

APPENDIX No. 8

Marine Studies at Mweeloon, Galway Bay by AQUAFACT



**Marine Studies at Mweeloon,
Galway Bay**

Produced by

AQUAFACT International Services Ltd

On behalf of

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Table of Contents

1. Introduction	1
2. Bathymetry & Tidal Survey.....	1
2.1 Materials & Methods	1
2.2 Results	3
3. Marine Intertidal Surveys.....	7
3.1 Materials & Methods	7
3.1.1 <i>Sampling Procedure</i>	7
3.1.2 <i>Sample Processing</i>	10
3.1.3 <i>Data Analysis</i>	12
3.2 Results	15
3.2.1 <i>Intertidal Transects</i>	15
3.2.2 <i>Intertidal Sediment</i>	16
3.2.3 <i>Infaunal Cores</i>	21
3.2.3.1 <i>Univariate Analysis</i>	21
3.2.3.2 <i>Multivariate Analysis</i>	22
3.2.3.3 <i>Sediment Characteristics</i>	33
4. Comparison with Renmore Benthic Communities	37

List of Figures

Figure 1.1: Location of the Mweeloon area on Tawin Island.....	1
Figure 2.1: Bathymetric survey lines of the vessel and location of tidal gauge.	3
Figure 2.2: Bathymetric levels in Mweeloon Lagoon, 6th October 2017.....	4
Figure 2.3: Locations of the five cilled entrances to Tawin.....	5
Figure 2.4: Tidal height over 10-day neap spring cycle compared with Galway Docks.	6
Figure 2.5: 24-hr subset of tidal data.	6
Figure 3.1: Intertidal transect locations.	8
Figure 3.2: Intertidal core station locations.....	9
Figure 3.3: Sediment type (Folk, 1945) from the intertidal areas around Mweeloon Lagoon.....	20
Figure 3.4: Community diversity indices for intertidal cores.	22
Figure 3.5: Dendrogram produced from Cluster analysis.	27
Figure 3.6: MDS plot.....	27
Figure 3.7: AMBI disturbance classification.....	33

Figure 3.8: 2D PCA ordination of the transformed sediment data.....	35
Figure 3.9: Bubble plots showing sediment parameters superimposed on the PCA ordination.	36
Figure 4.1: Dendrogram of the Tawin and Renmore intertidal datasets.....	39

List of Tables

Table 3.1: Intertidal core station coordinates.	10
Table 3.2: The classification of sediment particle size ranges into size classes (adapted from Buchanan, 1984).	11
Table 3.3: Summary of the AMBI values and their equivalences (after Borja <i>et al.</i> , 2000 modified from Grall & Glémarec, 1997).	15
Table 3.4: Sediment characteristics of the faunal stations sampled in the intertidal area of Mweeloon Lagoon.....	18
Table 3.5: Univariate measures of community structure.	21
Table 3.6: SIMPER Results.	28
Table 3.7: AMBI Results.....	32
Table 3.8: Two dimensional PCA on the transformed sediment data.....	34

List of Appendices

Appendix 8-1	Intertidal Transect Descriptions
Appendix 8-2	Grain Size Methodology
Appendix 8-3	Shore profiles
Appendix 8-4	Tawin Intertidal Species List
Appendix 8-5	AMBI Results

1. Introduction

As part of the compensation plan for loss of habitats that will arise if the Galway Port Expansion plan proceeds, AQUAFAC was commissioned by the Galway Harbour Authority to carry out a number of surveys in a part of Tawin Island called Mweeloon that had been identified as a possible suitable location in previous studies by AQUAFAC. The Mweeloon area is shown in Figure 1.1.

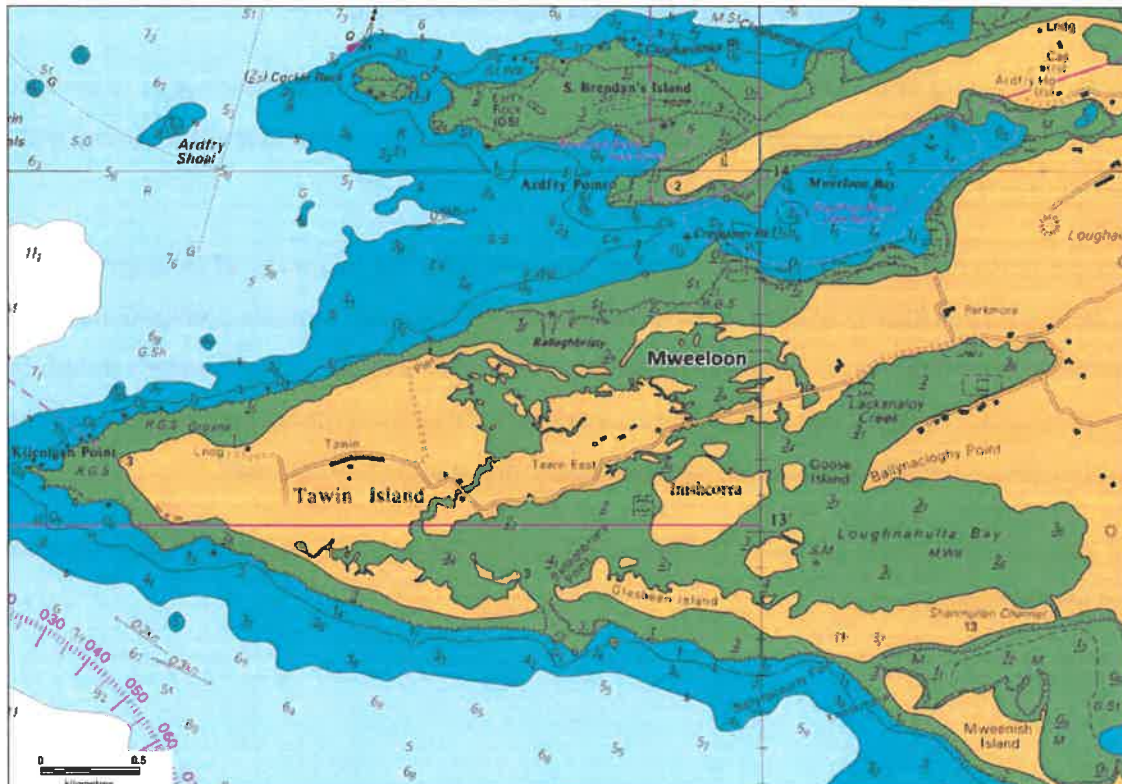


Figure 1.1: Location of the Mweeloon area on Tawin Island.

2. Bathymetry & Tidal Survey

2.1 Materials & Methods

The bathymetric survey of Mweeloon lagoon was carried out on the 6th October 2017. Figure 2.1 shows the survey track of the vessel. A Precision SonarMite single beam echo sounder in conjunction with a Trimble® GeoXT™ and Hurricane antenna was used to carry out the bathymetric survey of Mweeloon Lagoon.

A continuous real-time record of the survey track was made in conjunction with depth data output from the echo sounder. Continuous recording echo sounding was carried out at line intervals with data records (xyz) being recorded every second (approximately 1 record every 1m). The records of position and depth were time tagged to enable subsequent correction for tidal height with continuously recorded tidal data recorded by means of an Envirmon TD-Diver that was deployed within the survey area from 4th August to 6th October 2017. The tide gauge automatically recorded tidal elevations that coincided with the fieldwork (see Figure 2.1 for location of the deployment site) in order to remove tidal elevation variation from the bathymetric data in post processing.

Correct functioning of the echo sounder by the bar-check method was undertaken prior to and upon completion of the survey period. In addition, regular checks were made during the survey with a graduated pole to ensure accurate readings.

Dynamic horizontal positioning for the survey boat was achieved by means of Differential Global Positioning system (DGPS), which delivered precise, homogenous and continuous navigational output over the entire study area. The receiver antenna was located directly above the sounder's transducer, thereby negating the need to transform the incoming data. All bathymetric data were downloaded and post processed using Surfer to output depth contour maps at prescribed intervals.

The data collected by the Envirmon TS-Diver referred to in the previous section were used to record tidal elevation data.



Figure 2.1: Bathymetric survey lines of the vessel and location of tidal gauge.

2.2 Results

The British Admiralty carried out an extensive sea bed mapping exercise of a very large part of Galway Bay in 1843 but did not include this section of Tawin in that exercise. Figure 2.2 shows the results of the bathymetric survey carried out as part of this present study. For the most part, recorded water depths were less than 1m at Low Water with only one area recording depths greater than this, that being at the eastern half of Mweeloon Lagoon. Some areas as shown on Figure 2.2. were too shallow to allow access by boat and were not surveyed. As the area to the south of the access road into Tawin does not form part of Mweeloon Lagoon, the bathymetric survey did not extend into that area.

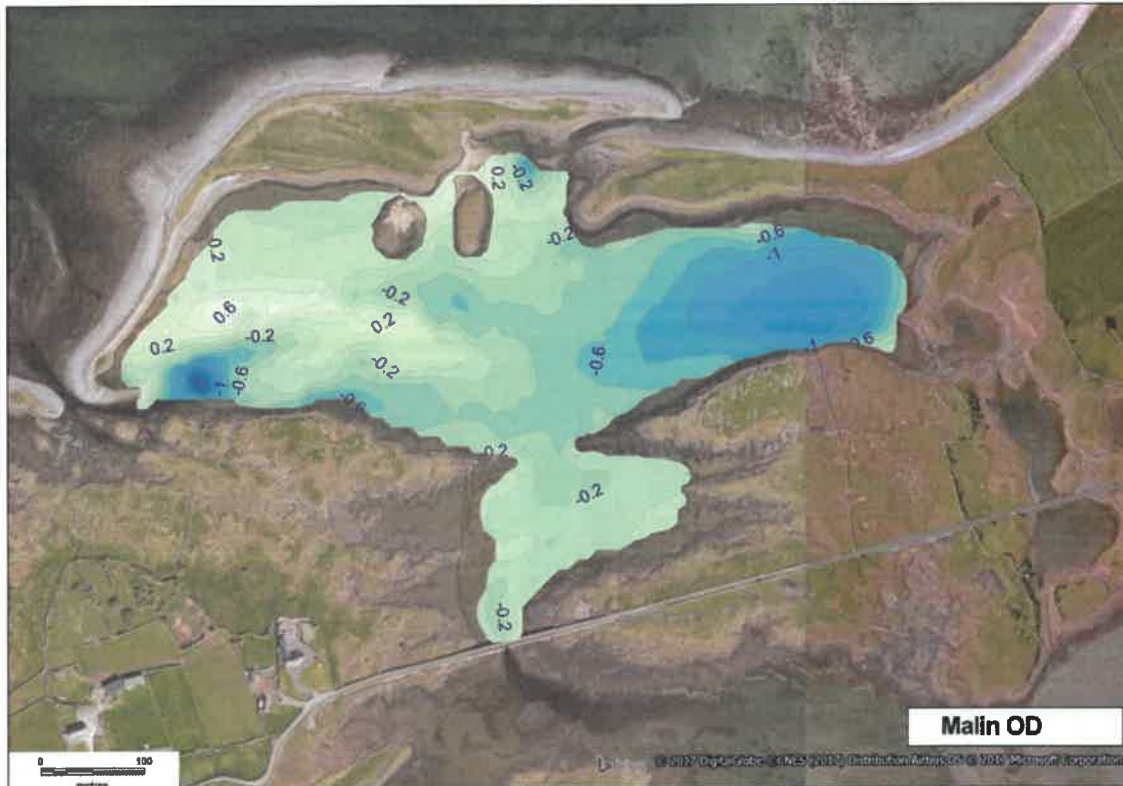


Figure 2.2: Bathymetric levels in Mweeloon Lagoon, 6th October 2017.

The water body with Tawin Island in known locally as “malloor” and it is considered very likely that this word comes from the Irish term “mall mhuir” that literally translates as “slow sea”. Mall mhuir is the Irish word for Neap Tide and the use of the term to describe the bodies of water within Tawin indicates that the locals were aware that, compared to tidal conditions in the open sea, tides inside Tawin were slack (the Irish for Spring Tide is Rabharta).

There are five silled entrances into Tawin (see Figure 2.3). Two are located on the south shore; Bealach Briste South that enters into Tawin Lagoon and this feeds into Lackenaloy Creek and Shanmullen Channel that enters Loughnahulla Bay from the southeast. There are three entrances on the north shore, one called Lurgan Stream to the east of Lurgan Island and two other entrances to the west of Lurgan Island both called Bealach Briste. However, as the local land owner, Mr. Patrick Grealy, uses the term Oileanbeag Stream for the opening at the western end of Lurgan Island, this term will be used in future (see Figure 2.3; these openings are also known locally as “The Guts”). The furthest west opening is called Bealach Briste West. Bealach Briste South is the widest opening at c. 100m while Shanmullen Channel is c. 20m wide and Oileanbeag Stream, Lurgan Stream and Bealach Briste West are only c. 10m wide. The tide flows in and out of Oileanbeag Stream and Bealach Briste West at all

times. However, the Lurgan Stream opening only functions 2 hours either side of High Water Spring tides.



Figure 2.3: Locations of the five cilled entrances to Tawin.

Results of the tidal height data collected within Mweeloon Lagoon relative to Galway Docks over a 10 day neap-spring period (not the entire data set) are presented in Figure 2.4 while Figure 2.5 shows a 24 hour subset of these data. From this latter figure, it can be seen that water ebbs from the lagoon for a c. 10 hour period and floods for c. 2.5 hours.

The main link within Mweeloon Lagoon to the open sea is through Oileanbeag Stream. There is another link further east at the eastern end of Lurgan Island but this only functions *ca* 2 hours before and 2 hours after High Water Spring tides.

There are connections between Mweeloon Lagoon and other bodies of water *e.g.* Tawin Lagoon and Lackenaloy Creek and to the south of the roadway into Tawin and these are under the road bridge onto the island and 2 small channels close to The Fieldíns. Flows through the opening under the bridge were observed to be predominantly in a north – south direction at all stages of the tide while flow through the 2 small channels only occurred *ca* 1 hr before High Water Springs in a southerly direction *i.e.* into Lackenaloy Creek.

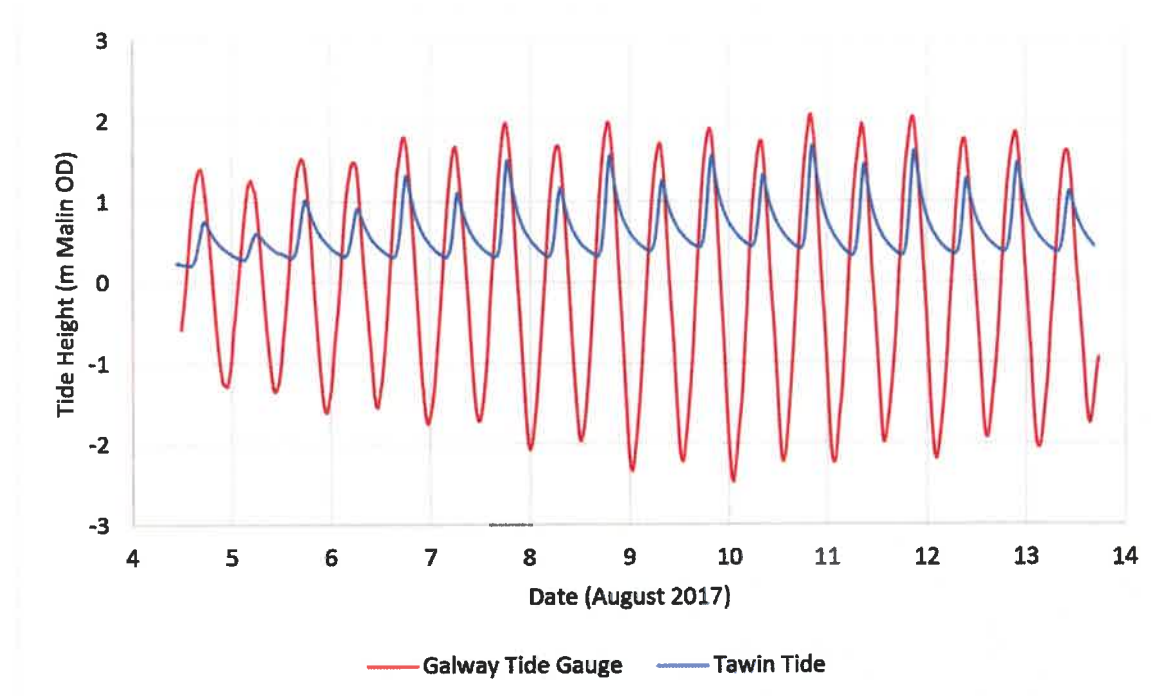


Figure 2.4: Tidal height over 10-day neap spring cycle compared with Galway Docks.

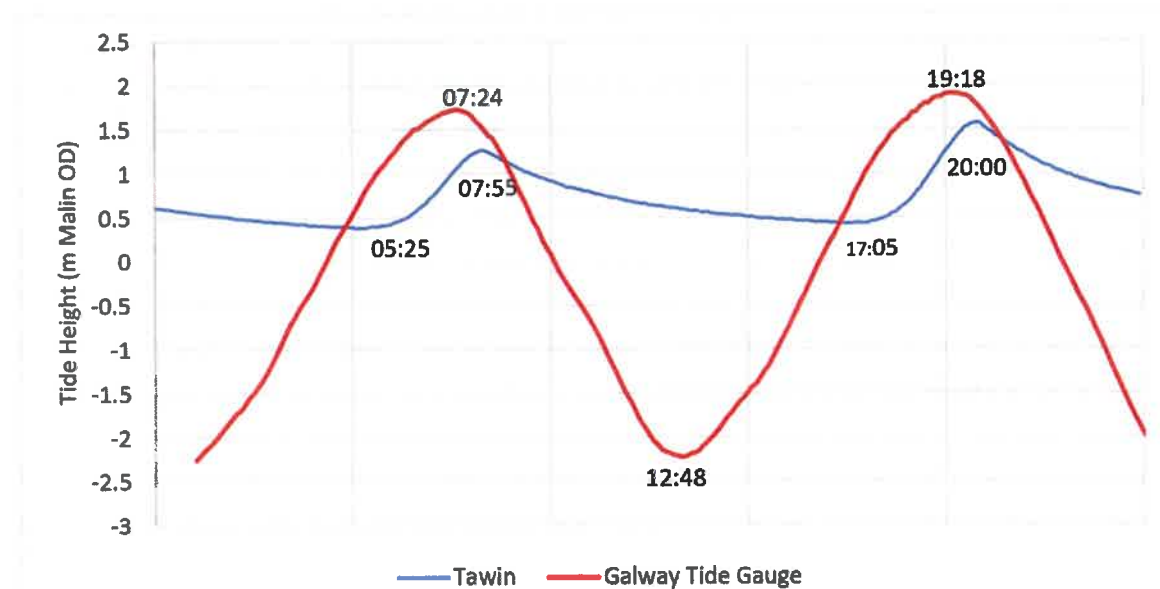


Figure 2.5: 24-hr subset of tidal data.

3. Marine Intertidal Surveys

3.1 *Materials & Methods*

3.1.1 Sampling Procedure

Sampling took place in August and December 2017. The sampling methodology was agreed with NPWS prior to survey work commencing. A total of 66 intertidal transects were surveyed from the HW mark to the LW mark. Figure 3.1 shows the locations of the transects. The transect survey date and start and end coordinates are presented in Appendix 8-1. The transects were surveyed by three experienced marine ecologists to document the intertidal habitat types within the proposed site. The surveyors determined biological zones based on differences in substrata and biological communities. A 0.25m² quadrat was used to record the species present, their abundance (using the SACFOR scale) and the substrate type. Specimens not possible to identify in the field were brought back to the laboratory for microscopic examination. Photographs within each habitat were also taken. Where substrate allowed, 15cm diameter cores (to a depth of 15cm) were collected for faunal and sedimentary analysis. At each of the core stations, five replicate faunal samples were collected and a sixth was collected for grain size and organic carbon analysis. Figure 3.2 shows the locations of the sediment core stations. Table 3.1 provides the coordinates of the core stations.

The samples collected for faunal analysis were carefully and gently sieved on a 1mm mesh sieve as a sediment water suspension for the retention of fauna. Great care was taken during the sieving process in order to minimise damage to taxa such as spionids, scale worms, phyllodocids and amphipods. The sample residue was carefully flushed into a pre-labelled (internally and externally) container from below. Each label contained the sample code and date. The samples were stained with Eosin-briebrich scarlet and fixed in 4% w/v buffered formaldehyde solution upon returning to the laboratory. These samples were ultimately preserved in 70% alcohol prior to processing.

The sediment samples were stored in labelled plastic containers and these samples were frozen (<-18°C) as soon as possible after acquisition.



Figure 3.1: Intertidal transect locations.

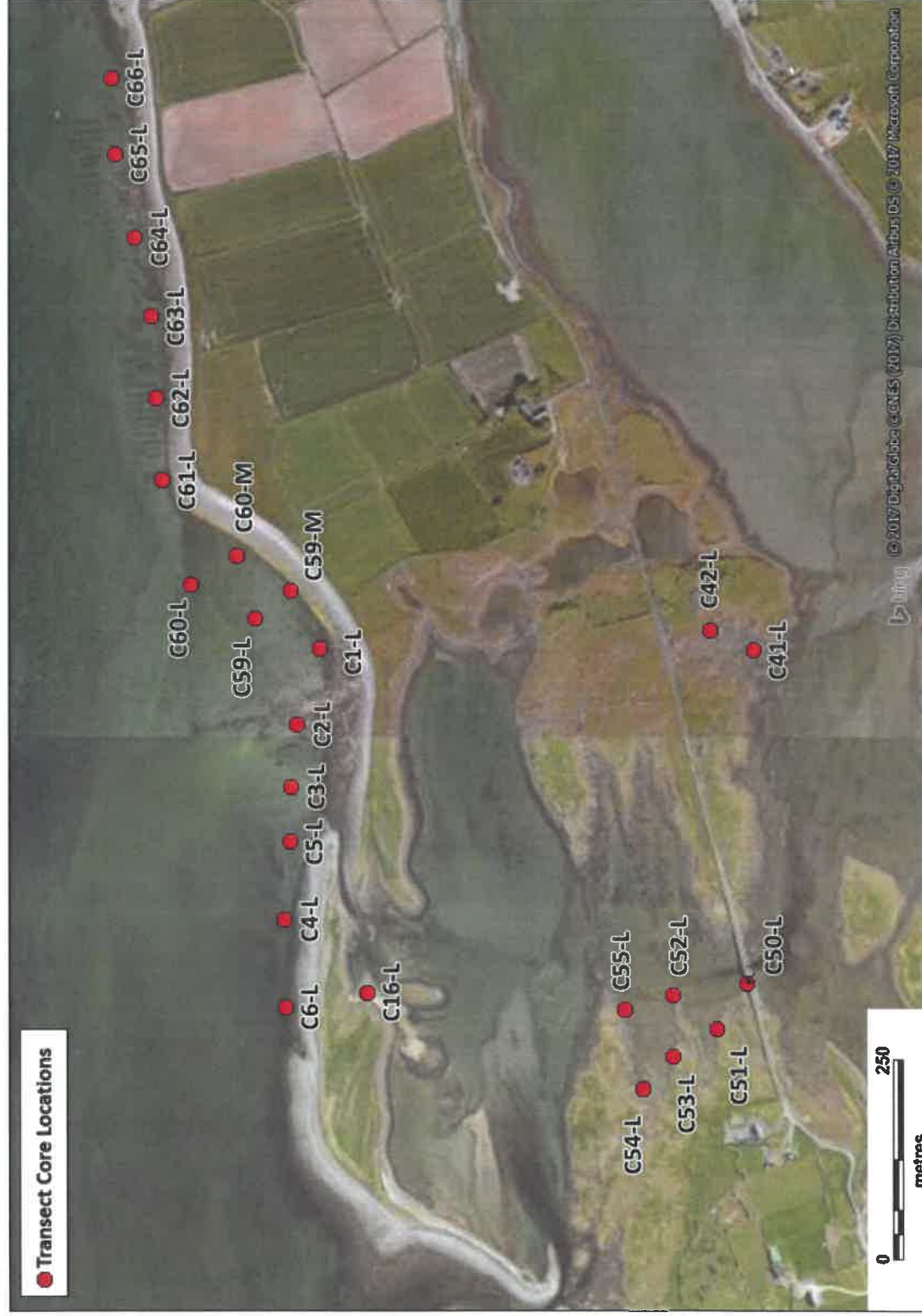


Figure 3.2: Intertidal core station locations.

Table 3.1: Intertidal core station coordinates.

Core Station	Longitude	Latitude
C1 L	-8.998359	53.226637
C2 L	-8.999760	53.226890
C3 L	-9.000950	53.226960
C4 L	-9.003420	53.227040
C5 L	-9.001970	53.226980
C6 L	-9.005080	53.227030
C16 L	-9.004800	53.226110
C41 L	-8.998380	53.221780
C42 L	-8.998020	53.222260
C50 L	-9.004630	53.221850
C51 L	-9.005490	53.222190
C52 L	-9.004850	53.222690
C53 L	-9.006000	53.222690
C54 L	-9.006610	53.223030
C55 L	-9.005120	53.223230
C59 M	-8.997260	53.226960
C59 L	-8.997790	53.227370
C60 M	-8.996620	53.227570
C60 L	-8.997150	53.228090
C61 L	-8.995190	53.228400
C62 L	-8.993660	53.228470
C63 L	-8.992120	53.228520
C64 L	-8.990650	53.228700
C65 L	-8.989090	53.228920
C66 L	-8.987670	53.228970

3.1.2 Sample Processing

All faunal samples were placed in an illuminated shallow white tray and sorted first by eye to remove large specimens and then sorted under a stereo microscope (x 10 magnification). Following the removal of larger specimens, the samples were placed into Petri dishes, approximately one half teaspoon at a time and sorted using a binocular microscope at x25 magnification.

The fauna was sorted into four main groups: Polychaeta, Mollusca, Crustacea and others. The 'others' group consisted of echinoderms, nematodes, nemerteans, cnidarians and other lesser phyla. The fauna

were maintained in stabilised 70% industrial methylated spirit (IMS) following retrieval and identified to species level where practical using a binocular microscope, a compound microscope and all relevant taxonomic keys. After identification and enumeration, specimens were separated and stored to species level. The faunal specimens were then identified to species level where possible using all relevant taxonomic keys and BEQUALM/NAMBQC guides.

The granulometric analysis was carried out by AQUAFAC using the traditional granulometric approach. Traditional analysis involved the dry sieving of approximately 100g of sediment using a series of Wentworth graded sieves. The process involved the separation of the sediment fractions by passing them through a series of sieves. Each sieve retained a fraction of the sediment, which were later weighed and a percentage of the total was calculated. Table 3.2 shows the classification of sediment particle size ranges into size classes. Sieves, which corresponded to the range of particle sizes (Table 3.2), were used in the analysis. Appendix 8-2 provides the detailed granulometric methodology.

Table 3.2: The classification of sediment particle size ranges into size classes (adapted from Buchanan, 1984).

Range of Particle Size	Classification	Phi Unit
<63µm	Silt/Clay	>4 Ø
63-125 µm	Very Fine Sand	4 Ø, 3.5 Ø
125-250 µm	Fine Sand	3 Ø, 2.5 Ø
250-500 µm	Medium Sand	2 Ø, 1.5 Ø
500-1000 µm	Coarse Sand	1 Ø, 1.5 Ø
1000-2000 µm (1 – 2mm)	Very Coarse Sand	0 Ø, -0.5 Ø
2000 – 4000 µm (2 – 4mm)	Very Fine Gravel	-1 Ø, -1.5 Ø
4000 -8000 µm (4 – 8mm)	Fine Gravel	-2 Ø, -2.5 Ø
8 -64 mm	Medium, Coarse & Very Coarse Gravel	-3 Ø to -5.5 Ø
64 – 256 mm	Cobble	-6 Ø to -7.5 Ø
>256 mm	Boulder	< -8 Ø

Organic carbon analysis was carried out by ALS laboratories using the Loss on Ignition (LOI) technique. This method involves oven drying the sediment sample in a muffle furnace (450°C for a period of 6 hours) after which time the organic content of the sample is determined by expressing as a percentage the weight of the sediment after ignition over the initial weight of the sediment.

3.1.3 Data Analysis

Statistical evaluation of the faunal data was undertaken using PRIMER v.6 (Plymouth Routines in Ecological Research). The faunal returns from all 5 replicate samples were totalled prior to analysis. Univariate statistics in the form of diversity indices are calculated. Numbers of species and numbers of individuals per sample will be calculated and the following diversity indices will be utilised:

1) Margalef's species richness index (D) (Margalef, 1958):

$$D = \frac{S-1}{\log N}$$

where: N is the number of individuals

S is the number of species

2) Pielou's Evenness index (J) (Pielou, 1977):

$$J = \frac{H' \text{ (observed)}}{H'_{\max}}$$

where: $H'_{\max}$ is the maximum possible diversity, which could be achieved if all species were equally abundant ($= \log_2 S$)

3) Shannon-Wiener diversity index (H') (Pielou, 1977):

$$H' = - \sum_{i=1}^S p_i (\log_2 p_i)$$

where: p_i is the proportion of the total count accounted for by the i^{th} taxa

4) Simpson's Diversity Index (Simpson, 1949)

$$1-\lambda' = 1 - \{\sum_i N_i(N_i-1)\} / \{N(N-1)\}$$

where N is the number of individuals of species i.

Species richness is a measure of the total number of species present for a given number of individuals. Evenness is a measure of how evenly the individuals are distributed among different species. The Shannon-Wiener index incorporates both species richness and the evenness component of diversity and Simpson's index is a more explicit measure of the latter, *i.e.* the proportional numerical dominance of species in the sample (Simpson, 1949).

The PRIMER programme (Clarke & Warwick, 2001) was used to carry out multivariate analyses on the station-by-station faunal data. All species/abundance data from the core survey was fourth root

transformed and used to prepare a Bray-Curtis similarity matrix in PRIMER. The fourth root transformation was used in order to allow the intermediate abundant and rarer species to play a part in the similarity calculation (other transformations *e.g.* square root and log, were tested but had little effect on the spatial relationships between stations).

The similarity matrix was then used in classification/cluster analysis. The aim of this analysis was to find “natural groupings” of samples, i.e. samples within a group that are more similar to each other, than they are similar to samples in different groups (Clarke & Warwick, *loc. cit.*). The PRIMER programme CLUSTER carried out this analysis by successively fusing the samples into groups and the groups into larger clusters, beginning with the highest mutual similarities then gradually reducing the similarity level at which groups are formed. The result was represented graphically in a dendrogram, the x-axis representing the full set of samples and the y-axis representing similarity levels at which two samples/groups are said to have fused. SIMPROF (Similarity Profile) permutation tests were incorporated into the CLUSTER analysis to identify statistically significant evidence of genuine clusters in samples which are *a priori* unstructured.

The Bray-Curtis similarity matrix was also subjected to a non-metric multi-dimensional scaling (MDS) algorithm (Kruskal & Wish, 1978), using the PRIMER programme MDS. This programme produced an ordination, which is a map of the samples in two- or three-dimensions, whereby the placement of samples reflects the similarity of their biological communities, rather than their simple geographical location (Clarke & Warwick, 2001). With regard to stress values, they give an indication of how well the multi-dimensional similarity matrix is represented by the two-dimensional plot. They are calculated by comparing the interpoint distances in the similarity matrix with the corresponding interpoint distances on the 2-d plot. Perfect or near perfect matches are rare in field data, especially in the absence of a single overriding forcing factor such as an organic enrichment gradient. Stress values increase, not only with the reducing dimensionality (lack of clear forcing structure), but also with increasing quantity of data (it is a sum of the squares type regression coefficient). Clarke & Warwick (*loc. cit.*) have provided a classification of the reliability of MDS plots based on stress values, having compiled simulation studies of stress value behaviour and archived empirical data. This classification generally holds well for 2-d ordinations of the type used in this study. Their classification is given below:

- Stress value < 0.05: Excellent representation of the data with no prospect of misinterpretation.
- Stress value < 0.10: Good representation, no real prospect of misinterpretation of overall structure, but very fine detail may be misleading in compact subgroups.

- Stress value < 0.20 : This provides a useful 2-d picture, but detail may be misinterpreted particularly nearing 0.20.
- Stress value 0.20 to 0.30: This should be viewed with scepticism, particularly in the upper part of the range, and discarded for a small to moderate number of points such as < 50 .
- Stress values > 0.30 : The data points are close to being randomly distributed in the 2-d ordination and not representative of the underlying similarity matrix.

Each stress value must be interpreted both in terms of its absolute value and the number of data points. In the case of this study, the moderate number of data points indicates that the stress value can be interpreted more or less directly. While the above classification is arbitrary, it does provide a framework that has proved effective in this type of analysis.

The species, which are responsible for the grouping of samples in cluster and ordination analyses, were identified using the PRIMER programme SIMPER (Clarke & Warwick, 1994). This programme determined the percentage contribution of each species to the dissimilarity/similarity within and between each sample group.

In order to determine what role (if any) sediment characteristics has on the faunal groupings, Principal Component Analysis (PCA) was carried out on the sediment grain size and organic carbon data. PCA is a 2D/3D ordination similar to that of non-metric MDS. The data was transformed to prevent any outliers having a disproportionate influence on the results. The grain size characteristics were arcsin transformed and the organic carbon results were $\log_{10}$ transformed as is standard practice. If any significant (pairwise correlations > 0.95) correlations existed between variables, only one variable from that correlated group was included in the analysis, to prevent the correlation being exaggerated in the analysis. Following transformation, the data was normalised to equalise the variance and standardise the contributory importance of each variable. The resulting data matrix was subjected to a correlation based PCA using Primer v6 programme PCA (Clarke & Warwick, 1994), to identify the parameters that accounted for the variance in the original dataset. The SIMPROF groupings assigned to the stations based on their faunal make-up (using CLUSTER) were added to the dataset to allow a comparison to be made between the faunal and sediment groupings.

In order to assess the benthic ecological quality of the community, the AZTI Marine Biotic Index (AMBI) was calculated on each replicate sample. AMBI offers a 'pollution or disturbance classification' which represents the benthic community health (*sensu* Grall & Glémarec, 1997). All epifauna and planktonic taxa are removed prior to analysis. Individuals are put into one of five ecological sensitivity groups

(Group I - very sensitive to disturbance/pollution; Group II - indifferent to disturbance/pollution; Group III - tolerant to disturbance/pollution; Group IV - second-order opportunists and Group V - first order opportunists) and the AMBI score is calculated as a weighted average of the sensitivity scores of each replicate sample. Assemblages with high proportions of sensitive taxa are indicative of areas with low levels of disturbance/pollution and stations dominated by opportunistic taxa reflect impacted areas. Table 3.3 shows the AMBI values and their equivalences (after Borja *et al.*, 2000).

Table 3.3: Summary of the AMBI values and their equivalences (after Borja *et al.*, 2000 modified from Grall & Glémarec, 1997).

AMBI Value (BC = Biotic Coefficient)	Dominating Ecological Group	Benthic Community Health	Site Pollution Classification
0.0 < BC ≤ 0.2	I	Normal	Unpolluted
0.2 < BC ≤ 1.2		Impoverished	
1.2 < BC ≤ 3.3	III	Unbalanced	Slightly Polluted
3.3 < BC ≤ 4.3	IV - V	Transitional to Polluted	Moderately Polluted
4.3 < BC ≤ 5.0		Polluted	
5.0 < BC ≤ 5.5	V	Transitional to Heavy Pollution	Heavily Polluted
5.5 < BC ≤ 6.0		Heavily Polluted	
7.0	Azoic	Azoic	Extremely Polluted

3.2 Results

3.2.1 Intertidal Transects

Appendix 8-1 provides a detailed description of all 66 intertidal transects surveyed. Appendix 8-3 provides the shore profiles of each transect. The shores of the area of Tawin surveyed fall into a number of different categories.

The first category is the sixteen locations on the north shore of Tawin that face into Galway Bay. The coast here experiences full daily symmetrical tidal variation including the longer lunar variations of the Spring and Neap cycles. These shores show the full range of zonation associated with such tidal conditions. At low water Spring tide, the length of the exposed shore is up to *ca* 200m particularly at the eastern end of Lurgan Island. The supratidal habitat along the entire length of this northern shore is comprised of limestone boulders and cobbles interspersed with gravel. The profile of this habitat is very steep and but shallows rapidly as it continues into the upper shore habitat. The shore profile continues to level out with distance from the shore and by mid tide, it has flattened out considerably.

Lower shore substrates at these sites are a sandy shell substrate with bivalves such as oysters (*Ostrea edulis*) and clams (*Tapes* and *Dosinia*). Small amounts of live maerl (*Lithothamnion* sp.) can also be found at low water. Although some intravariation in lichen and algal species recorded was recorded in these ten transects e.g. some lacked *Pelvetia* or *Ascophyllum*, overall, the typical zonation pattern was recorded on these shores with lichen species occurring in the supratidal and high shore levels followed by *Pelvetia*, *Fucus spiralis*, *F. vesiculosus*, *Ascophyllum* and finally, *F. serratus*. Band width of these algae can be tens of meters in extent. At the western end of Lurgan Island where the outflow from Mweeloon Lagoon via Oileanbeag Stream fans out to a width of c. 100m, this zonation pattern is far less clear as there is always some level of water that covers the substrate.

With regard to invertebrate taxa, they too show the classic zonation with isopods (*Ligia*) occurring under stones above high water and talitrid amphipods present in rotting weed at the High Water mark, littorinid gastropods and amphipods in the *Pelvetia* zone, other littorinid species, limpets and dog whelks and barnacle species at mid shore levels and echinoderms and bivalves at low water.

As the habitat within Tawin is lagoonal in nature, tidal conditions are very different than those described above and as noted in Section 2.2 above. Even under low water Spring tide conditions, water levels only fall to c.-1.5m below high water at most. Also, in this inner area, saltmarsh (with typical floral species such as *Limonium*, *Salicornia*, *Aster*, *Suede* and *Beta* being present) predominates in the supratidal and high water shore levels. Of special note is the presence of extensive stands of *Artemisia absinthium* which is present throughout the headland. Due to the restricted tidal conditions described above, the full suite and spatial extent of zonation present in the outer open sea shoreline does not occur inside the lagoon e.g. *F. serratus* is not exposed and in some locations, neither *F. spiralis* nor *F. vesiculosus* are exposed. Furthermore, algal band width is never more than a few meters in extent. The lagoonal specialists, *Ruppia cirrhosa* and *Idotea chelipes*, were recorded at one location. The inner lagoonal shores can be differentiated by their substrates i.e. mud, gravel/sand, stones, exposed bed rock. Figure 3.3 (Section 3.2.2) shows the distribution of the substrate types of intertidal habitat in the study area.

3.2.2 Intertidal Sediment

Table 3.4 shows the sediment characteristics of the faunal stations along the intertidal shore of Tawin.

T42-L contained the highest percentage of fine gravel (44.7%) and T59-M contained the highest fraction of very fine gravel (15.6%). T16-L contained the highest fraction of very coarse sand (29.9%). T62-L contained the highest fraction of coarse sand (87.7%). T66-L contained the highest fraction of

medium sand (54%). T54-L and T6-L had the highest percentage of fine sand (30% each) and T54-L also had the highest fraction of very fine sand (20.9%). T51-L had the highest percentage of silt-clay (28%). The sediment sampled was classified according to Folk (1954) as gravelly sand, slightly gravelly sand, sandy gravel, gravelly muddy sand, muddy sandy gravel, slightly gravelly muddy sand and sand. Figure 3.4 shows the distribution of sediment type throughout the survey area.

Organic matter values ranged from 2.65% (T60-M) to 18.05% (T50-L).

Table 3.4: Sediment characteristics of the faunal stations sampled in the intertidal area of Mweeloon Lagoon.

Station	Fine Gravel (>4mm)	Gravel (>2mm)	Very Coarse Sand (1-2mm)	Coarse Sand (0.5-1mm)	Medium Sand (0.25-0.5mm)	Fine Sand (125-250mm)	Very Fine Sand (62.5-125mm)	Silt-Clay (<63mm)	Folk (1954)	LOI (%)
T1-L	11.5	9.1	9.3	12.2	34.9	22.1	0.7	0.2	Gravelly sand	4.5
T2-L	6.8	9.0	15.6	25.4	41.5	1.7	0.0	0.0	Gravelly sand	10.75
T3-L	19.3	12.2	22.9	20.8	21.2	3.5	0.1	0.1	Sandy gravel	5.85
T4-L	31.6	11.0	13.5	13.1	15.6	14.3	0.6	0.3	Sandy gravel	3.84
T5-L	9.9	12.1	17.5	17.1	23.8	18.9	0.6	0.1	Gravelly sand	3.68
T6-L	13.9	7.7	10.7	8.9	27.8	30	0.8	0.3	Gravelly sand	4.41
T16-L	4.5	14.9	29.9	23.4	21.8	5	0.3	0.1	Gravelly sand	2.74
T41-L	28.9	5.1	8.1	11.7	16.7	13.6	6.6	9.3	Gravelly muddy sand	13
T42-L	44.7	0.1	0.1	0.3	1.3	16.2	12.2	25.1	Muddy sandy gravel	9.01
T50-L	5.6	1.4	4.3	10.4	18	22	17.2	21	Gravelly muddy sand	18.05
T51-L	1.5	0.6	3.3	9	17.8	23.3	16.6	28	Slightly gravelly muddy sand	17.75
T52-L	9.2	0.6	1.9	7.2	22.3	27.7	15.2	15.8	Gravelly muddy sand	11.2
T53-L	11.7	0.6	1.6	7.2	24.9	26.9	12.1	15.2	Gravelly muddy sand	11.8
T54-L	5.1	0.7	2.1	5.2	15.2	30	20.9	20.8	Gravelly muddy sand	7.45
T55-L	3.2	1	5.3	14.2	20.2	20.9	15.1	20.2	Slightly gravelly muddy sand	16.5
T59-M	23.7	15.6	19.2	33.4	4.1	2.6	0.9	0.5	Sandy gravel	4.59
T59-L	12.8	12.1	9.1	58.6	3.7	2.4	1.1	0.3	Gravelly sand	3.41
T60-M	14.8	14.9	21.7	33.9	5	3.2	6	0.4	Gravelly sand	2.65
T60-L	10.1	8.2	10.8	61.4	5	3.2	0.7	0.6	Gravelly sand	3.9
T61-L	0	0.2	2.8	86.7	3.5	2.1	3.8	0.9	Sand	2.68
T62-L	0	0.2	0.9	87.7	2.9	1.9	5.4	1	Sand	2.82
T63-L	0	0.4	1.3	84.2	5.6	3.5	3.8	1.1	Sand	3.11
T64-L	0	0.5	1.6	85.8	4.6	2.9	4	0.6	Sand	2.7

Station	Fine Gravel (>4mm)	Gravel (>2mm)	Very Coarse Sand (1-2mm)	Coarse Sand (0.5-1mm)	Medium Sand (0.25-0.5mm)	Fine Sand (125-250mm)	Very Fine Sand (62.5-125mm)	Silt-Clay (<63mm)	Folk (1954)	LOI (%)
T65-L	0.4	0.7	5.1	44	35.6	13.6	0.6	0	Slightly gravelly sand	2.89
T66-L	8.9	1.4	3.3	14.5	54	8	7.2	2.6	Gravelly sand	4.51

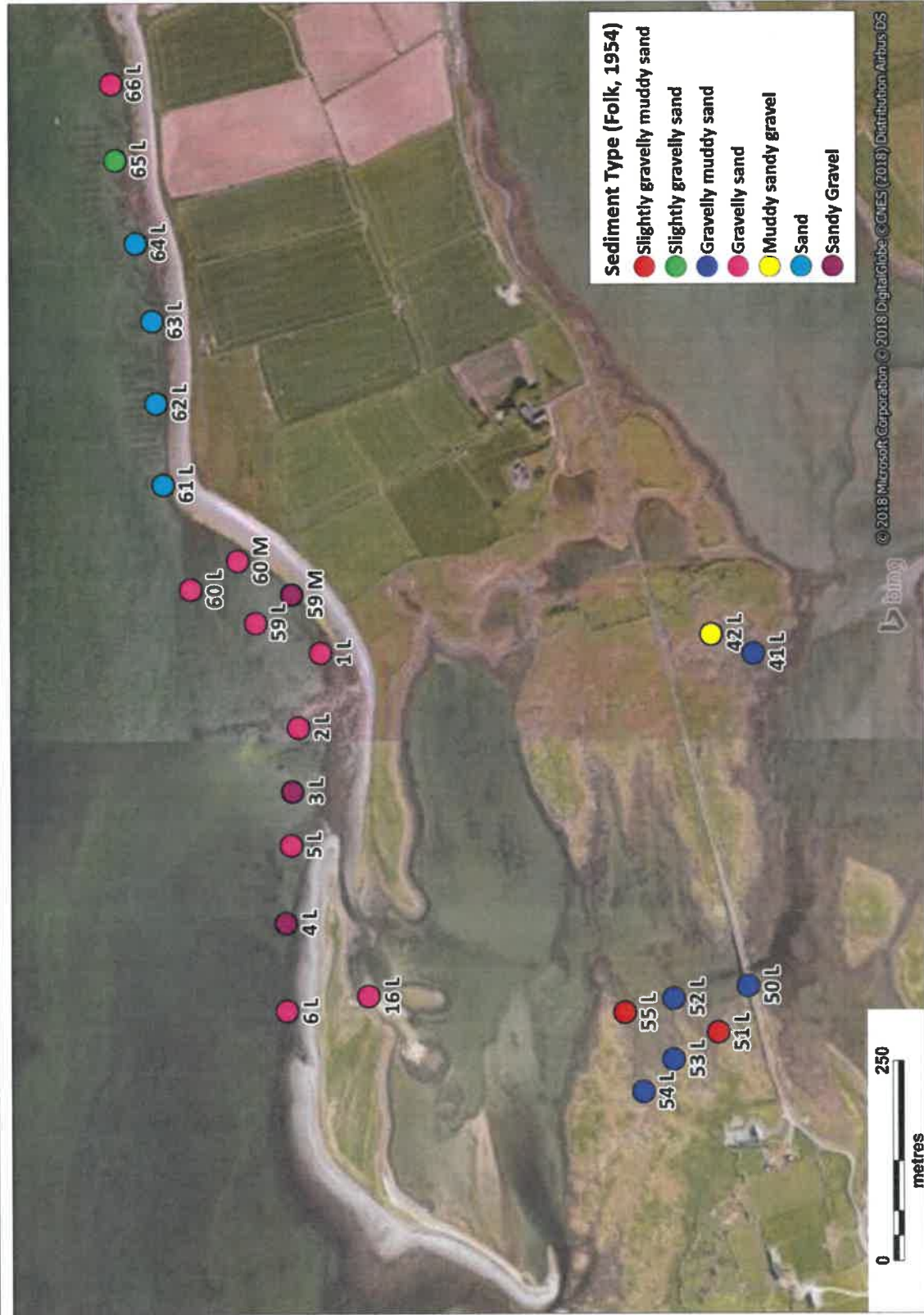


Figure 3.3: Sediment type (Folk, 1945) from the intertidal areas around Mweeloon Lagoon.

3.2.3 Infaunal Cores

The taxonomic identification of the benthic infauna across all 25 core stations sampled along the intertidal shores of Tawin yielded a total count of 231 taxa ascribed to 12 phyla. Four of the taxa could not be enumerated as they were colonial bryozoans. The remaining 227 taxa consisted of 14,031 individuals. Of the 227 taxa recorded, 159 were identified to species level. The remaining 68 could not be identified to species level as they were either juveniles, partial/damaged or indeterminate. Appendix 8-4 presents the faunal abundances from the sampled sites.

Of the 231 taxa present, 3 were cnidarians (corals, anemones, jellyfish etc), 1 was a platyhelminth (flat worm), 1 was a nematode (roundworm), 6 were a nemerteans (ribbon worms), 3 were sipunculids (acorn worm), 86 were annelids (segmented worms), 3 were a chelicerates (sea spider, mites), 57 were crustaceans (crabs, shrimps, prawns), 57 were molluscs (mussels, cockles, snails etc.), 4 were bryozoans (moss animal), 1 was a phoronid (horseshoe worm), 3 were echinoderms (brittlestars, starfish, sea cucumbers), 1 was a tunicate (sea squirt) and 5 were insects (flies).

3.2.3.1 Univariate Analysis

Univariate statistical analyses were carried out on the combined station-by-station faunal data. The colonial bryozoans were removed from the data set prior to analysis. The following parameters were calculated and can be seen in Table 3.5: taxon numbers, number of individuals, richness, evenness and Shannon-Weiner diversity. Taxon numbers ranged from 7 (T51-L) to 62 (T6). Number of individuals ranged from 69 (T51-L) to 2,368 (T16-L). Richness ranged from 1.42 (T51-L) to 9.4 (T60-L). Evenness ranged from 0.31 (T55-L and T59-M) to 0.90 (T3-L). Shannon-Weiner diversity ranged from 0.82 (T55-L) to 3.17 (T3-L). Figure 3.4 shows these community indices in graphical form.

Table 3.5: Univariate measures of community structure.

Stations	No. Taxa	No. Individuals	Richness	Evenness	Shannon-Weiner Diversity	Simpson's Diversity
T1-L	36	196	6.63	0.72	2.59	0.87
T2-L	15	130	2.88	0.52	1.40	0.61
T3-L	34	92	7.30	0.90	3.17	0.95
T4-L	57	413	9.30	0.65	2.65	0.84
T5-L	51	466	8.14	0.64	2.50	0.80
T6-L	62	1017	8.81	0.57	2.33	0.73
T16-L	44	2368	5.53	0.43	1.63	0.70
T41-L	14	153	2.58	0.65	1.71	0.75
T42-L	21	1578	2.72	0.49	1.48	0.67
T50-L	16	302	2.63	0.58	1.62	0.75

Stations	No. Taxa	No. Individuals	Richness	Evenness	Shannon-Weiner Diversity	Simpson's Diversity
T51-L	7	69	1.42	0.74	1.44	0.74
T52-L	11	129	2.06	0.59	1.41	0.68
T53-L	14	504	2.09	0.36	0.95	0.36
T54-L	20	2341	2.45	0.34	1.02	0.44
T55-L	14	588	2.04	0.31	0.82	0.34
T59-M	43	609	6.55	0.31	1.17	0.38
T59-L	50	463	7.98	0.72	2.82	0.91
T60-M	59	480	9.39	0.66	2.69	0.84
T60-L	56	347	9.40	0.76	3.04	0.92
T61-L	45	213	8.21	0.78	2.96	0.89
T62-L	40	190	7.43	0.81	3.00	0.92
T63-L	53	371	8.79	0.76	3.03	0.90
T64-L	27	101	5.63	0.71	2.33	0.78
T65-L	43	419	6.96	0.68	2.57	0.82
T66-L	49	489	7.75	0.76	2.94	0.92

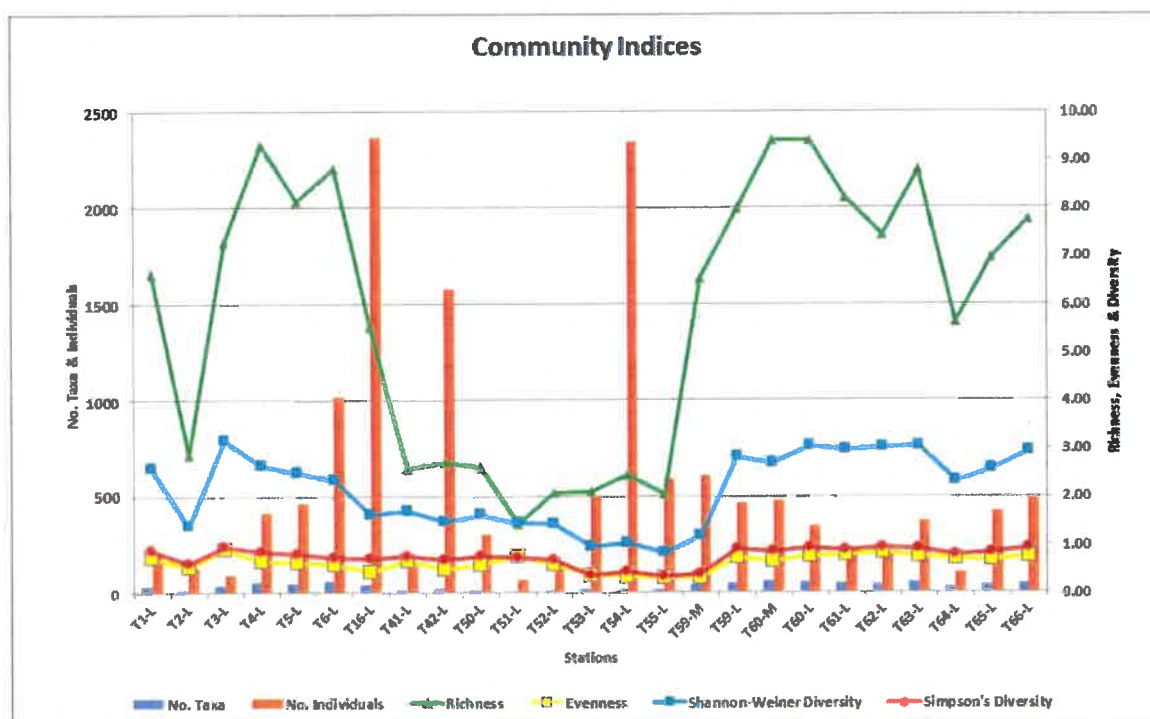


Figure 3.4: Community diversity indices for intertidal cores.

