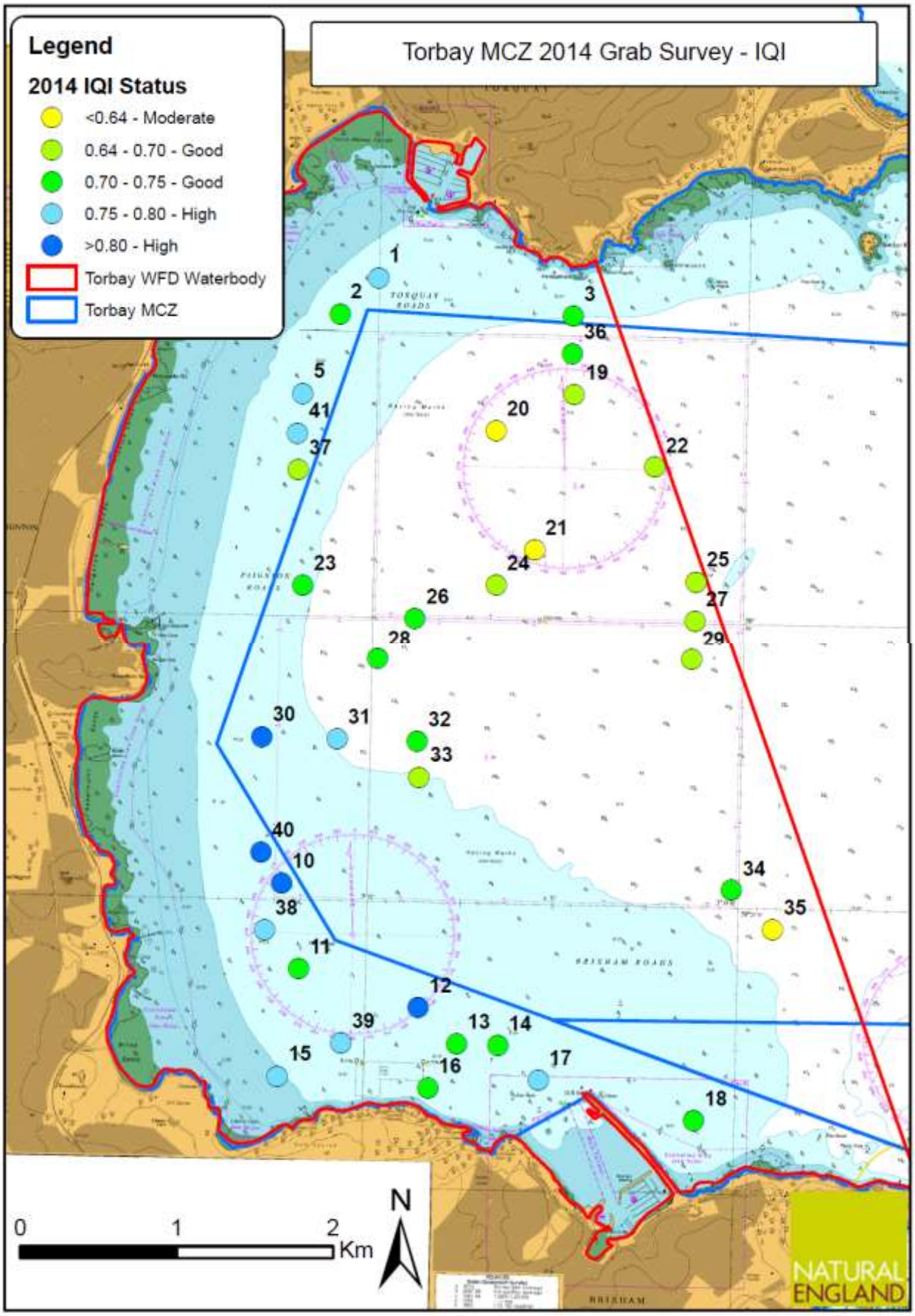
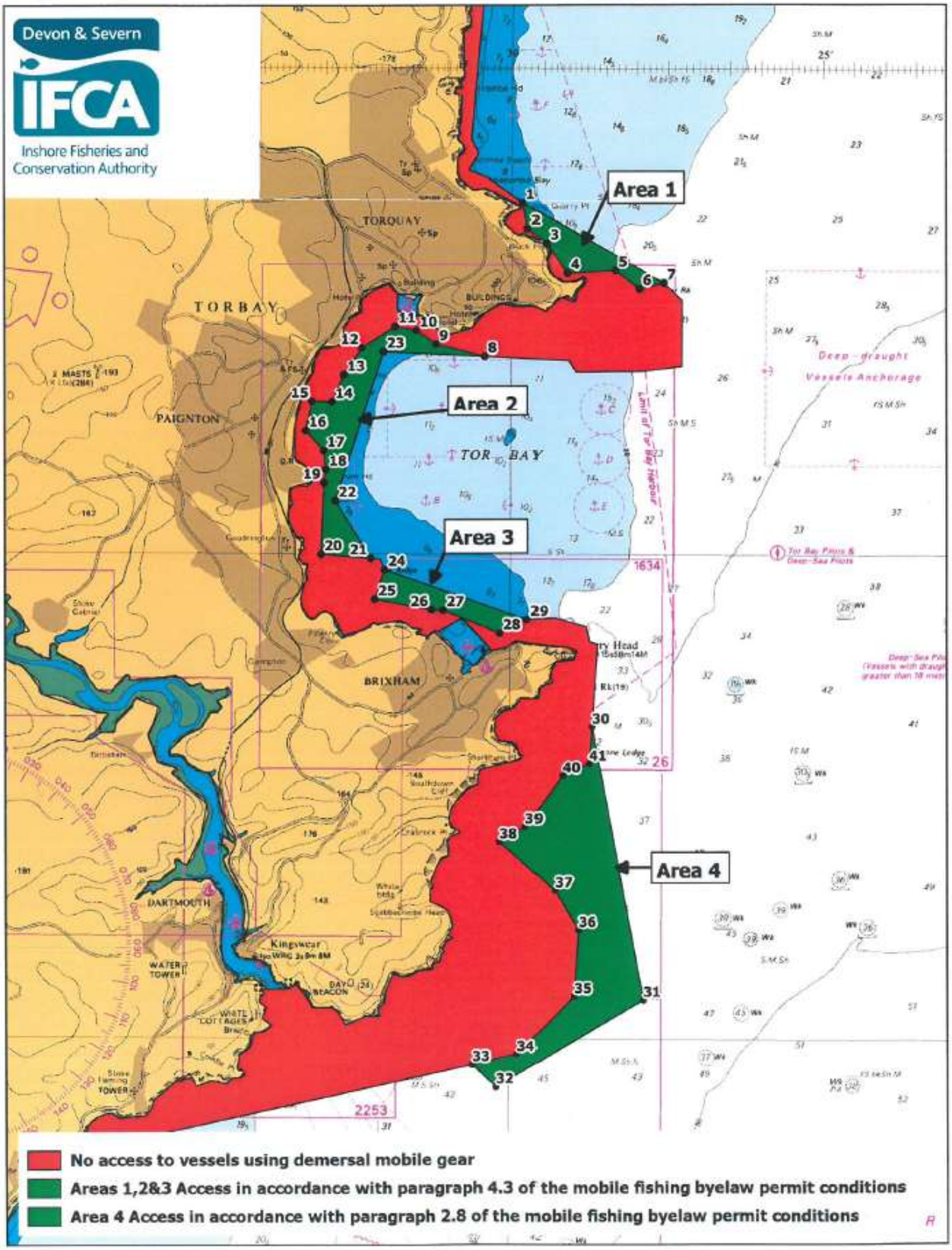