3.2.3.2 Multivariate Analysis

The same data set used above for the univariate analyses was also used for the multivariate analyses. The dendrogram and the MDS plot can be seen in Figures 3.5 and 3.6 respectively. SIMPROF analysis revealed 7 statistically significant groupings between the 25 stations (the samples connected by red

lines cannot be significantly differentiated). The stress level on the MDS plot indicates a good representation of the data with no real prospect of misinterpretation.

Group a contained 8 stations (T41, T42, T50, T51, T52, T53, T54 and T55). The stations in this group were all located within the lagoon and this group separated from all other stations at a 15.7% similarity. According to SIMPER analysis, this station has a within group similarity of 52.78%. This group contained 43 taxa comprising 5,664 individuals. Of the 43 taxa, 23 were present twice or less. Four species accounted for just over 86% of the faunal abundance of this group: the oligochaete *Tubificoides benedii* (3,260 individuals, 57.56% abundance), the amphipod *Corophium volutator* (794 individuals, 14.02% abundance), the gastropod mollusc *Peringia ulvae* (453 individuals, 8.0% abundance) and the polychaete *Capitella* sp. complex (377 individuals, 6.66% abundance). SIMPER analysis revealed that *Tubificoides benedii*, *Capitella* sp. complex and Nematodes were the characterising species of this group. Table 3.6 shows the full SIMPER results. Species richness and diversity were low for this group, ranging from 1.42 to 2.72 and 0.82 to 1.71 respectively. This group shows elements of the JNCC biotope LS.LMu.Uest.Tben. *Tubificoides benedii* and other oligochaetes.

Group b separated from Groups c, d, e and f at a 30.62% similarity level. Group b contained 6 stations (T61-L to T66-L), all located on the exposed outer shore. According to SIMPER analysis, this station has a within group similarity of 48.41%. This group contained 107 taxa comprising 1,783 individuals. Of the 107 taxa, 50 were present twice or less. Six species accounted for just over 50% of the faunal abundance of this group: the bivalve *Macomangulus tenuis* (333 individuals, 18.68% abundance), the polychaetes *Pygospio elegans* (167 individuals, 9.37% abundance) and *Spio martinensis* (126 individuals, 7.07 abundance), the amphipod *Crassikorophium crassicorne* (112 individuals, 6.28% abundance), Nematoda (84 individuals, 5.27% abundance) and the bivalve mollusc *Kurtiella bidentata* (68 individuals, 3.81% abundance).. SIMPER analysis revealed that the polychaete *Nephtys hombergii* and the bivalves *Kurtiella bidentata* and *Macomangulus tenuis* were the characterising species of this group. Table 3.6 shows the full SIMPER results. Species richness and diversity were average for this group, ranging from 5.63 to 8.79 and 2.33 to 3.03 respectively. This group shows no similarities to any of the JNCC biotopes.

Group c contained 2 stations (T1 and T3), both located on the exposed outer shore. According to SIMPER analysis, this group has a within group similarity of 42.98%. This group contained 54 taxa comprising 288 individuals. Of the 54 taxa, 32 were present twice or less. Four species accounted for just over 50% of the faunal abundance of this group: Nematoda (50 individuals, 17.36% abundance), the polychaete *Spirorbis* sp. (42 individuals, 14.58% abundance), the oligochaete *Tubificoides benedii*

(29 individuals, 10.07% abundance) and the bivalve mollusc *Macomangulus tenuis* (25 individuals, 8.68% abundance). SIMPER analysis could not determine the characterising species as there were only 2 stations in the group. Table 3.6 shows the full SIMPER results. Species richness was high and diversity was average for this group, ranging from 6.63 to 7.3 and 2.59 to 3.17, respectively. This group shows elements of the JNCC biotope LS.LSu.FiSa.Po.Aten, polychaetes and *Angulus* (now *Macomangulus*) *tenuis*.

Group d separated from Groups e and f at a 38.44% similarity level. This group contained two stations (T59-M and T59-L) at mid shore and lower shore along the same transect located on the exposed outer shore. According to SIMPER analysis this group has a within group similarity of 50.4%. This group contained 68 taxa comprising 1072 individuals. Of the 68 taxa, 44 were present twice or less. Four species accounted for just under 65% of the faunal abundance of this group: the oligochaete *Tubificoides benedii* (480 individuals, 44.78%), the polychaetes *Travisia forbesii* (74 individuals, 6.9%), Nematoda (71 individuals, 6.62%) and the bivalve mollusc *Macomangulus tenuis* (71 individuals, 6.62%). SIMPER analysis could not determine the characterising species as there were only 2 stations in the group. Table 3.6 shows the full SIMPER results. Species richness and diversity were average for this group, ranging from 6.55 to 7.98 and 1.17 to 2.82, respectively. This group shows elements of the JNCC biotope LS.LSu.FiSa.Po.Aten, polychaetes and *Angulus* (now *Macomangulus*) *tenuis*.

Group e separated from Group f at a 41.51% similarity level. Group e contained 3 stations (T4, T5 and T6), all located on the exposed outer shore. According to SIMPER analysis, this group has a within group similarity of 57.69%. This group contained 94 taxa comprising 1,896 individuals. Of the 94 taxa, 39 were present twice or less. Four species accounted for just under 60% of the faunal abundance of this group: Nematoda (862 individuals, 45.46% abundance), the chiton *Lepidochitona cinerea* (113 individuals, 5.96% abundance), the bivalve mollusc *Kurtiella bidentata* (78 individuals, 4.11% abundance) and the polychaete *Syllis mauretanicus* (77 individuals, 4.06% abundance). SIMPER analysis revealed that *Pholoe inornata*, *Glycera tridactyla*, Nematoda, *Polyophthalmus pictus* and *Macomangulus tenuis* were the characterising species of this group. Table 3.6 shows the full SIMPER results. Species richness was high and diversity was average for this group, ranging from 8.14 to 9.3 and 2.33 to 2.65 respectively. This group shows no similarities to any of the JNCC biotopes.

Group f separated from Groups c, d and e at a 43.7% similarity level. This group contained two stations (T60-M and T60-L) at mid shore and lower shore along the same transect located on the exposed outer shore. According to SIMPER analysis this group has a within group similarity of 43.7%. This group contained 90 taxa comprising 827 individuals. Of the 90 taxa, 57 were present twice or less. Six species

accounted for just under 60% of the faunal abundance of this group: Nematoda (243 individuals, 29.38%), the oligochaetes *Grania* sp. (69 individuals, 8.34%), *Tubificoides benedii* (49 individuals, 5.93%) and *Tubificoides pseudogaster* aggregate (43 individuals, 5.2%), the chiton *Lepidochitona cinerea* (46 individuals, 5.56%) and the polychaetes *Spirobranchus lamarcki* (45 individuals, 5.44%). SIMPER analysis could not determine the characterising species as there were only 2 stations in the group. Table 3.6 shows the full SIMPER results. Species richness and diversity were high for this group, ranging from 9.39 to 9.4 and 2.69 to 3.04, respectively. This group shows elements of the JNCC biotope LS.LMu.Uest.Tben. *Tubificoides benedii* and other oligochaetes.

Group g separated from Groups b, c, d, e and f at a 21.63% similarity level. This group contained 2 stations (T2 and T16), located inside and outside the lagoon. According to SIMPER analysis, this station has a within group similarity of 30.41%. This group contained 46 taxa comprising 2,363 individuals. Of the 46 taxa, 21 were present twice or less. Three species accounted for just over 86% of the faunal abundance of this group, the Enchytraeidae (1,091 individuals, 46.17% abundance), Nematoda (820 individuals, 34.7% abundance) and *Tubificoides* sp. (136 individuals, 5.76% abundance). SIMPER analysis could not determine the characterising species as there were only 2 stations in the group. Table 3.6 shows the full SIMPER results. Species richness was average and diversity was low for this group, ranging from 2.88 to 5.53 and 1.4 to 1.63, respectively. This group shows elements of the JNCC biotope LS.LMu.Uest.Tben. *Tubificoides benedii* and other oligochaetes.

JN1340 Tawin Intertidal

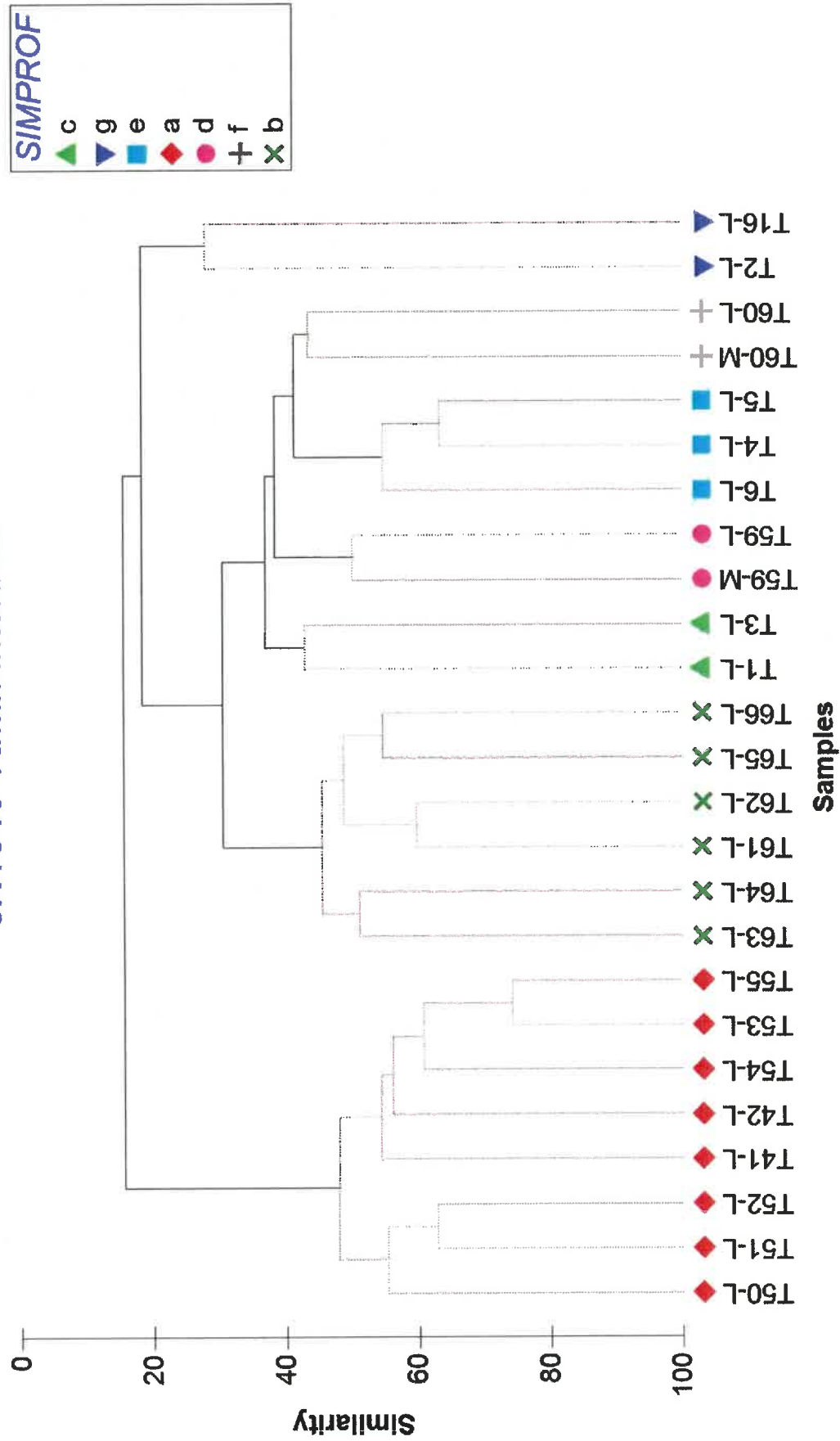


Figure 3.5: Dendrogram produced from Cluster analysis.

JN1340 Tawin Intertidal

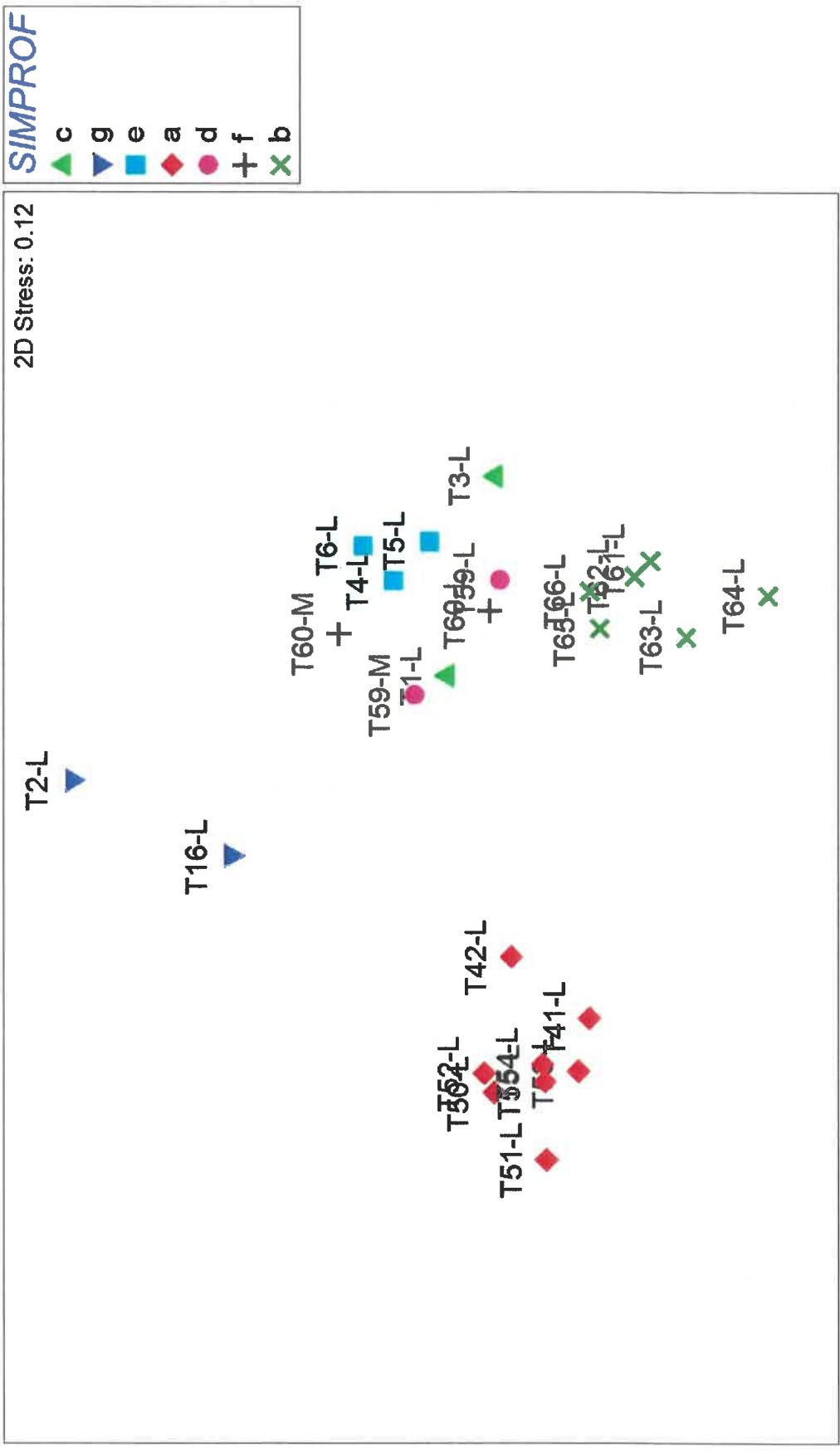


Figure 3.6: MDS plot.

Table 3.6: SIMPER Results.

Group a Average similarity: 52.78%					
Species	Av.Abund	Av.Sim	Sim/SD	Contrib%	Cum.%
<i>Tubificoides benedii</i>	3.83	11.91	4.83	22.57	22.57
<i>Capitella</i> sp. complex	2.56	9.95	3.9	18.86	41.43
Nematoda	2.18	7.33	4.75	13.89	55.31
<i>Tubificoides pseudogaster</i> agg.	1.69	4.91	1.59	9.3	64.61
<i>Peringia ulvae</i>	1.88	4.62	1.42	8.76	73.37
<i>Corophium volutator</i>	1.68	3.65	1.57	6.91	80.28
<i>Hediste diversicolor</i>	0.97	1.78	0.71	3.37	83.65
<i>Eteone longa</i> agg.	0.98	1.7	0.72	3.21	86.86
<i>Cerastoderma glaucum</i>	0.74	1.64	0.69	3.1	89.96
<i>Limecola balthica</i>	0.89	1.44	0.72	2.72	92.68
Group b Average similarity: 48.41%					
Species	Av.Abund	Av.Sim	Sim/SD	Contrib%	Cum.%
<i>Macomangulus tenuis</i>	2.7	4.49	6.14	9.28	9.28
Nematoda	1.87	2.69	4.94	5.56	14.85
<i>Kurtiella bidentata</i>	1.75	2.69	7.94	5.56	20.41
<i>Nephtys hombergii</i>	1.5	2.33	8.07	4.82	25.23
<i>Scoloplos armiger</i>	1.49	2.32	4.71	4.78	30.01
<i>Eteone longa</i> agg.	1.35	2.05	3.39	4.24	34.25
Veneridae	1.35	1.95	4.31	4.02	38.27
<i>Phyllodoce mucosa</i>	1.25	1.6	1.27	3.3	41.57
<i>Owenia borealis</i>	1.22	1.5	1.26	3.09	44.66
Tellinidae	1.44	1.46	1.24	3.01	47.67
<i>Crassikorophium crassicorne</i>	1.54	1.45	1.17	2.99	50.67
<i>Nephtys cirrosa</i>	1.15	1.45	1.24	2.99	53.66
<i>Prionospio</i> sp.	1.21	1.4	1.35	2.9	56.55
<i>Thracia phaseolina</i>	1.09	1.37	1.33	2.84	59.39
<i>Tubificoides pseudogaster</i> agg.	1.02	1.22	1.31	2.53	61.92
<i>Parexogone hebes</i>	0.95	1.2	1.34	2.48	64.4
<i>Bittium reticulatum</i>	1.08	1.19	1.34	2.46	66.86
<i>Nephtys</i> sp.	1.06	1.08	0.78	2.23	69.09
<i>Spio martinensis</i>	1.34	1.01	0.77	2.09	71.19
Nemertea sp. A	0.82	0.9	0.79	1.86	73.05
<i>Travisia forbesii</i>	1.03	0.89	0.78	1.83	74.88
<i>Fabulina fabula</i>	0.86	0.85	0.77	1.75	76.63
<i>Ruditapes philippinarum</i>	0.93	0.83	0.79	1.71	78.34
Spionidae	0.95	0.82	0.77	1.7	80.04
<i>Grania</i> sp.	0.91	0.8	0.79	1.64	81.69
<i>Pygospio elegans</i>	1.13	0.75	0.76	1.55	83.24
<i>Aricidea (Arcidea) minuta</i>	0.97	0.75	0.77	1.54	84.78
<i>Notomastus latericeus</i>	0.99	0.74	0.78	1.54	86.32
<i>Limecola balthica</i>	0.67	0.72	0.77	1.48	87.8

<i>Tubificoides benedii</i>	0.77	0.65	0.78	1.34	89.15
<i>Bathyporeia guilliamsoniana</i>	0.82	0.44	0.48	0.9	90.05
Group c Average similarity: 42.98%					
Species	Av.Abund	Av.Sim	Sim/SD	Contrib%	Cum.%
<i>Macomangulus tenuis</i>	1.88	4.28	#####	9.97	9.97
Nematoda	2.04	3.44	#####	8.01	17.98
<i>Lepidochitona cinerea</i>	1.53	3.44	#####	8.01	25.98
<i>Pholoe inornata</i>	1.32	3.03	#####	7.05	33.03
<i>Glycera tridactyla</i>	1.5	3.03	#####	7.05	40.08
<i>Kurtiella bidentata</i>	1.3	2.74	#####	6.37	46.45
<i>Phyllodoce mucosa</i>	1	2.3	#####	5.36	51.8
<i>Syllis mauretanica</i>	1	2.3	#####	5.36	57.16
Nereididae	1.09	2.3	#####	5.36	62.51
<i>Scoloplos armiger</i>	1	2.3	#####	5.36	67.87
<i>Notomastus latericeus</i>	1.16	2.3	#####	5.36	73.22
Serpulidae	1	2.3	#####	5.36	78.58
<i>Corophium volutator</i>	1.09	2.3	#####	5.36	83.93
<i>Badotria scorpioides</i>	1.09	2.3	#####	5.36	89.29
<i>Cerastoderma edule</i>	1.25	2.3	#####	5.36	94.64
Group d Average similarity: 50.4%					
Species	Av.Abund	Av.Sim	Sim/SD	Contrib%	Cum.%
Nematoda	2.43	3.71	#####	7.37	7.37
<i>Glycera tridactyla</i>	1.8	2.87	#####	5.7	13.06
<i>Lepidochitona cinerea</i>	2.05	2.87	#####	5.7	18.76
<i>Tubificoides pseudogaster</i> agg.	1.75	2.71	#####	5.39	24.14
Enchytraeidae	1.62	2.53	#####	5.01	29.16
Nemertea	1.62	2.28	#####	4.53	33.69
<i>Malacoceros girardi</i>	1.59	2.12	#####	4.22	37.9
Melitidae	1.37	2.12	#####	4.22	42.12
<i>Macomangulus tenuis</i>	2.09	2.12	#####	4.22	46.33
<i>Phyllodoce mucosa</i>	1.19	1.92	#####	3.81	50.14
<i>Prionospio</i> sp.	1.3	1.92	#####	3.81	53.95
<i>Crassikorophium crassicorne</i>	1.77	1.92	#####	3.81	57.76
<i>Cerastoderma edule</i>	1.19	1.92	#####	3.81	61.57
Platyhelminthes	1	1.61	#####	3.2	64.77
Nemertea sp. B	1	1.61	#####	3.2	67.97
<i>Pholoe inornata</i>	1	1.61	#####	3.2	71.18
<i>Perinereis cultrifera</i>	1	1.61	#####	3.2	74.38
<i>Nephtys cirrosa</i>	1.28	1.61	#####	3.2	77.58
Spionidae	1.09	1.61	#####	3.2	80.78
<i>Aonides oxycephala</i>	1	1.61	#####	3.2	83.99
<i>Pygospio elegans</i>	1	1.61	#####	3.2	87.19
<i>Tubificoides benedii</i>	2.84	1.61	#####	3.2	90.39
Group e Average similarity: 57.69%					

Species	Av.Abund	Av.Sim	Sim/SD	Contrib%	Cum.%
Nematoda	4	4.52	12.96	7.83	7.83
<i>Lepidochitona cinerea</i>	2.41	2.73	4.52	4.74	12.57
<i>Syllis mauretanica</i>	2.23	2.67	10.65	4.63	17.2
<i>Crassikorophium crassicorne</i>	2.03	2.48	6.26	4.3	21.5
<i>Kurtiella bidentata</i>	2.18	2.4	8.92	4.16	25.67
<i>Phoronis</i> sp.	1.93	2.33	10.49	4.04	29.71
<i>Dosinia</i> sp.	1.87	2.01	5.82	3.48	33.2
<i>Glycera tridactyla</i>	1.64	1.9	13.2	3.3	36.5
<i>Pholoe inornata</i>	1.55	1.83	13.14	3.17	39.67
<i>Zeuxo holdichi</i>	1.45	1.72	7.96	2.98	42.65
<i>Notomastus latericeus</i>	1.51	1.67	12.14	2.9	45.55
<i>Tubificoides benedii</i>	1.52	1.57	6.96	2.72	48.27
Nereididae	1.44	1.53	3.63	2.65	50.92
<i>Perinereis cultrifera</i>	1.19	1.51	12.14	2.62	53.54
<i>Cirriiformia tentaculata</i>	1.3	1.46	3.36	2.54	56.08
<i>Dosinia lupinus</i>	1.35	1.42	3.97	2.46	58.53
Enchytraeidae	1.56	1.4	8.19	2.42	60.96
<i>Grania</i> sp.	1.61	1.35	9.68	2.34	63.29
<i>Polyophthalmus pictus</i>	1.35	1.35	13.2	2.33	65.63
<i>Macomangulus tenuis</i>	1.23	1.35	13.2	2.33	67.96
<i>Nemertea</i>	1.06	1.27	12.14	2.2	70.16
<i>Cerebratulus marginatus</i>	1	1.27	12.14	2.2	72.37
<i>Glycera</i> sp.	1.14	1.27	12.14	2.2	74.57
<i>Parexogone hebes</i>	1.06	1.27	12.14	2.2	76.77
<i>Bodotria scorpioides</i>	1.06	1.27	12.14	2.2	78.98
Veneridae	1.17	1.27	12.14	2.2	81.18
<i>Lucinoma borealis</i>	1.01	0.66	0.58	1.14	82.32
<i>Psamathe fusca</i>	1.02	0.52	0.58	0.91	83.22
<i>Eteone longa</i> agg.	0.87	0.49	0.58	0.84	84.07
<i>Phyllodoce mucosa</i>	0.84	0.49	0.58	0.84	84.91
<i>Travisia forbesii</i>	1.21	0.49	0.58	0.84	85.76
<i>Erichthonius punctatus</i>	0.79	0.47	0.58	0.82	86.58
<i>Parvicardium exiguum</i>	1.09	0.47	0.58	0.82	87.4
Cirratulidae	0.88	0.46	0.58	0.8	88.2
<i>Cheirocratus</i> sp.	0.73	0.46	0.58	0.8	89
<i>Ampithoe helleri</i>	0.67	0.46	0.58	0.8	89.81
<i>Parvicardium pinnulatum</i>	0.77	0.46	0.58	0.8	90.61
Group e Average similarity: 43.7%					
Species	Av.Abund	Av.Sim	Sim/SD	Contrib%	Cum.%
Nematoda	3.27	3.85	#####	8.82	8.82
<i>Spirobranchus lamarcki</i>	2.18	2.85	#####	6.51	15.33
<i>Lepidochitona cinerea</i>	2.16	2.59	#####	5.92	21.25
<i>Tubificoides pseudogaster</i> agg.	2.12	2.49	#####	5.71	26.95

<i>Tubificoides benedii</i>	2.06	2.06	#####	4.71	31.66
Nemertea	1.66	1.96	#####	4.5	36.16
<i>Platynereis dumerilii</i>	1.71	1.96	#####	4.5	40.65
<i>Gammarus</i> sp.	1.41	1.86	#####	4.25	44.9
<i>Pholoe inornata</i>	1.44	1.73	#####	3.96	48.86
<i>Grania</i> sp.	2.08	1.73	#####	3.96	52.82
Aoridae	1.32	1.73	#####	3.96	56.77
Serpulidae	1.34	1.56	#####	3.58	60.35
<i>Bittium reticulatum</i>	1.62	1.56	#####	3.58	63.92
<i>Phyllodoce mucosa</i>	1.09	1.31	#####	3.01	66.93
<i>Glycera</i> sp.	1.16	1.31	#####	3.01	69.94
<i>Glycera tridactyla</i>	1.45	1.31	#####	3.01	72.94
<i>Protodorvillea kefersteini</i>	1	1.31	#####	3.01	75.95
<i>Capitella</i> sp. complex	1	1.31	#####	3.01	78.96
<i>Polyophthalmus pictus</i>	1	1.31	#####	3.01	81.96
<i>Spirobranchus</i> sp.	1.34	1.31	#####	3.01	84.97
<i>Calliopius laeviusculus</i>	1	1.31	#####	3.01	87.97
<i>Melita palmata</i>	1.16	1.31	#####	3.01	90.98
Group e Average similarity: 28.22%					
Species	Av.Abund	Av.Sim	Sim/SD	Contrib%	Cum.%
Enchytraeidae	4.29	6.33	#####	22.41	22.41
Nematoda	3.85	5.17	#####	18.31	40.73
Nemertea	1.25	2.56	#####	9.09	49.81
<i>Lekanesphaera monodi</i>	1.25	2.56	#####	9.09	58.9
<i>Cerastoderma edule</i>	1.34	2.56	#####	9.09	67.99
<i>Tipulidae</i> larvae	1.3	2.56	#####	9.09	77.08
<i>Cerebratulus marginatus</i>	1.25	2.16	#####	7.64	84.72
Corophiidae	1	2.16	#####	7.64	92.36

indicates that Sim/SD could not be calculated as there was only 2 stations in the group.

Table 3.7 and Figure 3.7 show the AMBI results from the analysis of the samples. Two stations were classified as undisturbed (T61-L and T64-L) and these were located on the eastern side of the northern shore. Twelve stations were classified as slightly disturbed (T1-L, T3-L, T4-L, T-L, T6-L, T59-L, T60-M, T60-L, T62-L, T63-L, T65-L and T66-L). These were all located on the northern shore. Six stations were classified as moderately disturbed (T2-L, T16-L, T42-L, T50-L, T51-L and T59-M). The locations of these stations varied from the outer northern shoreline to the inner lagoonal areas. Five stations were classified as heavily disturbed (T41-L, T52-L, T53-L, T54-L and T5-L). These were all located in the inner lagoonal areas. The heavily disturbed stations were dominated by opportunistic species which thrive in reduced sediments (Group V; 83.6% on average). The moderately disturbed stations were dominated by species tolerant to organic enrichment and opportunistic species which thrive in reduced sediments (Group III; 38.2% on average and Group V; 57.9% on average). The slightly

disturbed stations were dominated by species that are tolerant to excess organic matter enrichment and those that are very sensitive to organic enrichment (Group III, 46.7% on average and Group I; 23.3% on average). The undisturbed stations were dominated by species very sensitive to organic enrichment (Group I; 55% on average). Appendix 8-5 shows the detailed station results.

Table 3.7: AMBI Results.

Stations	I(%)	II(%)	III(%)	IV(%)	V(%)	Mean AMBI	Disturbance Classification
T1-L	11.5	33.3	32.8	1.6	20.8	2.628	Slightly disturbed
T2-L	6.2	2.3	31.5	3.1	56.9	4.629	Moderately disturbed
T3-L	34.8	30.3	32.6	1.1	1.1	1.543	Slightly disturbed
T4-L	10.3	28.9	56.7	1.5	2.7	2.23	Slightly disturbed
T5-L	14.4	23.7	54.5	2.8	4.6	2.245	Slightly disturbed
T6-L	13.2	9.7	68.1	0.8	8.2	2.777	Slightly disturbed
T16-L	0.3	1.1	44.9	0.1	53.7	4.538	Moderately disturbed
T41-L	0	1.3	17.8	3.9	77	5.402	Heavily disturbed
T42-L	0.1	0.6	64.1	0.1	35.2	4.137	Moderately disturbed
T50-L	1	0.7	36.3	0	62	4.808	Moderately disturbed
T51-L	1.4	0	42	0	56.5	4.844	Moderately disturbed
T52-L	2.3	0	17.1	0	80.6	5.383	Heavily disturbed
T53-L	1	1.4	9.3	0	88.3	5.607	Heavily disturbed
T54-L	0	1.8	20.9	0	77.2	5.215	Heavily disturbed
T55-L	0.5	0	4.8	0	94.7	5.803	Heavily disturbed
T59-M	1.8	5.2	10.2	0	82.8	4.775	Moderately disturbed
T59-L	34.1	23.1	34.7	3.3	4.8	1.437	Slightly disturbed
T60-M	13.8	14.9	45.3	0	26.1	3.025	Slightly disturbed
T60-L	19.6	24.1	37.7	0.6	18.1	2.267	Slightly disturbed
T61-L	54.6	12.1	28.5	1.4	3.4	1.159	Undisturbed
T62-L	33.2	22.3	38	3.3	3.3	1.423	Slightly disturbed
T63-L	32.8	15.2	49.3	1.4	1.4	1.796	Slightly disturbed
T64-L	55.4	12.9	31.7	0	0	1.091	Undisturbed
T65-L	19.5	7.6	70.4	0.2	2.2	2.167	Slightly disturbed
T66-L	42.9	5.3	40.2	8.5	3.2	1.766	Slightly disturbed

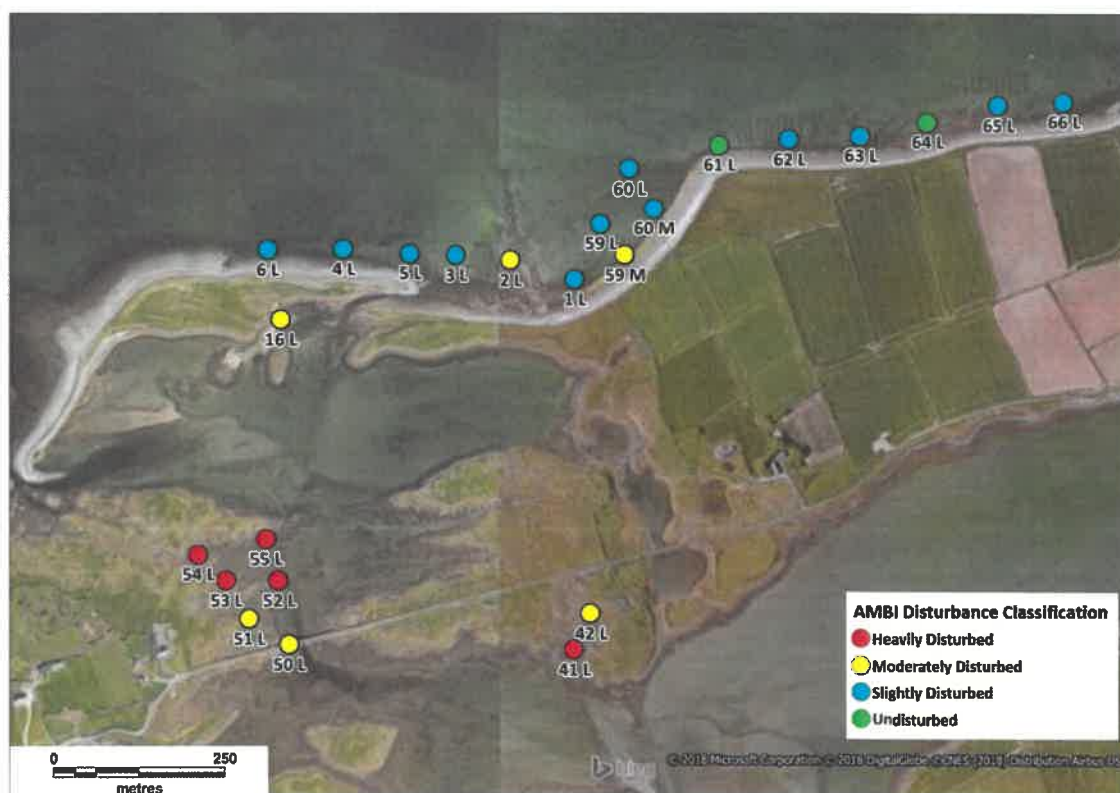


Figure 3.7: AMBI disturbance classification.

3.2.3.3 Sediment Characteristics

Table 3.8 shows the results of the Principal Component Analysis (PCA) on the arcsin transformed sediment grain size data and the $\log_{10}$ transformed organic carbon data; the ordination can be seen in Figure 3.8. PC1 and PC2 represent 75.7% of the variation in the data. Sediments were split based on gravel, very coarse sand and coarse sand (positive coefficients) and medium sand, fine sand, very fine sand, silt-clay and organic carbon (negative coefficients) along PC1. Sediments were split based on coarse sand, very fine sand and silt-clay (positive coefficients) and gravel, very coarse sand, medium sand, fine sand and organic carbon (negative coefficients) along PC2. Figure 3.8 also shows the SIMPROF groupings assigned to each station during the CLUSTER analysis. Most of faunal group b was characterised by coarse sand. Faunal group a was characterised by medium sand, fine sand, very fine sand, silt-clay and organic carbon. Faunal groups c, d, e, f and g were characterised by gravel and very coarse sand with varying proportions of medium sand and fine sand. Figure 3.9 shows the PCA ordination with bubble plots for each sediment parameter at each station superimposed on the plot (the larger the bubble, the higher the value of that parameter).

Table 3.8: Two dimensional PCA on the transformed sediment data.

Axes	PC1	PC 2	PC 3	PC 4	PC
Eigenvalues	3.83	2.22	1.05	0.443	0.248
Cumulative % Variation	47.9	75.7	88.8	94.4	97.5
Gravel (G)	0.042	-0.519	0.566	0.179	-0.379
Very Coarse Sand (VCS)	0.27	-0.485	0.095	-0.334	0.751
Coarse Sand (CS)	0.357	0.462	-0.077	-0.151	0.041
Medium Sand (MS)	-0.119	-0.378	-0.746	-0.153	-0.209
Fine Sand (FS)	-0.417	-0.18	-0.194	0.598	0.307
Very Fine Sand (VFS)	-0.435	0.274	0.131	-0.029	0.32
Silt-Clay (SC)	-0.481	0.134	0.22	-0.144	0.097
Organic Carbon (OC)	-0.435	-0.119	0.067	-0.657	-0.202

JN1340 Tawin 2017

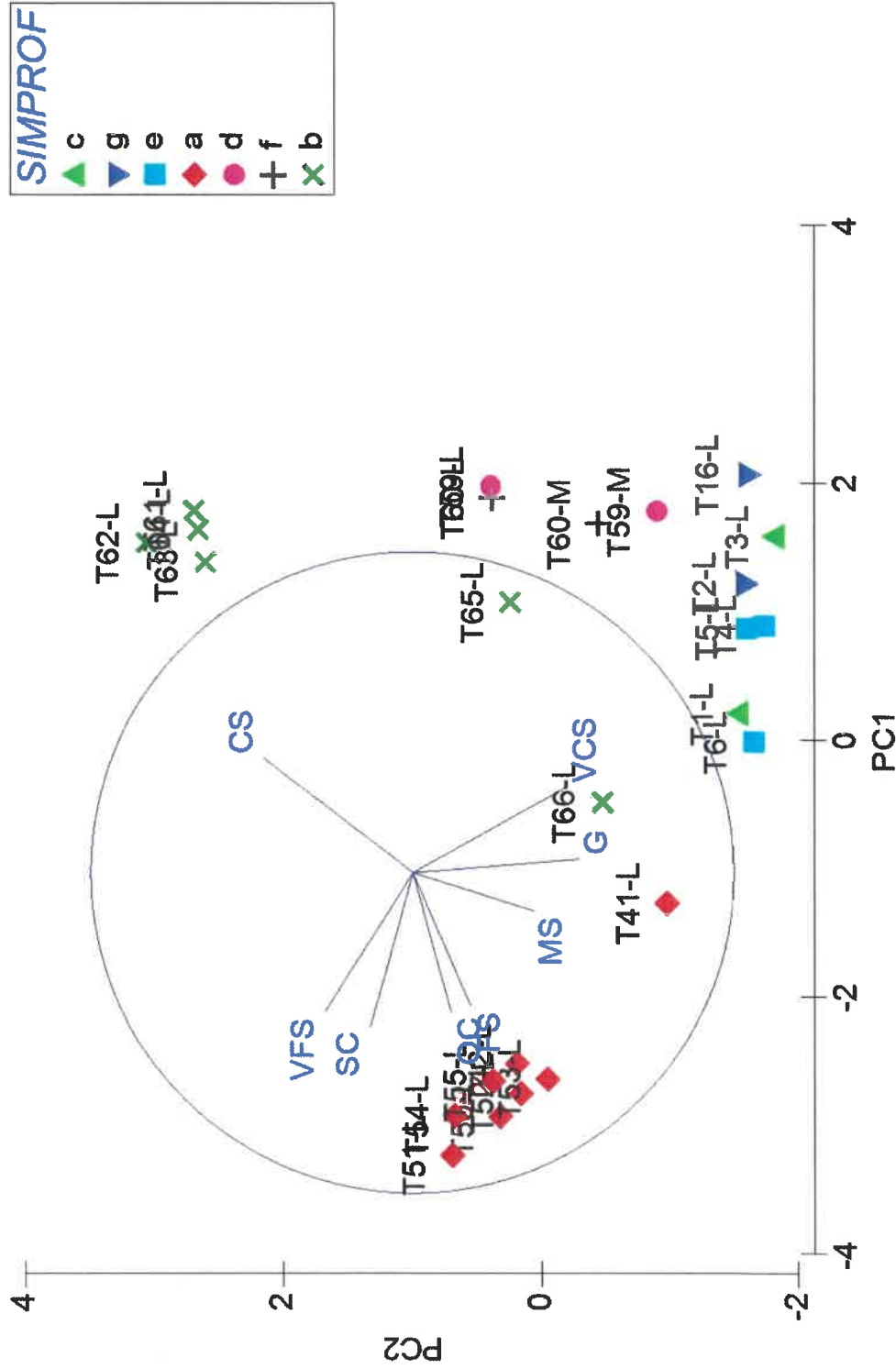


Figure 3.8: 2D PCA ordination of the transformed sediment data.

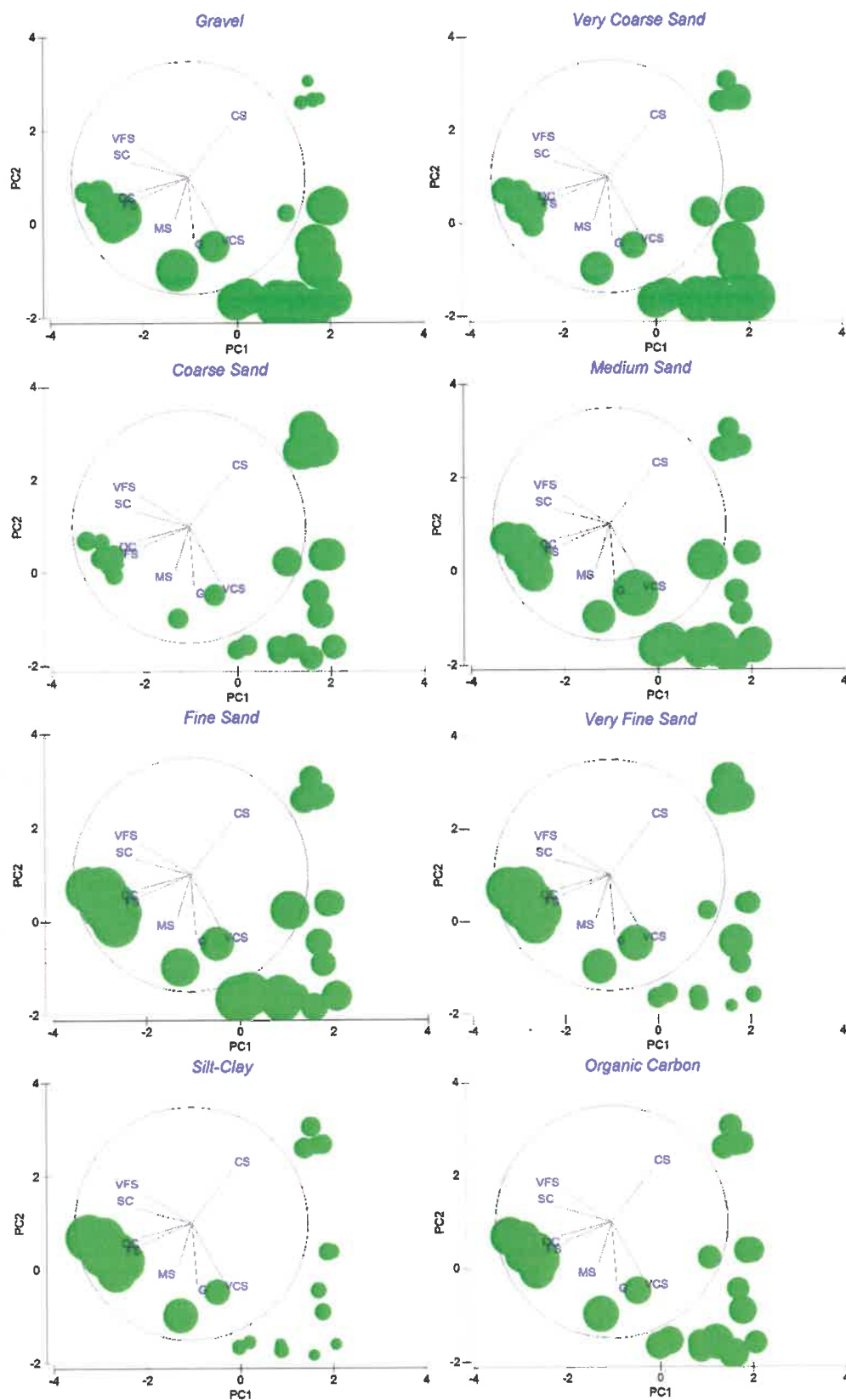


Figure 3.9: Bubble plots showing sediment parameters superimposed on the PCA ordination.

4. Comparison with Renmore Benthic Communities

Figure 4.1 shows the dendrogram of the combined Tawin and Renmore intertidal species abundances. It can be clearly seen in Figure 4.1 that there is a clear divide (15.41% similarity) between the stations on the outer shore of Tawin and all remaining Tawin and Renmore stations. Two of the Renmore stations (R1 and R2) were more similar to the stations from the inner lagoonal parts of Tawin (T41-T42, T50 T55) than they were to the other stations sampled at Renmore. Group c (stations R1 and R2) was 35.59% similar to Group d (stations T41-T42, T50 T55). These groups were similar to each other in terms of numbers of nematodes and the oligochaete *Tubificoides benedii* but dissimilar in terms of the presence of the following species in Group c and absence or (near absence) in Group d; the bivalves *Venerupis corrugata* and *Parvicardium pinnulatum*, the crustaceans *Brachyura* and *Melita palmata* and the polychaete *Malacoceros vulgaris*.

The remaining Renmore stations separate from Groups c and d at a 22.37% similarity level. Group a (R3, R4, R6 and R7) was 78.69% dissimilar to Group d (Tawin lagoonal stations) as nematodes were present in Group d and not a and the following were present in Group a and not d: *Cerebratulus* sp., *Scoloplos armiger*, *Melinna palmata* and *Glycera tridactyla*. Group b (R5, R8, R9 and R10) was 78.46% dissimilar to Group d (Tawin lagoonal stations) as nematodes, *Tubificoides benedii* and *Tubificoides pseudogaster* were present in Group d and not b.

The intertidal habitat at the Renmore area has historically been impacted by organic enrichment from loadings in the River Corrib which on an ebbing tide, flows over the western parts of the area. Before the Mutton Island treatment plant was commissioned in the early years of this century, untreated sewage effluent was disposed of to the sea either via the Corrib River itself or via a disposal pipe south of Nimmo's Pier for many, many decades giving rise to sediments with low levels of oxygen, high levels of sedimentary hydrogen sulphide and therefore reduced numbers of infaunal invertebrates. Besides the untreated effluent as a source of organic enrichment, the catchment of the Corrib particularly along the eastern area of Co. Galway and to a lesser extent, the southern section, drains lands that are intensively farmed. These areas also have a number of towns, e.g. Tuam, Headford, Oughterard that only have secondary treatment works, the effluent of which is disposed of to rivers that eventually flow into Lough Corrib and then on to the River Corrib and enter the sea at Galway City. The fact that the water of the Corrib River has its own organic loading contributes to the impact that the intertidal habitat at Renmore is experiencing.

In assessing the status of the intertidal habitat and species at Renmore both are deemed inadequate due to the levels of organic enrichment that this habitat is exposed to.

The results of the AMBI analysis (see Figure 3.8 above) showed that the area to the west of the survey location at Renmore is heavily disturbed with indicators of organic enrichment such as *Capitella capitata* being recorded. Other species that are tolerant of organic enrichment that were recorded there include *Malacoceros fuliginosus* and the oligochaetes *Tubificoides benedii* and *T. pseudogaster*.

Other than diffuse run off from agriculture and possible poorly operating septic tanks, there is no significant source of organic enrichment at the Mweeloon site. However, as there is no strong outflowing current in most parts of Mweeloon lagoon, there is no physical force capable of exporting sediment that is brought in with inflowing tides. This allows for the continuous build-up of sediment and its associated organic loading and gives rise to sediment with shallow redox depths. It is for this reason that stations within the lagoon are linked with all the stations at Renmore (see Figure 4.1 below) and conversely, those stations that are outside the lagoon (except T16) group separately to the Renmore stations.

JN1340 Tawin & Renmore Interstitial

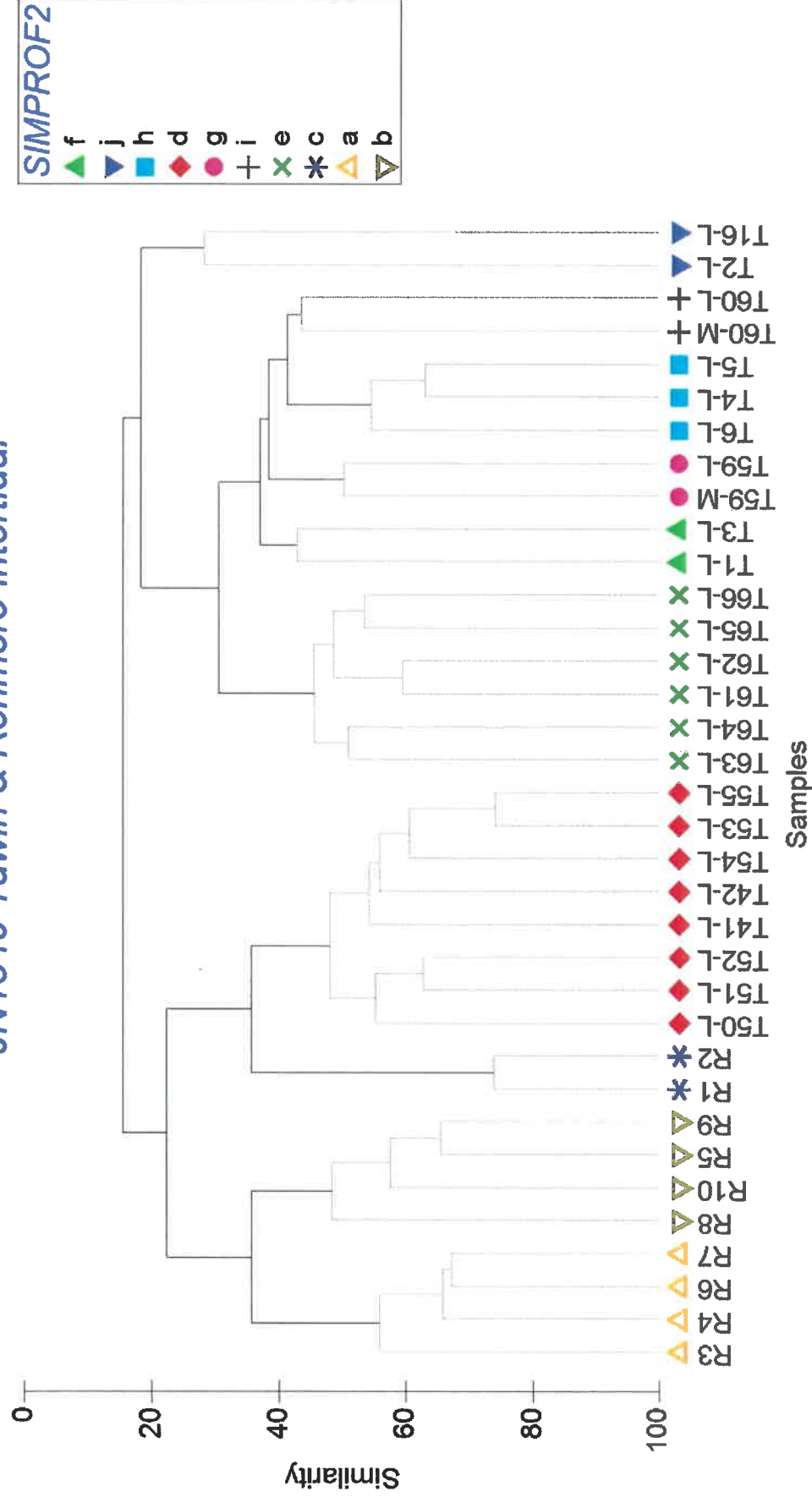


Figure 4.1: Dendrogram of the Tawin and Renmore interstitial datasets.

Appendix 8-1
Intertidal Transect Descriptions



T1 HW to LW
 Start Coordinate: 53.22625935, -8.998257703
 End Coordinate: 53.22709679, -8.998377349
 Total Length: ca. 93m
 Date: 9th August 2017

This transect is located at the most northeasterly part of the study area and faces north towards Galway City at the eastern part of an area known locally as Clois. Limestone boulders and stones characterise the substrate at the top half of this transect while the lower half is characterised by sand and shell. The upper most portion of the shore line is relatively steep and this gives way to a more gradual gradient in the lower ca. 80% of the shoreline (see shore profile above).



T1 Upper Shore. Substrate: Cobbles and boulders. Length
 JNCC Biotope Classification: LR.LLR.F.Pel. *Pelvetia canaliculata* on sheltered littoral fringe rock

<i>Pelvetia canaliculata</i>	40%	Common
<i>Fucus spiralis</i>	20%	Common
<i>Austrominius modestus</i>	5-10%	Occasional
<i>Littorina littorea</i>	1 per m ²	Rare



T1 Mid shore. Substrate: stones and gravel. Length
 JNCC Biotope Classification: LR.LLR.F.Fserr.FS Dense *Fucus serratus* on moderately exposed to very sheltered full salinity lower eulittoral rock.

Encrusting red	20%	Common
<i>Fucus serratus</i>	100%	Superabundant
<i>Fucus vesiculosus</i>		<5% Rare
Spirorbids (on <i>F. serratus</i>)	50%	Abundant
<i>Littorina littorea</i>	12	Common
<i>Littorina obtusata</i>		20 Common
<i>Gibbula umbilicalis</i>	2	Occasional
<i>Patella vulgata</i>	1	Occasional



T1 Lower Shore. Substrate: Sand and shell debris. Length
 No JNCC Biotope equivalent.

<i>Chondrus crispus</i>	30%	Common
Spirorbidae	<5%	Rare
<i>Littorina littorea</i>	7	Frequent
Paguridae	1	Rare
<i>Balanus crenatus</i> (on <i>L. littorea</i>)	6	Rare
<i>Cladostephus spongiosus</i>	<5%	Rare
<i>Sargassum muticum</i>	<5%	Rare



T2 HW to LW
 Start Coordinate: 53.22611501, -8.999625145
 End Coordinate: 53.22749167, -8.999583381
 Total Length: ca. 153m
 Date: 9th August 2017

This transect is 100m to the west of T1 and is in the central part of Clois and faces North. Limestone boulders and stones characterise the substrate at the top half of this transect while the lower half is characterised by sand and shell. The upper most portion of the shore line is relatively steep and this gives way to a more gradual gradient in the lower ca. 80% of the shoreline (see shore profile above).



T2 Upper Shore. Substrate: Cobbles and boulders.
 JNCC Biotope Classification: LR.LLR.F.Pel. *Pelvetia canaliculata* on sheltered littoral fringe rock

<i>Pelvetia canaliculata</i>	40%	Common
<i>Verrucaria</i>	80%	Superabundant
<i>Littorina saxatilis/arcana</i>	4 per m ²	Occasional



T2 Mid shore. Substrate: Coarse sand, shell and boulders.
 JNCC Biotope Classification: LR.LLR.F.Asc.X *Ascophyllum nodosum* on full salinity mid eulittoral mixed Substrata.

<i>Ascophyllum nodosum</i>	100%	Superabundant
<i>Fucus spiralis</i>	10-20%	Frequent
<i>Austrominius modestus</i>	20-30%	Common
<i>Nucella lapillus</i>	<1per m ²	Rare
<i>Patella vulgata</i>	<1per m ²	Rare
<i>Littorina littorea</i>	<1per m ²	Rare
Filamentous greens on <i>Fucus</i>	<5%	Rare



T2 Lower Shore. Substrate: Sand and shell debris.
 No JNCC Biotope equivalent.

<i>Fucus serratus</i>	5-10%	Occasional
<i>Colpomenia</i>	<5%	Rare
<i>Chondrus crispus</i>	5-10%	Occasional
<i>Himenthalia elongata</i>	5-10%	Occasional
<i>Sargassum muticum</i>	<5%	Rare
<i>Arenicola marina</i>	1per m ²	Occasional
<i>Cliona</i> sp.	<5%	Rare
<i>Ostrea edulis</i>	1 per 100m ²	Occasional
<i>Littorina littorea</i>	<1per m ²	Rare
<i>Melaraphe neritoides</i>	<1per m ²	Rare



T3 HW to LW
 Start Coordinate: 53.22615012, -9.001096934
 End Coordinate: 53.22711675, -9.000903302
 Total Length: ca. 111m
 Date: 9th August 2017

Lying a further 100m west of T2, this transect is in the western part of Clois. Algal-covered limestone boulders and stones are present at the top half of this transect while the lower half is characterised by sand and shell. The upper most portion of the shore line is relatively steep and this gives way to a more gradual gradient in the lower ca 80% of the shoreline (see shore profile above).



T3 Upper Shore. Substrate: Cobbles and boulders.
 JNCC Biotope Classification: LR.LLR.F.Pel. *Pelvetia canaliculata* on sheltered littoral fringe rock

<i>Fucus spiralis</i>	60%	Abundant
<i>Pelvetia canaliculata</i>	20%	Frequent
<i>Austrominius modestus</i>	<5%	Rare
<i>Verrucaria maura</i>	<5%	Rare
<i>Littorina obtusata</i>	1 per m ²	Rare
Gammaridea	100 per m ²	Common
<i>Melaraphe neritoides</i>	10 per m ²	Frequent
<i>Gibbula</i> sp. juvenile	2 per m ²	Occasional
<i>Carcinus maenas</i> juv.	1 per m ²	Rare



T3 Mid shore. Substrate: Coarse sand, shell and boulders.
 JNCC Biotope Classification: LR.HLR.FT.FserTX *Fucus serratus* with sponges, ascidians and red seaweeds on tide-swept lower eulittoral mixed substrata. Quadrat located on transition from mid to lower shore.

<i>Fucus serratus</i>	85%	Superabundant
<i>Fucus vesiculosus</i>	20%	Common
Encrusting red	<5%	Rare
Maerl	<5%	rare
Spirorbids	40%	Common
<i>Littorina littorea</i>	12 per m ²	Common
<i>Littorina obtusata</i>	7 per m ²	Common
<i>Austrominius modestus</i>	2 per m ²	Rare
<i>Ostrea edulis</i>	1 per m ²	Rare



T3 Lower Shore. Substrate: Sand and shell debris.
 No JNCC Biotope equivalent.

<i>Chondrus crispus</i>	20%	Common
<i>Cladostephus spongiosus</i>	<10%	Occasional
<i>Balanus crenatus</i>	<10%	Occasional
<i>Nucella lapillus</i>	1 per m ²	Rare



T4 HW to LW
 Start Coordinate: 53.22668336, -9.003529384
 End Coordinate: 53.22709272, -9.003386051
 Total Length: ca. 48m
 Date: 9th August 2017

This transect is 100m West of T5 on an island known locally as Lurgan and faces North. The upper most portion of the shore line is steep and this gives way to a more gradual gradient in the lower ca 80% of the shoreline (see shore profile above). Algal-covered limestone boulders and rocks are present in the upper half of the transect. Lower shore predominantly shell, coarse and stone, upper shore predominantly brown algae but there is a flat band (ca. 40m width) of sand and shell before the shore rises steeply (boulders) to HW. The band of sand shell has sparse clumps of *Fucus serratus* and *F. vesiculosus*, *Porphyra* sp. present, *Arenicola marina* (5 per m²) and *Nucella lapillus* present.



T4 Upper Shore. Substrate: Cobbles and boulders.
 JNCC Biotope Classification: LR.LLR.FVS.FspiVS *Fucus spiralis* on sheltered variable salinity upper eulittoral rock

<i>Fucus spiralis</i>	40-80%	Abundant
Filamentous greens	20-40%	Common
<i>Austrominius modestus</i>	10-20%	Frequent
<i>Gibbula umbilicalis</i>	1per m ²	Occasional
Chiton	<1per m ²	Rare
<i>Tectura virginea</i>	1per m ²	Occasional
<i>Littorina saxatilis/arcana</i>	1per m ²	Occasional



T4 Mid shore. Substrate: Coarse sand, shell and boulders.
 JNCC Biotope Classification: LR.HLR.FT.FserT *Fucus serratus*, sponges and ascidians on tide-swept lower eulittoral rock.

<i>Fucus serratus</i>	40%	Abundant
<i>Fucus vesiculosus</i>	<5%	Rare
<i>Chondrus crispus</i>	5-10%	Occasional
<i>Cancer pagurus</i> juv.	1per m ²	Rare
<i>Eupagurus bernhardus</i>	1per m ²	Rare
<i>Alpheus</i> sp.	1per m ²	Rare
<i>Ascidella</i>	1per m ²	Rare
<i>Austrominius modestus</i>	1per m ²	Abundant
<i>Patella vulgata</i>	1per m ²	Occasional
<i>Spirobranchus triquetus</i>	1per m ²	Rare
<i>Littorina fabalis</i>	1per m ²	Rare



T4 Lower Shore. Substrate: Sand and shell debris.
 No JNCC Biotope equivalent.

<i>Fucus serratus</i>	<5%	Rare
<i>Fucus vesiculosus</i>	<5%	Rare
<i>Colpomenia</i> sp.	<5%	Rare
<i>Chondrus crispus</i>	5-10%	Occasional
<i>Himantalia elongata</i>	5-10%	Occasional
Red crusts	<5%	Rare
<i>Arenicola marina</i>	1 per m ²	Occasional
<i>Cliona</i> sp.	<5%	Rare
<i>Ostrea edulis</i>	5-10%	Occasional
<i>Mytilus edulis</i>	<5%	Rare
<i>Littorina littorea</i>	<1 per m ²	Rare
<i>Melaraphe neritoides</i>	<1 per m ²	Rare



T5 HW to LW
 Start Coordinate: 53.22659366, -9.002156474
 End Coordinate: 53.22715614, -9.001863802
 Total Length: ca. 71m
 Date: 11th August 2017
 This transect is located at the eastern end of Lurgan to the north of Lurgan Stream. The upper most portion of the shore line is relatively steep and this gives way to a more gradual gradient in the lower ca. 80% of the shoreline (see shore profile above). Limestone boulders and stones characterise the substrate at the top half of this transect while the lower half is characterised by sand and shell. Algal cover on this transect is not as dense as other transects in the area.
 The sea bed in Lurgan Stream is dominated by dense beds of *Mytilus edulis*.



T5 Upper Shore. Substrate: Cobbles and boulders.
 JNCC Biotope Classification: LR.LLR.F.Pel. *Pelvetia canaliculata* on sheltered littoral fringe rock

<i>Fucus spiralis</i>	70-75%	Abundant
<i>Fucus serratus</i>	15-20%	Frequent
<i>Fucus vesiculosus</i>	10%	Occasional
Spirorbids on <i>F. serratus</i>	<5%	Rare
<i>Austrominius modestus</i>	<5%	Rare
<i>Semibalanus balanoides</i>	<5%	Rare
<i>Littorina saxatilis</i>	10	Frequent
<i>Littorina littorea</i>	15	Frequent
<i>Littorina obtusata</i>	3 per m ²	Frequent
Gammaridea	30 per m ²	Common



T5 Mid shore. Substrate: Cobbles and boulders.
 JNCC Biotope Classification: LR.LLR.F.Fserr.FS Dense *Fucus serratus* on moderately exposed to very sheltered full salinity lower eulittoral rock. Mid to lower shore long with gradual gradient.

Encrusting red	<10%	Occasional
<i>Fucus serratus</i>	90-100%	Superabundant
<i>Fucus vesiculosus</i>	<5%	Rare
Spirorbids (on <i>F. serratus</i>)	30-40%	Common
<i>Littorina littorea</i>	6 per m ²	Frequent
<i>Littorina obtusata</i>	13 per m ²	Frequent
<i>Gibbula umbilicalis</i>	3 per m ²	Occasional
<i>Carcinus maenas</i>	1 per m ²	Occasional
Gammaridea	1 per m ²	Occasional
<i>Spirobranchus</i> sp.	<5%	Rare
<i>Semibalanus balanoides</i>	<5%	Rare



T5 Lower Shore. Substrate: Cobbles, coarse sand and gravel.
 No JNCC Biotope equivalent.

<i>Chondrus crispus</i>	<5%	Rare
Encrusting reds	<5%	Rare
<i>Chorda filum</i>	<5%	Rare



T6 HW to LW
 Start Coordinate: 53.22669539, -9.005106103
 End Coordinate: 53.22706902, -9.00507267
 Total Length: ca. 42m
 Date: 11th August 2017
 T6 lies 100m west of T4 on Lurgan. The upper most portion of the shore line is not as steep as at other transects. Bare limestone rocks and boulders become increasingly algal-covered down the shore.



T6 Upper Shore. Substrate: Cobbles and boulders.
 JNCC Biotope Classification: LR Littoral rock (and other hard substrata).

<i>Fucus spiralis</i>	<5%	Rare
<i>Littorina saxatilis/arcana</i>	1 per m ²	Rare
Gammarids	100 per m ²	Common
<i>Elminius modestus</i>	1 per m ²	Rare.



T6 Mid shore. Substrate: Coarse sand, shell and boulders.
 JNCC Biotope Classification: LR.LLR.FVS.FvesVS *Fucus vesiculosus* on mid eulittoral variable salinity boulders and stable mixed substrata

<i>Fucus serratus</i>	20-40%	Common
<i>Fucus vesiculosus</i>	20-30%	Common
Red encrusting algae	<5%	Rare
<i>Leptosynapta</i> sp.	1 per m ²	Rare
Paguridae	1 per m ²	Rare
Chiton	1 per m ²	Rare
<i>Spirobranchus triquetus</i>	1 per m ²	Rare
<i>Patella vulgata</i>	1 per m ²	Rare
<i>Littorina fabalis</i>	10 per m ²	Frequent
<i>Austrominius modestus</i>	1 per m ²	Rare



T6 Lower Shore. Substrate: Sand and shell debris.
 No JNCC Biotope equivalent.

<i>Fucus serratus</i>	5-10%	Occasional
<i>Sargassum muticum</i>	5-10%	Occasional
<i>Chondrus crispus</i>	5-10%	Occasional
<i>Osmundea pinnatifida</i>	5-10%	Occasional
<i>Corraline officinalis</i>	5-10%	Occasional
<i>Monodonta lineata</i>	<1 per m ²	Rare
Red encrusting algae	<5%	Rare
<i>Pomatoceros</i> sp.	<1 per m ²	Rare
<i>Patella vulgata</i>	<1 per m ²	Rare
<i>Melaraphe neritoides</i>	10 per m ²	Frequent
<i>Austrominius modestus</i>	<1 per m ²	Rare
<i>Asterias rubens</i>	<1 per m ²	Rare
<i>Gibbula umbilicalis</i>	<1 per m ²	Rare



T7 HW to LW
 Start Coordinate: 53.22665153, -9.006554977
 End Coordinate: 53.22718582 -9.006604409
 Total Length: ca. 59m
 Date: 11th August 2017
 T7 lies in the central part of Lurgan and is 100m west of T6 and is north-facing. This transect is located in the mid area of Lurgan. The upper section of the shore line is relatively steep and this gives way to a more gradual gradient in the lower ca 80% of the shoreline. Limestone boulders and stones characterise the substrate at the top half of this transect.



T7 Upper Shore. Substrate: Cobbles and boulders.
 JNCC Biotope Classification: LR.LLR.F.Pel. *Pelvetia canaliculata* on sheltered littoral fringe rock

<i>Fucus spiralis</i>	10-15%	Frequent
<i>Enteromorpha</i>	10-20%	Frequent
<i>Austrominius modestus</i>	<5%	Rare
<i>Littorina littorea</i>	3 per m ²	Occasional
<i>Littorina saxatilis</i>	15 per m ²	Frequent
Gammaridea	35-40 per m ²	Frequent



T7 Mid shore. Substrate: Cobbles and boulders.
 JNCC Biotope Classification: LR.LLR.F.Fves.FS *Fucus vesiculosus* on full salinity moderately exposed to sheltered mid eulittoral rock.

<i>Fucus serratus</i>	<10%	Occasional
<i>Fucus vesiculosus</i>	90-100%	Superabundant
Encrusting red	<5%	Rare
Spirorbids on <i>F. serratus</i>	<5%	Rare
<i>Littorina littorea</i>	1 per m ²	Rare
<i>Littorina obtusata</i>	8 per m ²	Frequent
<i>Tectura virginea</i>	6 per m ²	Frequent
<i>Polysiphonia</i> spp.	<5%	Rare



T7 Lower Shore. Substrate: Boulders and cobbles.
 JNCC Biotope Classification: LR.MLR.BF.Fser *Fucus serratus* on moderately exposed lower eulittoral rock

<i>Fucus serratus</i>	80-90%	Superabundant
<i>Chondrus crispus</i>	30%	Common
Encrusting reds	40%	Common
Spirorbids	<5%	Rare
<i>Polysiphonia</i> spp.	<5%	Rare
<i>Semibalanus balanoides</i>	<5%	Rare



T8 HW to LW
 Start Coordinate: 53.22644654, -9.007973704
 End Coordinate: 53.22692393, -9.008765226
 Total Length: ca. 102m
 Date: 11th August 2017
 T8 is a further 100m West of the previous transect but faces in a Northwesterly direction. It is therefore more exposed than transects T1 – T7. Limestone boulders and stones characterise the upper shore and these become increasingly covered in algae down the shore.



T8 Upper Shore. Substrate: Cobbles and stones
 JNCC Biotope Classification: LR.LLR.F.Pel. *Pelvetia canaliculata* on sheltered littoral fringe rock

<i>Pelvetia canaliculata</i>	5-10%	occasional
<i>Fucus spiralis</i>	5-10%	Occasional
<i>Littorina saxatilis/arcana</i>	<1 per m ²	Rare



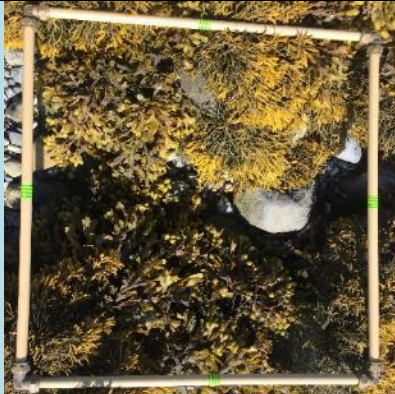
T8 Mid shore. Substrate: Large boulders with coarse sand.
 JNCC Biotope Classification: LR.LLR.F.Fves.X *Fucus vesiculosus* on mid eulittoral mixed substrata.

<i>Ascophyllum nodosum</i>	<5%	Rare
<i>Fucus vesiculosus</i>	40-80%	Abundant
<i>Patella vulgata</i>	1 per m ²	Occasional
<i>Melaraphe neritoides</i>	<1 per m ²	Rare
<i>Austrominius modestus</i>	1 per m ²	Occasional
<i>Cthamalus</i> sp.	5-10%	Occasional
<i>Nucella lapillus</i>	1 per m ²	Rare



T8 Lower Shore. Substrate: Boulders and cobbles.
 JNCC Biotope Classification: LR.MLR.BF.Fser.R *Fucus serratus* and red seaweeds on moderately exposed lower eulittoral rock.

<i>Fucus serratus</i>	40-80%	Abundant
<i>Sargassum muticum</i>	5-10%	Occasional
<i>Chondrus crispus</i>	<5%	Rare
<i>Osmundea pinnatifida</i>	5-10%	Occasional
<i>Phorcus lineatus</i>	<1 per m ²	Rare
Red encrusting algae	20-40%	Common
<i>Spirobranchus triquetus</i>	<5%	Rare
<i>Patella vulgata</i>	1 per m ²	Occasional
<i>Littorina fabalis</i>	10 per m ²	Frequent
<i>Austrominius modestus</i>	<1 per m ²	Rare
<i>Cthalamus</i> sp.	1 per m ²	Occasional
<i>Gibbula umbilicalis</i>	<1 per m ²	Rare

	T9 HW to LW Start Coordinate: 53.22578323, -9.008965134 End Coordinate: 53.22644902, -9.009924528 Total Length: <i>ca.</i> 129m Date: 11th August 2017 As for T8, T9 faces to the Northwest and experiences the same level of exposure as that transect does.																		
	T9 Upper Shore. Substrate: Cobbles and boulders. JNCC Biotope Classification: LR.LLR.F.Pel. <i>Pelvetia canaliculata</i> on sheltered littoral fringe rock <table><tr><td><i>Pelvetia canaliculata</i></td><td>30-40%</td><td>Common</td></tr><tr><td><i>Fucus spiralis</i></td><td>40-50%</td><td>Abundant</td></tr><tr><td><i>Verrucaria maura</i></td><td>15-20%</td><td>Frequent</td></tr><tr><td><i>Cthamalus stellatus</i> & <i>C. montagui</i></td><td><10%</td><td>Occasional</td></tr></table>	<i>Pelvetia canaliculata</i>	30-40%	Common	<i>Fucus spiralis</i>	40-50%	Abundant	<i>Verrucaria maura</i>	15-20%	Frequent	<i>Cthamalus stellatus</i> & <i>C. montagui</i>	<10%	Occasional						
<i>Pelvetia canaliculata</i>	30-40%	Common																	
<i>Fucus spiralis</i>	40-50%	Abundant																	
<i>Verrucaria maura</i>	15-20%	Frequent																	
<i>Cthamalus stellatus</i> & <i>C. montagui</i>	<10%	Occasional																	
	T9 Mid shore. Substrate: Large boulders with coarse sand. JNCC Biotope Classification: LR.LLR.F.Asc.X <i>Ascophyllum nodosum</i> on full salinity mid eulittoral mixed Substrata <table><tr><td><i>Ascophyllum nodosum</i></td><td>55-60%</td><td>Abundant</td></tr><tr><td><i>Vertebrata lanosa</i></td><td><5%</td><td>Rare</td></tr><tr><td><i>Fucus vesiculosus</i></td><td>40%</td><td>Abundant</td></tr><tr><td><i>Fucus serratus</i></td><td><5%</td><td>Rare</td></tr><tr><td><i>Littorina littorea</i></td><td>1 per m²</td><td>Occasional</td></tr><tr><td><i>Littorina obtusata</i></td><td>2 per m²</td><td>Occasional</td></tr></table>	<i>Ascophyllum nodosum</i>	55-60%	Abundant	<i>Vertebrata lanosa</i>	<5%	Rare	<i>Fucus vesiculosus</i>	40%	Abundant	<i>Fucus serratus</i>	<5%	Rare	<i>Littorina littorea</i>	1 per m ²	Occasional	<i>Littorina obtusata</i>	2 per m ²	Occasional
<i>Ascophyllum nodosum</i>	55-60%	Abundant																	
<i>Vertebrata lanosa</i>	<5%	Rare																	
<i>Fucus vesiculosus</i>	40%	Abundant																	
<i>Fucus serratus</i>	<5%	Rare																	
<i>Littorina littorea</i>	1 per m ²	Occasional																	
<i>Littorina obtusata</i>	2 per m ²	Occasional																	
	T9 Lower Shore. Substrate: Boulders and cobbles. No JNCC Biotope equivalent. <table><tr><td><i>Fucus vesiculosus</i></td><td>50-60%</td><td>Abundant</td></tr><tr><td><i>Fucus serratus</i></td><td>15-20%</td><td>Frequent</td></tr><tr><td>Spirorbids on fucoids</td><td><10%</td><td>Occasional</td></tr><tr><td>Encrusting reds</td><td><10%</td><td>Occasional</td></tr><tr><td>Orange breadcrumb sponge</td><td><5%</td><td>Rare</td></tr></table>	<i>Fucus vesiculosus</i>	50-60%	Abundant	<i>Fucus serratus</i>	15-20%	Frequent	Spirorbids on fucoids	<10%	Occasional	Encrusting reds	<10%	Occasional	Orange breadcrumb sponge	<5%	Rare			
<i>Fucus vesiculosus</i>	50-60%	Abundant																	
<i>Fucus serratus</i>	15-20%	Frequent																	
Spirorbids on fucoids	<10%	Occasional																	
Encrusting reds	<10%	Occasional																	
Orange breadcrumb sponge	<5%	Rare																	



T10 HW to LW
 Start Coordinate: 53.22494262, -9.009593857
 End Coordinate: 53.22526539, -9.010708607
 Total Length: ca. 129m
 Date: 11th August 2017
 T10 is the final transect on the outer shoreline of Lurgan and is exposed to Northwesterly and Westerly winds.
 Note outflowing Oileanbeag Stream in upper left hand part of photo. At the northwestern part of Moon Bay, the sea bed of Oileanbeag Stream is carpeted in dense beds of *Mytilus edulis*.



T10 Upper Shore. Substrate: Cobbles and boulders.
 JNCC Biotope Description: LR.LLR.FVS.FspiVS *Fucus spiralis* on sheltered variable salinity upper eulittoral rock.

<i>Fucus spiralis</i>	20-40%	Common
Filamentous greens	20-40%	Common
Amphipods	10 per m ²	Frequent
<i>Austrominius modestus</i>	5-10%	Occasional
<i>Cthamalus</i> sp.	5-10%	Occasional



T10 Mid shore. Substrate: Large boulders with coarse sand.
 JNCC Biotope Classification: LR.MLR.BF.Fser.Bo *Fucus serratus* and under-boulder fauna on lower eulittoral boulders.

<i>Fucus serratus</i>	40-80%	Abundant
<i>Spirorbids</i> sp.	5-10%	Occasional
<i>Fucus vesiculosus</i>	10-20%	Frequent
Red encrusting algae	20-40%	Common
Filamentous greens	20-40%	Common
<i>Littorina fabalis</i>	1 per m ²	Occasional
<i>Patella vulgata</i>	<1 per m ²	Rare
<i>Gibbula umbilicalis</i>	1 per m ²	Occasional
<i>Phorcus lineatus</i>	<1 per m ²	Rare
Amphipods	10 per m ²	Frequent

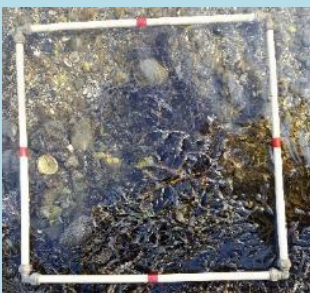


T10 Lower Shore. Substrate: Boulders and cobbles in Oileanbeag Stream.
 JNCC Biotope Classification: LR.MLR.BF.Fser.R *Fucus serratus* and red seaweeds on moderately exposed lower eulittoral rock.

<i>Fucus serratus</i>	40-80%	Abundant
<i>Spirorbids</i> sp.	<5%	Rare
<i>Fucus vesiculosus</i>	10-20%	Frequent
<i>Chondrus crispus</i>	<5%	Rare
Red encrusting algae	20-40%	Common
<i>Melaraphe neritoides</i>	1 per m ²	Occasional
<i>Patella vulgata</i>	<1 per m ²	Rare
<i>Dosinia exoleata</i>	<1 per m ²	Rare
<i>Gibbula umbilicalis</i>	1 per m ²	Occasional

	T11 HW to LW Start Coordinate: 53.22409301, -9.010259248 End Coordinate: 53.22413788, -9.010191767 Total Distance: 8m Date: 23rd August 2017 T11 lies on the inner side of Lurgan close to Oileanbeag Stream. It is a short transect and cobbles and stones characterise the substrate here. Within Oileanbeag Steam where it joins with the outflowing water from the water body to the West, mussels, <i>Mytilus edulis</i>, are present in high numbers and give rise to a shelly substrate which is dominated by their shells.									
	T11 Upper Shore. Substrate: Cobbles and stones. JNCC Biotope Classification: LR Littoral rock (and other hard substrata). No flora present <table><tr><td><i>Littorina saxatilis</i></td><td>30 per m²</td><td>Common</td></tr><tr><td><i>Carcinus maenas</i> (Juvenile)</td><td>1 per m²</td><td>Rare</td></tr></table>	<i>Littorina saxatilis</i>	30 per m ²	Common	<i>Carcinus maenas</i> (Juvenile)	1 per m ²	Rare			
<i>Littorina saxatilis</i>	30 per m ²	Common								
<i>Carcinus maenas</i> (Juvenile)	1 per m ²	Rare								
	T11 Mid shore. Substrate: Cobbles and stones JNCC Biotope Classification: LR Littoral rock (and other hard substrata) Drift weed on cobbles									
	T11 Lower Shore. Substrate: Cobbles and stones. JNCC Biotope Classification: LR.LLR.FVS.FvesVS <i>Fucus vesiculosus</i> on mid eulittoral variable salinity boulders and stable mixed substrata <table><tr><td><i>Fucus vesiculosus</i></td><td>10%</td><td>Frequent</td></tr><tr><td><i>Spirorbids</i> on <i>F. vesiculosus</i></td><td>5%</td><td>Occasional</td></tr><tr><td><i>Austrominius modestus</i></td><td>2 per m²</td><td>Rare</td></tr></table> Drift weed present	<i>Fucus vesiculosus</i>	10%	Frequent	<i>Spirorbids</i> on <i>F. vesiculosus</i>	5%	Occasional	<i>Austrominius modestus</i>	2 per m ²	Rare
<i>Fucus vesiculosus</i>	10%	Frequent								
<i>Spirorbids</i> on <i>F. vesiculosus</i>	5%	Occasional								
<i>Austrominius modestus</i>	2 per m ²	Rare								

	T12 HW to LW Start Coordinate: 53.22483947, -9.00953871 End Coordinate: 53.22480864, -9.009443087 Total Distance: 11m Date: 23rd August 2017 The substrate of this short transect is characterised by cobbles and stones. Above High Water concrete shore protection interlinking modular units had been put in place at some time in the past but are being undermined and are breaking apart.									
	T12 Upper Shore. Substrate: Cobbles and boulders. JNCC Biotope Classification: LR Littoral rock (and other hard substrata) <table><tr><td><i>Ligia oceanica</i></td><td>1 per m²</td><td>Rare</td></tr><tr><td><i>Carcinus maenas</i></td><td>1 per m²</td><td>Rare</td></tr><tr><td><i>Anurida maritima</i></td><td>1 per m²</td><td>Rare</td></tr></table>	<i>Ligia oceanica</i>	1 per m ²	Rare	<i>Carcinus maenas</i>	1 per m ²	Rare	<i>Anurida maritima</i>	1 per m ²	Rare
<i>Ligia oceanica</i>	1 per m ²	Rare								
<i>Carcinus maenas</i>	1 per m ²	Rare								
<i>Anurida maritima</i>	1 per m ²	Rare								
	T12 Mid shore. Substrate: Large boulders with coarse sand. JNCC Biotope Classification: LR.LLR.FVS.FvesVS <i>Fucus vesiculosus</i> on mid eulittoral variable salinity boulders and stable mixed substrata. <table><tr><td><i>Fucus vesiculosus</i></td><td>15%</td><td>Occasional</td></tr><tr><td><i>Ulva clathrata</i></td><td><5%</td><td>Rare</td></tr></table>	<i>Fucus vesiculosus</i>	15%	Occasional	<i>Ulva clathrata</i>	<5%	Rare			
<i>Fucus vesiculosus</i>	15%	Occasional								
<i>Ulva clathrata</i>	<5%	Rare								
	T12 Lower Shore. Substrate: Boulders and cobbles. No JNCC Biotope equivalent. Subtidal beyond 6.3m. Coarse sand with <i>Arenicola</i> (~5 per m²)									

	T13 HW to LW Start Coordinate: 53.22561431, -9.008829359 End Coordinate: 53.22554321, -9.008632615 Total Distance: 22m Date: 23rd August 2017 Salt marsh from algal drift line (+ talitrids) to 6.2m including <i>Suaeda</i> and <i>Limonium</i>. <i>Pelvetia</i> first at 7.7m.												
	T13 Upper Shore. Substrate: Cobbles and boulders. JNCC Biotope Classification: LR.LLR.F.Pel <i>Pelvetia canaliculata</i> on sheltered littoral fringe rock <table><tr><td><i>Pelvetia canaliculata</i></td><td>15%</td><td>Frequent</td></tr><tr><td><i>Verrucaria maura</i></td><td><5%</td><td>Rare</td></tr><tr><td><i>Ligia oceanica</i></td><td>30 per m²</td><td>Frequent</td></tr><tr><td>Amphipods</td><td>10 per m²</td><td>Occasional</td></tr></table>	<i>Pelvetia canaliculata</i>	15%	Frequent	<i>Verrucaria maura</i>	<5%	Rare	<i>Ligia oceanica</i>	30 per m ²	Frequent	Amphipods	10 per m ²	Occasional
<i>Pelvetia canaliculata</i>	15%	Frequent											
<i>Verrucaria maura</i>	<5%	Rare											
<i>Ligia oceanica</i>	30 per m ²	Frequent											
Amphipods	10 per m ²	Occasional											
	T13 Mid shore. Substrate: Cobbles and stones. JNCC Biotope Classification: LR.LLR.FVS.FspiVS <i>Fucus spiralis</i> on sheltered variable salinity upper eulittoral rock <table><tr><td><i>Fucus spiralis</i></td><td>15%</td><td>Frequent</td></tr><tr><td><i>Pelvetia canaliculata</i></td><td><5%</td><td>Rare</td></tr><tr><td><i>Austrominius modestus</i></td><td><5%</td><td>Rare</td></tr></table>	<i>Fucus spiralis</i>	15%	Frequent	<i>Pelvetia canaliculata</i>	<5%	Rare	<i>Austrominius modestus</i>	<5%	Rare			
<i>Fucus spiralis</i>	15%	Frequent											
<i>Pelvetia canaliculata</i>	<5%	Rare											
<i>Austrominius modestus</i>	<5%	Rare											
	T13 Lower Shore. Substrate: Cobbles and coarse sand. JNCC Biotope Classification: LR.LLR.FVS.FvesVS <i>Fucus vesiculosus</i> on mid eulittoral variable salinity boulders and stable mixed substrata <table><tr><td><i>Fucus vesiculosus</i></td><td>25%</td><td>Common</td></tr><tr><td><i>Fucus spiralis</i></td><td><5%</td><td>Rare</td></tr><tr><td><i>Ulva clathrata</i></td><td><5%</td><td>Rare</td></tr><tr><td><i>Littorina littorea</i></td><td>1 per m²</td><td>Occasional</td></tr></table>	<i>Fucus vesiculosus</i>	25%	Common	<i>Fucus spiralis</i>	<5%	Rare	<i>Ulva clathrata</i>	<5%	Rare	<i>Littorina littorea</i>	1 per m ²	Occasional
<i>Fucus vesiculosus</i>	25%	Common											
<i>Fucus spiralis</i>	<5%	Rare											
<i>Ulva clathrata</i>	<5%	Rare											
<i>Littorina littorea</i>	1 per m ²	Occasional											



T14 HW to LW
 Start Coordinate: 53.22600052, -9.007588901
 End Coordinate: 53.22584516, -9.007627433
 Total Distance: 17m
 Date: 23rd August 2017

The upper *ca* 7m of this transect is salt marsh habitat and plants included *Aster* and *Limonium* on a substrate of soil. Below this level, the substrate is composed of boulders, cobbles and oyster shell and at *ca* 11.5m changed to coarse gravel.



T14 Upper Shore. Substrate: Cobbles and boulders.
 JNCC Biotope Classification: LR.LLR.FVS.PelVS *Pelvetia canaliculata* on sheltered, variable salinity littoral fringe rock.

<i>Pelvetia canaliculata</i>	20%	Common
<i>Fucus spiralis</i>	<5%	Rare
<i>Verrucaria maura</i>	<15%	Frequent
<i>Littorina saxatilis</i>	6 per m ²	Frequent
<i>Littorina littorea</i>	1 per m ²	Rare
<i>Austrominius modestus</i>	<5%	Rare
Amphipods	2 per m ²	Occasional



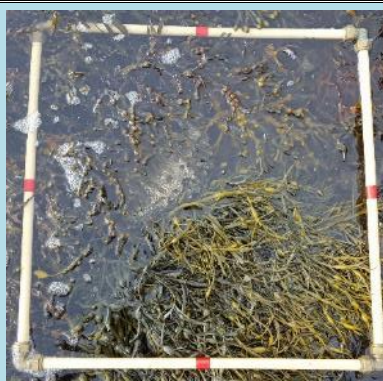
T14 Mid shore. Substrate: boulders and stable mixed substrata.
 JNCC Biotope Classification: LR.LLR.FVS.FvesVS *Fucus vesiculosus* on mid eulittoral variable salinity.

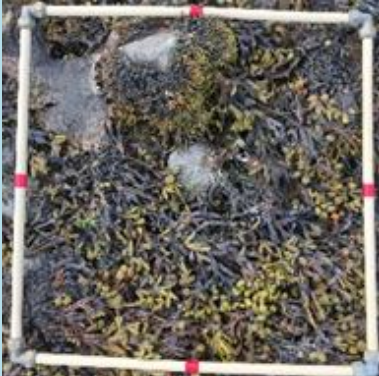
<i>Fucus vesiculatus</i>	25%	Common
<i>Fucus spiralis</i>	20%	Frequent
<i>Austrominius modestus</i>	<5%	Rare
Spirorbids on rocks	<5%	Rare
<i>Littorina saxatilis</i>	10 per m ²	Frequent
<i>Littorina littorea</i>	3 per m ²	Frequent
<i>Littorina fabalis</i>	2 per m ²	Occasional
<i>Gibbula umbilicalis</i>	2 per m ²	Occasional
<i>Mytilus edulis</i>	5 per m ²	Frequent
<i>Patella vulgata</i>	1 per m ²	Occasional
<i>Anurida maritima</i>	2 per m ²	Occasional
Amphipods	3 per m ²	Frequent



T14 Lower Shore. Substrate: boulders and cobbles with coarse sand.
 JNCC Biotope Classification: LR.LLR.FVS.AscVS *Ascophyllum nodosum* and *Fucus vesiculosus* on variable salinity mid eulittoral rock.

<i>Ascophyllum nodosum</i>	80%	Superabundant
<i>Fucus vesiculosus</i>	15%	Frequent
<i>Polysiphonia lanosa</i>	<5%	Rare
Spirorbids	<5%	Rare
<i>Austrominius modestus</i>	<5%	Rare

	T15 HW to LW Start Coordinate: 53.22599431, -9.006075609 End Coordinate: 53.2258513, -9.006151342 Total Distance: 18m Date: 23rd August 2017 The upper <i>ca</i> 7m of this transect is salt marsh habitat and plants included <i>Aster</i>, <i>Suaeda</i> and <i>Limonium</i> on a substrate of soil. Below this level, the substrate is composed of cobbles and at <i>ca</i> 11.5m, changed to muddy sand and gravel.															
	T15 Upper Shore. Substrate: Cobbles and boulders. JNCC Biotope Classification: LR.LLR.FVS.PelVS <i>Pelvetia canaliculata</i> on sheltered, variable salinity littoral fringe rock. <table><tr><td><i>Pelvetia canaliculata</i></td><td>25-30%</td><td>Common</td></tr><tr><td><i>Verrucaria maura</i></td><td><10%</td><td>Occasional</td></tr><tr><td><i>Littorina saxatilis</i></td><td>3 per m²</td><td>Frequent</td></tr><tr><td>Amphipods</td><td>2 per m²</td><td>Occasional</td></tr></table>	<i>Pelvetia canaliculata</i>	25-30%	Common	<i>Verrucaria maura</i>	<10%	Occasional	<i>Littorina saxatilis</i>	3 per m ²	Frequent	Amphipods	2 per m ²	Occasional			
<i>Pelvetia canaliculata</i>	25-30%	Common														
<i>Verrucaria maura</i>	<10%	Occasional														
<i>Littorina saxatilis</i>	3 per m ²	Frequent														
Amphipods	2 per m ²	Occasional														
	T15 Mid shore. Substrate: Large boulders with coarse sand. JNCC Biotope Classification: LR.LLR.FVS.FspiVS <i>Fucus spiralis</i> on sheltered variable salinity upper eulittoral rock <table><tr><td><i>Fucus spiralis</i></td><td>65%</td><td>Abundant</td></tr><tr><td><i>Pelvetia canaliculata</i></td><td><5%</td><td>Common</td></tr><tr><td><i>Carcinus maenas</i></td><td>8 per m²</td><td>Common</td></tr><tr><td>Talitridae</td><td>40 per m²</td><td>Frequent</td></tr></table>	<i>Fucus spiralis</i>	65%	Abundant	<i>Pelvetia canaliculata</i>	<5%	Common	<i>Carcinus maenas</i>	8 per m ²	Common	Talitridae	40 per m ²	Frequent			
<i>Fucus spiralis</i>	65%	Abundant														
<i>Pelvetia canaliculata</i>	<5%	Common														
<i>Carcinus maenas</i>	8 per m ²	Common														
Talitridae	40 per m ²	Frequent														
	T15 Lower Shore. Substrate: Boulders and cobbles. JNCC Biotope Classification: LR.LLR.FVS.AscVS <i>Ascophyllum nodosum</i> and <i>Fucus vesiculosus</i> on variable salinity mid eulittoral rock <table><tr><td><i>Fucus vesiculosus</i></td><td>35%</td><td>Common</td></tr><tr><td><i>Ascophyllum nodosum</i></td><td>25%</td><td>Common</td></tr><tr><td><i>Littorina littorea</i></td><td>8per m²</td><td>Occasional</td></tr><tr><td>Encrusting red algae</td><td><5%</td><td>Rare</td></tr><tr><td><i>Ascidia</i> sp.</td><td>1 per m²</td><td>Occasional</td></tr></table>	<i>Fucus vesiculosus</i>	35%	Common	<i>Ascophyllum nodosum</i>	25%	Common	<i>Littorina littorea</i>	8per m ²	Occasional	Encrusting red algae	<5%	Rare	<i>Ascidia</i> sp.	1 per m ²	Occasional
<i>Fucus vesiculosus</i>	35%	Common														
<i>Ascophyllum nodosum</i>	25%	Common														
<i>Littorina littorea</i>	8per m ²	Occasional														
Encrusting red algae	<5%	Rare														
<i>Ascidia</i> sp.	1 per m ²	Occasional														

	T16 HW to LW Start Coordinate: 53.22616511, -9.00495661 End Coordinate: 53.22610683, -9.004739082 Total Distance: 24m Date: 23rd August 2017 This transect lies to the north of Big Island and was the only site within Moon Bay where a biogenic sandy substrate was recorded comprising mostly of maerl debris. Salt marsh on a soil substrate was present in the upper shore and below this, the substrate was cobbles and coarse sand. At <i>ca</i> 4.5m, maerl debris and sand occurred.															
	T16 Upper Shore. Substrate: Cobbles and boulders. JNCC Biotope Classification: LR.LLR.FVS.PelVS <i>Pelvetia canaliculata</i> on sheltered, variable salinity littoral fringe rock. <table><tr><td><i>Pelvetia canaliculata</i></td><td><10%</td><td>Occasional</td></tr><tr><td><i>Fucus spiralis</i></td><td>60%</td><td>Abundant</td></tr><tr><td><i>Littorina littorea</i></td><td>10 per m²</td><td>Frequent</td></tr><tr><td>Amphipods</td><td>80-100</td><td>Common</td></tr><tr><td><i>Anurida maritima</i></td><td>8 per m²</td><td>Occasional</td></tr></table>	<i>Pelvetia canaliculata</i>	<10%	Occasional	<i>Fucus spiralis</i>	60%	Abundant	<i>Littorina littorea</i>	10 per m ²	Frequent	Amphipods	80-100	Common	<i>Anurida maritima</i>	8 per m ²	Occasional
<i>Pelvetia canaliculata</i>	<10%	Occasional														
<i>Fucus spiralis</i>	60%	Abundant														
<i>Littorina littorea</i>	10 per m ²	Frequent														
Amphipods	80-100	Common														
<i>Anurida maritima</i>	8 per m ²	Occasional														
	T16 Mid shore. Substrate: coarse sand and dead maerl. JNCC Biotope Classification: No Flora															
	T16 Lower Shore. Substrate: Coarse sand, dead maerl and shells. No JNCC Biotope equivalent <i>Fucus serratus</i> attached to a shell at 17m (subtidal) Rare.															



T17 HW to LW
 Start Coordinate: 53.22637198, -9.003685548
 End Coordinate: 53.22604096, -9.003920336
 Total Distance: 45m
 Date: 23rd August 2017

Amphipods were abundant rotting sea weed at High water mark. Stones dotted throughout the salt marsh had the lichen *Caloplaca sp.*, *Xanthoria sp.* and *Verrucaria sp.* present. *Aster tripolium* and *Suaeda maritima* was also found near High Water along with *Limonium humile* and *Salicornia europaea*. At 7.90m from high water the saltmarsh changed to a cobbled shoreline. Lurgan Creek is present at this transect.



T17 Upper Shore. Substrate: Cobbles and boulders.
 JNCC Biotope Classification: LR.LLR.FVS.FspiVS *Fucus spiralis* on sheltered variable salinity uppereulittoral rock

<i>Fucus spiralis</i>	20%	Common
<i>Littorina saxatilis</i>	2 per m ²	Occasional
<i>Littorina littorea</i>	1 per m ²	Occasional
<i>Littorina saxatilis</i>	1 per m ²	Occasional
<i>Austrominius modestus</i>	5%	Common
Amphipoda	5-10%	Occasional
<i>Carcinus maenas</i>	5-10%	Occasional



T17 Mid shore. Substrate: Cobbles and boulders.
 JNCC Biotope Classification: LR.LLR.FVS.FspiVS *Fucus spiralis* on sheltered variable salinity upper eulittoral rock

<i>Fucus spiralis</i>	40-80%	Abundant
<i>Lepidochiton cinerea</i>	3 per m ²	Occasional
Juvenile <i>Fucus</i>	<5%	Rare
<i>Carcinus maenas</i>	3 per m ²	Frequent
<i>Littorina saxatilis</i>	2 per m ²	Frequent
<i>Littorina fabalis</i>	1 per m ²	Occasional
<i>Littorina obtusata</i>	1 per m ²	Occasional
<i>Austrominius modestus</i>	30-40%	Common
Amphipods	100 per m ²	Common



T17 Lower Shore. Substrate: Cobbles and boulders.
 JNCC Biotope Classification: LR.LLR.FVS.FspiVS *Fucus spiralis* on sheltered variable salinity upper eulittoral rock (With *P. canaliculata* and *F. serratus*)

<i>Fucus spiralis</i>	55%	Abundant
<i>Fucus serratus</i>	<10%	Occasional
<i>Pelvetia canaliculata</i>	<5%	Rare
Juvenile <i>Fucus sp.</i>	<5%	Rare
Amphipoda	2 per m ²	Frequent
<i>Littorina saxatilis</i>	6 per m ²	Occasional
<i>Littorina obtusata</i>	1 per m ²	Occasional
<i>Austrominius modestus</i>	20-40%	Common
<i>Carcinus maenas</i>	3 per m ²	Frequent



T18 HW to LW
 Start Coordinate: 53.22569001, -9.002762781
 End Coordinate: 53.22555202 -9.002617208
 Total Distance: 20m
 Date: 23rd August 2017

T18 is located at the western end of Clois with salt marsh habitat present on the upper *ca* 6.5m of the shoreline. Plants present included *Atriplex*, *Suaeda*, *Artemisia* and *Linomium*. Below the 6.5m level, the substrate was cobbles and stones.