Figure 4 – Torbay MCZ Grab Survey Infaunal Quality Index (IQ) Results ©Natural England

Annex 2: Management for Towed (demersal) Gear

Annex 3a Tor Bay - Access areas for vessels using demersal trawl gear in accordance with paragraghs 2.8 and 4.3 of the mobile fishing byelaw permit conditions



Annex 3: Pressures audit trail

Fishing Activity Pressures: Trawls and dredges	**Subtidal mud**	**Screening Justification**
Abrasion/disturbance of the substrate on the surface of the seabed	S	**IN** – Need to consider spatial scale/intensity of activity to determine likely magnitude of pressure
Changes in suspended solids (water clarity)	S	**IN** – Need to consider spatial scale/intensity of activity to determine likely magnitude of pressure
Deoxygenation	NS	**OUT** – Insufficient activity levels to pose risk at level of concern
Hydrocarbon & PAH contamination. Includes those priority substances listed in Annex II of Directive 2008/105/EC.	IE	**OUT** - Insufficient activity levels to pose risk of large scale pollution event
Introduction of microbial pathogens	IE (Dredges only)	**OUT** – Insufficient activity levels to pose risk at level of concern
Introduction or spread of non-indigenous species	S	**OUT** - Activity operates in local area only so risk considered extremely low
Litter	IE	**OUT** – Insufficient activity levels to pose risk at level of concern
Nutrient enrichment	NS	**OUT** - Insufficient activity levels to pose risk of large scale pollution event
Organic enrichment	S	**OUT** - Insufficient activity levels to pose risk of large scale pollution event
Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion	S	**IN** – Need to consider spatial scale/intensity of activity to determine likely magnitude of pressure
Physical change (to another seabed type)	S	**OUT** – Insufficient activity levels to pose risk at level of concern
Removal of non-target species	S	**IN** – Need to consider spatial scale/intensity of activity to determine likely magnitude of pressure
Removal of target species		**IN** – Need to consider spatial scale/intensity of activity to determine likely magnitude of pressure
Siltation rate changes (low), including smothering (depth of vertical sediment overburden)	S	**IN** – Need to consider spatial scale/intensity of activity to determine likely magnitude of pressure
Synthetic compound contamination (incl. pesticides, antifoulants, pharmaceuticals). Includes those priority substances listed in Annex II of Directive 2008/105/EC.	IE	**OUT** - Insufficient activity levels to pose risk of large scale pollution event
Transition elements & organo-metal (e.g. TBT) contamination. Includes those priority substances listed in Annex II of Directive 2008/105/EC.	IE	**OUT** - Insufficient activity levels to pose risk of large scale pollution event