T18 Upper Shore. Substrate: Cobbles and boulders.
 JNCC Biotope Classification: LR.LLR.FVS.PelVS *Pelvetia canaliculata* on sheltered, variable salinity littoral fringe rock

<i>Pelvetia canaliculata</i>	25%	Common
<i>Verrucaria maura</i>	50%	Abundant
<i>Littorina saxatilis</i>	2 per m ²	Occasional
Amphipods	40-50	Common



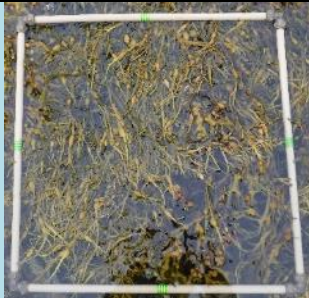
T18 Mid shore. Substrate: Cobbles and boulders.
 JNCC Biotope Classification: LR.LLR.FVS.FspiVS *Fucus spiralis* on sheltered variable salinity upper eulittoral rock

<i>Fucus spiralis</i>	50%	Abundant
<i>Pelvetia canaliculata</i>	<10%	Occasional
<i>Littorina littorea</i>	1per m ²	Occasional



T18 Lower Shore. Substrate: Cobbles and boulders.
 JNCC Biotope Classification: LR.LLR.FVS.FvesVS *Fucus vesiculosus* on mid eulittoral variable salinity boulders and stable mixed substrata. (with *F. serratus*)

<i>Fucus vesiculosus</i>	40%	Abundant
<i>Ascophyllum nodosum</i>	<10%	Occasional
<i>Fucus serratus</i>	<5%	Rare
Spirorbids on <i>F. spiralis</i>	<5%	Rare

	T19 HW to LW Start Coordinate: 53.22571819, -9.001292481 End Coordinate: 53.22551631, -9.001219235 Total Distance: 23m Date: 23rd August 2017 T19 lies midway along the southern shore of Clois with the upper 10.7m being salt marsh on a soil substrate. Plants recorded included <i>Artemisia</i> and <i>Aster</i>. Below this level, the substrate is boulders, cobbles and mud.																																							
	T19 Upper Shore. Substrate: Cobbles and boulders. JNCC Biotope Classification: LR.LLR.FVS.FspiVS <i>Fucus spiralis</i> on sheltered variable salinity upper eulittoral rock <table><tr><td><i>Fucus spiralis</i></td><td>80%</td><td>Superabundant</td></tr><tr><td>Spirorbids on <i>F. spiralis</i></td><td><5%</td><td>Rare</td></tr><tr><td><i>Littorina obtusata</i></td><td>3 per m²</td><td>Frequent</td></tr><tr><td>Amphipods</td><td>15 per m²</td><td>Frequent</td></tr></table>	<i>Fucus spiralis</i>	80%	Superabundant	Spirorbids on <i>F. spiralis</i>	<5%	Rare	<i>Littorina obtusata</i>	3 per m ²	Frequent	Amphipods	15 per m ²	Frequent																											
<i>Fucus spiralis</i>	80%	Superabundant																																						
Spirorbids on <i>F. spiralis</i>	<5%	Rare																																						
<i>Littorina obtusata</i>	3 per m ²	Frequent																																						
Amphipods	15 per m ²	Frequent																																						
	T19 Mid shore. Substrate: Large boulders with coarse sand. JNCC Biotope Classification: LR.LLR.FVS.FvesVS <i>Fucus vesiculosus</i> on mid eulittoral variable salinity boulders and stable mixed substrata <table><tr><td><i>Fucus vesiculosus</i></td><td>80%</td><td>Superabundant</td></tr><tr><td><i>Verrucaria maura</i></td><td><5%</td><td>Rare</td></tr><tr><td><i>Hildenbrandia rubra</i></td><td><5%</td><td>Rare</td></tr><tr><td>Spirorbids on Rock</td><td><5%</td><td>Rare</td></tr><tr><td><i>Littorina littorea</i></td><td>19 per m²</td><td>Frequent</td></tr><tr><td><i>Littorina fabalis</i></td><td>5 per m²</td><td>frequent</td></tr><tr><td><i>Littorina saxatilis</i></td><td>4 per m²</td><td>Frequent</td></tr><tr><td><i>Littorina obtusata</i></td><td>1 per m²</td><td>Rare</td></tr><tr><td><i>Gibbula umbilicalis</i></td><td>3 per m²</td><td>frequent</td></tr><tr><td><i>Tectura virginea</i></td><td>1 per m²</td><td>Rare</td></tr><tr><td><i>Austrominius modestus</i></td><td><10%</td><td>Occasional</td></tr><tr><td><i>Semibalanus balanoides</i></td><td>2 per m²</td><td>Rare</td></tr><tr><td><i>Mytilus edulis</i></td><td>3 per m²</td><td>Rare</td></tr></table>	<i>Fucus vesiculosus</i>	80%	Superabundant	<i>Verrucaria maura</i>	<5%	Rare	<i>Hildenbrandia rubra</i>	<5%	Rare	Spirorbids on Rock	<5%	Rare	<i>Littorina littorea</i>	19 per m ²	Frequent	<i>Littorina fabalis</i>	5 per m ²	frequent	<i>Littorina saxatilis</i>	4 per m ²	Frequent	<i>Littorina obtusata</i>	1 per m ²	Rare	<i>Gibbula umbilicalis</i>	3 per m ²	frequent	<i>Tectura virginea</i>	1 per m ²	Rare	<i>Austrominius modestus</i>	<10%	Occasional	<i>Semibalanus balanoides</i>	2 per m ²	Rare	<i>Mytilus edulis</i>	3 per m ²	Rare
<i>Fucus vesiculosus</i>	80%	Superabundant																																						
<i>Verrucaria maura</i>	<5%	Rare																																						
<i>Hildenbrandia rubra</i>	<5%	Rare																																						
Spirorbids on Rock	<5%	Rare																																						
<i>Littorina littorea</i>	19 per m ²	Frequent																																						
<i>Littorina fabalis</i>	5 per m ²	frequent																																						
<i>Littorina saxatilis</i>	4 per m ²	Frequent																																						
<i>Littorina obtusata</i>	1 per m ²	Rare																																						
<i>Gibbula umbilicalis</i>	3 per m ²	frequent																																						
<i>Tectura virginea</i>	1 per m ²	Rare																																						
<i>Austrominius modestus</i>	<10%	Occasional																																						
<i>Semibalanus balanoides</i>	2 per m ²	Rare																																						
<i>Mytilus edulis</i>	3 per m ²	Rare																																						
	T19 Lower Shore. Substrate: Boulders and cobbles. JNCC Biotope Classification: LR.LLR.FVS.AscVS <i>Ascophyllum nodosum</i> and <i>Fucus vesiculosus</i> on variable salinity mid eulittoral rock <table><tr><td><i>Fucus vesiculosus</i></td><td>10%</td><td>Frequent</td></tr><tr><td><i>Ascophyllum nodosum</i></td><td>90%</td><td>Superabundant</td></tr></table>	<i>Fucus vesiculosus</i>	10%	Frequent	<i>Ascophyllum nodosum</i>	90%	Superabundant																																	
<i>Fucus vesiculosus</i>	10%	Frequent																																						
<i>Ascophyllum nodosum</i>	90%	Superabundant																																						



T20 HW to LW
 Start Coordinate: 53.22582912, -8.99976084
 End Coordinate: 53.22566445, -8.999778095
 Total Distance: 18m
 Date: 23rd August 2017

The upper area of this transect is characterised by salt marsh habitat with rotting seaweed on high tide mark. There were some scattered boulders and rocks with the lichens *Verrucaria maura*, *Caloplaca* sp. and *Xanthoria* sp. growing on the rocks. Numerous amphipods were also present and some *Ligia* were recorded. *Limonium humile* was present in cluster along the upper shore. At 10.50m, the salt marsh habitat changed to cobbles and stones.



T20 Upper Shore. Substrate: Cobbles and boulders.
 JNCC Biotope Classification: LR.LLR.FVS.PelVS *Pelvetia canaliculata* on sheltered, variable salinity littoral fringe rock.

<i>Pelvetia canaliculata</i>	10%	Occasional
<i>Fucus spiralis</i>	15%	Frequent
<i>Ligia oceanica</i>	100 m ²	Common
Amphipod	1 per m ²	Occasional
<i>Verrucaria maura</i>	<10%	Rare



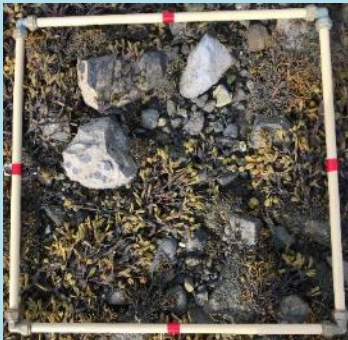
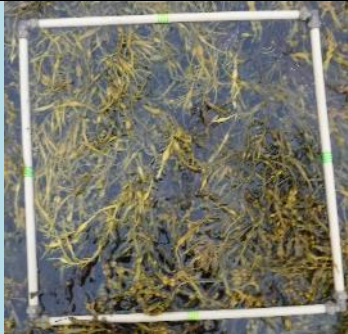
T20 Mid shore. Substrate: Cobbles and boulders.
 JNCC Biotope Classification: LR.LLR.FVS.FspiVS *Fucus spiralis* on sheltered variable salinity upper eulittoral rock

<i>Fucus spiralis</i>	100%	Superabundant
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T20 Lower Shore. Substrate: Cobbles and boulders.
 JNCC Biotope Classification: LR.LLR.FVS.FvesVS *Fucus vesiculosus* on mid eulittoral variable salinity boulders and stable mixed substrata

<i>Ascophyllum nodosum</i>	25%	Common
<i>Fucus vesiculosus</i>	50%	Abundant
<i>Littorina littorea</i>	2 per m ²	Frequent
<i>Nucella lapillus</i>	1 per m ²	Occasional
<i>Austrominius modestus</i>	20-40%	Common
<i>Littorina fabalis</i>	2 per m ²	Frequent
<i>Littorina obtusata</i>	2 per m ²	Frequent
<i>Littorina saxatilis</i>	5 per m ²	Frequent
<i>Verrucaria maura</i>	<5%	rare

	T21 HW to LW Start Coordinate: 53.22553113, -8.998319856 End Coordinate: 53.22535275, -8.998463331 Total Distance: 26m Date: 23rd August 2017 The upper <i>ca</i> 11 m of this transect is salt marsh on a soil substrate and plants recorded included <i>Artemisia</i>, <i>Limonium</i> and <i>Aster</i>. Below 11m, the substrate changed to cobbles and gravel.																		
	T21 Upper Shore. Substrate: Cobbles and boulders. JNCC Biotope Classification: LR.LLR.FVS.PelVS <i>Pelvetia canaliculata</i> on sheltered, variable salinity littoral fringe rock <table><tr><td><i>Pelvetia canaliculata</i></td><td>15%</td><td>Frequent</td></tr><tr><td><i>Fucus spiralis</i></td><td>25%</td><td>Common</td></tr><tr><td><i>Verrucaria maura</i></td><td><5%</td><td>Rare</td></tr><tr><td><i>Anurida maritima</i></td><td>100 per m²</td><td>Common</td></tr><tr><td><i>Littorina saxatilis</i></td><td>6 per m²</td><td>Frequent</td></tr><tr><td>Amphipods</td><td>20 per m²</td><td>Frequent</td></tr></table>	<i>Pelvetia canaliculata</i>	15%	Frequent	<i>Fucus spiralis</i>	25%	Common	<i>Verrucaria maura</i>	<5%	Rare	<i>Anurida maritima</i>	100 per m ²	Common	<i>Littorina saxatilis</i>	6 per m ²	Frequent	Amphipods	20 per m ²	Frequent
<i>Pelvetia canaliculata</i>	15%	Frequent																	
<i>Fucus spiralis</i>	25%	Common																	
<i>Verrucaria maura</i>	<5%	Rare																	
<i>Anurida maritima</i>	100 per m ²	Common																	
<i>Littorina saxatilis</i>	6 per m ²	Frequent																	
Amphipods	20 per m ²	Frequent																	
	T21 Mid shore. Substrate: Cobbles and boulders. JNCC Biotope Classification: LR.LLR.FVS.FspiVS <i>Fucus spiralis</i> on sheltered variable salinity upper eulittoral rock (with <i>P. canaliculata</i>) <table><tr><td><i>Fucus spiralis</i></td><td>95%</td><td>Superabundant</td></tr><tr><td><i>Pelvetia canaliculata</i></td><td><10%</td><td>Occasional</td></tr><tr><td><i>Austrominius modestus</i></td><td><5%</td><td>Rare</td></tr></table>	<i>Fucus spiralis</i>	95%	Superabundant	<i>Pelvetia canaliculata</i>	<10%	Occasional	<i>Austrominius modestus</i>	<5%	Rare									
<i>Fucus spiralis</i>	95%	Superabundant																	
<i>Pelvetia canaliculata</i>	<10%	Occasional																	
<i>Austrominius modestus</i>	<5%	Rare																	
	T21 Lower Shore. Substrate: Cobbles and boulders. JNCC Biotope Classification: LR.LLR.FVS.AscVS <i>Ascophyllum nodosum</i> and <i>Fucus vesiculosus</i> on variable salinity mid eulittoral rock <table><tr><td><i>Ascophyllum nodosum</i></td><td>25%</td><td>Common</td></tr><tr><td><i>Fucus vesiculosus</i></td><td>50%</td><td>Abundant</td></tr><tr><td>Spirorbids on <i>F. vesiculosus</i></td><td><5%</td><td>Rare</td></tr></table>	<i>Ascophyllum nodosum</i>	25%	Common	<i>Fucus vesiculosus</i>	50%	Abundant	Spirorbids on <i>F. vesiculosus</i>	<5%	Rare									
<i>Ascophyllum nodosum</i>	25%	Common																	
<i>Fucus vesiculosus</i>	50%	Abundant																	
Spirorbids on <i>F. vesiculosus</i>	<5%	Rare																	



T22 HW to LW
 Start Coordinate: 53.22496315, -8.998137942
 End Coordinate: 53.22490017, -8.998479168
 Total Distance: 37m
 Date: 22nd August 2017

Located in an area known locally as The Big Hill, High Water drift line at 0 m, with talitrids (Occasional). Saltmarsh from 0 - 10.60m changes to cobbles and boulders. *Verrucaria maura* and *Caloplaca* sp. present on boulders and bedrock. Vegetation includes *Artemisia* sp. and *Salicornia europaea*.



T22 Upper Shore. Substrate: Cobbles and boulders.
 JNCC Biotope Classification: LR.LLR.FVS.PelVS *Pelvetia canaliculata* on sheltered, variable salinity littoral fringe rock.

<i>Pelvetia canaliculata</i>	10- 20%	Frequent
<i>Fucus</i> sp. Juv.	<5%	Rare
<i>Ligia oceanica</i>	4 per m ²	Occasional
Talitrids	100 per m ²	Common
<i>Verrucaria maura</i>	40-50%	Abundant
<i>Littorina saxatilis</i>	8 per m ²	Occasional
<i>Littorina fabalis</i>	4 per m ²	Occasional



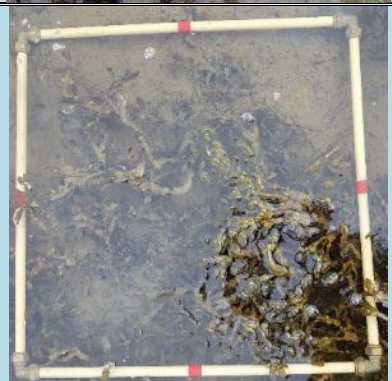
T22 Mid shore. Substrate: Cobbles and boulders.
 JNCC Biotope Classification: LR.LLR.FVS.FspiVS *Fucus spiralis* on sheltered variable salinity upper eulittoral rock.

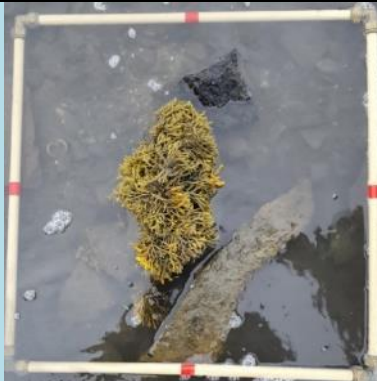
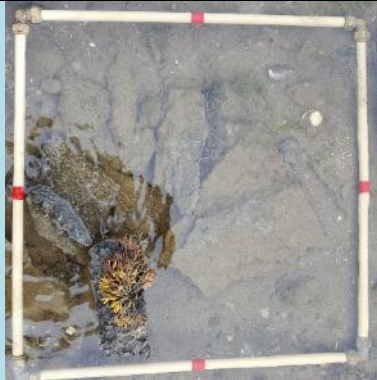
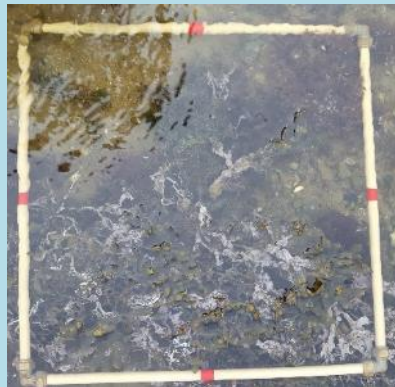
<i>Fucus vesiculosus</i>	<5%	Rare
<i>Fucus spiralis</i>	40%	Abundant
<i>Tectura virginea</i>	4 per m ²	Occasional
Talitrids	240 per m ²	Common
<i>Mytilus edulis</i>	<5%	Rare
<i>Austrominius modestus</i>	10 - 20%	Frequent
<i>Littorina saxatilis</i>	10 per m ²	Frequent
<i>Littorina littorea</i>	10 per m ²	Frequent



T22 Lower Shore. Substrate: Cobbles and boulders.
 JNCC Biotope Classification: LR.LLR.FVS.FvesVS *Fucus vesiculosus* on mid eulittoral variable salinity boulders and stable mixed substrata.

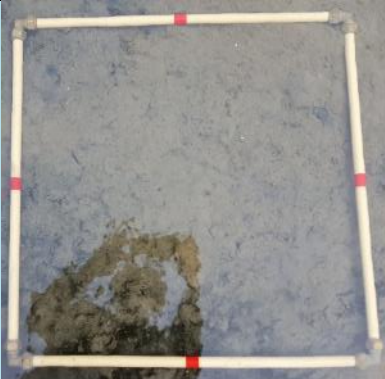
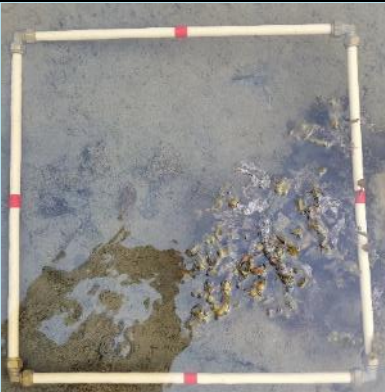
<i>Fucus serratus</i>	<5%	Rare
<i>Fucus vesiculosus</i>	50%	Abundant
<i>Ascophyllum nodosum</i>	20%	Common
<i>Littorina fabalis</i>	1 per m ²	Occasional
<i>Littorina littorea</i>	1 per m ²	Occasional
<i>Austrominius modestus</i>	20%	Frequent
<i>Littorina saxatilis</i>	3 per m ²	Frequent

	T23 HW to LW Start Coordinate: 53.22489051, -8.997081825 End Coordinate: 53.22459684, -8.997391332 Total Distance: 46m Date: 22nd August 2017 High water drift line at 0 m. Salt marsh from 0 – 18.00m changes to mud and cobbles. <i>Verrucaria maura</i> present on boulders. Vegetation includes <i>Artemisia</i> sp., <i>Plantago</i> sp., <i>Aster</i> sp. and <i>Salicornia europaea</i>.																					
	T23 Upper Shore. Substrate: Cobbles, boulders and mud. JNCC Biotope Classification: LR.LLR.FVS.PelVS <i>Pelvetia canaliculata</i> on sheltered, variable salinity littoral fringe rock. <table><tr><td><i>Pelvetia canaliculata</i></td><td>10- 20%</td><td>Frequent</td></tr><tr><td><i>Fucus spiralis</i></td><td><5%</td><td>Rare</td></tr><tr><td><i>Verrucaria maura</i></td><td><5%</td><td>Rare</td></tr><tr><td><i>Littorina saxatilis</i></td><td>8 per m²</td><td>Occasional</td></tr><tr><td><i>Littorina littorea</i></td><td>4 per m²</td><td>Occasional</td></tr><tr><td><i>Littorina obtusata</i></td><td>4 per m²</td><td>Occasional</td></tr><tr><td><i>Cerastoderma glauca</i></td><td>1 per m²</td><td>Occasional</td></tr></table>	<i>Pelvetia canaliculata</i>	10- 20%	Frequent	<i>Fucus spiralis</i>	<5%	Rare	<i>Verrucaria maura</i>	<5%	Rare	<i>Littorina saxatilis</i>	8 per m ²	Occasional	<i>Littorina littorea</i>	4 per m ²	Occasional	<i>Littorina obtusata</i>	4 per m ²	Occasional	<i>Cerastoderma glauca</i>	1 per m ²	Occasional
<i>Pelvetia canaliculata</i>	10- 20%	Frequent																				
<i>Fucus spiralis</i>	<5%	Rare																				
<i>Verrucaria maura</i>	<5%	Rare																				
<i>Littorina saxatilis</i>	8 per m ²	Occasional																				
<i>Littorina littorea</i>	4 per m ²	Occasional																				
<i>Littorina obtusata</i>	4 per m ²	Occasional																				
<i>Cerastoderma glauca</i>	1 per m ²	Occasional																				
	T23 Mid shore. Substrate: Cobbles, boulders and mud. JNCC Biotope Classification: LR.LLR.FVS.FspiVS <i>Fucus spiralis</i> on sheltered variable salinity upper eulittoral rock. <table><tr><td><i>Fucus spiralis</i></td><td>15%</td><td>Frequent</td></tr><tr><td><i>Verrucaria maura</i></td><td><5%</td><td>Rare</td></tr><tr><td><i>Littorina littorea</i></td><td>1 per m²</td><td>Occasional</td></tr></table>	<i>Fucus spiralis</i>	15%	Frequent	<i>Verrucaria maura</i>	<5%	Rare	<i>Littorina littorea</i>	1 per m ²	Occasional												
<i>Fucus spiralis</i>	15%	Frequent																				
<i>Verrucaria maura</i>	<5%	Rare																				
<i>Littorina littorea</i>	1 per m ²	Occasional																				
	T23 Lower Shore. Substrate: Mud with cobbles and boulders. JNCC Biotope Classification: LR.LLR.FVS.FvesVS <i>Fucus vesiculosus</i> on mid eulittoral variable salinity boulders and stable mixed substrata. <table><tr><td><i>Fucus vesiculosus</i></td><td>60%</td><td>Frequent</td></tr><tr><td><i>Arenicola marina</i></td><td>7per m²</td><td>Occasional</td></tr></table>	<i>Fucus vesiculosus</i>	60%	Frequent	<i>Arenicola marina</i>	7per m ²	Occasional															
<i>Fucus vesiculosus</i>	60%	Frequent																				
<i>Arenicola marina</i>	7per m ²	Occasional																				

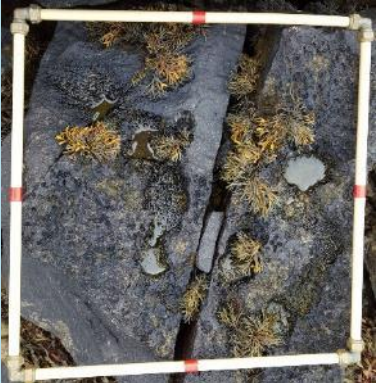
	T24 HW to LW Start Coordinate: 53.22413958, -8.997022212 End Coordinate: 53.22403426, -8.997130479 Total Distance: 16m Date: 22nd August 2017 Located in an area known locally as Curragh Martín Long, the High Water drift line at 0m has rotting algae with Talitridae (Common). Saltmarsh from 0 – 5.90m changes to mud/cobbles/boulders/bedrock below that height. <i>Verrucaria maura</i> and <i>Caloplaca</i> present on boulders. Vegetation includes <i>Artemisia</i> sp., <i>Plantago</i> sp. and <i>Aster</i>. Shallow redox < 5mm									
	T24 Upper Shore. Substrate: Cobbles, boulders and mud. JNCC Biotope Classification: LR.LLR.FVS.PelVS <i>Pelvetia canaliculata</i> on sheltered, variable salinity littoral fringe rock <table><tr><td><i>Pelvetia canaliculata</i></td><td>10- 20%</td><td>Frequent</td></tr><tr><td><i>Verrucaria maura</i></td><td>10%</td><td>Frequent</td></tr><tr><td><i>Littorina saxatilis</i></td><td>20 per m²</td><td>Frequent</td></tr></table>	<i>Pelvetia canaliculata</i>	10- 20%	Frequent	<i>Verrucaria maura</i>	10%	Frequent	<i>Littorina saxatilis</i>	20 per m ²	Frequent
<i>Pelvetia canaliculata</i>	10- 20%	Frequent								
<i>Verrucaria maura</i>	10%	Frequent								
<i>Littorina saxatilis</i>	20 per m ²	Frequent								
	T24 Mid shore. Substrate: Cobbles, boulders and mud. JNCC Biotope Classification: LR.LLR.FVS.FvesVS <i>Fucus vesiculosus</i> on mid eulittoral variable salinity boulders and stable mixed substrata <table><tr><td><i>Fucus spiralis</i></td><td><5%</td><td>Frequent</td></tr><tr><td><i>Arenicola marina</i></td><td>4per m²</td><td>Occasional</td></tr></table>	<i>Fucus spiralis</i>	<5%	Frequent	<i>Arenicola marina</i>	4per m ²	Occasional			
<i>Fucus spiralis</i>	<5%	Frequent								
<i>Arenicola marina</i>	4per m ²	Occasional								
	T24 Lower Shore. Substrate: Cobbles, boulders and mud. JNCC Biotope Classification: LR.LLR.FVS.FvesVS <i>Fucus vesiculosus</i> on mid eulittoral variable salinity boulders and stable mixed substrata <table><tr><td><i>Fucus vesiculosus</i></td><td>50%</td><td>Abundant</td></tr><tr><td><i>Gracilaria gracilis</i></td><td>10-20%</td><td>Frequent</td></tr><tr><td>Encrusting red algae</td><td>10-20%</td><td>Frequent</td></tr></table>	<i>Fucus vesiculosus</i>	50%	Abundant	<i>Gracilaria gracilis</i>	10-20%	Frequent	Encrusting red algae	10-20%	Frequent
<i>Fucus vesiculosus</i>	50%	Abundant								
<i>Gracilaria gracilis</i>	10-20%	Frequent								
Encrusting red algae	10-20%	Frequent								

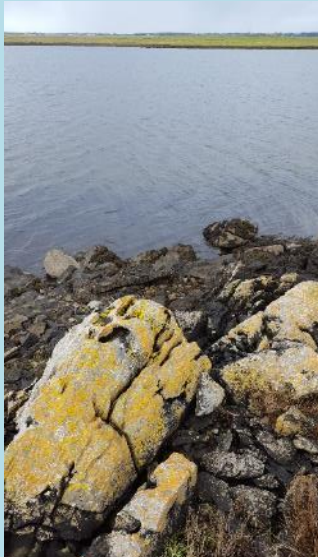
	T25 HW to LW Start Coordinate: 53.22390394, -8.99568819 End Coordinate: 53.22390447, -8.995624938 Total Distance: <i>ca.</i> 6 m Date: 23rd August 2017 As this station was located at the edge of a small, shallow lagoon known locally as The Lough, it was not possible to get samples from 3 levels.
	T25 <i>Ruppia cirrhosa</i> in The Lough. Substrate : stone and Mud No JNCC Biotope equivalent. A sweep net record sixteen faunal species including one lagoon specialist <i>Cerastoderma glaucum</i>.

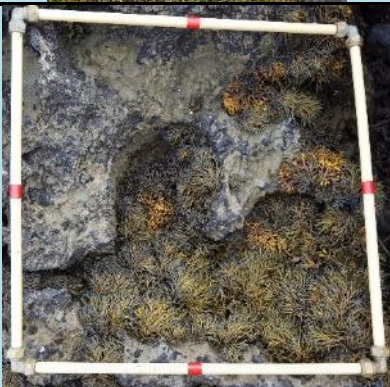
	T26 HW to LW Start Coordinate: 53.22351842, -8.994872639 End Coordinate: 53.22354636, -8.99493655 Total Distance: <i>ca.</i> 7 m Date: 23rd August 2017 As this station was also located at the edge of The Lough, it was not possible to get samples from 3 levels. Substrate: Stones on mud. A sweep net recorded twenty two faunal species including one lagoon specialist <i>Palaemonetes varians</i>
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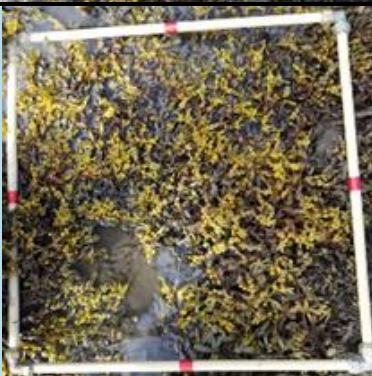
	T27 HW to LW Start Coordinate: 53.22370997, -8.997318013 End Coordinate: 53.22375251, -8.997150297 Total Distance: 19m Date: 30th August 2017 Located in an area known locally as Curragh Martín Long, this transect starts a drift line (0 m) with talitrids (Frequent). Saltmarsh extends from 0 – 7.3 m and vegetation included <i>Artemisia</i> sp., <i>Plantago maritima</i>, <i>Glaux maritima</i>, <i>Aster</i> sp., <i>Salicornia europaea</i>, <i>Armeria maritima</i>, <i>Spergularia</i> sp. and <i>Suaeda maritima</i>. <i>Verrucaria maura</i>, <i>Caloplaca thallincola</i>, <i>Xanthoria parietina</i> were present on stones. After 8.50 m substrate is boulders with mud between. Redox is shallow and H₂S bubbles on surface of mud. <i>Arenicola</i> sp. 15 per m². <i>Pelvetia canaliculata</i> also starts at 8.50 m but is only occasional on boulders. <i>Fucus vesiculosus</i> starts at 9.80 m but also is just occasional on boulders. Some <i>Beggiatoa</i> sp. present. <i>Littorina littorea</i> occasional.						
	T27 Upper shore. Substrate: Bedrock, stones and mud. No JNCC Biotope equivalent. LR.LLR.FVS.PelVS <i>Pelvetia canaliculata</i> on sheltered, variable salinity littoral fringe rock. Anoxic mud <table><tr><td><i>Pelvetia canaliculata</i></td><td>10- 20%</td><td>Frequent</td></tr></table>	<i>Pelvetia canaliculata</i>	10- 20%	Frequent			
<i>Pelvetia canaliculata</i>	10- 20%	Frequent					
	T27 Mid Shore Substrate: Bedrock, stones and mud. No JNCC Biotope equivalent. Anoxic mud without vegetation. <table><tr><td><i>Arenicola marina</i></td><td>4 per m²</td><td>Occasional</td></tr></table>	<i>Arenicola marina</i>	4 per m ²	Occasional			
<i>Arenicola marina</i>	4 per m ²	Occasional					
	T27 Lower shore. Substrate: Bedrock, stones and mud. JNCC Biotope Classification: LR.LLR.FVS.FvesVS <i>Fucus vesiculosus</i> on mid eulittoral variable salinity boulders and stable mixed substrata. Anoxic mud <table><tr><td><i>Fucus vesiculosus</i></td><td>10-20%</td><td>Frequent</td></tr><tr><td><i>Arenicola marina</i></td><td>12per m²</td><td>Frequent</td></tr></table>	<i>Fucus vesiculosus</i>	10-20%	Frequent	<i>Arenicola marina</i>	12per m ²	Frequent
<i>Fucus vesiculosus</i>	10-20%	Frequent					
<i>Arenicola marina</i>	12per m ²	Frequent					

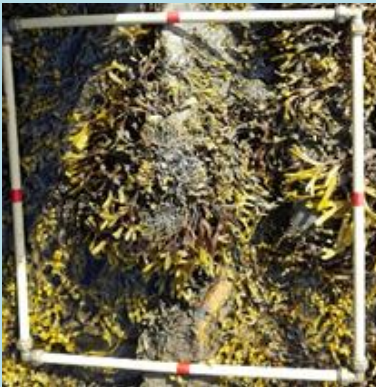
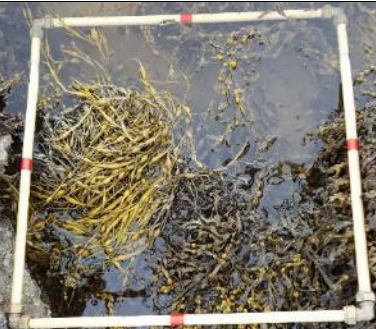
	T28 HW to LW Start Coordinate: 53.22417772, -8.998135501 End Coordinate: 53.22428149, -8.998211722 Total Distance: 13m Date: 24th August 2017 The area above Mean High Water is characterised by salt marsh with algal debris on the highest tide mark. <i>Limonium humile</i> and talitrid amphipods present. Saltmarsh gives way to cobbles at 1m.												
	T28 Upper Shore. Substrate: Cobbles and boulders. JNCC Biotope Classification: LR.LLR.FVS.PelVS <i>Pelvetia canaliculata</i> on sheltered, variable salinity littoral fringe rock <table><tr><td><i>Pelvetia canaliculata</i></td><td>60%</td><td>Abundant</td></tr><tr><td><i>Verrucaria maura</i></td><td><5%</td><td>rare</td></tr><tr><td><i>Ligia oceanica</i></td><td>3per m²</td><td>Frequent</td></tr><tr><td><i>Austrominius modestus</i></td><td><5%</td><td>Rare</td></tr></table>	<i>Pelvetia canaliculata</i>	60%	Abundant	<i>Verrucaria maura</i>	<5%	rare	<i>Ligia oceanica</i>	3per m ²	Frequent	<i>Austrominius modestus</i>	<5%	Rare
<i>Pelvetia canaliculata</i>	60%	Abundant											
<i>Verrucaria maura</i>	<5%	rare											
<i>Ligia oceanica</i>	3per m ²	Frequent											
<i>Austrominius modestus</i>	<5%	Rare											
	T28 Mid shore. Substrate: Boulders, cobbles and mud. JNCC Biotope Classification: LR.LLR.FVS Fucoids in variable salinity conditions <table><tr><td><i>Fucus spiralis</i></td><td>20-30%</td><td>Common</td></tr><tr><td><i>Fucus vesiculosus</i></td><td>20-30%</td><td>Common</td></tr><tr><td><i>Pelvetia canaliculata</i></td><td><5%</td><td>Abundant</td></tr></table>	<i>Fucus spiralis</i>	20-30%	Common	<i>Fucus vesiculosus</i>	20-30%	Common	<i>Pelvetia canaliculata</i>	<5%	Abundant			
<i>Fucus spiralis</i>	20-30%	Common											
<i>Fucus vesiculosus</i>	20-30%	Common											
<i>Pelvetia canaliculata</i>	<5%	Abundant											
	T28 Lower Shore. Substrate: Boulders, cobbles and mud. JNCC Biotope Classification: LR.LLR.FVS.FvesVS <i>Fucus vesiculosus</i> on mid eulittoral variable salinity boulders and stable mixed substrata <table><tr><td><i>Fucus vesiculosus</i></td><td>20-30%</td><td>Common</td></tr><tr><td><i>Ascophyllum nodosum</i></td><td>20-30%</td><td>Common</td></tr><tr><td><i>Carcinus maenas</i></td><td>1 per m²</td><td>Occasional</td></tr><tr><td>filamentous green algae</td><td>5-10%</td><td>Occasional</td></tr></table> Redox is shallow	<i>Fucus vesiculosus</i>	20-30%	Common	<i>Ascophyllum nodosum</i>	20-30%	Common	<i>Carcinus maenas</i>	1 per m ²	Occasional	filamentous green algae	5-10%	Occasional
<i>Fucus vesiculosus</i>	20-30%	Common											
<i>Ascophyllum nodosum</i>	20-30%	Common											
<i>Carcinus maenas</i>	1 per m ²	Occasional											
filamentous green algae	5-10%	Occasional											

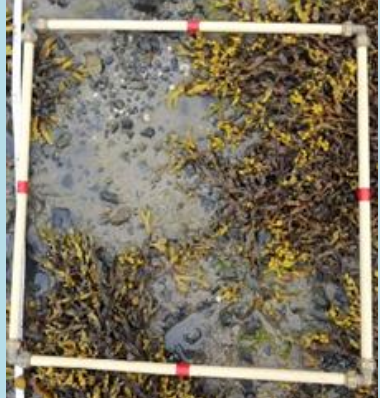
	T29 HW to LW Start Coordinate: 53.22442537, -8.999543633 End Coordinate: 53.22448529, -8.999566117 Total Distance: 7m Date: 24th August 2017 <i>Verrucaria maura</i> present. <i>Pelvetia caniculata</i> was recorded at the high water mark. <i>Fucus spiralis</i> was recorded at 0.20m and <i>Pelvetia canaliculata</i>. The limpet <i>Austrominius modestus</i> was recorded at 2m along with <i>Ascophyllum nodosum</i> with epiphytic red algae present.																								
	T29 Upper Shore. Substrate: Bedrock. JNCC Biotope Classification: LR.LLR.FVS.PelVS <i>Pelvetia canaliculata</i> on sheltered, variable salinity littoral fringe rock. <table><tr><td><i>Pelvetia canaliculata</i></td><td>15%</td><td>Frequent</td></tr><tr><td><i>Fucus spiralis</i></td><td><5%</td><td>Rare</td></tr><tr><td><i>Verrucaria maura</i></td><td>80%</td><td>Superabundant</td></tr></table>	<i>Pelvetia canaliculata</i>	15%	Frequent	<i>Fucus spiralis</i>	<5%	Rare	<i>Verrucaria maura</i>	80%	Superabundant															
<i>Pelvetia canaliculata</i>	15%	Frequent																							
<i>Fucus spiralis</i>	<5%	Rare																							
<i>Verrucaria maura</i>	80%	Superabundant																							
	T29 Mid shore. Substrate: Bedrock, boulders and cobbles JNCC Biotope Classification: LR.LLR.FVS.FspiVS <i>Fucus spiralis</i> on sheltered variable salinity upper eulittoral rock (with <i>P. canaliculata</i>). <table><tr><td><i>Pelvetia canaliculata</i></td><td>10%</td><td>Occasional</td></tr><tr><td><i>Fucus spiralis</i></td><td>>40%</td><td>Abundant</td></tr><tr><td><i>Austrominius modestus</i></td><td>20-40%</td><td>Abundant</td></tr><tr><td><i>Littorina obtusata</i></td><td>1 per m²</td><td>Occasional</td></tr><tr><td><i>Amphipoda</i></td><td>1 per m²</td><td>Occasional</td></tr><tr><td><i>Carcinus maenas</i></td><td>2 per m²</td><td>Frequent</td></tr><tr><td><i>Littorina saxatilis</i></td><td>2 per m²</td><td>Frequent</td></tr><tr><td><i>Actinia equina</i></td><td>1 per m²</td><td>Occasional</td></tr></table>	<i>Pelvetia canaliculata</i>	10%	Occasional	<i>Fucus spiralis</i>	>40%	Abundant	<i>Austrominius modestus</i>	20-40%	Abundant	<i>Littorina obtusata</i>	1 per m ²	Occasional	<i>Amphipoda</i>	1 per m ²	Occasional	<i>Carcinus maenas</i>	2 per m ²	Frequent	<i>Littorina saxatilis</i>	2 per m ²	Frequent	<i>Actinia equina</i>	1 per m ²	Occasional
<i>Pelvetia canaliculata</i>	10%	Occasional																							
<i>Fucus spiralis</i>	>40%	Abundant																							
<i>Austrominius modestus</i>	20-40%	Abundant																							
<i>Littorina obtusata</i>	1 per m ²	Occasional																							
<i>Amphipoda</i>	1 per m ²	Occasional																							
<i>Carcinus maenas</i>	2 per m ²	Frequent																							
<i>Littorina saxatilis</i>	2 per m ²	Frequent																							
<i>Actinia equina</i>	1 per m ²	Occasional																							
	T29 Lower Shore. Substrate: Bedrock, boulders and cobbles. JNCC Biotope Classification: LR.LLR.FVS.AscVS <i>Ascophyllum nodosum</i> and <i>Fucus vesiculosus</i> on variable salinity mid eulittoral rock. <table><tr><td><i>Ascophyllum nodosum</i></td><td>50%</td><td>Abundant</td></tr><tr><td><i>Fucus vesiculosus</i></td><td>30%</td><td>Common</td></tr><tr><td><i>Littorina littorea</i></td><td>1 per m²</td><td>Occasional</td></tr></table>	<i>Ascophyllum nodosum</i>	50%	Abundant	<i>Fucus vesiculosus</i>	30%	Common	<i>Littorina littorea</i>	1 per m ²	Occasional															
<i>Ascophyllum nodosum</i>	50%	Abundant																							
<i>Fucus vesiculosus</i>	30%	Common																							
<i>Littorina littorea</i>	1 per m ²	Occasional																							

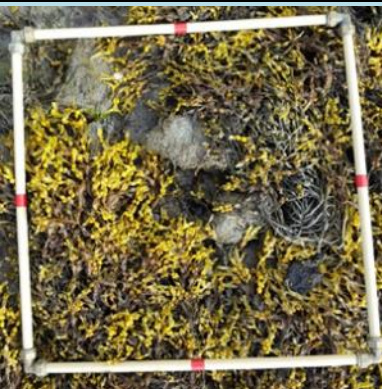
	T30 HW to LW Start Coordinate: 53.22418927, -9.00100377 End Coordinate: 53.22423641, -9.001041774 Total Distance: 7m Date: 24th August 2017 Rocky shoreline with areas of jagged, exposed bedrock and cobble. Also stone wall running along the shoreline with <i>Verrucaria</i> abundant.															
	T30 Upper Shore. Substrate: Bedrock, boulders and cobbles. JNCC Biotope Classification: LR.LLR.FVS.PelVS <i>Pelvetia canaliculata</i> on sheltered, variable salinity littoral fringe rock. <table><tr><td><i>Pelvetia canaliculata</i></td><td>10%</td><td>Occasional</td></tr><tr><td><i>Verrucaria maura</i></td><td>40-80%</td><td>Abundant</td></tr><tr><td><i>Ligia oceanica</i></td><td>100 per m²</td><td>Common</td></tr><tr><td>Amphipods</td><td>100 per m²</td><td>Common</td></tr><tr><td><i>Littorina saxatilis</i></td><td>6 per m²</td><td>Frequent</td></tr></table>	<i>Pelvetia canaliculata</i>	10%	Occasional	<i>Verrucaria maura</i>	40-80%	Abundant	<i>Ligia oceanica</i>	100 per m ²	Common	Amphipods	100 per m ²	Common	<i>Littorina saxatilis</i>	6 per m ²	Frequent
<i>Pelvetia canaliculata</i>	10%	Occasional														
<i>Verrucaria maura</i>	40-80%	Abundant														
<i>Ligia oceanica</i>	100 per m ²	Common														
Amphipods	100 per m ²	Common														
<i>Littorina saxatilis</i>	6 per m ²	Frequent														
	T30 Mid shore. Substrate: Bedrock, boulders and cobbles. JNCC Biotope Classification: LR.LLR.FVS.FspiVS <i>Fucus spiralis</i> on sheltered variable salinity upper eulittoral rock (with <i>P. canaliculata</i>) <table><tr><td><i>Pelvetia canaliculata</i></td><td>15%</td><td>Frequent</td></tr><tr><td><i>Fucus spiralis</i></td><td>25%</td><td>Common</td></tr><tr><td><i>Austrominius modestus</i></td><td><5%</td><td>Rare</td></tr><tr><td><i>Verrucaria maura</i></td><td><5%</td><td>Rare</td></tr><tr><td><i>Patella</i> sp.</td><td>4 per m²</td><td>Occasional</td></tr></table>	<i>Pelvetia canaliculata</i>	15%	Frequent	<i>Fucus spiralis</i>	25%	Common	<i>Austrominius modestus</i>	<5%	Rare	<i>Verrucaria maura</i>	<5%	Rare	<i>Patella</i> sp.	4 per m ²	Occasional
<i>Pelvetia canaliculata</i>	15%	Frequent														
<i>Fucus spiralis</i>	25%	Common														
<i>Austrominius modestus</i>	<5%	Rare														
<i>Verrucaria maura</i>	<5%	Rare														
<i>Patella</i> sp.	4 per m ²	Occasional														
	T30 Lower Shore. Substrate: Bedrock, boulders and cobbles. JNCC Biotope Classification: LR.LLR.FVS.AscVS <i>Ascophyllum nodosum</i> and <i>Fucus vesiculosus</i> on variable salinity mid eulittoral rock (without <i>F. vesiculosus</i>) <table><tr><td><i>Ascophyllum nodosum</i></td><td>85%</td><td>Superabundant</td></tr><tr><td><i>Austrominius modestus</i></td><td>10%</td><td>Occasional</td></tr></table>	<i>Ascophyllum nodosum</i>	85%	Superabundant	<i>Austrominius modestus</i>	10%	Occasional									
<i>Ascophyllum nodosum</i>	85%	Superabundant														
<i>Austrominius modestus</i>	10%	Occasional														

	T31 HW to LW Start Coordinate: 53.22378358, -9.00221742 End Coordinate: 53.22379446, -9.002428554 Total Distance: 22m Date: 24th August 2017 The lichens <i>Verrucaria maura</i>, <i>Caloplaca</i> sp., and <i>Xanthoria</i> sp. were all prevalent on the exposed bedrock and cobbles.									
	T31 Upper Shore. Substrate: Bedrock and cobbles. JNCC Biotope Classification: LR.LLR.FVS.PelVS <i>Pelvetia canaliculata</i> on sheltered, variable salinity littoral fringe rock. <table><tr><td><i>Pelvetia canaliculata</i></td><td>50%</td><td>Abundant</td></tr><tr><td><i>Verrucaria maura</i></td><td>10-20%</td><td>Frequent</td></tr></table>	<i>Pelvetia canaliculata</i>	50%	Abundant	<i>Verrucaria maura</i>	10-20%	Frequent			
<i>Pelvetia canaliculata</i>	50%	Abundant								
<i>Verrucaria maura</i>	10-20%	Frequent								
	T31 Mid shore. Substrate: Bedrock and cobbles. JNCC Biotope Classification: LR.LLR.FVS.FspiVS <i>Fucus spiralis</i> on sheltered variable salinity upper eulittoral rock. <table><tr><td><i>Fucus spiralis</i></td><td>60%</td><td>Abundant</td></tr><tr><td><i>Austrominius modestus</i></td><td><5%</td><td>Rare</td></tr></table>	<i>Fucus spiralis</i>	60%	Abundant	<i>Austrominius modestus</i>	<5%	Rare			
<i>Fucus spiralis</i>	60%	Abundant								
<i>Austrominius modestus</i>	<5%	Rare								
	T31 Lower Shore. Substrate: Bedrock and cobbles. JNCC Biotope Classification: LR.LLR.FVS.AscVS <i>Ascophyllum nodosum</i> and <i>Fucus vesiculosus</i> on variable salinity mid eulittoral rock. <table><tr><td><i>Ascophyllum nodosum</i></td><td>75%</td><td>Abundant</td></tr><tr><td><i>Fucus vesiculosus</i></td><td>25%</td><td>Common</td></tr><tr><td><i>Austrominius modestus</i></td><td><5%</td><td>Rare</td></tr></table>	<i>Ascophyllum nodosum</i>	75%	Abundant	<i>Fucus vesiculosus</i>	25%	Common	<i>Austrominius modestus</i>	<5%	Rare
<i>Ascophyllum nodosum</i>	75%	Abundant								
<i>Fucus vesiculosus</i>	25%	Common								
<i>Austrominius modestus</i>	<5%	Rare								

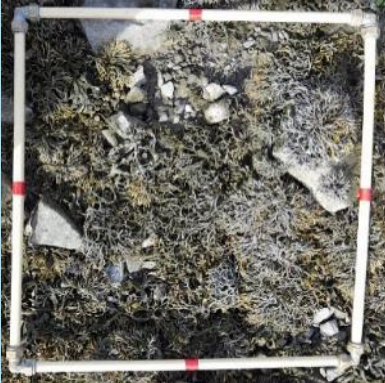
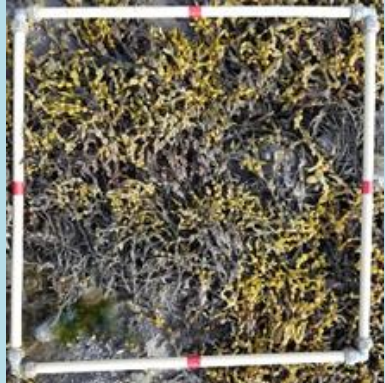
	T32 HW to LW Start Coordinate: 53.22338234, -9.000642283 End Coordinate: 53.22342952, -9.000675014 Total Distance: 7m Date: 24th August 2017 This station was composed of a combination of bedrock and cobble with areas of mud covering the geology. Exposed rocks had a covering of <i>Caloplaca</i> sp., <i>Xanthoria</i> sp. and <i>Verrucaria maura</i>. Redox is shallow on mud between bedrock.												
	T32 Upper Shore. Substrate: Bedrock and cobbles. JNCC Biotope Classification: LR.LLR.FVS.PelVS <i>Pelvetia canaliculata</i> on sheltered, variable salinity littoral fringe rock <table><tr><td><i>Pelvetia canaliculata</i></td><td><20%</td><td>Frequent</td></tr><tr><td><i>Fucus spiralis</i></td><td><5%</td><td>Rare</td></tr><tr><td><i>Ligia oceanica</i></td><td>1 per m²</td><td>Occasional</td></tr><tr><td>Amphipod</td><td>1 per m²</td><td>Occasional</td></tr></table>	<i>Pelvetia canaliculata</i>	<20%	Frequent	<i>Fucus spiralis</i>	<5%	Rare	<i>Ligia oceanica</i>	1 per m ²	Occasional	Amphipod	1 per m ²	Occasional
<i>Pelvetia canaliculata</i>	<20%	Frequent											
<i>Fucus spiralis</i>	<5%	Rare											
<i>Ligia oceanica</i>	1 per m ²	Occasional											
Amphipod	1 per m ²	Occasional											
	T32 Mid shore. Substrate: Bedrock, cobbles and mud. JNCC Biotope Classification: LR.LLR.FVS.FvesVS <i>Fucus vesiculosus</i> on mid eulittoral variable salinity boulders and stable mixed substrata (with <i>F. spiralis</i>) <table><tr><td><i>Fucus vesiculosus</i></td><td>>80%</td><td>Superabundant</td></tr><tr><td><i>Fucus spiralis</i></td><td><20%</td><td>Common</td></tr><tr><td>Juvenile <i>Fucus</i></td><td><5%</td><td>Rare</td></tr><tr><td><i>Littorina fabalis</i></td><td>2 per m²</td><td>Frequent</td></tr></table>	<i>Fucus vesiculosus</i>	>80%	Superabundant	<i>Fucus spiralis</i>	<20%	Common	Juvenile <i>Fucus</i>	<5%	Rare	<i>Littorina fabalis</i>	2 per m ²	Frequent
<i>Fucus vesiculosus</i>	>80%	Superabundant											
<i>Fucus spiralis</i>	<20%	Common											
Juvenile <i>Fucus</i>	<5%	Rare											
<i>Littorina fabalis</i>	2 per m ²	Frequent											
	T32 Lower Shore. Substrate: Bedrock, cobbles and mud JNCC Biotope Classification: LR.LLR.FVS.FvesVS <i>Fucus vesiculosus</i> on mid eulittoral variable salinity boulders and stable mixed substrata <table><tr><td><i>Fucus vesiculosus</i></td><td>80%</td><td>Superabundant</td></tr><tr><td><i>Ascophyllum nodosum</i></td><td>15%</td><td>Frequent</td></tr><tr><td><i>Arenicola marina</i></td><td>7 per m²</td><td>Occasional</td></tr></table> <i>Palaemon serratus</i> observed in the water Redox < 0.5 cms.	<i>Fucus vesiculosus</i>	80%	Superabundant	<i>Ascophyllum nodosum</i>	15%	Frequent	<i>Arenicola marina</i>	7 per m ²	Occasional			
<i>Fucus vesiculosus</i>	80%	Superabundant											
<i>Ascophyllum nodosum</i>	15%	Frequent											
<i>Arenicola marina</i>	7 per m ²	Occasional											

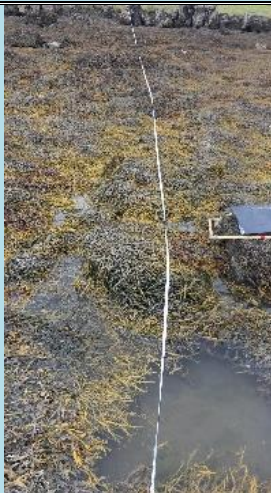
	T33 HW to LW Start Coordinate: 53.22318176, -9.001544382 End Coordinate: 53.22308335, -9.001584262 Total Distance: 12m Date: 24th August 2017 At the high water mark amphipods were present, at the 1m mark the saltmarsh gave way to exposed bedrock and cobbles. Redox level shallow on mud between rocks.																								
	T33 Upper Shore. Substrate: Bedrock, Cobbles and mud JNCC Biotope Classification: LR.LLR.FVS.PelVS <i>Pelvetia canaliculata</i> on sheltered, variable salinity littoral fringe rock <table><tr><td><i>Pelvetia canaliculata</i></td><td>20%</td><td>Common</td></tr><tr><td><i>Fucus spiralis</i></td><td>20%</td><td>Common</td></tr><tr><td><i>Anurida maritima</i></td><td>5 per m²</td><td>Frequent</td></tr><tr><td><i>Littorina fabalis</i></td><td>1 per m²</td><td>Occasional</td></tr><tr><td><i>Littorina saxatilis</i></td><td>1 per m²</td><td>Occasional</td></tr></table>	<i>Pelvetia canaliculata</i>	20%	Common	<i>Fucus spiralis</i>	20%	Common	<i>Anurida maritima</i>	5 per m ²	Frequent	<i>Littorina fabalis</i>	1 per m ²	Occasional	<i>Littorina saxatilis</i>	1 per m ²	Occasional									
<i>Pelvetia canaliculata</i>	20%	Common																							
<i>Fucus spiralis</i>	20%	Common																							
<i>Anurida maritima</i>	5 per m ²	Frequent																							
<i>Littorina fabalis</i>	1 per m ²	Occasional																							
<i>Littorina saxatilis</i>	1 per m ²	Occasional																							
	T33 Mid shore. Substrate: Bedrock, Cobbles and mud. JNCC Biotope Classification: Mix of LR.LLR.FVS.FspiVS <i>Fucus spiralis</i> on sheltered variable salinity upper eulittoral rock and LR.LLR.FVS.FvesVS <i>Fucus vesiculosus</i> on mid eulittoral variable salinity boulders and stable mixed substrata <table><tr><td><i>Pelvetia canaliculata</i></td><td>10%</td><td>Frequent</td></tr><tr><td><i>Fucus spiralis</i></td><td>30%</td><td>Common</td></tr><tr><td><i>Fucus vesiculosus</i></td><td>30%</td><td>Common</td></tr><tr><td><i>Austrominius modesta</i></td><td><5%</td><td>Rare</td></tr><tr><td><i>Anurida maritima</i></td><td>10 per m²</td><td>Frequent</td></tr><tr><td><i>Littorina littorea</i></td><td>1 per m²</td><td>Occasional</td></tr><tr><td><i>Littorina obtusata</i></td><td>1 per m²</td><td>Occasional</td></tr><tr><td><i>Verrucaria maura</i></td><td><5%</td><td>Rare</td></tr></table> <i>Palaemon serratus</i> observed in the water. Redox < 0.5 cms.	<i>Pelvetia canaliculata</i>	10%	Frequent	<i>Fucus spiralis</i>	30%	Common	<i>Fucus vesiculosus</i>	30%	Common	<i>Austrominius modesta</i>	<5%	Rare	<i>Anurida maritima</i>	10 per m ²	Frequent	<i>Littorina littorea</i>	1 per m ²	Occasional	<i>Littorina obtusata</i>	1 per m ²	Occasional	<i>Verrucaria maura</i>	<5%	Rare
<i>Pelvetia canaliculata</i>	10%	Frequent																							
<i>Fucus spiralis</i>	30%	Common																							
<i>Fucus vesiculosus</i>	30%	Common																							
<i>Austrominius modesta</i>	<5%	Rare																							
<i>Anurida maritima</i>	10 per m ²	Frequent																							
<i>Littorina littorea</i>	1 per m ²	Occasional																							
<i>Littorina obtusata</i>	1 per m ²	Occasional																							
<i>Verrucaria maura</i>	<5%	Rare																							
	T33 Lower Shore. Substrate: Bedrock, Cobbles and mud JNCC Biotope Classification: LR.LLR.FVS.FvesVS <i>Fucus vesiculosus</i> on mid eulittoral variable salinity boulders and stable mixed substrata <table><tr><td><i>Fucus vesiculosus</i></td><td>50%</td><td>Abundant</td></tr><tr><td><i>Ascophyllum nodosum</i></td><td>25%</td><td>Common</td></tr></table>	<i>Fucus vesiculosus</i>	50%	Abundant	<i>Ascophyllum nodosum</i>	25%	Common																		
<i>Fucus vesiculosus</i>	50%	Abundant																							
<i>Ascophyllum nodosum</i>	25%	Common																							

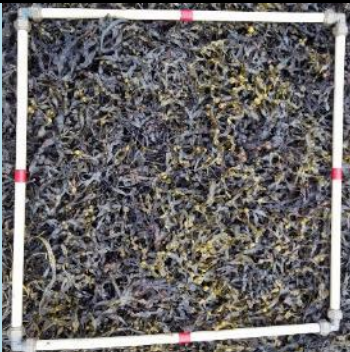
	T34 HW to LW Start Coordinate: 53.22292998, -8.999877859 End Coordinate: 53.22299716, -9.000543685 Total Distance: 74m Date: 29th August 2017 High Water mark at 0m with drift weed containing talitrids (Common). Saltmarsh with small areas of exposed bedrock extended from 0 - 23.50 m where the substrate changed to exposed bedrock with cobbles and mud between. Saltmarsh contained <i>Aster</i>, <i>Plantago maritima</i>, <i>Salicornia europaea</i> and <i>Suaeda maritima</i>. Lichens including <i>Verrucaria maura</i>, <i>Caloplaca</i> sp. and <i>Xanthoria parietina</i> were recorded on exposed bedrock on the saltmarsh. Redox level shallow.															
	T34 Upper Shore. Substrate: Bedrock, boulders, cobbles and mud JNCC Biotope Classification: Mix of LR.LLR.FVS.PelVS <i>Pelvetia canaliculata</i> on sheltered, variable salinity littoral fringe rock and LR.LLR.FVS.FspiVS <i>Fucus spiralis</i> on sheltered variable salinity upper eulittoral rock <table><tr><td><i>Pelvetia canaliculata</i></td><td>35%</td><td>Common</td></tr><tr><td><i>Fucus spiralis</i></td><td>35%</td><td>Common</td></tr><tr><td><i>Littorina saxatilis</i></td><td>12 per m²</td><td>Frequent</td></tr><tr><td><i>Littorina fabalis</i></td><td>4 per m²</td><td>Occasional</td></tr><tr><td>Talitrids</td><td>100 per m²</td><td>Common</td></tr></table>	<i>Pelvetia canaliculata</i>	35%	Common	<i>Fucus spiralis</i>	35%	Common	<i>Littorina saxatilis</i>	12 per m ²	Frequent	<i>Littorina fabalis</i>	4 per m ²	Occasional	Talitrids	100 per m ²	Common
<i>Pelvetia canaliculata</i>	35%	Common														
<i>Fucus spiralis</i>	35%	Common														
<i>Littorina saxatilis</i>	12 per m ²	Frequent														
<i>Littorina fabalis</i>	4 per m ²	Occasional														
Talitrids	100 per m ²	Common														
	T34 Mid shore. Substrate: Bedrock, boulders, cobbles and mud JNCC Biotope Classification: LR.LLR.FVS.FvesVS <i>Fucus vesiculosus</i> on mid eulittoral variable salinity boulders and stable mixed substrata <table><tr><td><i>Fucus vesiculosus</i></td><td>30%</td><td>Common</td></tr><tr><td><i>Fucus spiralis</i></td><td><5%</td><td>Rare</td></tr><tr><td><i>Littorina littorea</i></td><td>4 per m²</td><td>Occasional</td></tr></table>	<i>Fucus vesiculosus</i>	30%	Common	<i>Fucus spiralis</i>	<5%	Rare	<i>Littorina littorea</i>	4 per m ²	Occasional						
<i>Fucus vesiculosus</i>	30%	Common														
<i>Fucus spiralis</i>	<5%	Rare														
<i>Littorina littorea</i>	4 per m ²	Occasional														
	T34 Lower Shore. Substrate: Bedrock, boulders, cobbles and mud JNCC Biotope Classification: LR.LLR.FVS.AscVS <i>Ascophyllum nodosum</i> and <i>Fucus vesiculosus</i> on variable salinity mid eulittoral rock <table><tr><td><i>Fucus vesiculosus</i></td><td>75%</td><td>Abundant</td></tr><tr><td><i>Ascophyllum nodosum</i></td><td>25%</td><td>Common</td></tr><tr><td><i>Cladophora</i> sp.</td><td><5%</td><td>Rare</td></tr><tr><td><i>Ulva intestinalis</i></td><td><5%</td><td>Rare</td></tr></table>	<i>Fucus vesiculosus</i>	75%	Abundant	<i>Ascophyllum nodosum</i>	25%	Common	<i>Cladophora</i> sp.	<5%	Rare	<i>Ulva intestinalis</i>	<5%	Rare			
<i>Fucus vesiculosus</i>	75%	Abundant														
<i>Ascophyllum nodosum</i>	25%	Common														
<i>Cladophora</i> sp.	<5%	Rare														
<i>Ulva intestinalis</i>	<5%	Rare														

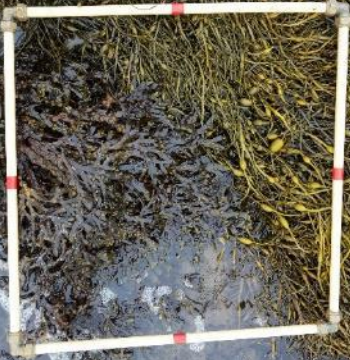
	T35 HW to LW Start Coordinate: 53.22256414, -9.001245297 End Coordinate: 53.22282243, -9.001383116 Total Distance: 32m Date: 29th August 2017 High water mark at 0 m with drift weed containing Talitrids. Saltmarsh with small areas of exposed bedrock extended from 0 – 15.20 m where the substrate changed to exposed bedrock with cobbles and mud between. Redox shallow on mud. Saltmarsh contained <i>Aster</i>, <i>Plantago maritima</i> and <i>Salicornia europaea</i>. <i>Verrucaria maura</i> was present on exposed bedrock on the upper shore. <i>Pelvetia canaliculata</i> band starts at 15.60 m and <i>Fucus spiralis</i> began at 15.90 m.																								
	T35 Upper Shore. Substrate: Bedrock, cobbles and mud. JNCC Biotope Classification: LR.LLR.FVS.PelVS <i>Pelvetia canaliculata</i> on sheltered, variable salinity littoral fringe rock (with <i>F. spiralis</i>) <table><tr><td><i>Pelvetia canaliculata</i></td><td>50%</td><td>Common</td></tr><tr><td><i>Fucus spiralis</i></td><td>25%</td><td>Common</td></tr><tr><td>Talitrids</td><td>120 per m²</td><td>Common</td></tr></table>	<i>Pelvetia canaliculata</i>	50%	Common	<i>Fucus spiralis</i>	25%	Common	Talitrids	120 per m ²	Common															
<i>Pelvetia canaliculata</i>	50%	Common																							
<i>Fucus spiralis</i>	25%	Common																							
Talitrids	120 per m ²	Common																							
	T35 Mid shore. Substrate: Bedrock, cobbles and mud JNCC Biotope Classification: LR.LLR.FVS.FvesVS <i>Fucus vesiculosus</i> on mid eulittoral variable salinity boulders and stable mixed substrata <table><tr><td><i>Fucus vesiculosus</i></td><td>60%</td><td>Abundant</td></tr><tr><td><i>Ascophyllum nodosum</i></td><td>10%</td><td>Occasional</td></tr><tr><td><i>Anurida maritima</i></td><td>40 per m²</td><td>Frequent</td></tr><tr><td><i>Littorina saxatilis</i></td><td>4 per m²</td><td>Occasional</td></tr><tr><td><i>Littorina fabalis</i></td><td>8 per m²</td><td>Occasional</td></tr><tr><td><i>Littorina littorea</i></td><td>4 per m²</td><td>Occasional</td></tr><tr><td><i>Austrominius modestus</i></td><td><5%</td><td>Rare</td></tr><tr><td><i>Carcinus maenas</i></td><td>4 per m²</td><td>Common</td></tr></table>	<i>Fucus vesiculosus</i>	60%	Abundant	<i>Ascophyllum nodosum</i>	10%	Occasional	<i>Anurida maritima</i>	40 per m ²	Frequent	<i>Littorina saxatilis</i>	4 per m ²	Occasional	<i>Littorina fabalis</i>	8 per m ²	Occasional	<i>Littorina littorea</i>	4 per m ²	Occasional	<i>Austrominius modestus</i>	<5%	Rare	<i>Carcinus maenas</i>	4 per m ²	Common
<i>Fucus vesiculosus</i>	60%	Abundant																							
<i>Ascophyllum nodosum</i>	10%	Occasional																							
<i>Anurida maritima</i>	40 per m ²	Frequent																							
<i>Littorina saxatilis</i>	4 per m ²	Occasional																							
<i>Littorina fabalis</i>	8 per m ²	Occasional																							
<i>Littorina littorea</i>	4 per m ²	Occasional																							
<i>Austrominius modestus</i>	<5%	Rare																							
<i>Carcinus maenas</i>	4 per m ²	Common																							
	T35 Lower Shore. Substrate: Bedrock, cobbles and mud JNCC Biotope Classification: LR.LLR.FVS.AscVS <i>Ascophyllum nodosum</i> and <i>Fucus vesiculosus</i> on variable salinity mid eulittoral rock <table><tr><td><i>Fucus vesiculosus</i></td><td>40%</td><td>Abundant</td></tr><tr><td><i>Ascophyllum nodosum</i></td><td>25%</td><td>Common</td></tr><tr><td><i>Ulva clathrata</i></td><td><5%</td><td>Rare</td></tr><tr><td><i>Ulva intestinalis</i></td><td><5%</td><td>Rare</td></tr></table>	<i>Fucus vesiculosus</i>	40%	Abundant	<i>Ascophyllum nodosum</i>	25%	Common	<i>Ulva clathrata</i>	<5%	Rare	<i>Ulva intestinalis</i>	<5%	Rare												
<i>Fucus vesiculosus</i>	40%	Abundant																							
<i>Ascophyllum nodosum</i>	25%	Common																							
<i>Ulva clathrata</i>	<5%	Rare																							
<i>Ulva intestinalis</i>	<5%	Rare																							

	T36 HW to LW Start Coordinate: 53.22230879, -9.00264165 End Coordinate: 53.22256194, -9.002637017 Total Distance: 28m Date: 29th August 2017 High water mark at 0 m with drift weed containing talitrids. Saltmarsh with small areas of exposed bedrock extended from 0 – 19.20 m where the substrate changed to exposed bedrock with cobbles and mud between. Redox shallow on mud. Saltmarsh contained <i>Aster</i>, <i>Plantago maritima</i>, <i>Salicornia europaea</i> and <i>Suaeda maritima</i>. Lichens including <i>Verrucaria maura</i>, <i>Caloplaca</i> sp. and <i>Xanthoria parietina</i> were recorded on exposed bedrock on the saltmarsh. <i>Pelvetia canaliculata</i> band starts at 19.60 m and <i>Fucus spiralis</i> begins at 19.70 m.																								
	T36 Upper Shore. Substrate: Bedrock, cobbles and mud JNCC Biotope Classification: LR.LLR.FVS.FspiVS <i>Fucus spiralis</i> on sheltered variable salinity upper eulittoral rock (with <i>P. canaliculata</i>) <table><tr><td><i>Pelvetia canaliculata</i></td><td>10-20%</td><td>Frequent</td></tr><tr><td><i>Fucus spiralis</i></td><td>40-50%</td><td>Abundant</td></tr><tr><td>Talitrids</td><td>80 per m²</td><td>Frequent</td></tr><tr><td><i>Anurida maritima</i></td><td>40 per m²</td><td>Frequent</td></tr><tr><td><i>Littorina saxatilis</i></td><td>8 per m²</td><td>Occasional</td></tr><tr><td><i>Austrominius modestus</i></td><td><5%</td><td>Rare</td></tr><tr><td><i>Carcinus maenas</i></td><td>8 per m²</td><td>Common</td></tr><tr><td><i>Verrucaria maura</i></td><td><5%</td><td>Rare</td></tr></table>	<i>Pelvetia canaliculata</i>	10-20%	Frequent	<i>Fucus spiralis</i>	40-50%	Abundant	Talitrids	80 per m ²	Frequent	<i>Anurida maritima</i>	40 per m ²	Frequent	<i>Littorina saxatilis</i>	8 per m ²	Occasional	<i>Austrominius modestus</i>	<5%	Rare	<i>Carcinus maenas</i>	8 per m ²	Common	<i>Verrucaria maura</i>	<5%	Rare
<i>Pelvetia canaliculata</i>	10-20%	Frequent																							
<i>Fucus spiralis</i>	40-50%	Abundant																							
Talitrids	80 per m ²	Frequent																							
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<i>Austrominius modestus</i>	<5%	Rare																							
<i>Carcinus maenas</i>	8 per m ²	Common																							
<i>Verrucaria maura</i>	<5%	Rare																							
	T36 Mid shore. Substrate: Bedrock, Cobbles and mud JNCC Biotope Classification: LR.LLR.FVS.FvesVS <i>Fucus vesiculosus</i> on mid eulittoral variable salinity boulders and stable mixed substrata <table><tr><td><i>Fucus vesiculosus</i></td><td>60%</td><td>Abundant</td></tr><tr><td><i>Pelvetia canaliculata</i></td><td><5%</td><td>Frequent</td></tr><tr><td><i>Littorina littorea</i></td><td>4 per m²</td><td>Occasional</td></tr></table>	<i>Fucus vesiculosus</i>	60%	Abundant	<i>Pelvetia canaliculata</i>	<5%	Frequent	<i>Littorina littorea</i>	4 per m ²	Occasional															
<i>Fucus vesiculosus</i>	60%	Abundant																							
<i>Pelvetia canaliculata</i>	<5%	Frequent																							
<i>Littorina littorea</i>	4 per m ²	Occasional																							
	T36 Lower Shore. Substrate: Bedrock, cobbles and mud JNCC Biotope Classification: LR.LLR.FVS.FvesVS <i>Fucus vesiculosus</i> on mid eulittoral variable salinity boulders and stable mixed substrata <table><tr><td><i>Fucus vesiculosus</i></td><td>70%</td><td>Abundant</td></tr><tr><td><i>Ascophyllum nodosum</i></td><td>10%</td><td>Occasional</td></tr><tr><td><i>Littorina littorea</i></td><td>4 per m²</td><td>Occasional</td></tr><tr><td><i>Arenicola</i> sp.</td><td>20 per m²</td><td>Frequent</td></tr></table>	<i>Fucus vesiculosus</i>	70%	Abundant	<i>Ascophyllum nodosum</i>	10%	Occasional	<i>Littorina littorea</i>	4 per m ²	Occasional	<i>Arenicola</i> sp.	20 per m ²	Frequent												
<i>Fucus vesiculosus</i>	70%	Abundant																							
<i>Ascophyllum nodosum</i>	10%	Occasional																							
<i>Littorina littorea</i>	4 per m ²	Occasional																							
<i>Arenicola</i> sp.	20 per m ²	Frequent																							

	T37 HW to LW Start Coordinate: 53.22202631, -9.003499629 End Coordinate: 53.22207239, -9.00403843 Total Distance: 60m Date: 29th August 2017 High water mark at 0 m at wall with drift weed containing Talitrids. Substrate made up of rocks and road chippings with tar until 1.90 m where it changes to saltmarsh from 1.90 – 2.50 m where the substrate changed to exposed bedrock with cobbles. Saltmarsh contained <i>Aster</i>, <i>Limonium</i> sp. and <i>Salicornia europaea</i>. Lichens included <i>Verrucaria maura</i>, <i>Caloplaca</i> sp. and <i>Xanthoria parietina</i> were recorded on wall. <i>Pelvetia canaliculata</i> band starts at 3.10 m and <i>Fucus spiralis</i> begins at 19.70 m.																		
	T37 Upper Shore. Substrate: Cobbles and boulders. JNCC Biotope Classification: LR.LLR.FVS.PelVS <i>Pelvetia canaliculata</i> on sheltered, variable salinity littoral fringe rock <table><tr><td><i>Pelvetia canaliculata</i></td><td>70-80%</td><td>Abundant</td></tr><tr><td><i>Fucus spiralis</i></td><td><10%</td><td>Occasional</td></tr><tr><td>Talitrids</td><td>150 per m²</td><td>Common</td></tr><tr><td><i>Anurida maritima</i></td><td>110 per m²</td><td>Common</td></tr><tr><td><i>Austrominius modestus</i></td><td><5%</td><td>Rare</td></tr><tr><td><i>Carcinus maenas</i></td><td>4 per m²</td><td>Common</td></tr></table>	<i>Pelvetia canaliculata</i>	70-80%	Abundant	<i>Fucus spiralis</i>	<10%	Occasional	Talitrids	150 per m ²	Common	<i>Anurida maritima</i>	110 per m ²	Common	<i>Austrominius modestus</i>	<5%	Rare	<i>Carcinus maenas</i>	4 per m ²	Common
<i>Pelvetia canaliculata</i>	70-80%	Abundant																	
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<i>Austrominius modestus</i>	<5%	Rare																	
<i>Carcinus maenas</i>	4 per m ²	Common																	
	T37 Mid shore. Substrate: Cobbles with coarse sand and mud. JNCC Biotope Classification: LR.LLR.FVS.FvesVS <i>Fucus vesiculosus</i> on mid eulittoral variable salinity boulders and stable mixed substrata <table><tr><td><i>Fucus vesiculosus</i></td><td>80%</td><td>Abundant</td></tr><tr><td><i>Littorina littorea</i></td><td>4 per m²</td><td>Occasional</td></tr><tr><td>Talitrids</td><td>40 per m²</td><td>Frequent</td></tr><tr><td><i>Mytilus edulis</i></td><td><5%</td><td>Rare</td></tr><tr><td><i>Patella</i> sp.</td><td>4 per m²</td><td>Occasional</td></tr></table>	<i>Fucus vesiculosus</i>	80%	Abundant	<i>Littorina littorea</i>	4 per m ²	Occasional	Talitrids	40 per m ²	Frequent	<i>Mytilus edulis</i>	<5%	Rare	<i>Patella</i> sp.	4 per m ²	Occasional			
<i>Fucus vesiculosus</i>	80%	Abundant																	
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Talitrids	40 per m ²	Frequent																	
<i>Mytilus edulis</i>	<5%	Rare																	
<i>Patella</i> sp.	4 per m ²	Occasional																	
	T37 Lower Shore. Substrate: Boulders, cobbles with coarse sand and mud. JNCC Biotope Classification: LR.LLR.FVS.AscVS <i>Ascophyllum nodosum</i> and <i>Fucus vesiculosus</i> on variable salinity mid eulittoral rock <table><tr><td><i>Fucus vesiculosus</i></td><td>60%</td><td>Abundant</td></tr><tr><td><i>Ascophyllum nodosum</i></td><td>40%</td><td>Abundant</td></tr><tr><td><i>Littorina littorea</i></td><td>12 per m²</td><td>Frequent</td></tr></table>	<i>Fucus vesiculosus</i>	60%	Abundant	<i>Ascophyllum nodosum</i>	40%	Abundant	<i>Littorina littorea</i>	12 per m ²	Frequent									
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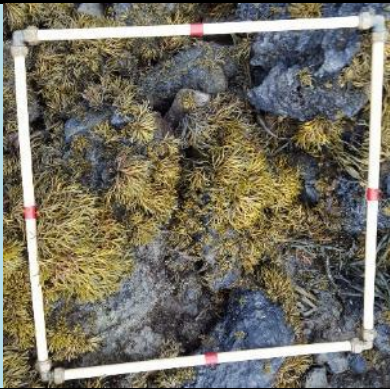
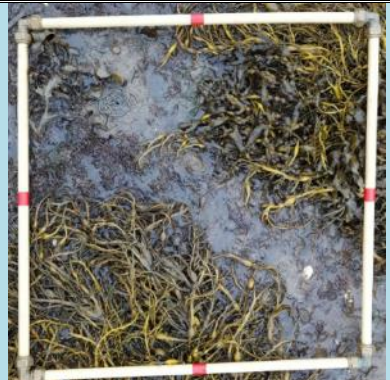
	T38 HW to LW Start Coordinate: 53.22197148, -9.002306924 End Coordinate: 53.22146397, -9.002458502 Total Distance: ca. 59 m Date: 30th August 2017 Salt marsh flora includes <i>Spergularia</i> sp., <i>Suaeda maritima</i>, <i>Limonium humile</i>, <i>Aster tripolium</i> and <i>Salicornia europaea</i>.																		
	T38 Upper Shore. Substrate: Cobbles on mud JNCC Biotope Classification: LR.LLR.FVS.FspiVS <i>Fucus spiralis</i> on sheltered variable salinity upper eulittoral rock. <table><tr><td><i>Fucus spiralis</i></td><td>70%</td><td>Abundant</td></tr><tr><td>Amphipoda</td><td>40-50</td><td>Common</td></tr><tr><td><i>Anurida maritima</i></td><td>10 per m²</td><td>Frequent</td></tr></table>	<i>Fucus spiralis</i>	70%	Abundant	Amphipoda	40-50	Common	<i>Anurida maritima</i>	10 per m ²	Frequent									
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	T38 Mid shore. Substrate Cobbles on mud. JNCC Biotope Classification: LR.LLR.FVS.AscVS <i>Ascophyllum nodosum</i> and <i>Fucus vesiculosus</i> on variable salinity mid eulittoral rock. <table><tr><td><i>Ascophyllum nodosum</i></td><td>60%</td><td>Abundant</td></tr><tr><td><i>Fucus vesiculosus</i></td><td>35-40%</td><td>Common</td></tr><tr><td>Spirorbids on <i>A.nodosum</i></td><td><5%</td><td>Rare</td></tr><tr><td><i>Littorina obtusata</i></td><td>8 per m²</td><td>Frequent</td></tr><tr><td><i>Littorina fabalis</i></td><td>2 per m²</td><td>Occasional</td></tr></table>	<i>Ascophyllum nodosum</i>	60%	Abundant	<i>Fucus vesiculosus</i>	35-40%	Common	Spirorbids on <i>A.nodosum</i>	<5%	Rare	<i>Littorina obtusata</i>	8 per m ²	Frequent	<i>Littorina fabalis</i>	2 per m ²	Occasional			
<i>Ascophyllum nodosum</i>	60%	Abundant																	
<i>Fucus vesiculosus</i>	35-40%	Common																	
Spirorbids on <i>A.nodosum</i>	<5%	Rare																	
<i>Littorina obtusata</i>	8 per m ²	Frequent																	
<i>Littorina fabalis</i>	2 per m ²	Occasional																	
	T38 Lower Shore. Substrate: cobbles on mud. JNCC Biotope Classification: LR.LLR.FVS.AscVS <i>Ascophyllum nodosum</i> and <i>Fucus vesiculosus</i> on variable salinity mid eulittoral rock <table><tr><td><i>Ascophyllum nodosum</i></td><td>90%</td><td>Superabundant</td></tr><tr><td><i>Fucus vesiculosus</i></td><td><5%</td><td>Rare</td></tr><tr><td>Spirorbids on <i>A. nodosum</i></td><td><5%</td><td>Rare</td></tr><tr><td><i>Hymeniacidon perlevis</i></td><td><5%</td><td>Rare</td></tr><tr><td><i>Patella</i> sp.</td><td>2 per m²</td><td>Occasional</td></tr><tr><td>Talitrids</td><td>20 per m²</td><td>Frequent</td></tr></table>	<i>Ascophyllum nodosum</i>	90%	Superabundant	<i>Fucus vesiculosus</i>	<5%	Rare	Spirorbids on <i>A. nodosum</i>	<5%	Rare	<i>Hymeniacidon perlevis</i>	<5%	Rare	<i>Patella</i> sp.	2 per m ²	Occasional	Talitrids	20 per m ²	Frequent
<i>Ascophyllum nodosum</i>	90%	Superabundant																	
<i>Fucus vesiculosus</i>	<5%	Rare																	
Spirorbids on <i>A. nodosum</i>	<5%	Rare																	
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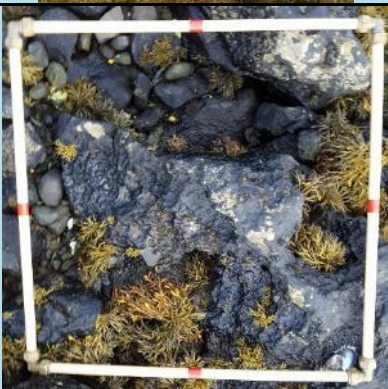
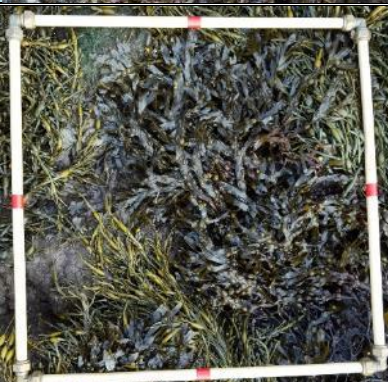
	T39 HW to LW Start Coordinate: 53.22194932, -9.001178245 End Coordinate: 53.22178472, -9.000810655 Total Distance: <i>ca.</i> 44 m Date: 30th August 2017 Salt marsh flora includes <i>Spergularia</i> sp., <i>Suaeda maritima</i>, <i>Limonium humile</i>, <i>Aster tripolium</i> and <i>Salicornia europaea</i>.																					
	T39 Upper Shore. Substrate: Bedrock, boulders, cobbles and mud. JNCC Biotope Classification: LR.LLR.FVS.PelVS <i>Pelvetia canaliculata</i> on sheltered, variable salinity littoral fringe rock <table><tr><td><i>Pelvetia canaliculata</i></td><td><15%</td><td>Frequent</td></tr><tr><td><i>Fucus spiralis</i></td><td><15%</td><td>Frequent</td></tr><tr><td>Amphipods</td><td>30 per m²</td><td>Frequent</td></tr><tr><td><i>Anurida maritima</i></td><td>50 per m²</td><td>Common</td></tr></table>	<i>Pelvetia canaliculata</i>	<15%	Frequent	<i>Fucus spiralis</i>	<15%	Frequent	Amphipods	30 per m ²	Frequent	<i>Anurida maritima</i>	50 per m ²	Common									
<i>Pelvetia canaliculata</i>	<15%	Frequent																				
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Amphipods	30 per m ²	Frequent																				
<i>Anurida maritima</i>	50 per m ²	Common																				
	T39 Mid shore. Substrate: boulders, cobbles and mud JNCC Biotope Classification: LR.LLR.FVS.FvesVS <i>Fucus vesiculosus</i> on mid eulittoral variable salinity boulders and stable mixed substrata. <table><tr><td><i>Fucus vesiculosus</i></td><td>100%</td><td>Superabundant</td></tr><tr><td><i>Littorina fabalis</i></td><td>2 per m²</td><td>Occasional</td></tr><tr><td>Talitrids</td><td>3 per m²</td><td>Occasional</td></tr></table>	<i>Fucus vesiculosus</i>	100%	Superabundant	<i>Littorina fabalis</i>	2 per m ²	Occasional	Talitrids	3 per m ²	Occasional												
<i>Fucus vesiculosus</i>	100%	Superabundant																				
<i>Littorina fabalis</i>	2 per m ²	Occasional																				
Talitrids	3 per m ²	Occasional																				
	T39 Lower Shore. Substrate: boulders, cobbles and mud JNCC Biotope Classification: LR.LLR.F.Asc <i>Ascophyllum nodosum</i> on very sheltered mid eulittoral rock. <table><tr><td><i>Ascophyllum nodosum</i></td><td>95-100%</td><td>Superabundant</td></tr><tr><td><i>Mytilus edulis</i></td><td>3 per m²</td><td>Frequent</td></tr><tr><td>Spirorbids on rock</td><td><5%</td><td>Rare</td></tr><tr><td><i>Balanus crenatus</i></td><td>1 per m²</td><td>Rare</td></tr><tr><td><i>Austrominius modestus</i></td><td>3 per m²</td><td>Rare</td></tr><tr><td>Amphipoda</td><td>3 per m²</td><td>Frequent</td></tr><tr><td><i>Lepidochiton cineraria</i></td><td>1 per m²</td><td>rare</td></tr></table>	<i>Ascophyllum nodosum</i>	95-100%	Superabundant	<i>Mytilus edulis</i>	3 per m ²	Frequent	Spirorbids on rock	<5%	Rare	<i>Balanus crenatus</i>	1 per m ²	Rare	<i>Austrominius modestus</i>	3 per m ²	Rare	Amphipoda	3 per m ²	Frequent	<i>Lepidochiton cineraria</i>	1 per m ²	rare
<i>Ascophyllum nodosum</i>	95-100%	Superabundant																				
<i>Mytilus edulis</i>	3 per m ²	Frequent																				
Spirorbids on rock	<5%	Rare																				
<i>Balanus crenatus</i>	1 per m ²	Rare																				
<i>Austrominius modestus</i>	3 per m ²	Rare																				
Amphipoda	3 per m ²	Frequent																				
<i>Lepidochiton cineraria</i>	1 per m ²	rare																				

	T40 HW to LW Start Coordinate: 53.22192255, -8.99984386 End Coordinate: 53.22166905, -8.999890675 Total Distance: <i>ca.</i> 28 m Date: 30th August 2017 Salt marsh flora includes grasses, <i>Spergularia</i> sp., <i>Suaeda maritima</i>, <i>Limonium humile</i>, <i>Aster tripolium</i> and <i>Artemisia</i> sp.												
	T40 Upper Shore. Substrate: Bedrock, boulders, cobbles and mud. JNCC Biotope Classification: LR.LLR.FVS.FspiVS <i>Fucus spiralis</i> on sheltered variable salinity upper eulittoral rock. <table><tr><td><i>Pelvetia canaliculata</i></td><td><5%</td><td>Rare</td></tr><tr><td><i>Fucus spiralis</i></td><td>75%</td><td>Abundant</td></tr><tr><td>Amphipoda</td><td>10</td><td>Frequent</td></tr><tr><td>Spirorbids on rock</td><td><5%</td><td>Rare</td></tr></table>	<i>Pelvetia canaliculata</i>	<5%	Rare	<i>Fucus spiralis</i>	75%	Abundant	Amphipoda	10	Frequent	Spirorbids on rock	<5%	Rare
<i>Pelvetia canaliculata</i>	<5%	Rare											
<i>Fucus spiralis</i>	75%	Abundant											
Amphipoda	10	Frequent											
Spirorbids on rock	<5%	Rare											
	T40 Mid shore. Substrate: Bedrock, boulders, cobbles and mud. JNCC Biotope Classification: LR.LLR.FVS.AscVS <i>Ascophyllum nodosum</i> and <i>Fucus vesiculosus</i> on variable salinity mid eulittoral rock. <table><tr><td><i>Fucus vesiculosus</i></td><td>80%</td><td>Superabundant</td></tr><tr><td><i>Ascophyllum nodosum</i></td><td>30%</td><td>Common</td></tr><tr><td>Spirorbids on <i>Fucus</i></td><td><5%</td><td>Rare</td></tr></table>	<i>Fucus vesiculosus</i>	80%	Superabundant	<i>Ascophyllum nodosum</i>	30%	Common	Spirorbids on <i>Fucus</i>	<5%	Rare			
<i>Fucus vesiculosus</i>	80%	Superabundant											
<i>Ascophyllum nodosum</i>	30%	Common											
Spirorbids on <i>Fucus</i>	<5%	Rare											
	T40 Lower Shore. Substrate: Bedrock, boulders, cobbles and mud. JNCC Biotope Classification: LR.LLR.FVS.AscVS <i>Ascophyllum nodosum</i> and <i>Fucus vesiculosus</i> on variable salinity mid eulittoral rock. <table><tr><td><i>Fucus vesiculosus</i></td><td>50%</td><td>Abundant</td></tr><tr><td><i>Ascophyllum nodosum</i></td><td>30%</td><td>Common</td></tr><tr><td>Spirorbids on <i>Fucus</i></td><td><5%</td><td>Rare</td></tr><tr><td><i>Littorina littorea</i></td><td>2 per m²</td><td>Occasional</td></tr></table>	<i>Fucus vesiculosus</i>	50%	Abundant	<i>Ascophyllum nodosum</i>	30%	Common	Spirorbids on <i>Fucus</i>	<5%	Rare	<i>Littorina littorea</i>	2 per m ²	Occasional
<i>Fucus vesiculosus</i>	50%	Abundant											
<i>Ascophyllum nodosum</i>	30%	Common											
Spirorbids on <i>Fucus</i>	<5%	Rare											
<i>Littorina littorea</i>	2 per m ²	Occasional											

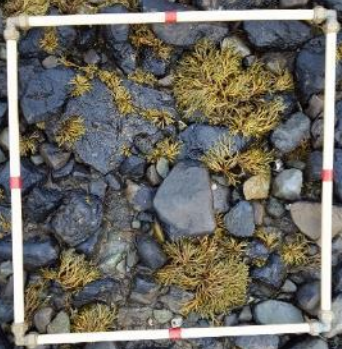
	T41 HW to LW Start Coordinate: 53.22181388, -8.998465398 End Coordinate: 53.22177987, -8.998369716 Total Distance: <i>ca.</i> 11 m Date: 14th November 17 Salt marsh flora includes grasses, <i>Spergularia</i> sp., <i>Suaeda maritima</i>, <i>Aster tripolium</i> and <i>Artemisia</i> sp															
	T41 Upper Shore. Substrate: boulders, Cobbles and mud. JNCC Biotope Classification: LR.LLR.FVS.PelVS <i>Pelvetia canaliculata</i> on sheltered, variable salinity littoral fringe rock. <table><tr><td><i>Pelvetia canaliculata</i></td><td>20%</td><td>Common</td></tr><tr><td><i>Fucus spiralis</i></td><td><5%</td><td>Abundant</td></tr><tr><td><i>Littorina fabalis</i></td><td>1 per m²</td><td>Occasional</td></tr><tr><td><i>Littorina saxatilis</i></td><td>2 per m²</td><td>Occasional</td></tr><tr><td><i>Verrucaria maura</i></td><td>10%</td><td>Frequent</td></tr></table>	<i>Pelvetia canaliculata</i>	20%	Common	<i>Fucus spiralis</i>	<5%	Abundant	<i>Littorina fabalis</i>	1 per m ²	Occasional	<i>Littorina saxatilis</i>	2 per m ²	Occasional	<i>Verrucaria maura</i>	10%	Frequent
<i>Pelvetia canaliculata</i>	20%	Common														
<i>Fucus spiralis</i>	<5%	Abundant														
<i>Littorina fabalis</i>	1 per m ²	Occasional														
<i>Littorina saxatilis</i>	2 per m ²	Occasional														
<i>Verrucaria maura</i>	10%	Frequent														
	T41 Mid shore. Substrate: boulders, Cobbles and mud. No JNCC Biotope equivalent. <table><tr><td><i>Fucus spiralis</i></td><td>15%</td><td>Frequent</td></tr><tr><td><i>Fucus vesiculosus</i></td><td>30%</td><td>Common</td></tr></table>	<i>Fucus spiralis</i>	15%	Frequent	<i>Fucus vesiculosus</i>	30%	Common									
<i>Fucus spiralis</i>	15%	Frequent														
<i>Fucus vesiculosus</i>	30%	Common														
	T41 Lower Shore. Substrate: Mud with sparse rocks. JNCC Biotope Classification: LR.LLR.FVS.AscVS <i>Ascophyllum nodosum</i> and <i>Fucus vesiculosus</i> on variable salinity mid eulittoral rock. <table><tr><td><i>Fucus vesiculosus</i></td><td>20%</td><td>Common</td></tr><tr><td><i>Ascophyllum nodosum</i></td><td>35%</td><td>Common</td></tr><tr><td><i>Arenicola</i> sp.</td><td>2 per m²</td><td>Occasional</td></tr></table>	<i>Fucus vesiculosus</i>	20%	Common	<i>Ascophyllum nodosum</i>	35%	Common	<i>Arenicola</i> sp.	2 per m ²	Occasional						
<i>Fucus vesiculosus</i>	20%	Common														
<i>Ascophyllum nodosum</i>	35%	Common														
<i>Arenicola</i> sp.	2 per m ²	Occasional														

	T42 HW to LW Start Coordinate: 53.22230517, -8.997981269 End Coordinate: 53.22224784, -8.998027383 Total Distance: <i>ca.</i> 7 m Date: 14th November 17 Salt marsh flora includes grasses, <i>Spergularia</i> sp., <i>Suaeda maritima</i>, <i>Aster tripolium</i> and <i>Artemisia</i> sp.															
	T42 Upper Shore. Substrate: Cobbles and boulders. No JNCC Biotope equivalent. <table><tr><td>Saltmarsh</td><td>15%</td><td>Frequent</td></tr><tr><td><i>Pelvetia canaliculata</i></td><td>20%</td><td>Common</td></tr><tr><td><i>Fucus spiralis</i></td><td>15%</td><td>Frequent</td></tr><tr><td><i>Carcinus maenas</i></td><td>1 per m²</td><td>Occasional</td></tr><tr><td><i>Verrucaria maura</i></td><td><5%</td><td>Frequent</td></tr></table>	Saltmarsh	15%	Frequent	<i>Pelvetia canaliculata</i>	20%	Common	<i>Fucus spiralis</i>	15%	Frequent	<i>Carcinus maenas</i>	1 per m ²	Occasional	<i>Verrucaria maura</i>	<5%	Frequent
Saltmarsh	15%	Frequent														
<i>Pelvetia canaliculata</i>	20%	Common														
<i>Fucus spiralis</i>	15%	Frequent														
<i>Carcinus maenas</i>	1 per m ²	Occasional														
<i>Verrucaria maura</i>	<5%	Frequent														
	T42 Mid shore. Substrate: Large boulders with coarse sand. No JNCC Biotope equivalent. <table><tr><td><i>Fucus spiralis</i></td><td>65%</td><td>Abundant</td></tr><tr><td><i>Pelvetia canaliculata</i></td><td><5%</td><td>Rare</td></tr><tr><td><i>Anurida maritima</i></td><td>8 per m²</td><td>Occasional</td></tr></table>	<i>Fucus spiralis</i>	65%	Abundant	<i>Pelvetia canaliculata</i>	<5%	Rare	<i>Anurida maritima</i>	8 per m ²	Occasional						
<i>Fucus spiralis</i>	65%	Abundant														
<i>Pelvetia canaliculata</i>	<5%	Rare														
<i>Anurida maritima</i>	8 per m ²	Occasional														
	T42 Lower Shore. Substrate: Boulders and cobbles. No JNCC Biotope equivalent. <table><tr><td><i>Fucus spiralis</i></td><td>10%</td><td>Frequent</td></tr><tr><td><i>Fucus vesiculosus</i></td><td>10%</td><td>Frequent</td></tr><tr><td><i>Ascophyllum nodosum</i></td><td>15%</td><td>Frequent</td></tr><tr><td><i>Arenicola</i> sp.</td><td>1 per m²</td><td>Occasional</td></tr><tr><td><i>Cladophora</i> sp.</td><td><5%</td><td>Rare</td></tr></table>	<i>Fucus spiralis</i>	10%	Frequent	<i>Fucus vesiculosus</i>	10%	Frequent	<i>Ascophyllum nodosum</i>	15%	Frequent	<i>Arenicola</i> sp.	1 per m ²	Occasional	<i>Cladophora</i> sp.	<5%	Rare
<i>Fucus spiralis</i>	10%	Frequent														
<i>Fucus vesiculosus</i>	10%	Frequent														
<i>Ascophyllum nodosum</i>	15%	Frequent														
<i>Arenicola</i> sp.	1 per m ²	Occasional														
<i>Cladophora</i> sp.	<5%	Rare														

	T43 HW to LW Start Coordinate: 53.22149813, -8.99800996 End Coordinate: 53.22141109, -8.998202991 Total Distance: <i>ca.</i> 22 m Date: 28th August 17 Salt marsh flora includes grasses, <i>Spergularia</i> sp., <i>Suaeda maritima</i>, <i>Aster tripolium</i> and <i>Artemisia</i> sp.												
	T43 Upper Shore. Substrate: Bedrock, Cobbles and boulders. JNCC Biotope Classification: LR.LLR.FVS.PelVS <i>Pelvetia canaliculata</i> on sheltered, variable salinity littoral fringe rock <table><tr><td><i>Pelvetia canaliculata</i></td><td>30%</td><td>Common</td></tr><tr><td><i>Verrucaria maura</i></td><td>20%</td><td>Common</td></tr><tr><td><i>Littorina saxatilis</i></td><td>1 per m²</td><td>Occasional</td></tr><tr><td>Talitrids</td><td>50 per m²</td><td>Frequent</td></tr></table>	<i>Pelvetia canaliculata</i>	30%	Common	<i>Verrucaria maura</i>	20%	Common	<i>Littorina saxatilis</i>	1 per m ²	Occasional	Talitrids	50 per m ²	Frequent
<i>Pelvetia canaliculata</i>	30%	Common											
<i>Verrucaria maura</i>	20%	Common											
<i>Littorina saxatilis</i>	1 per m ²	Occasional											
Talitrids	50 per m ²	Frequent											
	T43 Mid shore. Substrate: Cobbles and mud. JNCC Biotope Classification: LR.LLR.FVS.FspiVS <i>Fucus spiralis</i> on sheltered variable salinity upper eulittoral rock <table><tr><td><i>Fucus spiralis</i></td><td>90%</td><td>Superabundant</td></tr><tr><td><i>Pelvetia canaliculata</i></td><td><5%</td><td>Rare</td></tr><tr><td><i>Littorina obtusata</i></td><td>1 per m²</td><td>Occasional</td></tr><tr><td>Talitrids</td><td>20 per m²</td><td>Frequent</td></tr></table>	<i>Fucus spiralis</i>	90%	Superabundant	<i>Pelvetia canaliculata</i>	<5%	Rare	<i>Littorina obtusata</i>	1 per m ²	Occasional	Talitrids	20 per m ²	Frequent
<i>Fucus spiralis</i>	90%	Superabundant											
<i>Pelvetia canaliculata</i>	<5%	Rare											
<i>Littorina obtusata</i>	1 per m ²	Occasional											
Talitrids	20 per m ²	Frequent											
	T43 Lower Shore. Substrate: Mud and cobbles. JNCC Biotope Classification: LR.LLR.FVS.AscVS <i>Ascophyllum nodosum</i> and <i>Fucus vesiculosus</i> on variable salinity mid eulittoral rock <table><tr><td><i>Fucus vesiculosus</i></td><td>10%</td><td>Frequent</td></tr><tr><td><i>Ascophyllum nodosum</i></td><td>35%</td><td>Common</td></tr><tr><td><i>Arenicola</i> sp.</td><td>1 per m²</td><td>Occasional</td></tr></table>	<i>Fucus vesiculosus</i>	10%	Frequent	<i>Ascophyllum nodosum</i>	35%	Common	<i>Arenicola</i> sp.	1 per m ²	Occasional			
<i>Fucus vesiculosus</i>	10%	Frequent											
<i>Ascophyllum nodosum</i>	35%	Common											
<i>Arenicola</i> sp.	1 per m ²	Occasional											

	T44 HW to LW Start Coordinate: 53.22147304, -8.996849597 End Coordinate: 53.22141105, -8.996695278 Total Distance: ca. 17 m Date: 28th August 17 Salt marsh flora includes grasses, <i>Spergularia</i> sp., <i>Suaeda maritima</i>, <i>Limonium humile</i>, <i>Aster tripolium</i> and <i>Artemisia</i> sp																		
	T44 Upper Shore. Substrate: Bedrock and cobbles. JNCC Biotope Classification: LR.LLR.FVS.PelVS <i>Pelvetia canaliculata</i> on sheltered, variable salinity littoral, fringe rock <table><tr><td><i>Pelvetia canaliculata</i></td><td>15%</td><td>Frequent</td></tr><tr><td><i>Verrucaria maura</i></td><td>90%</td><td>superabundant</td></tr><tr><td><i>Littorina saxatilis</i></td><td>12 per m²</td><td>Frequent</td></tr><tr><td>Talitrids</td><td>5 per m2</td><td>Occasional</td></tr></table>	<i>Pelvetia canaliculata</i>	15%	Frequent	<i>Verrucaria maura</i>	90%	superabundant	<i>Littorina saxatilis</i>	12 per m ²	Frequent	Talitrids	5 per m2	Occasional						
<i>Pelvetia canaliculata</i>	15%	Frequent																	
<i>Verrucaria maura</i>	90%	superabundant																	
<i>Littorina saxatilis</i>	12 per m ²	Frequent																	
Talitrids	5 per m2	Occasional																	
	T44 Mid shore. Substrate: Cobbles and boulders. JNCC Biotope Classification: LR.LLR.FVS.FspiVS <i>Fucus spiralis</i> on sheltered variable salinity upper eulittoral rock <table><tr><td><i>Fucus spiralis</i></td><td>80%</td><td>Superabundant</td></tr><tr><td><i>Pelvetia canaliculata</i></td><td><5%</td><td>Rare</td></tr><tr><td><i>Littorina obtusata</i></td><td>1 per m²</td><td>Occasional</td></tr><tr><td><i>Littorina saxatilis</i></td><td>1 per m²</td><td>Occasional</td></tr><tr><td><i>Austrominius modestus</i></td><td>10%</td><td>Frequent</td></tr><tr><td><i>Verrucaria maura</i></td><td>40%</td><td>Abundant</td></tr></table>	<i>Fucus spiralis</i>	80%	Superabundant	<i>Pelvetia canaliculata</i>	<5%	Rare	<i>Littorina obtusata</i>	1 per m ²	Occasional	<i>Littorina saxatilis</i>	1 per m ²	Occasional	<i>Austrominius modestus</i>	10%	Frequent	<i>Verrucaria maura</i>	40%	Abundant
<i>Fucus spiralis</i>	80%	Superabundant																	
<i>Pelvetia canaliculata</i>	<5%	Rare																	
<i>Littorina obtusata</i>	1 per m ²	Occasional																	
<i>Littorina saxatilis</i>	1 per m ²	Occasional																	
<i>Austrominius modestus</i>	10%	Frequent																	
<i>Verrucaria maura</i>	40%	Abundant																	
	T44 Lower Shore. Substrate: Boulders and cobbles. JNCC Biotope Classification: LR.LLR.FVS.AscVS <i>Ascophyllum nodosum</i> and <i>Fucus vesiculosus</i> on variable salinity mid eulittoral rock <table><tr><td><i>Fucus vesiculosus</i></td><td>50%</td><td>Abundant</td></tr><tr><td><i>Ascophyllum nodosum</i></td><td>30%</td><td>Common</td></tr><tr><td><i>Spirorbis</i> sp.</td><td><5%</td><td>Rare</td></tr><tr><td><i>Littorina obtusata</i></td><td>3 per m²</td><td>Occasional</td></tr><tr><td><i>Littorina fabalis</i></td><td>4 per m²</td><td>Occasional</td></tr><tr><td><i>Austrominius modestus</i></td><td>10%</td><td>Frequent</td></tr></table>	<i>Fucus vesiculosus</i>	50%	Abundant	<i>Ascophyllum nodosum</i>	30%	Common	<i>Spirorbis</i> sp.	<5%	Rare	<i>Littorina obtusata</i>	3 per m ²	Occasional	<i>Littorina fabalis</i>	4 per m ²	Occasional	<i>Austrominius modestus</i>	10%	Frequent
<i>Fucus vesiculosus</i>	50%	Abundant																	
<i>Ascophyllum nodosum</i>	30%	Common																	
<i>Spirorbis</i> sp.	<5%	Rare																	
<i>Littorina obtusata</i>	3 per m ²	Occasional																	
<i>Littorina fabalis</i>	4 per m ²	Occasional																	
<i>Austrominius modestus</i>	10%	Frequent																	

		T45 HW to LW Start Coordinate: 53.22214654, -8.995763423 End Coordinate: 53.22197989, -8.995638308 Total Distance: ca. 24 m Date: 28th August 17 Salt marsh flora includes grasses, <i>Spergularia</i> sp., <i>Suaeda maritima</i>, <i>Limonium humile</i>, <i>Aster tripolium</i> and <i>Artemisia</i> sp.															
		T45 Upper Shore. Substrate: Cobble and mud. JNCC Biotope Classification: LR.LLR.FVS.PelVS <i>Pelvetia canaliculata</i> on sheltered, variable salinity littoral fringe rock <table border="0"> <tr> <td><i>Pelvetia canaliculata</i></td><td>15%</td><td>Frequent</td></tr> <tr> <td><i>Verrucaria maura</i></td><td>15%</td><td>Frequent</td></tr> <tr> <td><i>Littorina saxatilis</i></td><td>14 per m²</td><td>Frequent</td></tr> <tr> <td><i>Littorina obtusata</i></td><td>1 per m²</td><td>Occasional</td></tr> <tr> <td><i>Austrominius modestus</i></td><td><5%</td><td>Rare</td></tr> </table>	<i>Pelvetia canaliculata</i>	15%	Frequent	<i>Verrucaria maura</i>	15%	Frequent	<i>Littorina saxatilis</i>	14 per m ²	Frequent	<i>Littorina obtusata</i>	1 per m ²	Occasional	<i>Austrominius modestus</i>	<5%	Rare
<i>Pelvetia canaliculata</i>	15%	Frequent															
<i>Verrucaria maura</i>	15%	Frequent															
<i>Littorina saxatilis</i>	14 per m ²	Frequent															
<i>Littorina obtusata</i>	1 per m ²	Occasional															
<i>Austrominius modestus</i>	<5%	Rare															
		T45 Mid shore. Substrate: Cobbles and mud. JNCC Biotope Classification: LR.LLR.FVS.FspiVS <i>Fucus spiralis</i> on sheltered variable salinity upper eulittoral rock <table border="0"> <tr> <td><i>Fucus spiralis</i></td><td>90%</td><td>Superabundant</td></tr> <tr> <td><i>Littorina obtusata</i></td><td>1 per m²</td><td>Occasional</td></tr> <tr> <td><i>Austrominius modestus</i></td><td><5%</td><td>Rare</td></tr> </table>	<i>Fucus spiralis</i>	90%	Superabundant	<i>Littorina obtusata</i>	1 per m ²	Occasional	<i>Austrominius modestus</i>	<5%	Rare						
<i>Fucus spiralis</i>	90%	Superabundant															
<i>Littorina obtusata</i>	1 per m ²	Occasional															
<i>Austrominius modestus</i>	<5%	Rare															
		T45 Lower Shore. Substrate: Cobbles and mud. JNCC Biotope Classification: LR.LLR.FVS.AscVS <i>Ascophyllum nodosum</i> and <i>Fucus vesiculosus</i> on variable salinity mid eulittoral rock. <table border="0"> <tr> <td><i>Fucus vesiculosus</i></td><td>55%</td><td>Abundant</td></tr> <tr> <td><i>Ascophyllum nodosum</i></td><td>50%</td><td>Abundant</td></tr> <tr> <td><i>Carcinus maenas</i></td><td>1 per m²</td><td>Common</td></tr> <tr> <td><i>Littorina saxatilis</i></td><td>5 per m²</td><td>Occasional</td></tr> </table>	<i>Fucus vesiculosus</i>	55%	Abundant	<i>Ascophyllum nodosum</i>	50%	Abundant	<i>Carcinus maenas</i>	1 per m ²	Common	<i>Littorina saxatilis</i>	5 per m ²	Occasional			
<i>Fucus vesiculosus</i>	55%	Abundant															
<i>Ascophyllum nodosum</i>	50%	Abundant															
<i>Carcinus maenas</i>	1 per m ²	Common															
<i>Littorina saxatilis</i>	5 per m ²	Occasional															

		T46 HW to LW Start Coordinate: 53.22262505, -8.99453563 End Coordinate: 53.22247448, -8.99437926 Total Distance: <i>ca.</i> 23 m Date: 23rd August 17 Salt marsh <i>ca.</i> 6 m wide band at top of shore. Talitrids in rotting weed at HW. Plant species included <i>Aster</i> sp. and <i>Artemesia</i>.															
		T46 Upper Shore. Substrate: Cobbles JNCC Biotope Classification: LR.LLR.FVS.PelVS <i>Pelvetia canaliculata</i> on sheltered, variable salinity littoral fringe rock <table border="0"> <tr> <td><i>Pelvetia canaliculata</i></td><td>15%</td><td>Frequent</td></tr> <tr> <td><i>Littorina saxatilis</i></td><td>2 per m²</td><td>Occasional</td></tr> </table>	<i>Pelvetia canaliculata</i>	15%	Frequent	<i>Littorina saxatilis</i>	2 per m ²	Occasional									
<i>Pelvetia canaliculata</i>	15%	Frequent															
<i>Littorina saxatilis</i>	2 per m ²	Occasional															
		T46 Mid shore. Substrate: Boulders and cobbles. JNCC Biotope Classification: LR.LLR.FVS.FspiVS <i>Fucus spiralis</i> on sheltered variable salinity upper eulittoral rock. <table border="0"> <tr> <td><i>Fucus spiralis</i></td><td>100%</td><td>Superabundant</td></tr> <tr> <td><i>Littorina obtusata</i></td><td>2 per m²</td><td>Occasional</td></tr> <tr> <td>Talitrids</td><td>10 per m²</td><td>Frequent</td></tr> </table>	<i>Fucus spiralis</i>	100%	Superabundant	<i>Littorina obtusata</i>	2 per m ²	Occasional	Talitrids	10 per m ²	Frequent						
<i>Fucus spiralis</i>	100%	Superabundant															
<i>Littorina obtusata</i>	2 per m ²	Occasional															
Talitrids	10 per m ²	Frequent															
		T46 Lower Shore. Substrate: Boulders and cobbles. JNCC Biotope Classification: LR.LLR.FVS.AscVS <i>Ascophyllum nodosum</i> and <i>Fucus vesiculosus</i> on variable salinity mid eulittoral rock. <table border="0"> <tr> <td><i>Fucus vesiculosus</i></td><td>60%</td><td>Abundant</td></tr> <tr> <td><i>Ascophyllum nodosum</i></td><td>50%</td><td>Abundant</td></tr> <tr> <td><i>Littorina obtusata</i></td><td>2 per m²</td><td>Occasional</td></tr> <tr> <td><i>Littorina saxatilis</i></td><td>2 per m²</td><td>Occasional</td></tr> <tr> <td><i>Patella</i> sp.</td><td>5 per m²</td><td>Occasional</td></tr> </table>	<i>Fucus vesiculosus</i>	60%	Abundant	<i>Ascophyllum nodosum</i>	50%	Abundant	<i>Littorina obtusata</i>	2 per m ²	Occasional	<i>Littorina saxatilis</i>	2 per m ²	Occasional	<i>Patella</i> sp.	5 per m ²	Occasional
<i>Fucus vesiculosus</i>	60%	Abundant															
<i>Ascophyllum nodosum</i>	50%	Abundant															
<i>Littorina obtusata</i>	2 per m ²	Occasional															
<i>Littorina saxatilis</i>	2 per m ²	Occasional															
<i>Patella</i> sp.	5 per m ²	Occasional															

			T47 HW to LW Start Coordinate: 53.22313499, -8.995607098 End Coordinate: 53.22306935, -8.99589026 Total Distance: <i>ca.</i> 31 m Date: 28th August 17 As this station was located at the edge of a small, shallow lagoon, it was not possible to get samples from 3 levels. Plant species included <i>Aster</i> sp. and <i>Artemesia</i>.
			T47 In water. Cobbles on mud No JNCC Biotope equivalent.

			T48 HW to LW Start Coordinate: 53.22258466, -8.995583795 End Coordinate: 53.22265605, -8.995748878 Total Distance: <i>ca.</i> 19 m Date: 28th August 17 As this station was located at the edge of a small, shallow lagoon, it was not possible to get samples from 3 levels. Plant species included <i>Aster</i> sp. and <i>Artemesia</i>.
			T48 In water. Substrate: Cobbles and mud. No JNCC Biotope equivalent. <i>Pelvetia canaliculata</i> 10% Frequent

	T49 HW to LW Start Coordinate: 53.22247094, -8.99669879 End Coordinate: 53.22248425, -8.996620022 Total Distance: <i>ca.</i> 8 m Date: 28th August 17 As this station was located at the edge of a small, shallow lagoon, it was not possible to get samples from 3 levels. Plant species included <i>Aster</i> sp. and <i>Artemesia</i>.			
	T49 Upper Shore. Substrate: Cobbles and boulders. No JNCC Biotope equivalent. <table><tr><td><i>Ulva intestinalis</i></td><td>5-10%</td><td>Occasional</td></tr></table>	<i>Ulva intestinalis</i>	5-10%	Occasional
<i>Ulva intestinalis</i>	5-10%	Occasional		



T50 HW to LW
 Start Coordinate: 53.22181448, -9.004889063
 End Coordinate: 53.2218548, -9.004610602
 Total Distance: ca. 30 m
 Date: 30th August 17

High water drift line at 0 m, with *Talitrids* (Occasional). Transect runs along bridge wall. Saltmarsh at beginning of transect changing immediately to boulders, bedrock and some chippings from the road. *Verrucaria maura* and *Caloplaca* sp. present on boulders and bedrock. Vegetation includes *Artemisia* sp. and *Salicornia europaea*. *Pelvetia canaliculata* starts at 4.60 m and *Fucus spiralis* starts at 12.40 m. Bedrock/wall at 17.70 m. *Fucus vesiculosus* starts at 19.40 m and *P. canaliculata* ends at 19.50 m. *Ascophyllum nodosum* starts at 19.80 m. *Littorina littorea* occasional and *Carcinus maenas* common. After 21.30 m substrate changes to mud and boulders. 21.70 m *Mytilus edulis* rare (<5%). *Arenicola* sp. 10 per m². *Polysiphonia lanosa* Frequent on *A. nodosum*. Colony of *Hymeniacion perlevis* at 28 m, two more colonies further out at approximately 35 m and 40 m.



T50 Upper Shore. Substrate: Cobbles, boulders and mud.
 JNCC Biotope Classification: LR.LLR.FVS.PelVS *Pelvetia canaliculata* on sheltered, variable salinity littoral fringe rock

<i>Pelvetia canaliculata</i>	15%	Frequent
<i>Fucus spiralis</i>	<5%	Rare
<i>Ligia oceanica</i>	4 per m ²	Occasional
Talitrids	100 per m ²	Common
<i>Verrucaria maura</i>	<5%	Rare
<i>Austrominius modestus</i>	<5%	Rare
<i>Littorina saxatilis</i>	4 per m ²	Occasional



T50 Mid shore. Substrate: Cobbles and mud.
 JNCC Biotope Classification: LR.LLR.FVS.FspiVS *Fucus spiralis* on sheltered variable salinity upper eulittoral rock.

<i>Fucus spiralis</i>	60%	Abundant
<i>Pelvetia canaliculata</i>	<5%	Rare
<i>Ligia oceanica</i>	2 per m ²	Occasional
Talitrids	20 per m ²	Frequent



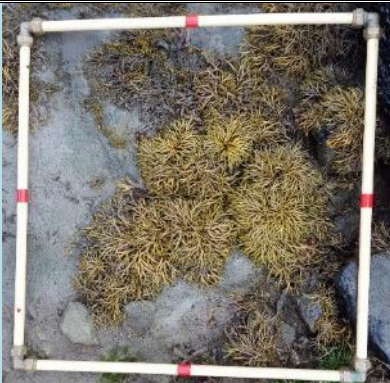
T50 Lower Shore. Substrate: Boulders, cobbles and mud.
 JNCC Biotope Classification: LR.LLR.FVS.AscVS *Ascophyllum nodosum* and *Fucus vesiculosus* on variable salinity mid eulittoral rock.

<i>Fucus vesiculosus</i>	30%	Common
<i>Ascophyllum nodosum</i>	40%	Common
<i>Ligia oceanica</i>	120 per m ²	Common
Talitrids	240 per m ²	Common
<i>Mytilus edulis</i>	<5%	Rare
<i>Carcinus maenas</i>	8 per m ²	Common
<i>Austrominius modestus</i>	10 - 20%	Frequent



T51 HW to LW
 Start Coordinate: 53.22214468, -9.005503048
 End Coordinate: 53.22220501, -9.005478101
 Total Distance: ca. 7 m
 Date: 30th August 17

Transect starts on saltmarsh no obvious high water mark visible. Saltmarsh from 0 – 2.40 m vegetation includes *Artemisia* sp., *Salicornia europaea*, *Aster* sp. and *Spergularia* sp. After 2.40 m substrate changed to Exposed bedrock with mud between, redox was shallow. *Verrucaria maura* and *Caloplaca* sp. were present on exposed bedrock at the upper shower. *Pelvetia canaliculata* starts at 2.40 m, *Fucus spiralis* starts at 2.50 m and *Fucus vesiculosus* starts at 3.60 m. *Ascophyllum nodosum* starts at 6.60 m. *Arenicola* sp. occasional and *Mytilus edulis* rare. *Austrominius modestus* common on two large boulders/bedrock. *Littorina littorea* and *Patella* sp. were both rare.



T51 Upper Shore. Substrate: Cobbles and bedrock.
 JNCC Biotope Classification: LR.LLR.FVS.PelVS *Pelvetia canaliculata* on sheltered, variable salinity littoral fringe rock.

<i>Pelvetia canaliculata</i>	30%	Common
<i>Fucus spiralis</i>	<5%	Rare
<i>Ligia oceanica</i>	40 per m ²	Frequent
Talitrids	120 per m ²	Common
<i>Peringia ulvae</i>	4 per m ²	Occasional



T51 Mid shore. Substrate: Cobbles and mud
 No JNCC Biotope equivalent.

<i>Fucus spiralis</i>	25%	Common
<i>Fucus vesiculosus</i>	20%	Common
<i>Pelvetia canaliculata</i>	<5%	Rare
Talitrids	100 per m ²	Common



T51 Lower Shore. Substrate: Boulders, cobbles and mud.
 JNCC Biotope Classification: LR.LLR.FVS.FvesVS *Fucus vesiculosus* on mid eulittoral variable salinity boulders and stable mixed substrata.

<i>Fucus vesiculosus</i>	70%	Abundant
<i>Ascophyllum nodosum</i>	<5%	Rare
<i>Austrominius modestus</i>	10 - 20%	Frequent
<i>Littorina obtusata</i>	4 per m ²	Occasional
<i>Arenicola</i> sp.	8 per m ²	Occasional
Talitrids	120 per m ²	Common
<i>Littorina saxatilis</i>	4 per m ²	Occasional
<i>Littorina fabalis</i>	8 per m ²	Occasional

	T52 HW to LW Start Coordinate: 53.2226357, -9.005055892 End Coordinate: 53.22269174, -9.004788338 Total Distance: <i>ca.</i> 29 m Date: 30th August 17 Transect starts on saltmarsh no obvious high water mark visible. Saltmarsh from 0 – 3.70 m vegetation includes <i>Limonium</i> sp., <i>Salicornia europaea</i>, <i>Aster</i> sp. and <i>Spergularia</i> sp. After 3.70 m substrate changed to Exposed bedrock with mud between, redox was shallow. <i>Verrucaria maura</i> present on exposed bedrock at the upper shower. <i>Pelvetia canaliculata</i> starts at 3.70 m. <i>Fucus spiralis</i> starts at 3.90 m and <i>Fucus vesiculosus</i> starts at 5.80 m. <i>Carcinus maenas</i> and <i>Patella</i> sp. where rare. <i>Ascophyllum nodosum</i> starts at 15.40 m. After 16.30 m <i>Arenicola</i> sp. occasional. <i>Mytilus edulis</i> occasional at 17.10 m												
	T52 Upper Shore. Substrate: Bedrock. JNCC Biotope Classification: LR.LLR.FVS.PelVS <i>Pelvetia canaliculata</i> on sheltered, variable salinity littoral fringe rock. <table><tr><td><i>Pelvetia canaliculata</i></td><td>40%</td><td>Abundant</td></tr><tr><td><i>Fucus spiralis</i></td><td><10%</td><td>Occasional</td></tr><tr><td>Talitrids</td><td>120 per m²</td><td>Common</td></tr><tr><td><i>Verrucaria maura</i></td><td><5%</td><td>Rare</td></tr></table>	<i>Pelvetia canaliculata</i>	40%	Abundant	<i>Fucus spiralis</i>	<10%	Occasional	Talitrids	120 per m ²	Common	<i>Verrucaria maura</i>	<5%	Rare
<i>Pelvetia canaliculata</i>	40%	Abundant											
<i>Fucus spiralis</i>	<10%	Occasional											
Talitrids	120 per m ²	Common											
<i>Verrucaria maura</i>	<5%	Rare											
	T52 Mid shore. Substrate: Cobbles and mud. No JNCC Biotope equivalent. <table><tr><td><i>Fucus spiralis</i></td><td>40%</td><td>Abundant</td></tr><tr><td><i>Fucus vesiculosus</i></td><td><5%</td><td>Rare</td></tr><tr><td><i>Pelvetia canaliculata</i></td><td>15%</td><td>Frequent</td></tr></table>	<i>Fucus spiralis</i>	40%	Abundant	<i>Fucus vesiculosus</i>	<5%	Rare	<i>Pelvetia canaliculata</i>	15%	Frequent			
<i>Fucus spiralis</i>	40%	Abundant											
<i>Fucus vesiculosus</i>	<5%	Rare											
<i>Pelvetia canaliculata</i>	15%	Frequent											
	T52 Lower Shore. Substrate: Boulders and cobbles. No JNCC Biotope equivalent. <table><tr><td><i>Fucus vesiculosus</i></td><td><5%</td><td>Rare</td></tr><tr><td><i>Fucus spiralis</i></td><td><10%</td><td>Occasional</td></tr><tr><td><i>Littorina obtusata</i></td><td>4 per m²</td><td>Occasional</td></tr></table>	<i>Fucus vesiculosus</i>	<5%	Rare	<i>Fucus spiralis</i>	<10%	Occasional	<i>Littorina obtusata</i>	4 per m ²	Occasional			
<i>Fucus vesiculosus</i>	<5%	Rare											
<i>Fucus spiralis</i>	<10%	Occasional											
<i>Littorina obtusata</i>	4 per m ²	Occasional											



T53 HW to LW
 Start Coordinate: 53.22254399, -9.006176652
 End Coordinate: 53.22269435, -9.005979844
 Total Distance: ca. 27 m
 Date: 30th August 17

Transect starts on saltmarsh no obvious high water mark visible. Saltmarsh extends from 0 – 11.10 m, vegetation included *Artemisia* sp., *Plantago maritima*, *Glaux maritima*, *Aster* sp., *Salicornia europaea*, *Armeria maritima*, *Spergularia* sp. and *Suaeda maritima*. *Verrucaria maura*, *Caloplaca thallincola* and *Xanthoria parietina* was present on exposed bedrock. Substrate changes at 11.10 m to bedrock with mud over cobbles between, redox shallow. *Pelvetia canaliculata* starts at 11.20 m. *Fucus spiralis* starts at 11.60 m and *Fucus vesiculosus* starts at 13.80 m. *Littorina saxatilis* rare. *Pelvetia canaliculata* continues along transect but only higher up on boulders and exposed bedrock. *Ulva intestinalis* present at 18.90 m. *Patella* sp. and *Arenicola* sp. occasional.



T53 Upper Shore. Substrate: Bedrock, cobbles and mud
 JNCC Biotope Classification: LR.LLR.FVS.PelVS *Pelvetia canaliculata* on sheltered, variable salinity littoral fringe rock

<i>Pelvetia canaliculata</i>	10%	Occasional
<i>Fucus spiralis</i>	<5%	Rare
<i>Verrucaria maura</i>	<5%	Rare
<i>Caloplaca</i> sp.	<5%	Rare
<i>Xanthoria parietina</i>	<5%	Rare
<i>Ligia oceanica</i>	4 per m ²	Occasional



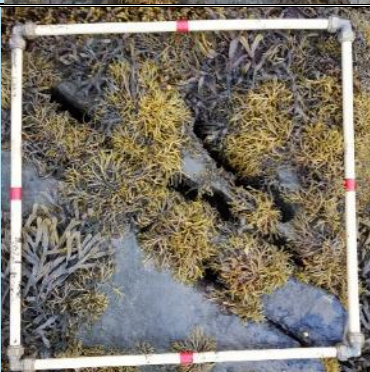
T53 Mid shore. Substrate: Bedrock, cobbles and mud.
 No JNCC Biotope equivalent.

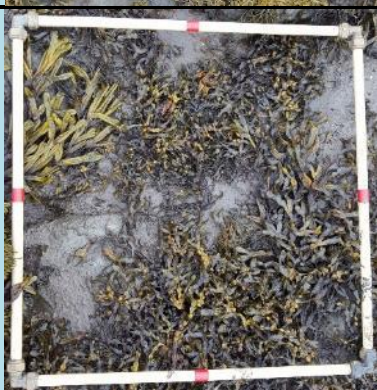
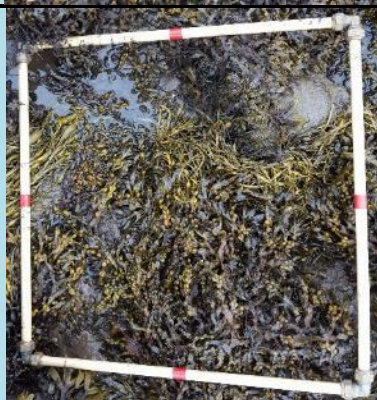
<i>Fucus spiralis</i>	30%	Common
<i>Fucus vesiculosus</i>	10%	Frequent
<i>Pelvetia canaliculata</i>	10%	Frequent
<i>Arenicola</i> sp.	2 per m ²	Occasional

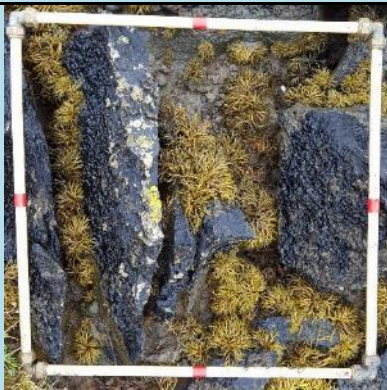


T53 Lower Shore. Substrate: Bedrock, cobbles and mud.
 No JNCC Biotope equivalent.

<i>Fucus vesiculosus</i>	30%	Common
<i>Fucus spiralis</i>	<5%	Rare
<i>Ascophyllum nodosum</i>	15%	Frequent
<i>Littorina obtusata</i>	8 per m ²	Occasional
<i>Littorina fabalis</i>	8 per m ²	Occasional
Spirorbids on <i>A. nodosum</i>	5-10%	Occasional

	T54 HW to LW Start Coordinate: 53.22335171, -9.006722774 End Coordinate: 53.22301418, -9.00660415 Total Distance: ca. 40 m Date: 29th August 17 T54 was characterised by a covering of <i>Pelvetia canaliculata</i> and <i>Fucus spiralis</i> towards the upper half of the shore, with <i>Fucus vesiculosus</i> present on the lower shore. The sediment was characterized by exposed limestone pavement which clints and grykes that had been filled in by muddy sand that had a shallow redox depth.												
	T54 Upper Shore. Substrate: Bedrock, boulders, cobbles and mud. JNCC Biotope Classification: LR.LLR.FVS.PelVS <i>Pelvetia canaliculata</i> on sheltered, variable salinity littoral fringe rock <table><tr><td><i>Pelvetia canaliculata</i></td><td>15%</td><td>Frequent</td></tr><tr><td><i>Verrucaria maura</i></td><td>10%</td><td>Frequent</td></tr></table>	<i>Pelvetia canaliculata</i>	15%	Frequent	<i>Verrucaria maura</i>	10%	Frequent						
<i>Pelvetia canaliculata</i>	15%	Frequent											
<i>Verrucaria maura</i>	10%	Frequent											
	T54 Mid shore. Substrate: Bedrock and mud. No JNCC Biotope equivalent. <table><tr><td><i>Pelvetia canaliculata</i></td><td>35%</td><td>Common</td></tr><tr><td><i>Fucus spiralis</i></td><td>20%</td><td>Common</td></tr><tr><td><i>Verrucaria maura</i></td><td><5%</td><td>Rare</td></tr><tr><td><i>Littorina saxatilis</i></td><td>1 per m²</td><td>Occasional</td></tr></table>	<i>Pelvetia canaliculata</i>	35%	Common	<i>Fucus spiralis</i>	20%	Common	<i>Verrucaria maura</i>	<5%	Rare	<i>Littorina saxatilis</i>	1 per m ²	Occasional
<i>Pelvetia canaliculata</i>	35%	Common											
<i>Fucus spiralis</i>	20%	Common											
<i>Verrucaria maura</i>	<5%	Rare											
<i>Littorina saxatilis</i>	1 per m ²	Occasional											
	T54 Lower Shore. Substrate: Bedrock, cobbles and mud. No JNCC Biotope equivalent. LR.LLR.FVS.FvesVS <i>Fucus vesiculosus</i> on mid eulittoral variable salinity boulders and stable mixed substrata. <table><tr><td><i>Fucus spiralis</i></td><td><5%</td><td>Rare</td></tr><tr><td><i>Fucus vesiculosus</i></td><td>60%</td><td>Abundant</td></tr><tr><td><i>Arenicola</i> sp.</td><td>1 per m²</td><td>Occasional</td></tr><tr><td><i>Littorina obtusata</i></td><td>1 per m²</td><td>Occasional</td></tr></table>	<i>Fucus spiralis</i>	<5%	Rare	<i>Fucus vesiculosus</i>	60%	Abundant	<i>Arenicola</i> sp.	1 per m ²	Occasional	<i>Littorina obtusata</i>	1 per m ²	Occasional
<i>Fucus spiralis</i>	<5%	Rare											
<i>Fucus vesiculosus</i>	60%	Abundant											
<i>Arenicola</i> sp.	1 per m ²	Occasional											
<i>Littorina obtusata</i>	1 per m ²	Occasional											

	T55 HW to LW Start Coordinate: 53.22332647, -9.005214402 End Coordinate: 53.22319762, -9.005111219 Total Distance: <i>ca.</i> 17 m Date: 29th August 17 T55 was characterised by exposed limestone pavement with clints and grykes filled in by mud. There was a lot of soft sediment with a shallow redox depth. <i>Pelvetia canaliculata</i> ends at 2.20m. <i>Fucus spiralis</i> began at 1.50m and ended at the 5.70m mark. <i>Fucus vesiculosus</i> started at 7.10m and continued sub tidally.																		
	T55 Upper Shore. Substrate: Bedrock, Cobbles and mud. No JNCC Biotope equivalent <table><tr><td><i>Pelvetia canaliculata</i></td><td>25%</td><td>Common</td></tr><tr><td><i>Fucus spiralis</i></td><td>20%</td><td>Common</td></tr><tr><td><i>Fucus vesiculosus</i></td><td><5%</td><td>Rare</td></tr></table>	<i>Pelvetia canaliculata</i>	25%	Common	<i>Fucus spiralis</i>	20%	Common	<i>Fucus vesiculosus</i>	<5%	Rare									
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<i>Fucus spiralis</i>	20%	Common																	
<i>Fucus vesiculosus</i>	<5%	Rare																	
	T55 Mid shore. Substrate: Bedrock and mud. No JNCC Biotope equivalent <table><tr><td><i>Fucus vesiculosus</i></td><td>50%</td><td>Abundant</td></tr><tr><td><i>Fucus spiralis</i></td><td>10%</td><td>Frequent</td></tr><tr><td>Talitrids</td><td>10 per m²</td><td>Frequent</td></tr></table>	<i>Fucus vesiculosus</i>	50%	Abundant	<i>Fucus spiralis</i>	10%	Frequent	Talitrids	10 per m ²	Frequent									
<i>Fucus vesiculosus</i>	50%	Abundant																	
<i>Fucus spiralis</i>	10%	Frequent																	
Talitrids	10 per m ²	Frequent																	
	T55 Lower Shore. Substrate: Bedrock and mud. No JNCC Biotope equivalent <table><tr><td><i>Pelvetia canaliculata</i></td><td><5%</td><td>Rare</td></tr><tr><td><i>Fucus spiralis</i></td><td><5%</td><td>Rare</td></tr><tr><td><i>Fucus vesiculosus</i></td><td>55%</td><td>Abundant</td></tr><tr><td><i>Ascophyllum nodosum</i></td><td>20%</td><td>Common</td></tr><tr><td><i>Littorina obtusata</i></td><td>1 per m²</td><td>Occasional</td></tr><tr><td>Talitrids</td><td>1 per m²</td><td>Occasional</td></tr></table>	<i>Pelvetia canaliculata</i>	<5%	Rare	<i>Fucus spiralis</i>	<5%	Rare	<i>Fucus vesiculosus</i>	55%	Abundant	<i>Ascophyllum nodosum</i>	20%	Common	<i>Littorina obtusata</i>	1 per m ²	Occasional	Talitrids	1 per m ²	Occasional
<i>Pelvetia canaliculata</i>	<5%	Rare																	
<i>Fucus spiralis</i>	<5%	Rare																	
<i>Fucus vesiculosus</i>	55%	Abundant																	
<i>Ascophyllum nodosum</i>	20%	Common																	
<i>Littorina obtusata</i>	1 per m ²	Occasional																	
Talitrids	1 per m ²	Occasional																	

	T56 HW to LW Start Coordinate: 53.22345796, -9.005755222 End Coordinate: 53.22364232, -9.0056541 Total Distance: ca. 23 m Date: 29th August 17 The upper shore was characterised by the presence of by common wormwood (<i>Artemisia absinthium</i>) Rotting algae marked the area where the tideline stopped with numerous amphipods present. The geology of the station was characterised by weathered limestone with the lichens <i>Caloplaca</i> sp. and <i>Xanthoria</i> sp. present. <i>Pelvetia canaliculata</i> was first recorded at 2.60m. <i>Fucus spiralis</i> was first recorded at 4.90m and <i>Fucus vesiculosus</i> at 6.80m. <i>Ascophyllum nodosum</i> starts at 7.20m. <i>Hymeniacion perlevis</i> present sub tidally and one Butterfish (<i>Pholis gunnellus</i>) was recorded.																					
	T56 Upper Shore. Substrate: Cobbles and boulders. JNCC Biotope Classification: LR.LLR.FVS.PelVS <i>Pelvetia canaliculata</i> on sheltered, variable salinity littoral fringe rock <table><tr><td><i>Pelvetia canaliculata</i></td><td>30%</td><td>Common</td></tr><tr><td><i>Caloplaca</i> sp.</td><td><5%</td><td>Rare</td></tr><tr><td><i>Verrucaria maura</i></td><td>40%</td><td>Abundant</td></tr><tr><td><i>Littorina saxatilis</i></td><td>1 per m²</td><td>Occasional</td></tr></table>	<i>Pelvetia canaliculata</i>	30%	Common	<i>Caloplaca</i> sp.	<5%	Rare	<i>Verrucaria maura</i>	40%	Abundant	<i>Littorina saxatilis</i>	1 per m ²	Occasional									
<i>Pelvetia canaliculata</i>	30%	Common																				
<i>Caloplaca</i> sp.	<5%	Rare																				
<i>Verrucaria maura</i>	40%	Abundant																				
<i>Littorina saxatilis</i>	1 per m ²	Occasional																				
	T56 Mid shore. Substrate: Boulders, cobbles and fine sand No JNCC Biotope equivalent. <table><tr><td><i>Pelvetia canaliculata</i></td><td>25%</td><td>Common</td></tr><tr><td><i>Fucus spiralis</i></td><td>25%</td><td>Common</td></tr><tr><td><i>Verrucaria maura</i></td><td>15%</td><td>Frequent</td></tr><tr><td><i>Ligia oceanica</i></td><td>1 per m²</td><td>Occasional</td></tr><tr><td><i>Littorina saxatilis</i></td><td>4 per m²</td><td>Occasional</td></tr><tr><td><i>Austrominius modestus</i></td><td><5%</td><td>Rare</td></tr><tr><td>Talitrids</td><td>4 per m²</td><td>Occasional</td></tr></table>	<i>Pelvetia canaliculata</i>	25%	Common	<i>Fucus spiralis</i>	25%	Common	<i>Verrucaria maura</i>	15%	Frequent	<i>Ligia oceanica</i>	1 per m ²	Occasional	<i>Littorina saxatilis</i>	4 per m ²	Occasional	<i>Austrominius modestus</i>	<5%	Rare	Talitrids	4 per m ²	Occasional
<i>Pelvetia canaliculata</i>	25%	Common																				
<i>Fucus spiralis</i>	25%	Common																				
<i>Verrucaria maura</i>	15%	Frequent																				
<i>Ligia oceanica</i>	1 per m ²	Occasional																				
<i>Littorina saxatilis</i>	4 per m ²	Occasional																				
<i>Austrominius modestus</i>	<5%	Rare																				
Talitrids	4 per m ²	Occasional																				
	T56 Lower Shore. Substrate: Boulders, cobbles JNCC Biotope Classification: LR.LLR.FVS.AscVS <i>Ascophyllum nodosum</i> and <i>Fucus vesiculosus</i> on variable salinity mid eulittoral rock <table><tr><td><i>Fucus vesiculosus</i></td><td>30%</td><td>frequent</td></tr><tr><td><i>Ascophyllum nodosum</i></td><td>75%</td><td>Occasional</td></tr><tr><td><i>Patella</i> sp.</td><td>1 per m²</td><td>Occasional</td></tr><tr><td><i>Littorina littorea</i></td><td>5 per m²</td><td>Occasional</td></tr><tr><td><i>Mytilus edulis</i></td><td><5 %</td><td>Rare</td></tr></table>	<i>Fucus vesiculosus</i>	30%	frequent	<i>Ascophyllum nodosum</i>	75%	Occasional	<i>Patella</i> sp.	1 per m ²	Occasional	<i>Littorina littorea</i>	5 per m ²	Occasional	<i>Mytilus edulis</i>	<5 %	Rare						
<i>Fucus vesiculosus</i>	30%	frequent																				
<i>Ascophyllum nodosum</i>	75%	Occasional																				
<i>Patella</i> sp.	1 per m ²	Occasional																				
<i>Littorina littorea</i>	5 per m ²	Occasional																				
<i>Mytilus edulis</i>	<5 %	Rare																				



T57 HW to LW
 Start Coordinate: 53.22388192, -9.007162238
 End Coordinate: 53.22393886, -9.007163574
 Total Distance: ca. 5 m
 Date: 29th August 17

Upper shore characterised by a large line of boulders adjacent to a stone wall running along the shore. Common wormwood (*Artemisia absinthium*) was abundant. The saltmarsh gave way to rock at the 1m mark with the lichen species *Caloplaca* sp. *Xanthoria* sp. and *Verrucaria maura* all present. Rotting algae was present at the high water mark with numerous amphipods also present once it was disturbed. *Pelvetia canaliculata* was first observed at 4.50m. *Fucus spiralis* was observed with attached epiphyte spirorbid worms at 5.60m. *Fucus vesiculosus* was observed at 5.70m, *Ascophyllum nodosum* was observed at 7.50m.



T57 Upper Shore. Substrate: Bedrock, boulders and cobbles.
 JNCC Biotope Classification: LR.LLR.FVS.PelVS *Pelvetia canaliculata* on sheltered, variable salinity littoral fringe rock

<i>Pelvetia canaliculata</i>	20%	Common
<i>Verrucaria maura</i>	50%	Abundant
<i>Ligia oceanica</i>	10 per m ²	Frequent
<i>Austrominius modestus</i>	<5%	Rare
Talitrids	7 per m ²	Occasional



T57 Mid shore. Substrate: Bedrock, boulders and cobbles.
 JNCC Biotope Classification: LR.LLR.FVS.FspiVS *Fucus spiralis* on sheltered variable salinity upper eulittoral rock

<i>Fucus spiralis</i>	95%	Superabundant
<i>Verrucaria maura</i>	<5%	Rare
<i>Littorina saxatilis</i>	4 per m ²	Occasional
<i>Austrominius modestus</i>	<5%	Rare



T57 Lower Shore. Substrate: Bedrock, boulders and cobbles.
 JNCC Biotope Classification: LR.LLR.FVS.AscVS *Ascophyllum nodosum* and *Fucus vesiculosus* on variable salinity mid eulittoral rock

<i>Ascophyllum nodosum</i>	60%	Abundant
<i>Fucus vesiculosus</i>	25%	Frequent
Encrusting red algae	<5%	Rare
<i>Ulva lactuca</i>	<5%	Rare
<i>Littorina fabalis</i>	3 per m ²	Occasional
<i>Austrominius modestus</i>	<5%	Rare



T58 HW to LW

Start Coordinate: 53.2237757, -9.008873151

End Coordinate: 53.22389408, -9.008717772

Total Distance: ca. 21 m

Date: 29th August 17

Shoreline characterized by the lichens *Caloplaca* sp. and *Verrucaria maura* covering the exposed rock. *Salicornia europaea* was present at the 1m mark in small tufts scattered throughout the saltmarsh area. *Pelvetia canaliculata* started at the 0.20m – 3.30m. *Fucus spiralis* started at 1.90m and *Fucus vesiculosus* starts at 3.90m. *Ascophyllum nodosum* was from 4.80-5.70m.



T58 Upper Shore. Substrate: Cobbles and boulders.

JNCC Biotope Classification: LR.LLR.FVS.PelVS *Pelvetia canaliculata* on sheltered, variable salinity littoral fringe rock

<i>Pelvetia canaliculata</i>	35%	Common
<i>Verrucaria maura</i>	20%	Frequent
<i>Austrominius modestus</i>	<5%	Rare
<i>Fucus spiralis</i>	<5%	Abundant



T58 Mid shore. Substrate: Boulders, cobbles and mud.

No JNCC Biotope equivalent.

<i>Pelvetia canaliculata</i>	<5%	Common
<i>Fucus spiralis</i>	20%	Frequent
<i>Ligia oceanica</i>	2 per m ²	Frequent
Amphipods (Talitridae)	12 per m ²	Common



T58 Lower Shore. Substrate: Boulders and cobbles.

JNCC Biotope Classification: LR.LLR.FVS.AscVS *Ascophyllum nodosum* and *Fucus vesiculosus* on variable salinity mid eulittoral rock

<i>Ascophyllum nodosum</i>	60%	Abundant
<i>Fucus vesiculosus</i>	40%	Abundant
<i>Ligia oceanica</i>	10 per m ²	Frequent
<i>Littorina littorea</i>	2 per m ²	Frequent
<i>Carcinus maenas</i>	1 per m ²	Occasional



T59 HW to LW
 Start Coordinate: 53.22668, -8.99684
 End Coordinate: 53.22732, -8.99788
 Total Distance: ca. 99 m
 Date: 05th December 2017
 High water marked by drift weed. Drift line from 0 -4m. Cobbles and coarse sand from 0 – 7m, Cobbles and boulders after 7m.

Fucus serratus attached to small rocks at 9m likely blown up shore. *Fucus spiralis* begins at 15.20m. *Fucus vesiculosus* begins at 21.70m. *Porphyra umbilicalis* at 25.80m.

Fucus serratus starts at 35.50m. *Osmundea pinnatifida* and *Chondrus crispus* at 37.50m. *Fucus vesiculosus* ends at 42.50m. Boulders change to sand and shell at 43.90m. Coarse sand and shell 50-73m. *Arenicola* sp. <1/m². 73m medium sand with no weed/sparse weed and *Arenicola* sp. 2-4 /m². *Fucus vesiculosus* on buried rock. 90.8m change from medium sand to sand shells and cobbles.



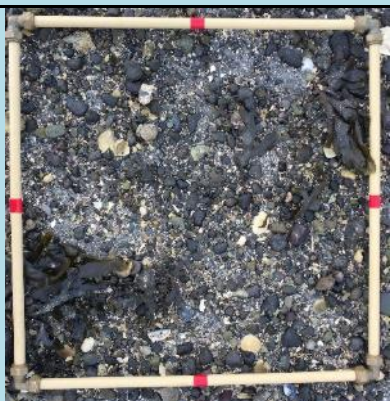
T59 Upper Shore. Substrate: Cobbles on coarse sand
 JNCC Biotope Classification: LR.LLR.F.Fspi.X *Fucus spiralis* on full salinity upper eulittoral mixed substrata.

<i>Fucus spiralis</i>	10-15%	Frequent
<i>Ulva lactuca</i>	<5%	Rare
Green algae on boulders	30%	Common
<i>Austrominius modestus</i>	<5%	Rare
Gammaridae	10 per m ²	Frequent
<i>Littorina saxatilis</i>	1 per m ²	Occasional
<i>Littorina fabalis</i>	1 per m ²	Occasional



T59 Mid shore. Substrate: Cobbles and boulders
 JNCC Biotope Classification: LR.LLR.F.Fves.X *Fucus vesiculosus* on mid eulittoral mixed substrata.

<i>Fucus vesiculosus</i>	90%	Superabundant
Spirorbidae	<10%	Occasional
<i>Patella</i> sp.	7 per m ²	Occasional
<i>Fucus serratus</i>	<5%	Rare
<i>Ostrea edulis</i>	1 per m ²	Common
<i>Austrominius modestus</i>	25%	Common
<i>Littorina saxatilis</i>	1 per m ²	Occasional
<i>Littorina obtusata</i>	1 per m ²	Occasional
<i>Littorina littorea</i>	7 per m ²	Occasional
<i>Gibbula umbilicalis</i>	1 per m ²	Occasional



T59 Lower Shore. Substrate: Coarse sand
 No JNCC Biotope equivalent.

<i>Fucus spiralis</i>	<5%	Rare
<i>Fucus serratus</i>	<5%	Rare
<i>Littorina obtusata</i>	1 per m ²	Occasional
<i>Littorina littorea</i>	6 per m ²	Occasional
Maerl live	<5%	Rare
<i>Hildenbrandia rubra</i>	<5%	Rare



T60 HW to LW
 Start Coordinate: 53.22737, -8.99608
 End Coordinate: 53.22806, -8.99787
 Total Distance: ca.143 m
 Date: 05th December 2017
 High water marked by drift weed. Drift line from 0 -4m. Cobbles and coarse sand from 0 – 6.80m, Cobbles and boulders after 6.80m.

Fucus spiralis begins at 24.8m. *Ascophyllum nodosum* attached to small rocks at 18.90m likely blown up shore. Green algae present on boulders. *Austrominius modestus* starts at 23.20m.

Fucus vesiculosus begins at 25.60m. *Fucus spiralis* ends at 29.70m.

Fucus serratus starts at 34.90m. Cobbles/boulders change to coarse sand and finer cobbles. 46.10 end of *Fucus vesiculosus*. 48m *Pholis gunnellus* (5cm aprox). *Ostrea edulis*, *Chlamys* sp. and scale worm at 51m. *Chondrus crispus* and *Osmundea pinnatifida* at 48m. 50m encrusting red algae common. *Arenicola* sp. 4 /m². 55m *Corallina officinalis*. *Saccharina latissima* 60.10m. *Polydora rotunda* at 70.80m. *Ascidella aspersa* at 87.80. 104.40m *Ostrea edulis*. Breadcrumb sponge at 128.10m. *Nucella* sp. egg mass and *Archidoris pseudoargus* at 138.30m. Trestles rubble at 140.3. *Fucus serratus* ends at 141.10m.



T60 Upper Shore. Substrate: Cobbles on coarse sand.
 JNCC Biotope Classification: LR.LLR.F.Fspi.X *Fucus spiralis* on full salinity upper eulittoral mixed substrata.

<i>Fucus spiralis</i>	40%	Abundant
<i>Austrominius modestus</i>	5-10%	Occasional
Gammaridae	20-30 per m ²	Frequent
<i>Littorina saxatilis</i>	2 per m ²	Occasional
<i>Littorina littorea</i>	6 per m ²	Occasional
<i>Porphyra umbilicalis</i>	<5%	Rare



T60 Mid shore. Substrate: Cobbles
 JNCC Biotope Classification: LR.LLR.F.Fves.X *Fucus vesiculosus* on mid eulittoral mixed substrata.

<i>Fucus vesiculosus</i>	90%	Superabundant
Spirorbidae	10-20%	Frequent
<i>Patella</i> sp.	7 per m ²	Occasional
<i>Austrominius modestus</i>	10-20%	Frequent
<i>Balanus crenatus</i>	<5%	Rare
<i>Littorina obtusata</i>	1 per m ²	Occasional
<i>Gibbula umbilicalis</i>	2 per m ²	Occasional
Anomiidae	4 per m ²	Occasional



T60 Lower Shore. Substrate: Medium sand
 No JNCC Biotope equivalent.

<i>Hildenbrandia rubra</i>	<5%	Rare
<i>Ostrea edulis</i>	1 per m ²	Common
Paguridae	3 per m ²	Occasional
Encrusting red	<5%	Rare
<i>Polysiphonia elongata</i>	<5%	Rare



T61 HW to LW
 Start Coordinate: 53.22797, -8.99511
 End Coordinate: 53.22859, -8.99542
 Total Distance: ca. 72m
 Date: 05th December 2017
 High water marked by drift weed with *Talitrids*. Stones on gravel and coarse sand 0-20m. *Fucus spiralis* from 24.10 – 31.90m.

Fucus vesiculosus from 31.10 – 41.40m.

 Substrate changes to muddy sand after 70m. *Maja squinado* and *Chlamys opercularis* present.

 Oyster trestles present on lower shore with attached fauna and flora – Tunicates, *Ostrea edulis*, *Halichondria* sp., *Fucus vesiculosus* and *Osmundea pinnatifida*.



T61 Upper Shore. Substrate: Cobbles and boulders
 JNCC Biotope Classification: LR.LLR.F.Fspi.X *Fucus spiralis* on full salinity upper eulittoral mixed substrata.

<i>Fucus spiralis</i>	40-80%	Abundant
Filamentous green algae	30%	Common
<i>Austrominius modestus</i>	20%	Common
Gammaridae	10 per m ²	Frequent
<i>Littorina obtusata</i>	1 per m ²	Occasional



T61 Mid shore. Substrate: Cobbles and boulders
 No JNCC Biotope equivalent.

<i>Fucus vesiculosus</i>	70%	Occasional
<i>Fucus serratus</i>	10-20%	Frequent
Spirorbidae	<10%	Occasional
<i>Littorina littorea</i>	1 per m ²	Occasional
<i>Gibbula umbilicalis</i>	1 per m ²	Occasional
Red encrusting algae	<5%	Rare



T61 Lower Shore. Substrate: Muddy sand
 No JNCC Biotope equivalent.

<i>Osmundea pinnatifida</i>	<5%	Rare
<i>Arenicola</i> sp.	4 per m ²	Occasional
<i>Ostrea edulis</i>	1 per m ²	Common
<i>Chlamys opercularis</i>	1 per m ²	Common
<i>Austrominius modestus</i>	<5%	Rare
<i>Pagurus bernhardus</i>	1 per m ²	Occasional

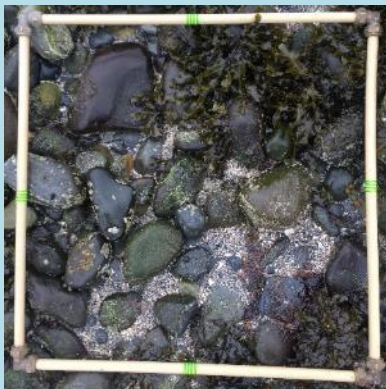
	T62 HW to LW Start Coordinate: 53.22810, -8.99356 End Coordinate: 53.22883, -8.99366 Total Distance: ca.82 m Date: 05th December 2017 High water marked by drift weed with Talitrids. Stones on gravel. 13.80m <i>Fucus spiralis</i>, Gammarids, <i>Austrominius modestus</i>, <i>Melaraphe neritoides</i>. 25m Stones on gravel and sand. <i>Ascophyllum nodosum</i>, <i>Fucus vesiculosus</i>, <i>Fucus serratus</i>. Substrate changes to sandy mudd after 67m. Fauna present on lower shore - <i>Chlamys opercularis</i>, Tunicates, <i>Ostrea edulis</i>, <i>Halichondria</i> sp., <i>Buccinum undatum</i>, <i>Arenicola</i> sp., <i>Mytilus edulis</i>, <i>Didemnum</i> on mussels, <i>Tapes</i> sp. and <i>Ammodytes tobianus</i>.																					
	T62 Upper Shore. Substrate: Cobbles on coarse sand No JNCC Biotope equivalent. <table><tr><td><i>Fucus vesiculosus</i></td><td>20-40%</td><td>Common</td></tr><tr><td><i>Melaraphe neritoides</i></td><td>1 per m²</td><td>Occasional</td></tr><tr><td><i>Austrominius modestus</i></td><td>20%</td><td>Common</td></tr><tr><td>Gammaridae</td><td>5 per m²</td><td>Occasional</td></tr><tr><td>Filamentous green algae</td><td>5-10%</td><td>Occasional</td></tr></table>	<i>Fucus vesiculosus</i>	20-40%	Common	<i>Melaraphe neritoides</i>	1 per m ²	Occasional	<i>Austrominius modestus</i>	20%	Common	Gammaridae	5 per m ²	Occasional	Filamentous green algae	5-10%	Occasional						
<i>Fucus vesiculosus</i>	20-40%	Common																				
<i>Melaraphe neritoides</i>	1 per m ²	Occasional																				
<i>Austrominius modestus</i>	20%	Common																				
Gammaridae	5 per m ²	Occasional																				
Filamentous green algae	5-10%	Occasional																				
	T62 Mid shore. Substrate: Cobbles on coarse sand No JNCC Biotope equivalent. <table><tr><td><i>Fucus vesiculosus</i></td><td>5-10%</td><td>Occasional</td></tr><tr><td><i>Fucus serratus</i></td><td>5-10%</td><td>Occasional</td></tr><tr><td>Spirorbidae</td><td>5-10%</td><td>Occasional</td></tr><tr><td><i>Ascophyllum nodosum</i></td><td>5-10%</td><td>Occasional</td></tr><tr><td><i>Polysiphonia lanosa</i></td><td><5%</td><td>Rare</td></tr><tr><td><i>Austrominius modestus</i></td><td><5%</td><td>Rare</td></tr><tr><td><i>Patella vulgata</i></td><td><1 per m²</td><td>Rare</td></tr></table>	<i>Fucus vesiculosus</i>	5-10%	Occasional	<i>Fucus serratus</i>	5-10%	Occasional	Spirorbidae	5-10%	Occasional	<i>Ascophyllum nodosum</i>	5-10%	Occasional	<i>Polysiphonia lanosa</i>	<5%	Rare	<i>Austrominius modestus</i>	<5%	Rare	<i>Patella vulgata</i>	<1 per m ²	Rare
<i>Fucus vesiculosus</i>	5-10%	Occasional																				
<i>Fucus serratus</i>	5-10%	Occasional																				
Spirorbidae	5-10%	Occasional																				
<i>Ascophyllum nodosum</i>	5-10%	Occasional																				
<i>Polysiphonia lanosa</i>	<5%	Rare																				
<i>Austrominius modestus</i>	<5%	Rare																				
<i>Patella vulgata</i>	<1 per m ²	Rare																				
	T62 Lower Shore. Substrate: Muddy sand No JNCC Biotope equivalent. <table><tr><td><i>Arenicola</i> sp.</td><td>4 per m²</td><td>Occasional</td></tr></table>	<i>Arenicola</i> sp.	4 per m ²	Occasional																		
<i>Arenicola</i> sp.	4 per m ²	Occasional																				



T63 HW to LW
 Start Coordinate: 53.22811, -8.99203
 End Coordinate: 53.22859, -8.99213
 Total Distance: ca.54 m
 Date: 06th December 2017
 High water marked by drift weed. Drift line 0m. Talitrids present in drift weed. 0-3.60m coarse sand. Cobbles cobble zone begins at 3.60m. *Fucus spiralis* at 11.70m.

Fucus vesiculosus begins at 17.60m. *Fucus spiralis* ends at 20.60m.
Ascophyllum nodosum begins at 22.90m. *Polysiphonia lanosa* attached to *A. nodosum*.

Fucus serratus starts at 25.30m. *Chondrus crispus* at 28.50m.
Chondracanthus acicularis at 28.30m. Boulders and cobbles change to medium sand at 31.40m. *A. nodosum* ends at 32m.



T63 Upper Shore. Substrate: Cobbles on coarse sand
 JNCC Biotope Classification: LR.LLR.F.Fspi.X *Fucus spiralis* on full salinity upper eulittoral mixed substrata.

<i>Fucus spiralis</i>	15%	Frequent
<i>Ulva clathrata</i>	10%	Frequent
<i>Porphyra umbilicalis</i>	<5%	Rare
<i>Austrominius modestus</i>	15-20%	Frequent
<i>Semibalanus</i> sp.	<5%	Rare
Gammaridae	2 per m ²	Occasional
<i>Littorina littorea</i>	15 per m ²	Frequent
<i>Littorina fabalis</i>	3 per m ²	Occasional



T63 Mid shore. Substrate: Cobbles on coarse sand
 JNCC Biotope Classification: LR.LLR.F.Fves.X *Fucus vesiculosus* on mid eulittoral mixed substrata.

<i>Fucus vesiculosus</i>	90%	Superabundant
Spirorbidae	<5%	Rare
<i>Patella</i> sp.	3 per m ²	Occasional
<i>Ascophyllum nodosum</i>	<5%	Rare
<i>Littorina obtusata</i>	5 per m ²	Occasional
<i>Littorina fabalis</i>	2 per m ²	Occasional
<i>Nucella lapillus</i>	1 per m ²	Occasional
Encrusting red algae	<5%	Rare
<i>Amathia imbricata</i>	<5%	Rare



T63 Lower Shore. Substrate: Muddy sand
 No JNCC Biotope equivalent.

<i>Arenicola marina</i>	3 per m ²	Occasional
<i>Ostrea edulis</i>	1 per m ²	Common
<i>Littorina littorea</i>	6 per m ²	Occasional



T64 HW to LW
 Start Coordinate: 53.22826, -8.99064
 End Coordinate: 53.22891, -8.99089
 Total Distance: ca. 74 m
 Date: 06th December 2017
 Strand line at 0m, Talitrids present. Medium sand from 0 – 5.30m. Coarse sand and shell from 5.30 – 8m, Cobbles and sparse boulders after 8m.

Pelvetia canaliculata begins at 13.10m. *Fucus spiralis* begins at 14m.

Pelvetia canaliculata ends at 16.20. *Fucus vesiculosus* begins at 18.50m. *Ascophyllum nodosum* begins at 18.70m. *Fucus spiralis* ends at 24.70m. *Fucus serratus* starts at 23m.

Boulder at 27.60m with 90% semibalanus balanoides. 41.80m *Osmundea pinnatifida*, *Chondracathus acicularis*, *Chondrus crispus*. 42m *Cladophora rupestris*. *A. nodosum* ends at 42.70m. *F. vesiculosus* ends at 44m. 24.20m end of cobbles. 24.20-33.10m coarse sand and boulders. 33.10m onwards medium sand. *Arenicola* sp. 10-12 per m² on lower shore.



T64 Upper Shore. Substrate: Cobbles and boulders
 JNCC Biotope Classification: LR.LLR.F.Fspi.X *Fucus spiralis* on full salinity upper eulittoral mixed substrata.

<i>Pelvetia canaliculata</i>	10%	Frequent
<i>Fucus spiralis</i>	10-15%	Frequent
<i>Austrominius modestus</i>	<5%	Rare
<i>Semibalanus balanoides</i>	<5%	Rare
Gammaridae	50 per m ²	Frequent
<i>Littorina obtusata</i>	1 per m ²	Occasional
<i>Patella vulgata</i>	1 per m ²	Occasional
<i>Verrucaria maura</i>	<5%	Rare



T64 Mid shore. Substrate: Cobbles and boulders
 JNCC Biotope Classification: LR.LLR.F.Fves.X *Fucus vesiculosus* on mid eulittoral mixed substrata.

<i>Fucus vesiculosus</i>	90-100%	Superabundant
<i>Austrominius modestus</i>	<5%	Rare
<i>Fucus spiralis</i>	<5%	Rare
<i>Littorina obtusata</i>	9 per m ²	Occasional
Gammarids	10-20 per m ²	Frequent



T64 Lower Shore. Substrate: Muddy sand
 No JNCC Biotope equivalent.

<i>Arenicola</i> sp.	2 per m ² Occasional
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T65 HW to LW

Start Coordinate: 53.22845, -8.98903

End Coordinate: 53.22905, -8.98907

Total Distance: ca.67 m

Date: 07th December 2017

High water marked by drift weed. Drift line 0-4m. Talitrids present in drift weed. 0-9.90m medium sand. Cobbles cobble zone begins at 9.90m. *Fucus vesiculosus* at 9.70m attached to a small rock blown upshore. *Pelvetia canaliculata* at 14.10m. *Fucus spiralis* at 16.50m. *Ascophyllum nodosum* at 16.80m attached to small rock blown upshore.

Fucus vesiculosus begins at 20.60m. *Fucus spiralis* ends at 24m. *Fucus serratus* attached to rock at 22.60m probably blown up shore. *Fucus serratus* band starts at 29.70m. Patella sp. on exposed rock at 33m. Cobbles end at 29.70 and medium sand starts. *Littorina obtusata* at 34m.

59.20-60.80m *Magallana gigas* mixture of empty and living knocked from nearby oyster trestles. 69m *Archidoris pseudoargus* present on sand. Didemnum growing on trestles.



T65 Upper Shore. Substrate: Cobbles on coarse sand

JNCC Biotope Classification: LR.LLR.F.Fspi.X *Fucus spiralis* on full salinity upper eulittoral mixed substrata.

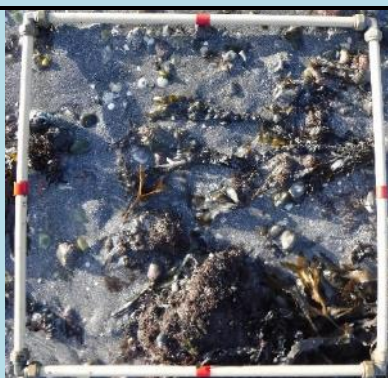
<i>Fucus spiralis</i>	40%	Abundant
<i>Porphyra umbilicalis</i>	<5%	Rare
<i>Austrominius modestus</i>	<10%	Occasional
<i>Littorina saxatilis</i>	2 per m ²	Occasional
<i>Littorina obtusata</i>	1 per m ²	Occasional



T65 Mid shore. Substrate: Cobbles on coarse sand

JNCC Biotope Classification: LR.LLR.F.Fves.X *Fucus vesiculosus* on mid eulittoral mixed substrata.

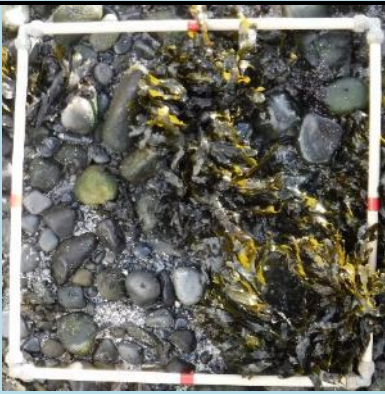
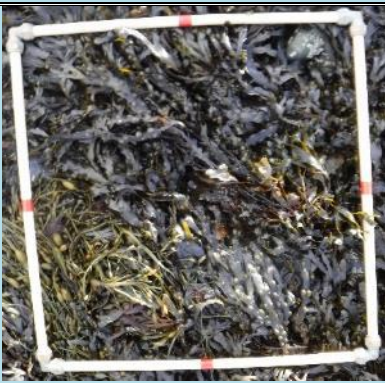
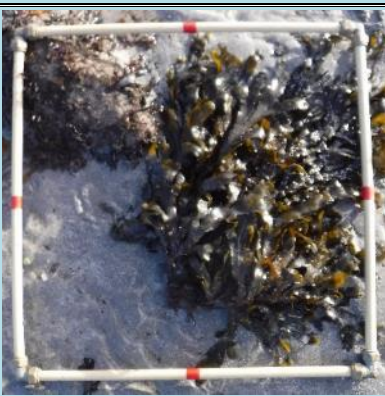
<i>Fucus vesiculosus</i>	80%	Superabundant
<i>Fucus serratus</i>	<5%	Rare
<i>Fucus spiralis</i>	<5%	Rare
Spirorbidae	<5%	Rare
<i>Patella</i> sp.	1 per m ²	Occasional
<i>Ascophyllum nodosum</i>	15%	Frequent
<i>Littorina saxatilis</i>	1 per m ²	Occasional
<i>Carcinus maenas</i>	1 per m ²	Occasional
<i>Polysiphonia lanosa</i>	<5%	Rare
<i>Austrominius modestus</i>	10%	Frequent
<i>Balanus crenatus</i>	<5%	Rare
Gammarids	5 per m ²	Occasional



T65 Lower Shore. Substrate: Boulders on medium sand

No JNCC Biotope equivalent.

<i>Fucus serratus</i>	45%	Abundant
<i>Chondrus crispus</i>	<5%	Rare
Spirorbidae	<5%	Rare
Paguridae	1 per m ²	Occasional

	T66 HW to LW Start Coordinate: 53.22852, -8.98758 End Coordinate: 53.22902, -8.98772 Total Distance: ca.57 m Date: 07th December 2017 High water marked by drift weed at 0m, Talitrids present. Drift line from 0-4m. Coarse sand from 0 -11.10m changing to cobbles. <i>Fucus vesiculosus</i> attached to rock at 13.50 blown up shore. <i>Fucus spiralis</i> begins at 15.30m. <i>Cladophora sp.</i> on rocks from 20.20 – 25m. <i>Fucus vesiculosus</i> begins at 23.20m. <i>Chondrus crispus</i> at 26.40. Substrate changes from cobbles to coarse sand at 26.40. <i>Fucus serratus</i> starts at 26.40m. Encrusting red algae on sparse rocks and pebbles 28.10m. <i>Chondracanthus acicularis</i> at 28.80m. <i>Osmundea pinnatifida</i> at 39.70m. 39m substrate cobbles and medium sand. <i>Dumontia contorta</i> at 40m. 41m substrate boulders and medium sand. 50m breadcrumb sponge occasional. <i>Cerastoderma edule</i> present at 50m. Didemnum present on exposed rock at 60m.																					
	T66 Upper Shore. Substrate: Cobbles on coarse sand JNCC Biotope Classification: LR.LLR.F.Fspi.X <i>Fucus spiralis</i> on full salinity upper eulittoral mixed substrata. <table><tr><td><i>Fucus spiralis</i></td><td>30%</td><td>Common</td></tr><tr><td><i>Austrominius modestus</i></td><td><10%</td><td>Occasional</td></tr><tr><td><i>Porphyra umbilicalis</i></td><td><5%</td><td>Rare</td></tr></table>	<i>Fucus spiralis</i>	30%	Common	<i>Austrominius modestus</i>	<10%	Occasional	<i>Porphyra umbilicalis</i>	<5%	Rare												
<i>Fucus spiralis</i>	30%	Common																				
<i>Austrominius modestus</i>	<10%	Occasional																				
<i>Porphyra umbilicalis</i>	<5%	Rare																				
	T66 Mid shore. Substrate: Cobbles and boulders JNCC Biotope Classification: LR.LLR.F.Fves.X <i>Fucus vesiculosus</i> on mid eulittoral mixed substrata. <table><tr><td><i>Fucus vesiculosus</i></td><td>80%</td><td>Superabundant</td></tr><tr><td><i>Spirorbidae</i></td><td><5%</td><td>Rare</td></tr><tr><td><i>Austrominius modestus</i></td><td><5%</td><td>Rare</td></tr></table>	<i>Fucus vesiculosus</i>	80%	Superabundant	<i>Spirorbidae</i>	<5%	Rare	<i>Austrominius modestus</i>	<5%	Rare												
<i>Fucus vesiculosus</i>	80%	Superabundant																				
<i>Spirorbidae</i>	<5%	Rare																				
<i>Austrominius modestus</i>	<5%	Rare																				
	T66 Lower Shore. Substrate: Boulders on medium sand No JNCC Biotope equivalent. <table><tr><td><i>Fucus vesiculosus</i></td><td><5%</td><td>Rare</td></tr><tr><td><i>Fucus serratus</i></td><td>30%</td><td>Common</td></tr><tr><td><i>Spirorbidae</i></td><td><5%</td><td>Rare</td></tr><tr><td><i>Littorina saxatilis</i></td><td>1 per m²</td><td>Occasional</td></tr><tr><td><i>Littorina littorea</i></td><td>3 per m²</td><td>Occasional</td></tr><tr><td><i>Chondrus crispus</i></td><td><5%</td><td>Rare</td></tr><tr><td>Encrusting red algae</td><td><5%</td><td>Rare</td></tr></table>	<i>Fucus vesiculosus</i>	<5%	Rare	<i>Fucus serratus</i>	30%	Common	<i>Spirorbidae</i>	<5%	Rare	<i>Littorina saxatilis</i>	1 per m ²	Occasional	<i>Littorina littorea</i>	3 per m ²	Occasional	<i>Chondrus crispus</i>	<5%	Rare	Encrusting red algae	<5%	Rare
<i>Fucus vesiculosus</i>	<5%	Rare																				
<i>Fucus serratus</i>	30%	Common																				
<i>Spirorbidae</i>	<5%	Rare																				
<i>Littorina saxatilis</i>	1 per m ²	Occasional																				
<i>Littorina littorea</i>	3 per m ²	Occasional																				
<i>Chondrus crispus</i>	<5%	Rare																				
Encrusting red algae	<5%	Rare																				

Appendix 8-2

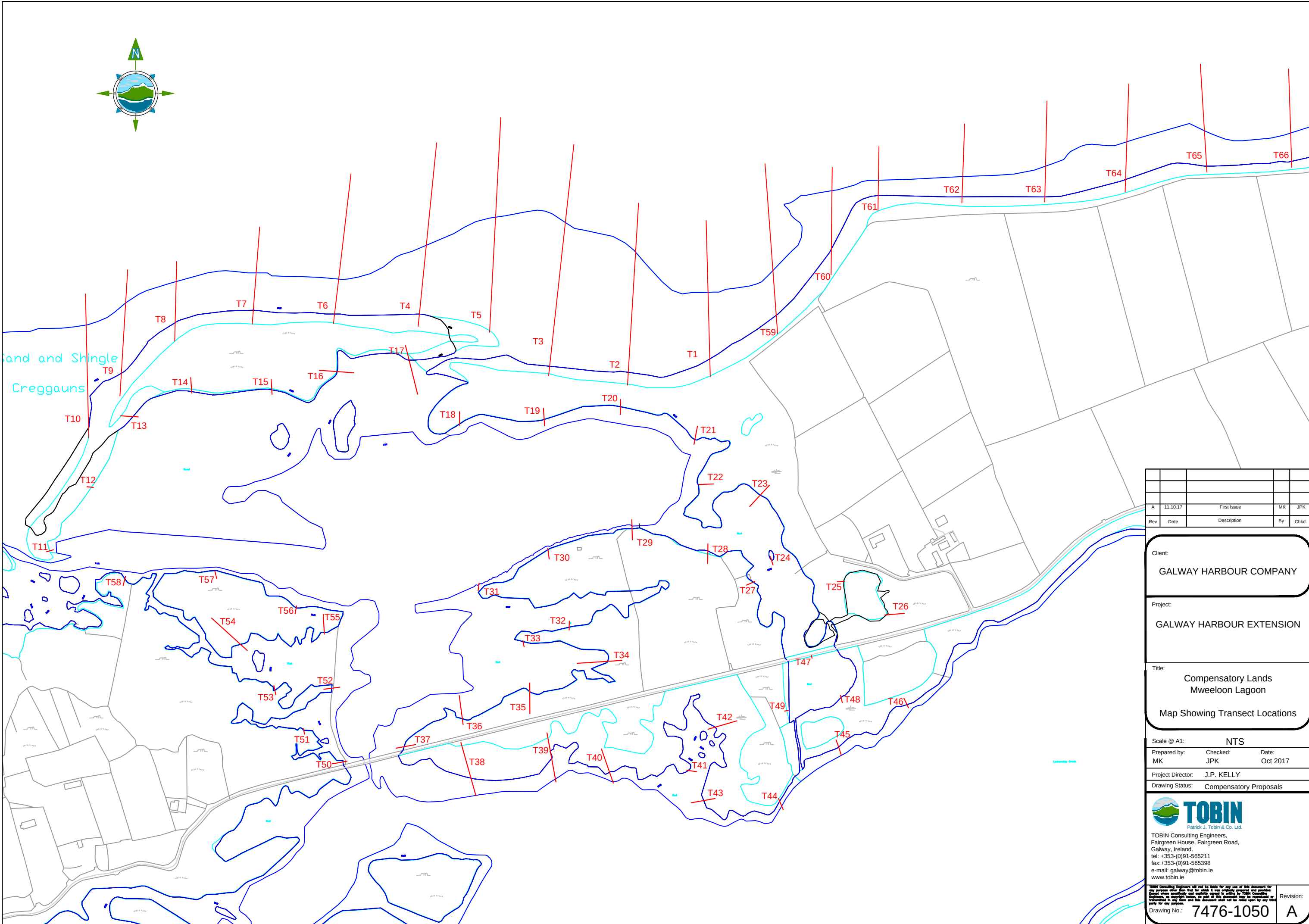
Grain Size Methodology

Granulometry

1. Approximately 25g of dried sediment is weighed out and placed in a labelled 1L glass beaker to which 100 ml of a 6 percent hydrogen peroxide solution was then added. This was allowed to stand overnight in a fume hood.
2. The beaker is placed on a hot plate and heated gently. Small quantities of hydrogen peroxide are added to the beaker until there is no further reaction. This peroxide treatment removes any organic material from the sediment which can interfere with grain size determination.
3. The beaker is then emptied of sediment and rinsed into a 63 μ m sieve. This is then washed with distilled water to remove any residual hydrogen peroxide. The sample retained on the sieve is then carefully washed back into the glass beaker up to a volume of approximately 250ml of distilled water.
4. 10ml of sodium hexametaphosphate solution is added to the beaker and this solution is stirred for ten minutes and then allowed to stand overnight. This treatment helps to dissociate the clay particles from one another.
5. The beaker with the sediment and sodium hexametaphosphate solution is washed and rinsed into a 63 μ m sieve. The retained sample is carefully washed from the sieve into a labelled aluminium tray and placed in an oven for drying at 100°C for 24 hours.
6. When dry this sediment is sieved through a series of graduated sieves ranging from 4 mm down to 63 μ m for 10 minutes using an automated column shaker. The fraction of sediment retained in each of the different sized sieves is weighed and recorded.
7. The silt/clay fraction is determined by subtracting all weighed fractions from the initial starting weight of sediment as the less than 63 μ m fraction was lost during the various washing stages.

Appendix 8-3

Shore Profiles



A	11.10.17	First Issue	MK	JPK	
Rev	Date	Description	By	Chkd.	

Client:
GALWAY HARBOUR COMPANY

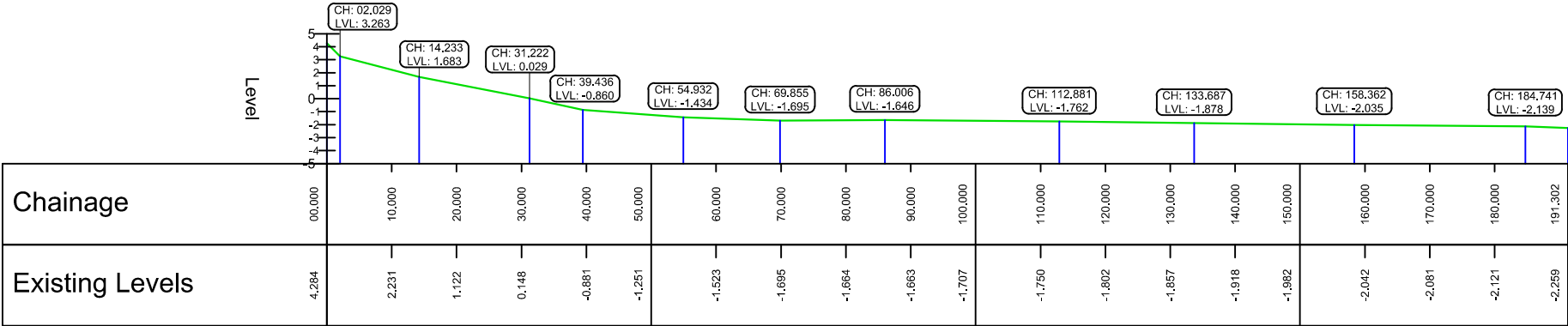
Project:
GALWAY HARBOUR EXTENSION

Title:
Compensatory Lands
Mweeloon Lagoon
Map Showing Transect Locations

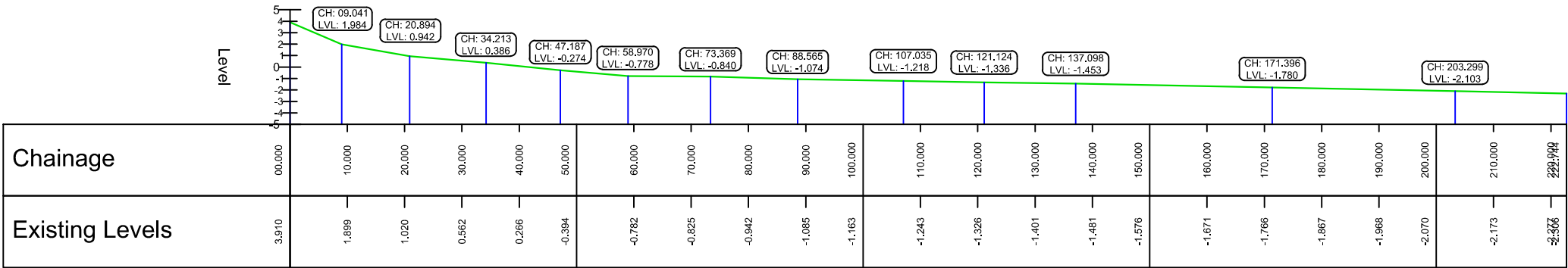
Scale @ A1:	NTS	
Prepared by: MK	Checked: JPK	Date: Oct 2017
Project Director:	J.P. KELLY	
Drawing Status:	Compensatory Proposals	

**TOBIN**
Patrick J. Tobin & Co. Ltd.

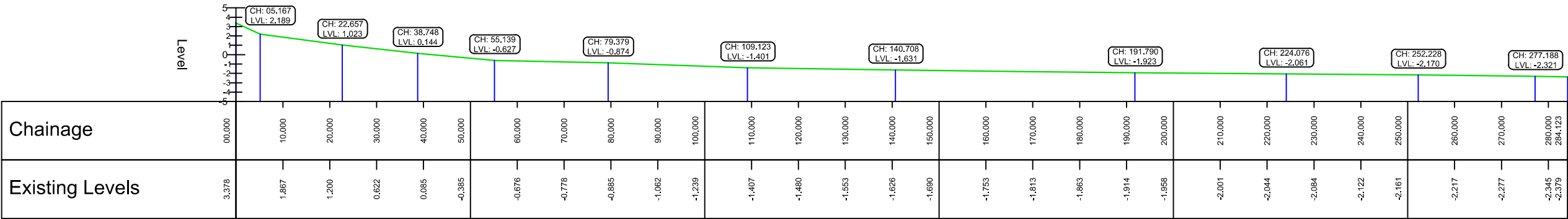
TOBIN Consulting Engineers,
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tel: +353-(0)91-565211
fax: +353-(0)91-565398
e-mail: galway@tobin.ie
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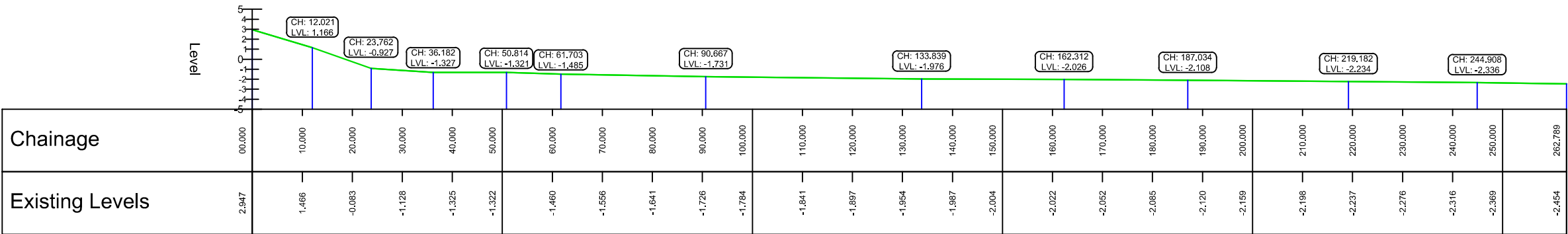
Transect 1



Transect 2



Transect 3



Transect 4

Scale @A3:
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Vertical 1:500

A	02/10/17	First Issue	MK	JPK
Rev	Date	Description	By	Chkd.

Client:
GALWAY HARBOUR COMPANY

Project:
GALWAY HARBOUR EXTENSION
COMPENSATORY MEASURES

Title:
Transect Profiles
Sheet 1 of 15

Scale @ A1: As Shown

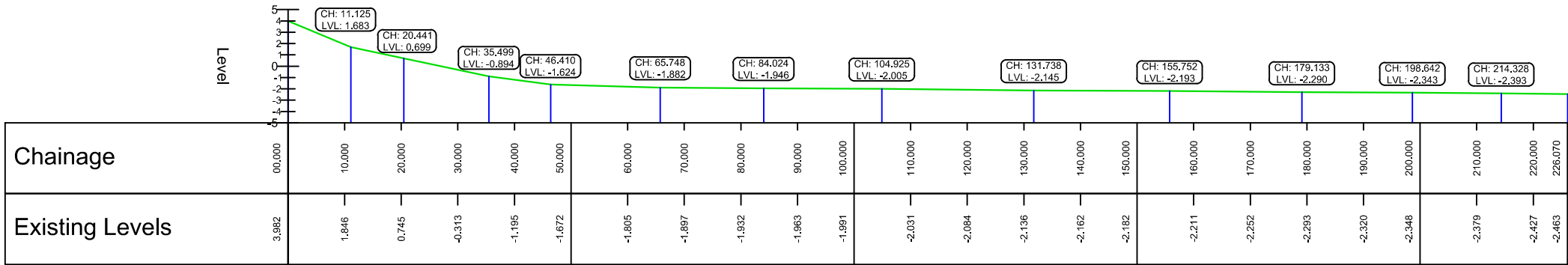
Prepared by: MK
Checked: JPK
Date: Oct 17

Project Director: J.P. KELLY

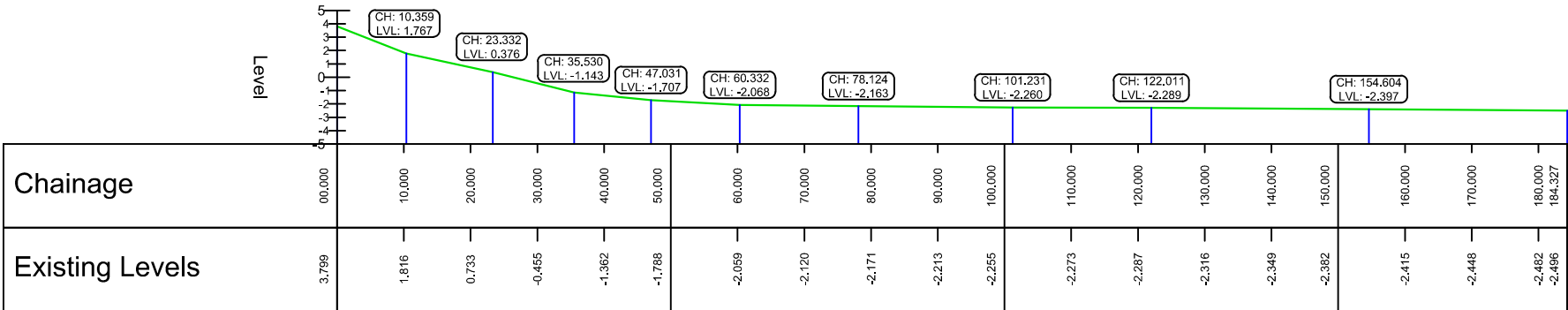
Drawing Status: COMPENSATORY MEASURES


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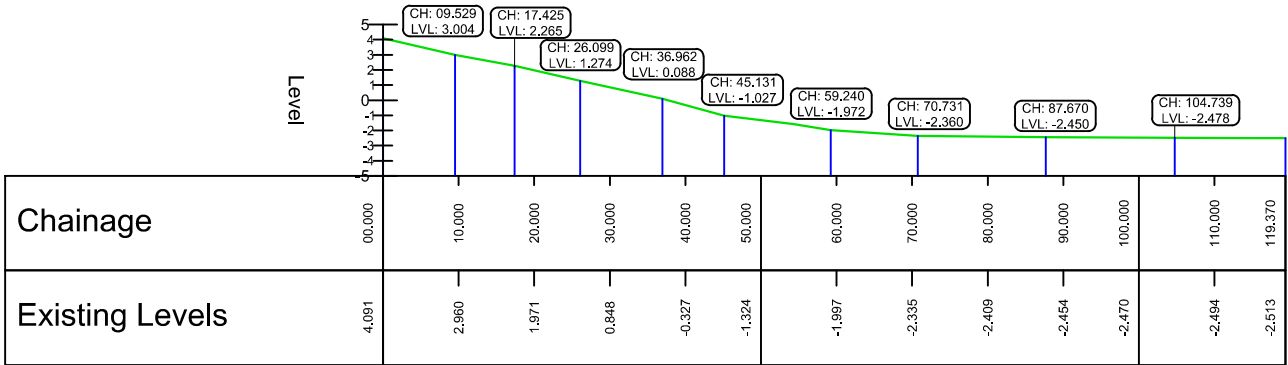
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Revision: A



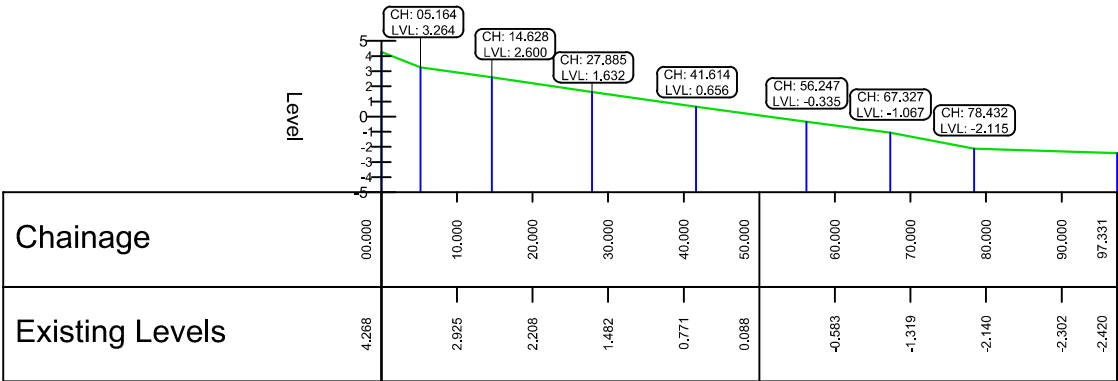
Transect 5



Transect 6



Transect 7



Transect 8

Scale @A3:
Horizontal 1:1000
Vertical 1:500

A	02/10/17	First Issue	MK	JPK
Rev	Date	Description	By	Chkd.

Client:
GALWAY HARBOUR COMPANY

Project:
GALWAY HARBOUR EXTENSION
COMPENSATORY MEASURES

Title:
Transect Profiles
Sheet 2 of 15

Scale @ A1: As Shown

Prepared by: MK
Checked: JPK
Date: Oct 17

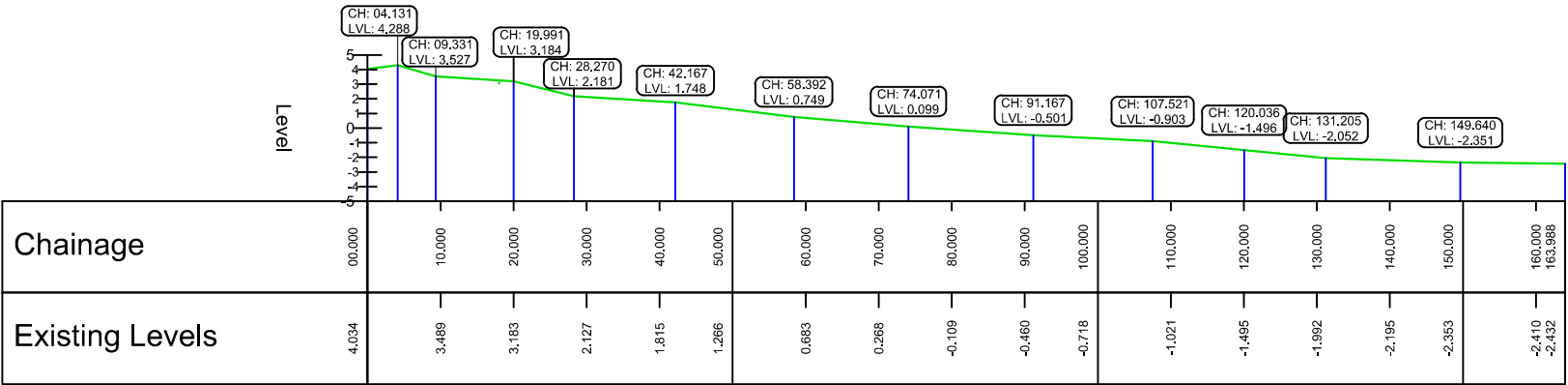
Project Director: J.P. KELLY

Drawing Status: COMPENSATORY MEASURES


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Drawing No.: 7476-1036

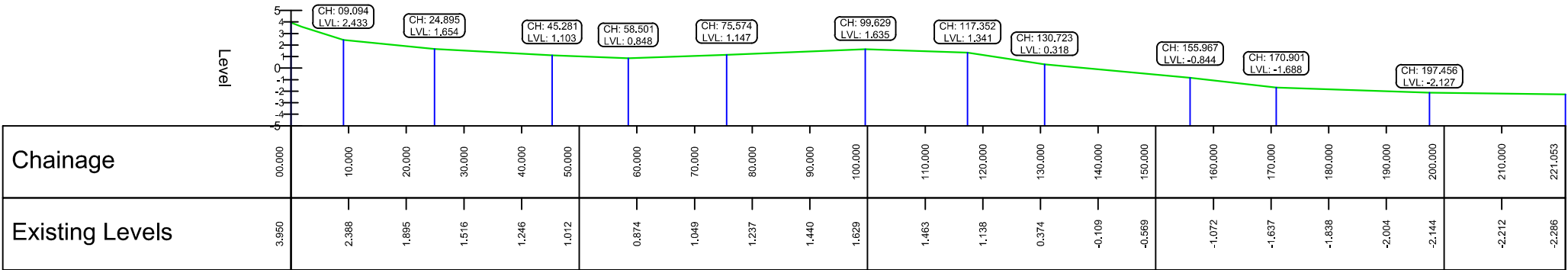
Revision: A



Transect 9

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Vertical 1:500

A	02/10/17	First Issue	MK	JKP
Rev	Date	Description	By	Chkd.



Transect 10

Client:

GALWAY HARBOUR COMPANY

Project:

GALWAY HARBOUR EXTENSION
COMPENSATORY MEASURES

Title:

Transect Profiles
Sheet 3 of 15

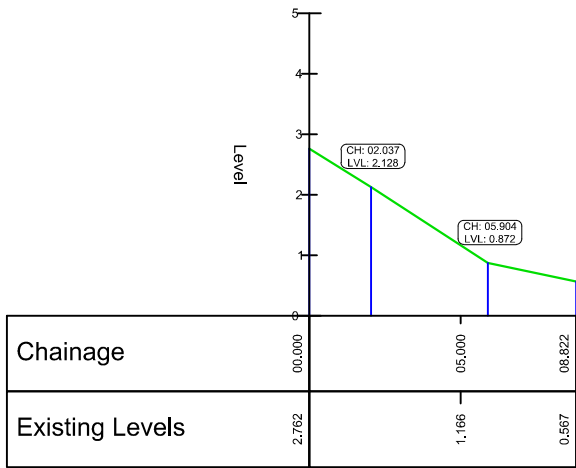
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Prepared by: MK	Checked: JKP	Date: Oct 17
Project Director:	J.P. KELLY	
Drawing Status:	COMPENSATORY MEASURES	



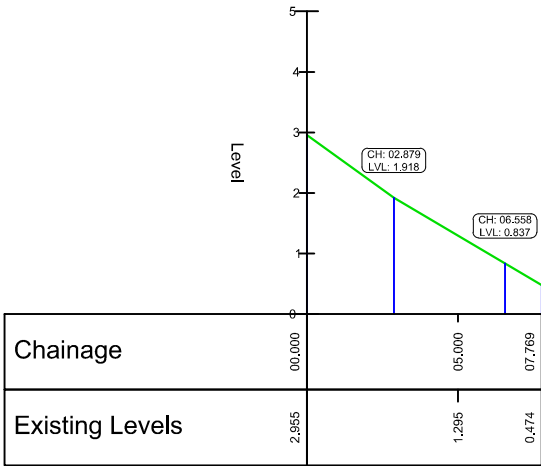
TOBIN Consulting Engineers,
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fax: +353-(0)91-565398
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Drawing No.: 7476-1037

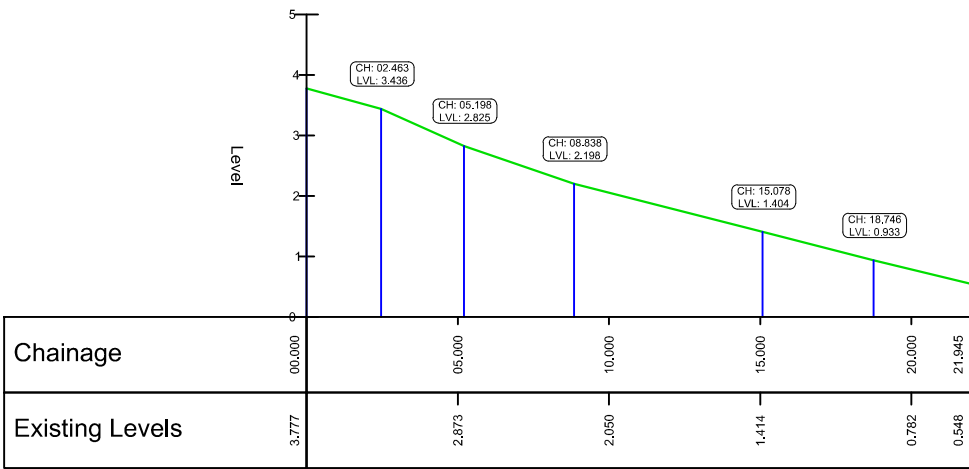
Revision: A



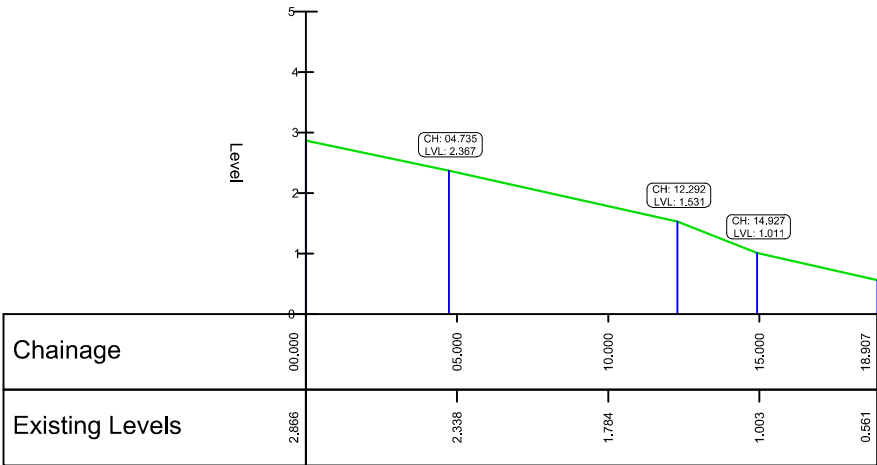
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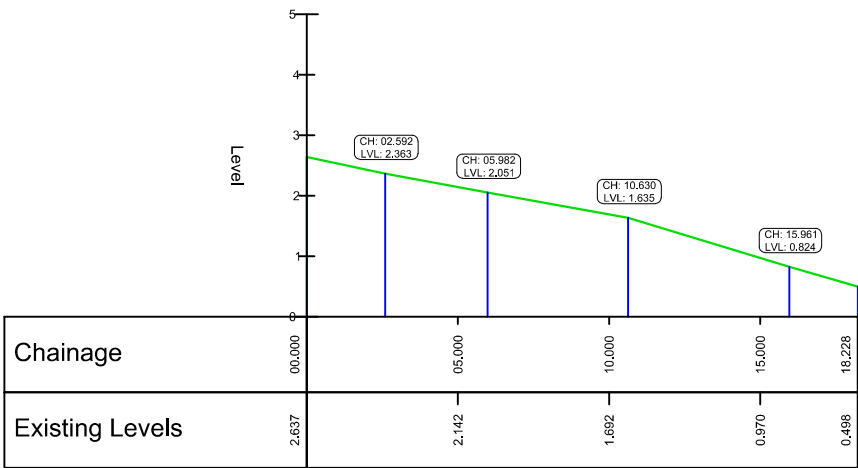
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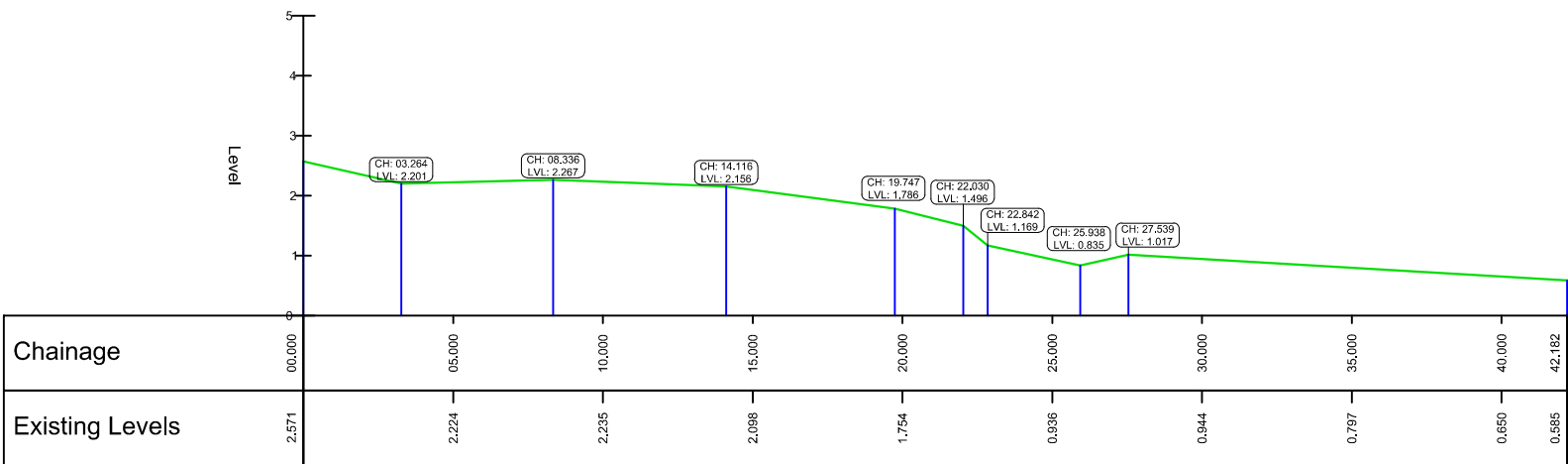
Transect 13



Transect 14



Transect 15



Transect 16

Scale:
Horizontal 1:250
Vertical 1:125

A	29/09/17	First Issue	MK	JPK
Rev	Date	Description	By	Chkd.

Client:

GALWAY HARBOUR COMPANY

Project:

GALWAY HARBOUR EXTENSION
COMPENSATORY MEASURES

Title:

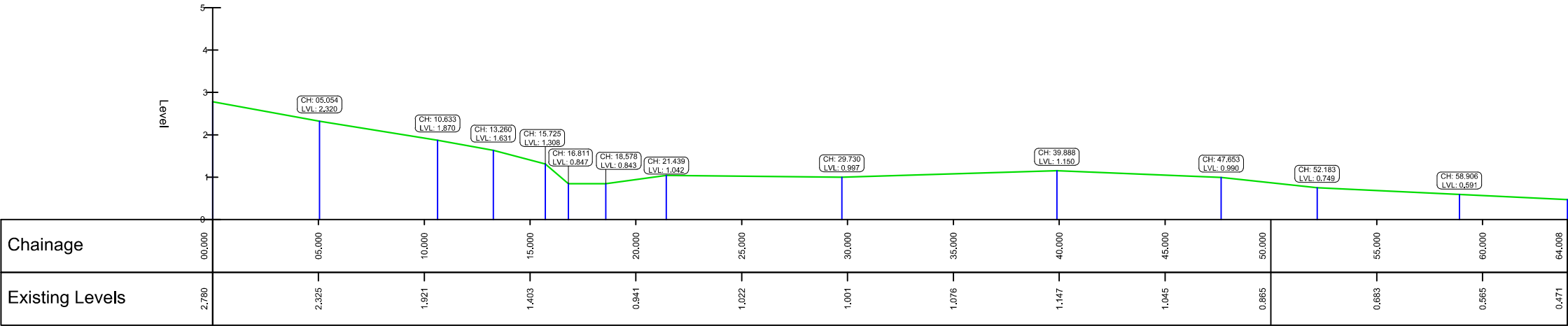
Transect Profiles
Sheet 4 of 15

Scale @ A1:	@A3: As Shown	
Prepared by: MK	Checked: JPK	Date: Oct 17
Project Director:	J.P. KELLY	
Drawing Status:	COMPENSATORY MEASURES	

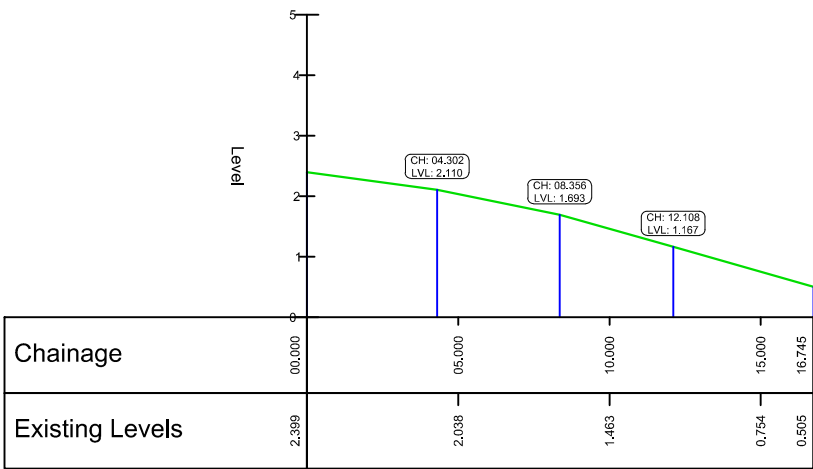


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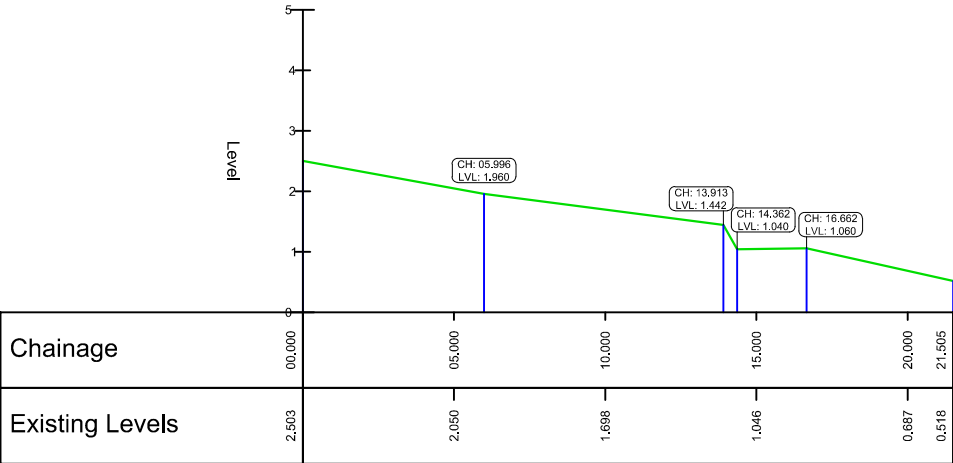
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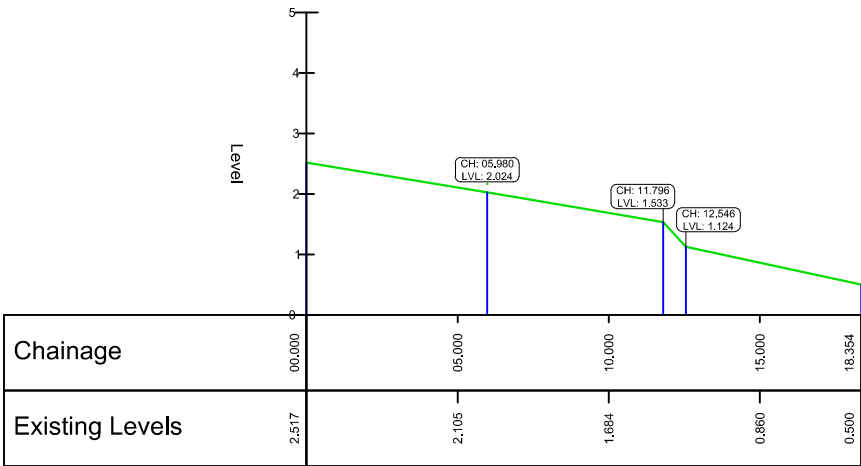
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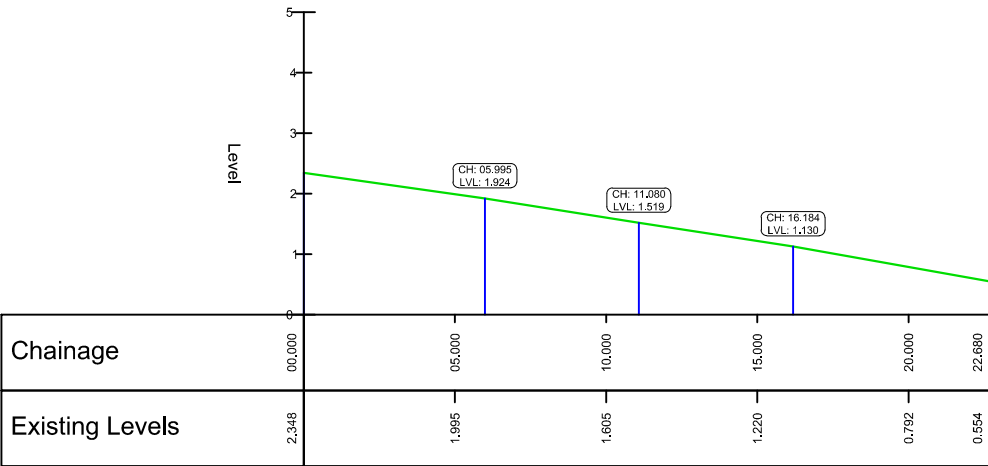
Transect 18



Transect 19



Transect 20



Transect 21

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Vertical 1:125

A	29/09/17	First Issue	MK	JKP
Rev	Date	Description	By	Chkd.

Client:

GALWAY HARBOUR COMPANY

Project:

GALWAY HARBOUR EXTENSION
COMPENSATORY MEASURES

Title:

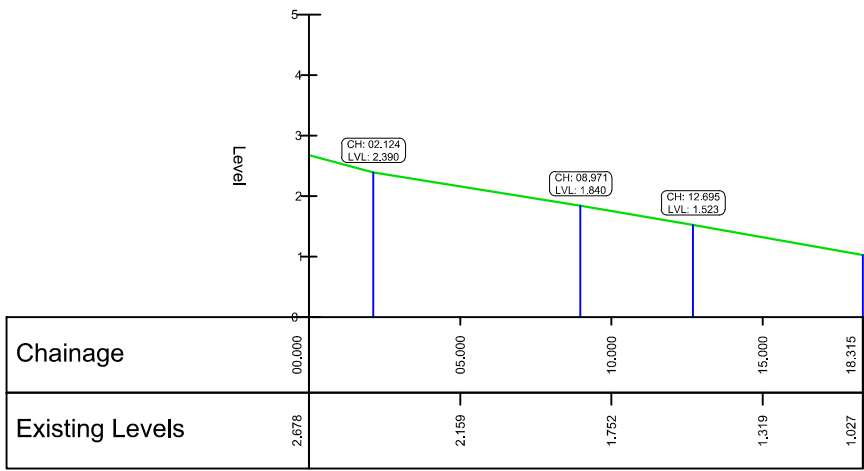
Transect Profiles
Sheet 5 of 15

Scale @ A1:	@A3: As Shown	
Prepared by:	Checked:	Date:
MK	JKP	Oct 17
Project Director:	J.P. KELLY	
Drawing Status:	COMPENSATORY MEASURES	

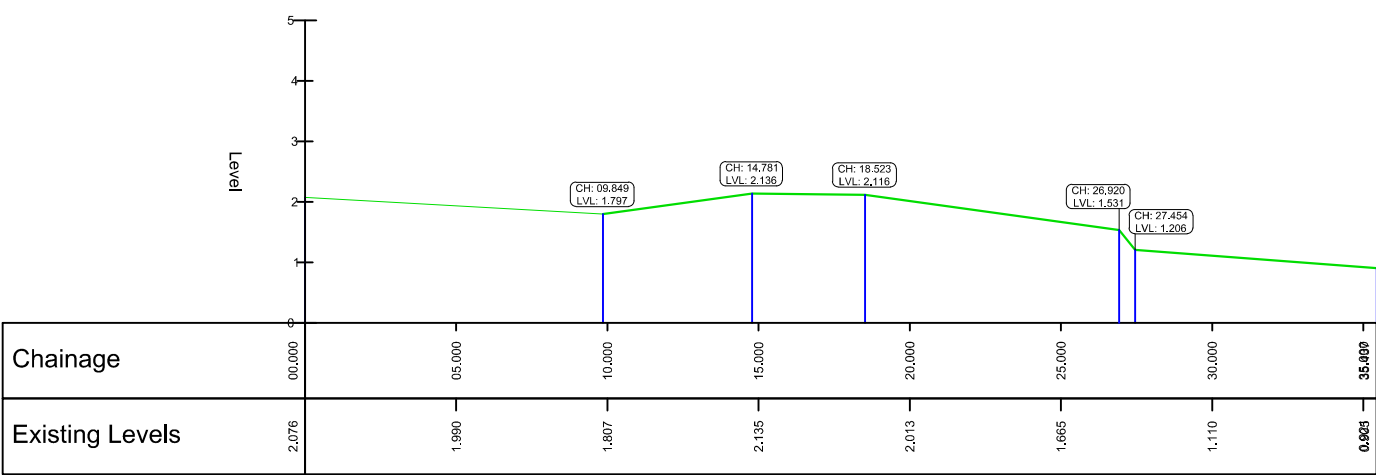


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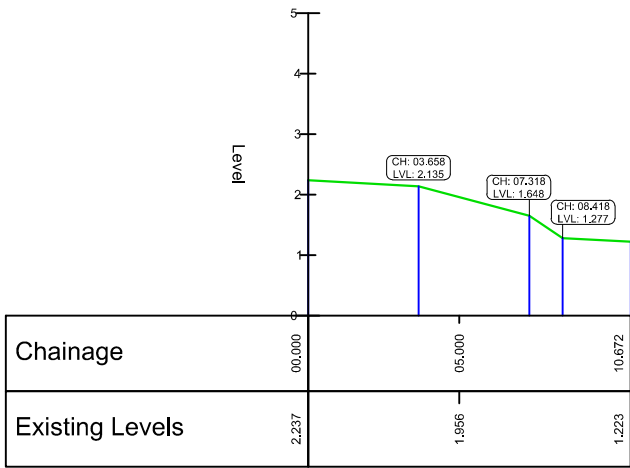
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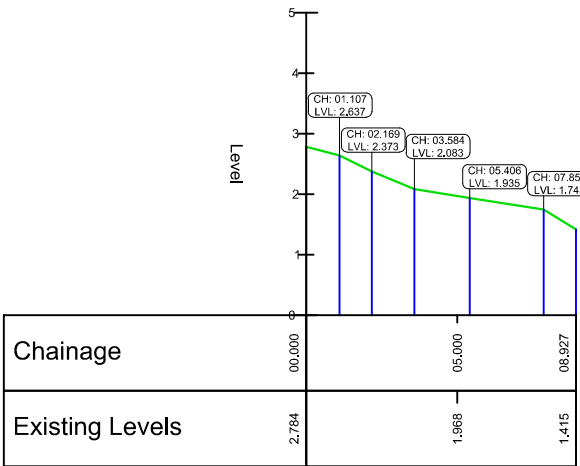
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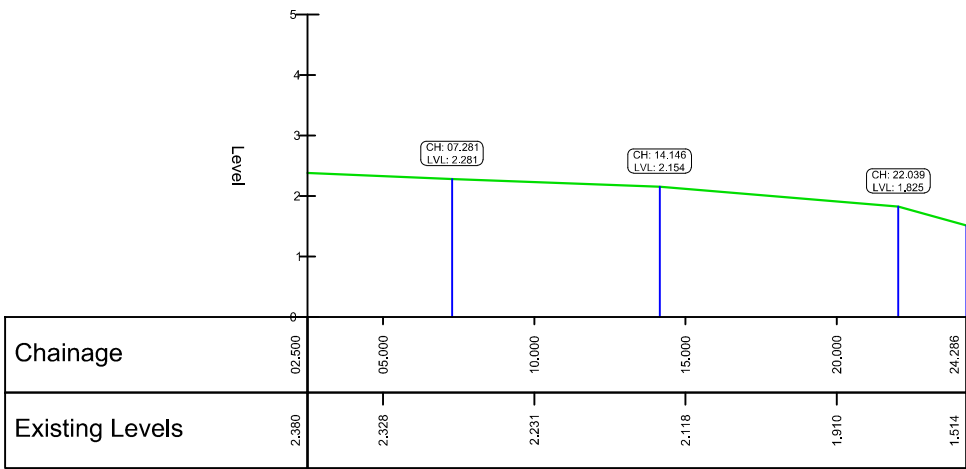
Transect 23



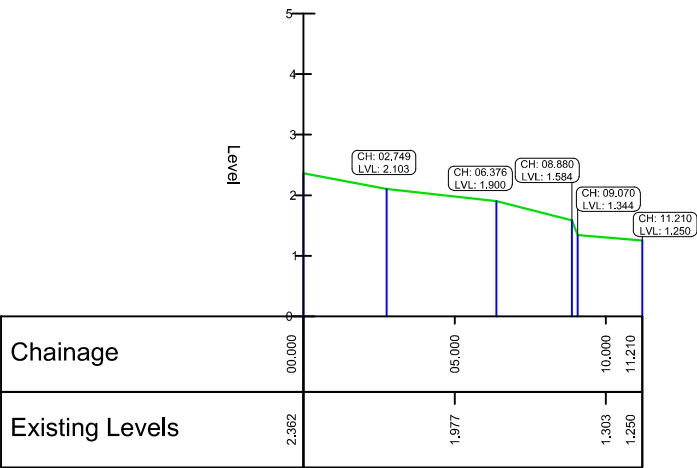
Transect 24



Transect 25



Transect 26



Transect 27

Scale:
Horizontal 1:250
Vertical 1:125

A	29/09/17	First Issue	MK	JPK
Rev	Date	Description	By	Chkd.

Client:
GALWAY HARBOUR COMPANY

Project:
GALWAY HARBOUR EXTENSION
COMPENSATORY MEASURES

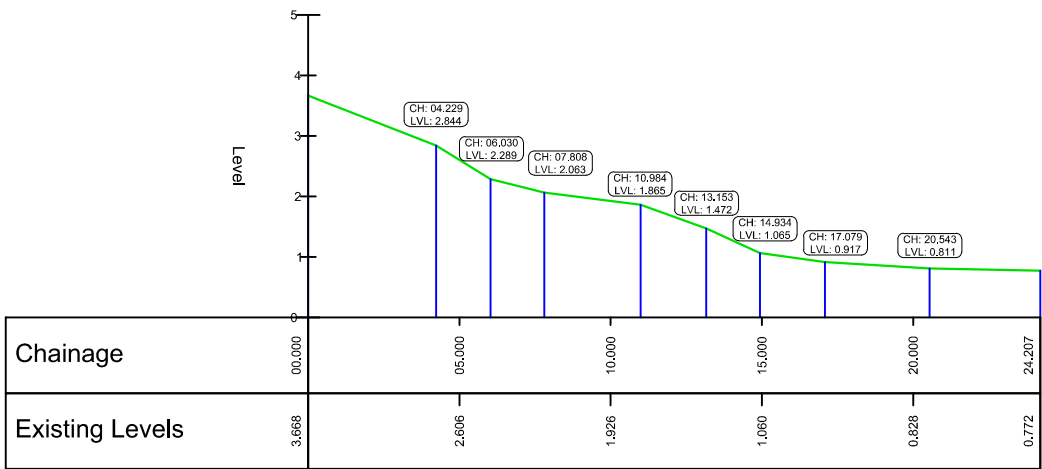
Title:
Transect Profiles
Sheet 6 of 15

Scale @ A1:	@A3: As Shown	
Prepared by:	Checked:	Date:
MK	JPK	Oct 17
Project Director:	J.P. KELLY	
Drawing Status:	COMPENSATORY MEASURES	

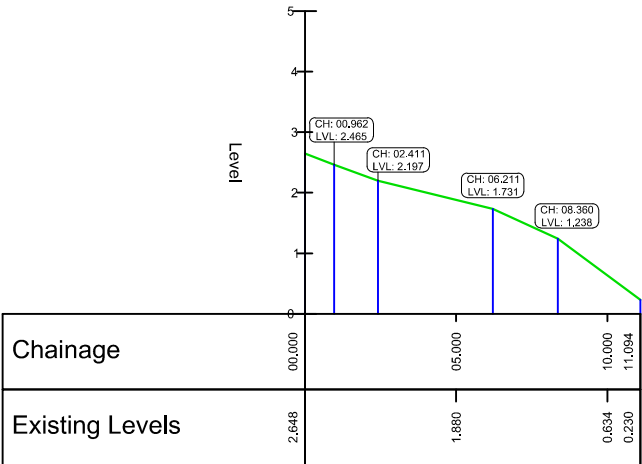


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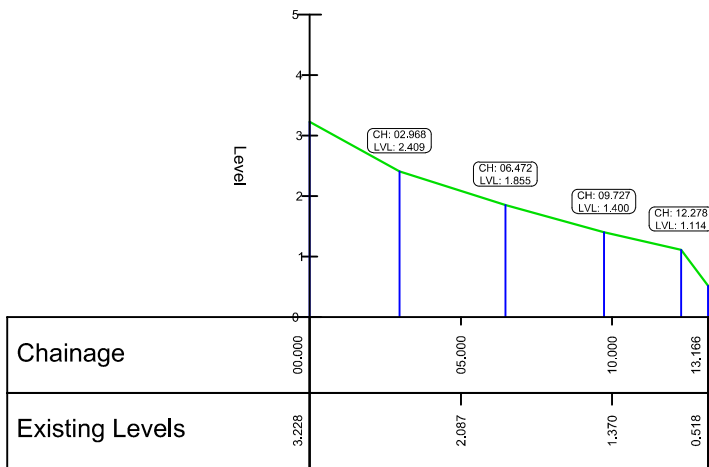
Drawing No.: 7476-1040	Revision: A
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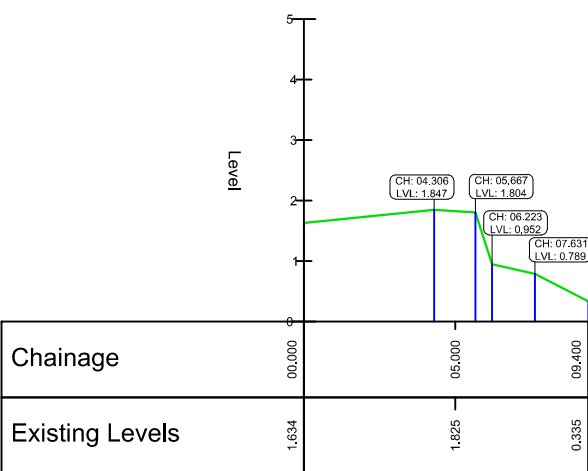
Transect 28



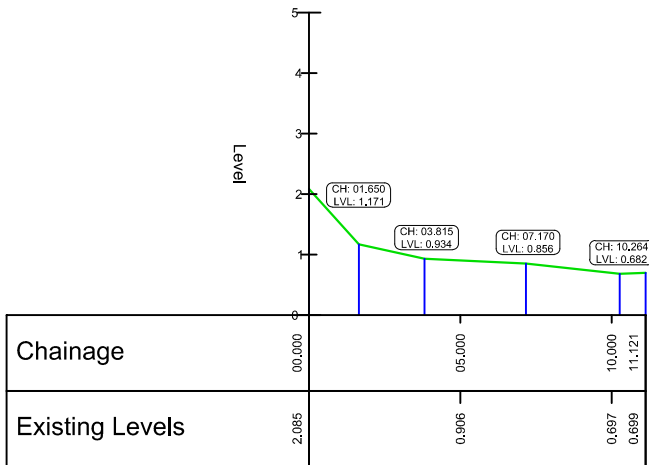
Transect 29



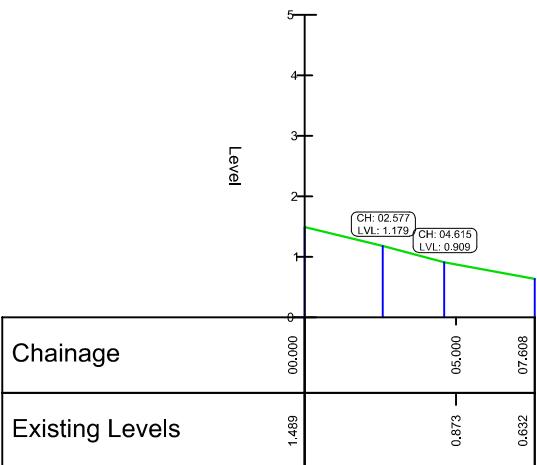
Transect 30



Transect 31



Transect 32



Transect 33

Scale:
Horizontal 1:250
Vertical 1:125

A	29/09/17	First Issue	MK	JPK
Rev	Date	Description	By	Chkd.

Client:
GALWAY HARBOUR COMPANY

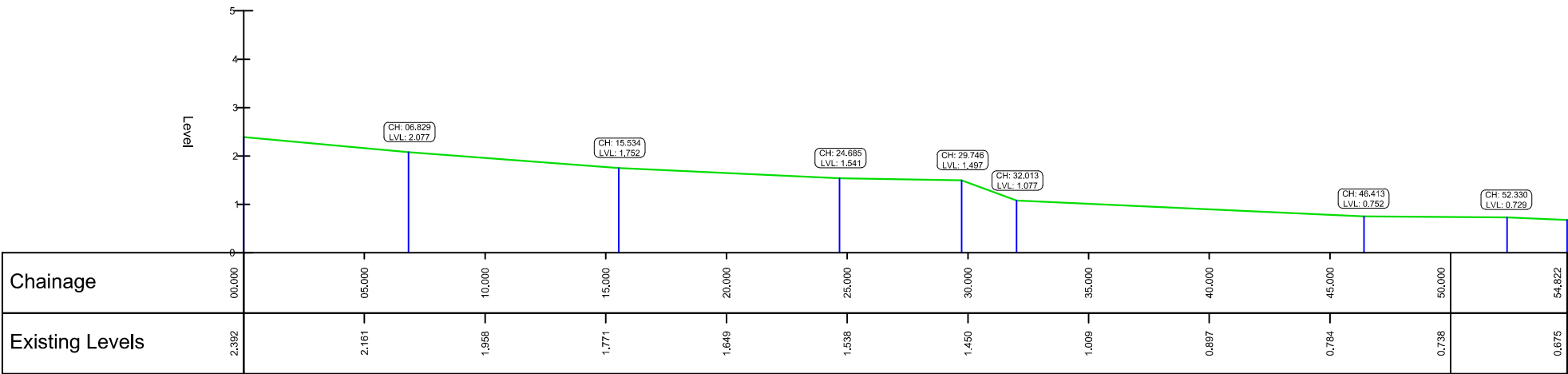
Project:
GALWAY HARBOUR EXTENSION
COMPENSATORY MEASURES

Title:
Transect Profiles
Sheet 7 of 15

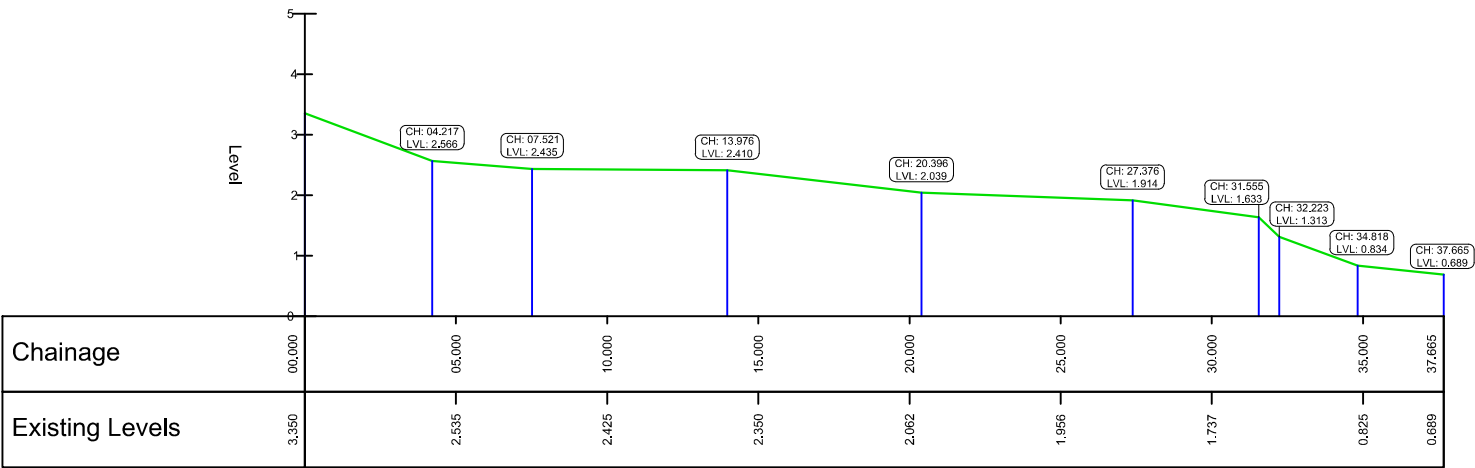
Scale @ A1: @A3: As Shown
Prepared by: MK Checked: JPK Date: Oct 17
Project Director: J.P. KELLY
Drawing Status: COMPENSATORY MEASURES


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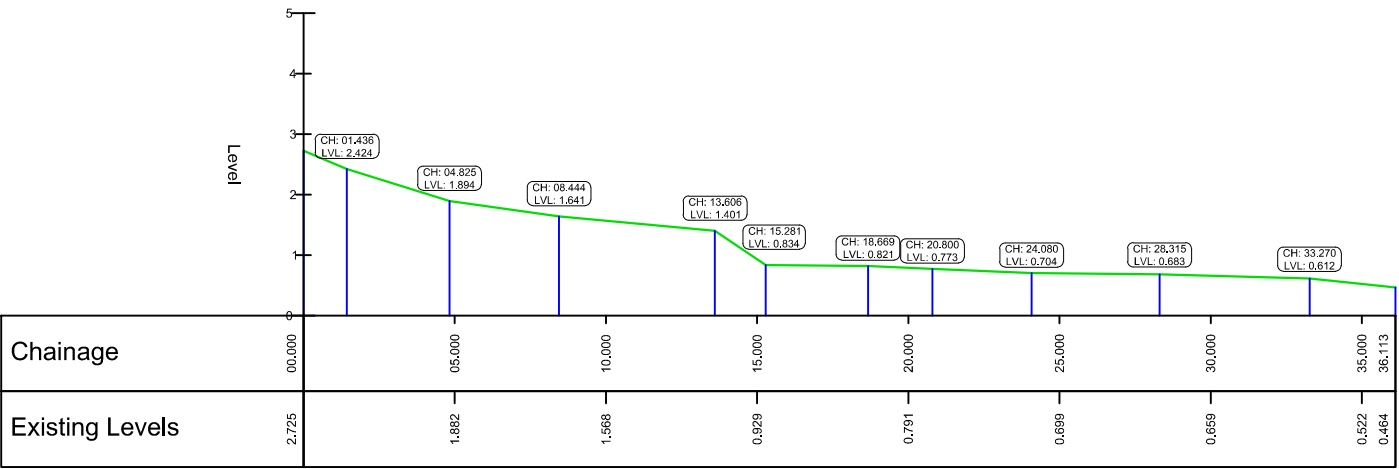
Drawing No.: 7476-1041 Revision: A



Transect 34



Transect 35



Transect 36

Scale:
Horizontal 1:250
Vertical 1:125

A	29/09/17	First Issue	MK	JPK
Rev	Date	Description	By	Chkd

Client:
GALWAY HARBOUR COMPANY

Project:
GALWAY HARBOUR EXTENSION
COMPENSATORY MEASURES

Title:
Transect Profiles
Sheet 8 of 15

Scale @ A1: @A3: As Shown

Prepared by: MK
Checked: JPK
Date: Oct 17

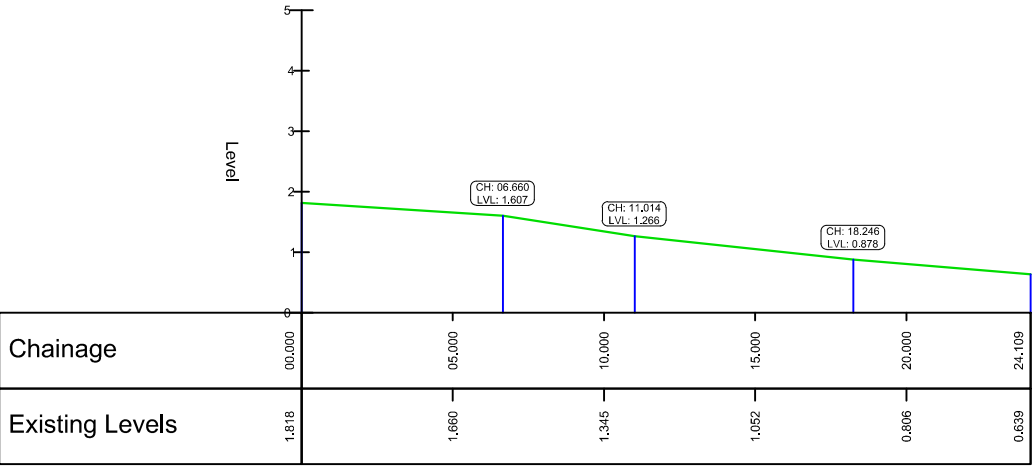
Project Director: J.P. KELLY

Drawing Status: COMPENSATORY MEASURES

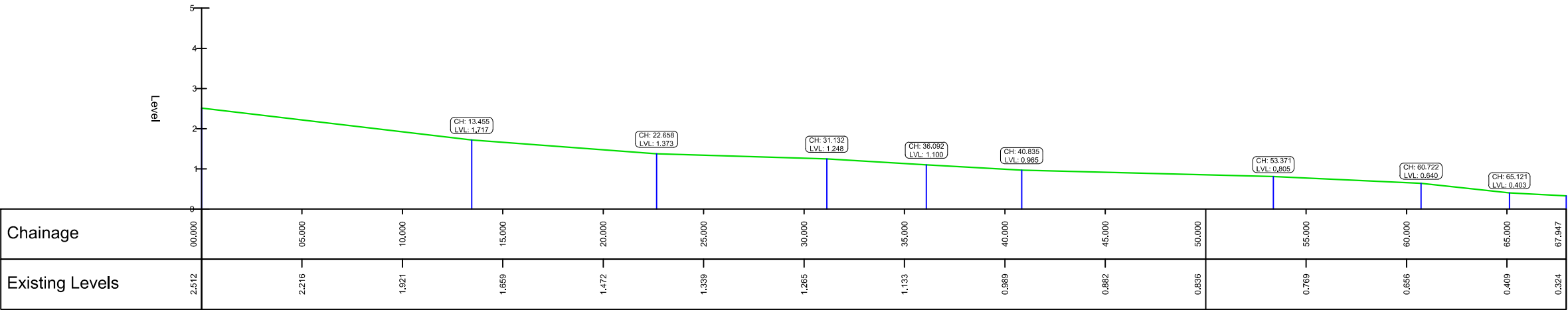


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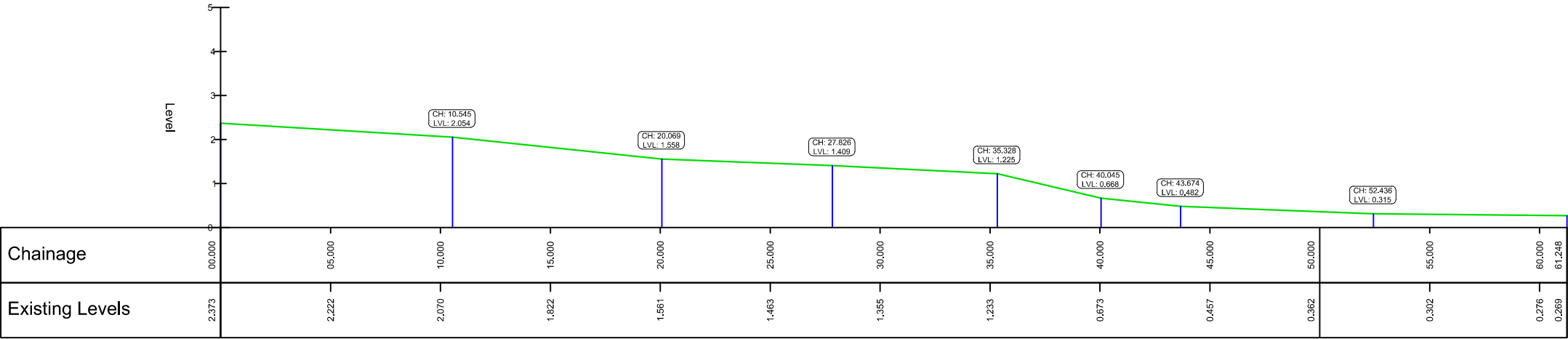
Drawing No.: 7476-1042
Revision: A



Transect 37



Transect 38



Transect 36

Scale:
Horizontal 1:250
Vertical 1:125

A	29/09/17	First Issue	MK	JPK
Rev	Date	Description	By	Chkd.

Client:
GALWAY HARBOUR COMPANY

Project:
GALWAY HARBOUR EXTENSION
COMPENSATORY MEASURES

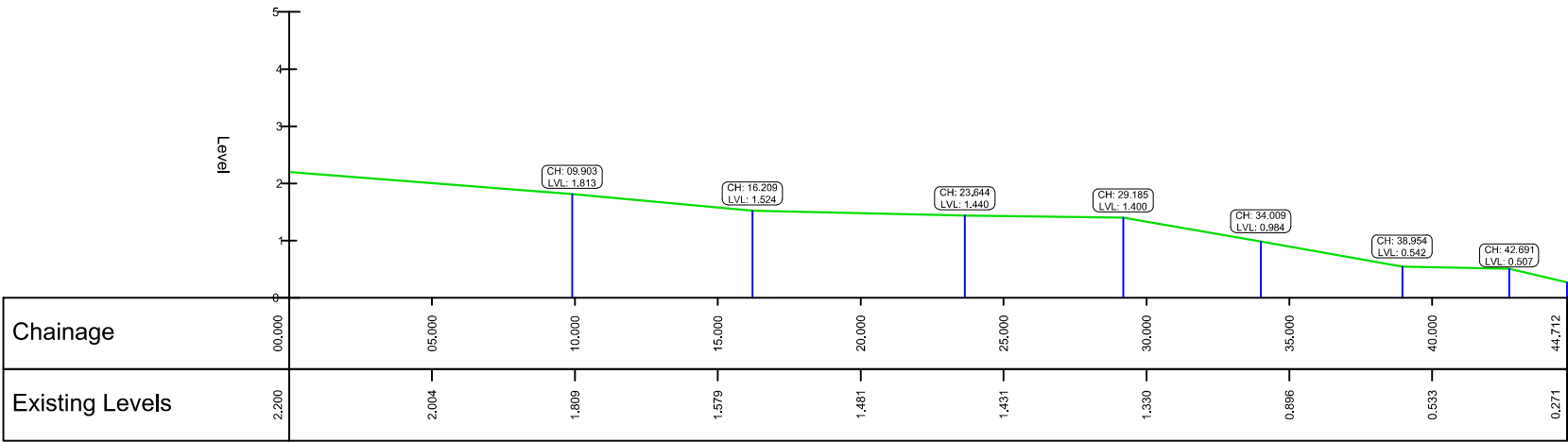
Title:
Transect Profiles
Sheet 9 of 15

Scale @ A1:		@A3: As Shown	
Prepared by:	Checked:	Date:	
MK	JPK	Oct 17	
Project Director:	J.P. KELLY		
Drawing Status:	COMPENSATORY MEASURES		

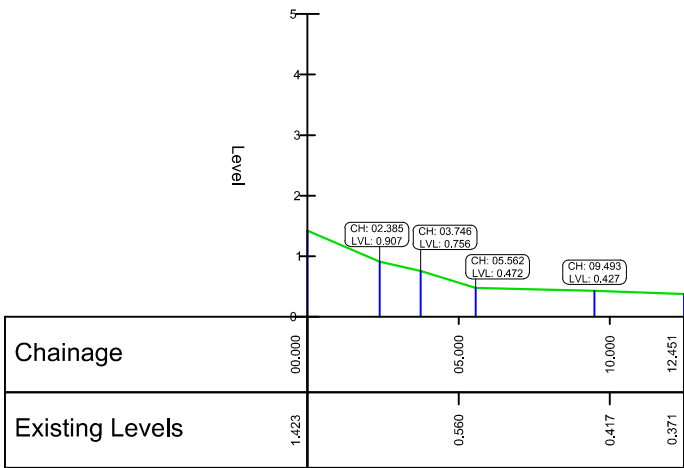


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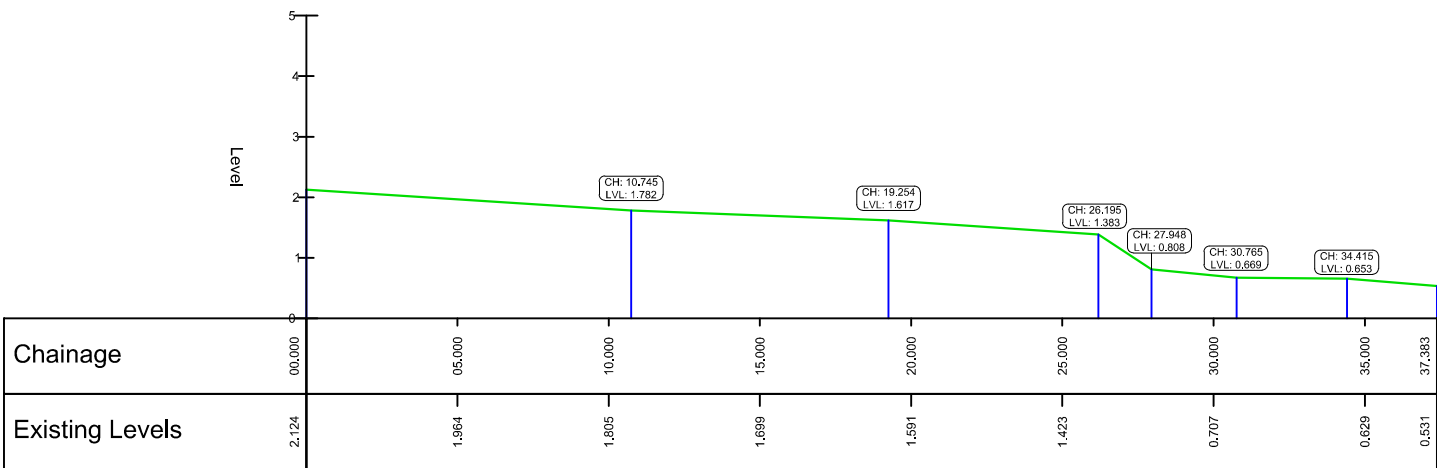
Drawing No.: 7476-1043	Revision: A
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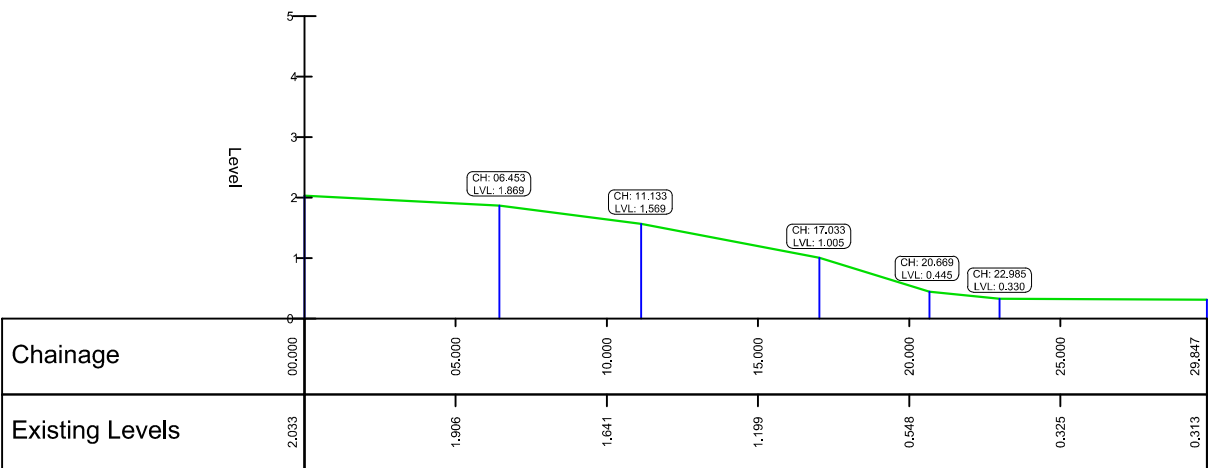
Transect 40



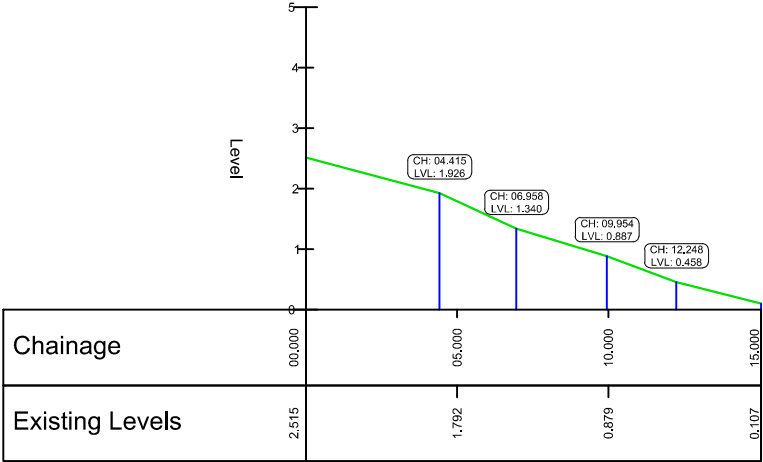
Transect 41



Transect 42



Transect 43



Transect 44

Scale:
Horizontal 1:250
Vertical 1:125

A	29/09/17	First Issue	MK	JPK
Rev	Date	Description	By	Chkd.

Client:
GALWAY HARBOUR COMPANY

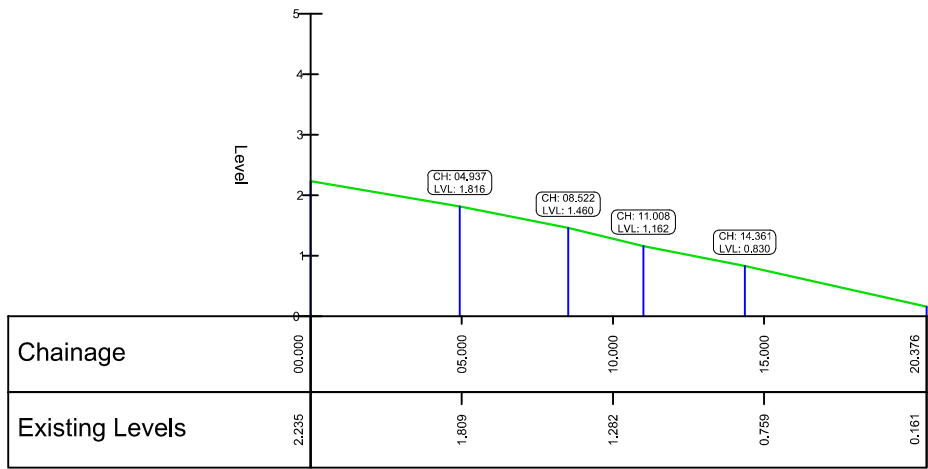
Project:
GALWAY HARBOUR EXTENSION
COMPENSATORY MEASURES

Title:
Transect Profiles
Sheet 10 of 15

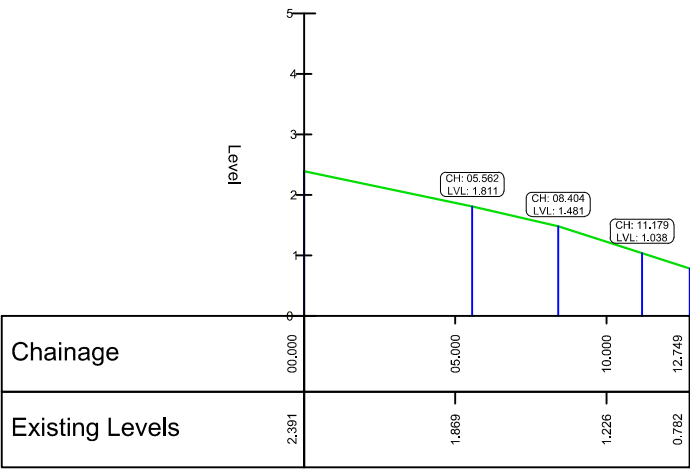
Scale @ A1:	@A3: As Shown	
Prepared by:	Checked:	Date:
MK	JPK	Oct 17
Project Director:	J.P. KELLY	
Drawing Status:	COMPENSATORY MEASURES	

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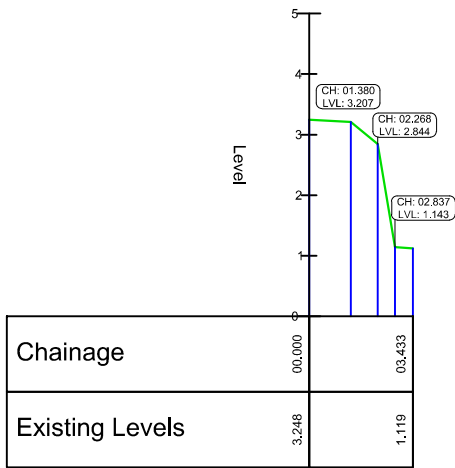
Revision:
Drawing No.: 7476-1044 A



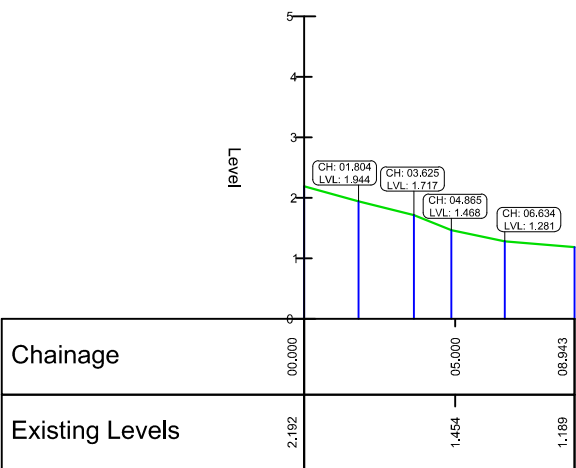
Transect 45



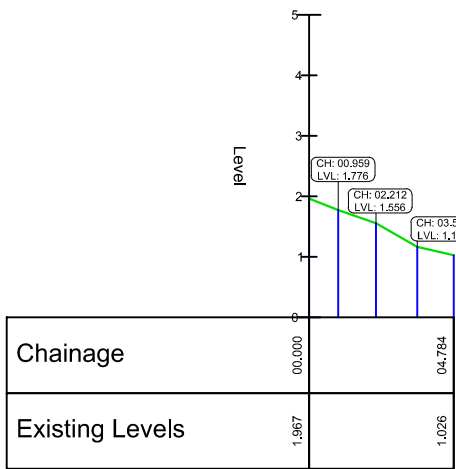
Transect 46



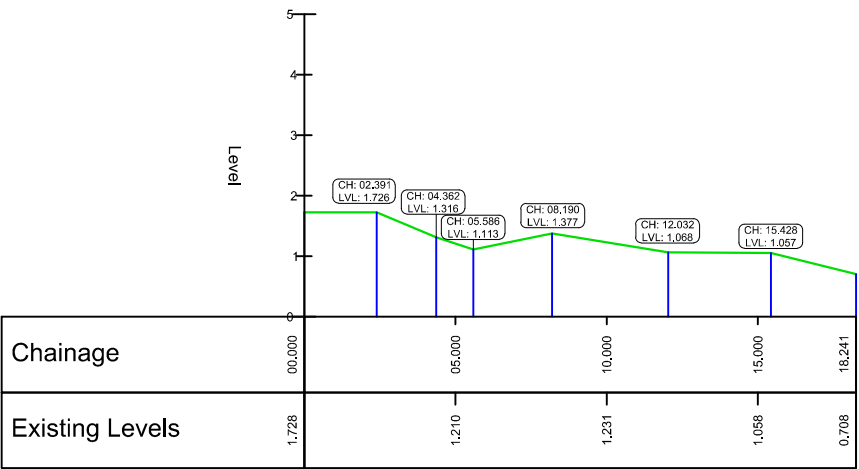
Transect 47



Transect 48



Transect 49



Transect 50

Scale:
Horizontal 1:250
Vertical 1:125

A	29/09/17	First Issue	MK	JPK
Rev	Date	Description	By	Chkd.

Client:
GALWAY HARBOUR COMPANY

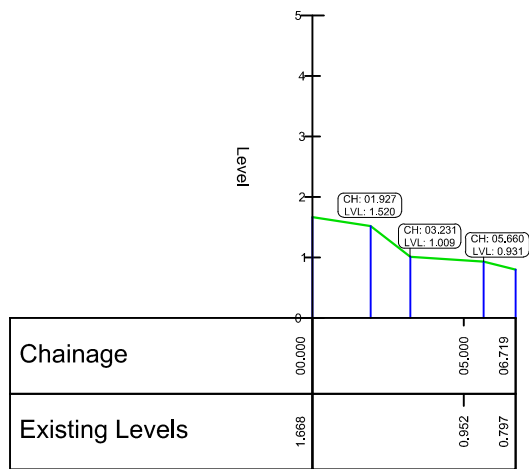
Project:
GALWAY HARBOUR EXTENSION
COMPENSATORY MEASURES

Title:
Transect Profiles
Sheet 11 of 15

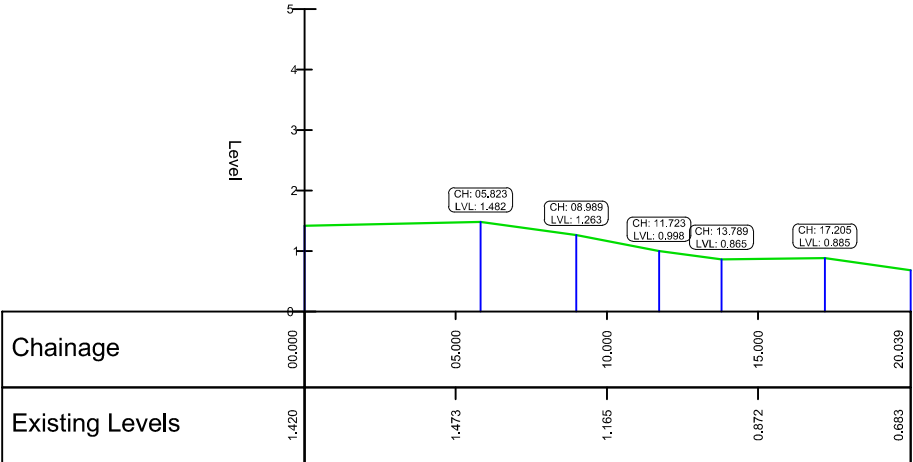
Scale @ A1: @A3: As Shown
Prepared by: MK Checked: JPK Date: Oct 17
Project Director: J.P. KELLY
Drawing Status: COMPENSATORY MEASURES

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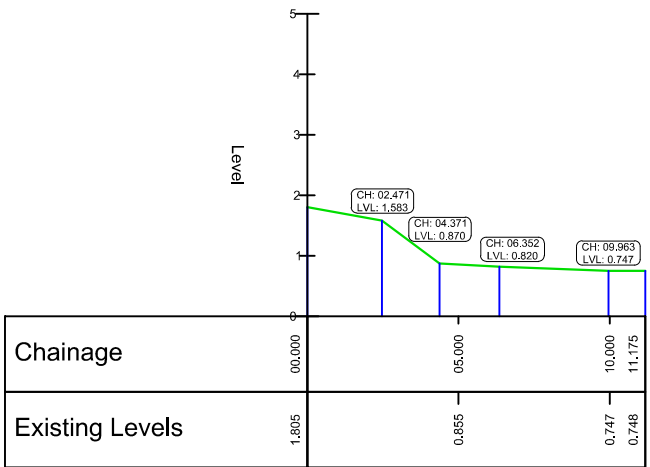
Drawing No.: 7476-1045 Revision: A



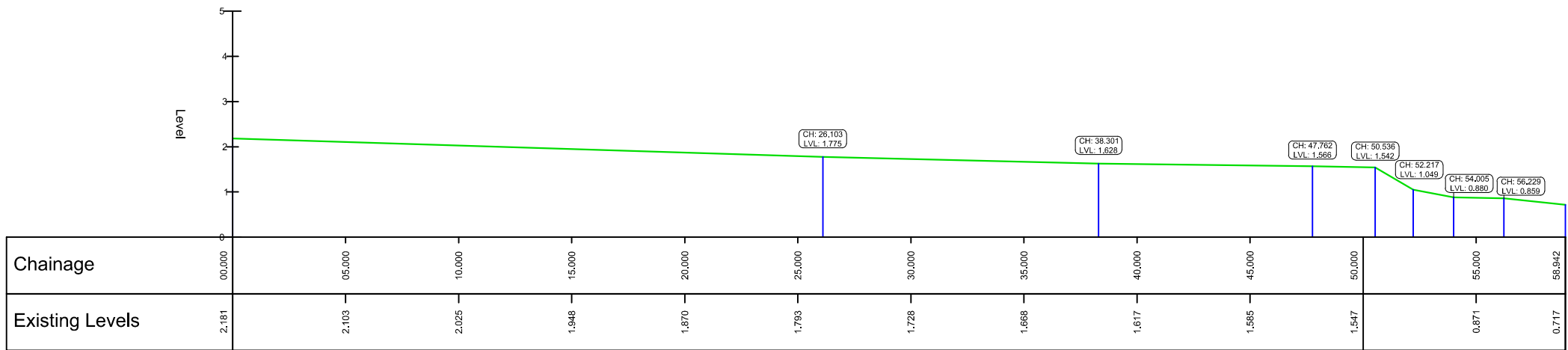
Transect 51



Transect 52



Transect 53



Transect 54

Scale:
Horizontal 1:250
Vertical 1:125

A	29/09/17	First Issue	MK	JPK
Rev	Date	Description	By	Chkd.

Client:
GALWAY HARBOUR COMPANY

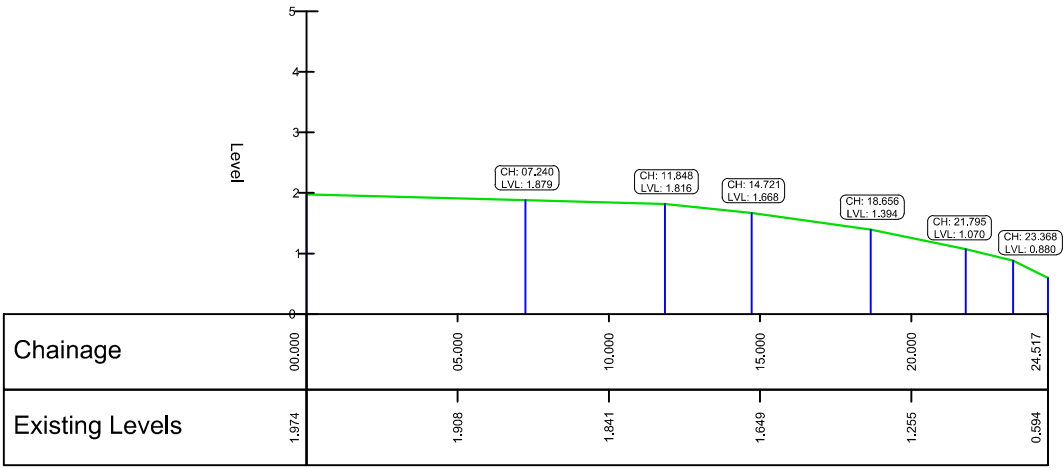
Project:
GALWAY HARBOUR EXTENSION
COMPENSATORY MEASURES

Title:
Transect Profiles
Sheet 12 of 15

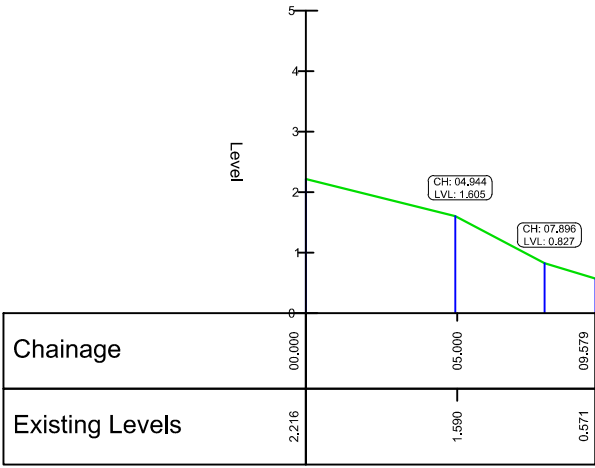
Scale @ A1:		@A3: As Shown	
Prepared by:		Checked:	Date:
MK		JPK	Oct 17
Project Director:		J.P. KELLY	
Drawing Status:		COMPENSATORY MEASURES	


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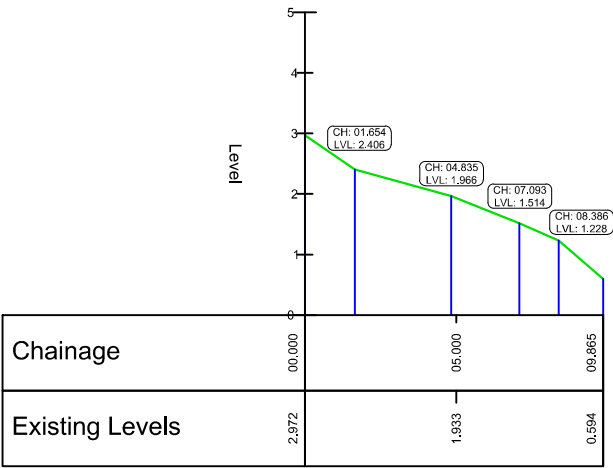
Drawing No.: 7476-1046	Revision: A
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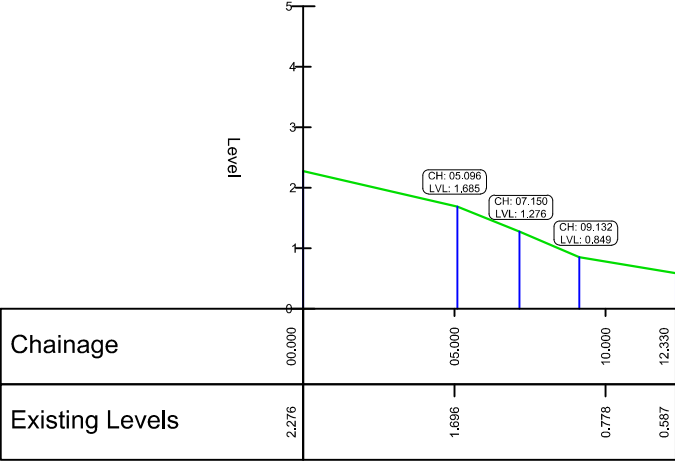
Transect 55



Transect 56



Transect 57



Transect 58

Scale:
Horizontal 1:250
Vertical 1:125

A	29/09/17	First Issue	MK	JPK
Rev	Date	Description	By	Chkd.

Client:
GALWAY HARBOUR COMPANY

Project:
GALWAY HARBOUR EXTENSION
COMPENSATORY MEASURES

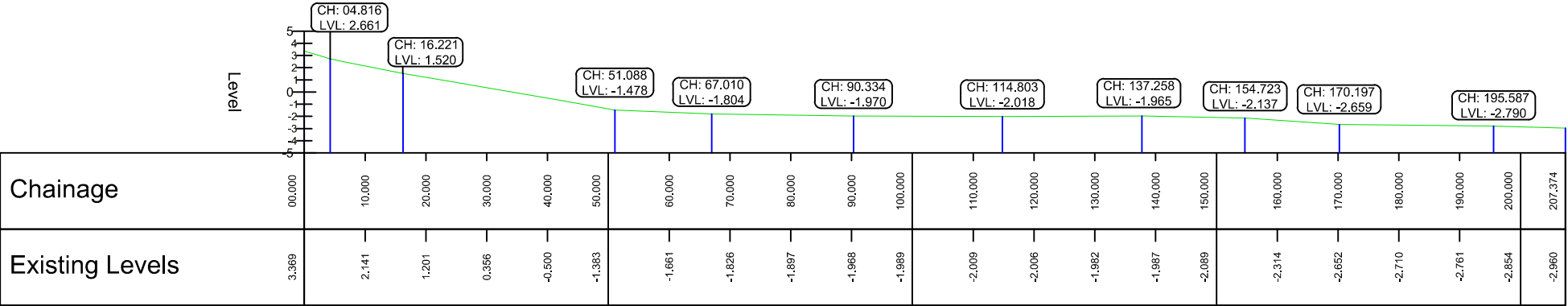
Title:
Transect Profiles
Sheet 13 of 15

Scale @ A1:	@A3: As Shown	
Prepared by:	Checked:	Date:
MK	JPK	Oct 17
Project Director:	J.P. KELLY	
Drawing Status:	COMPENSATORY MEASURES	

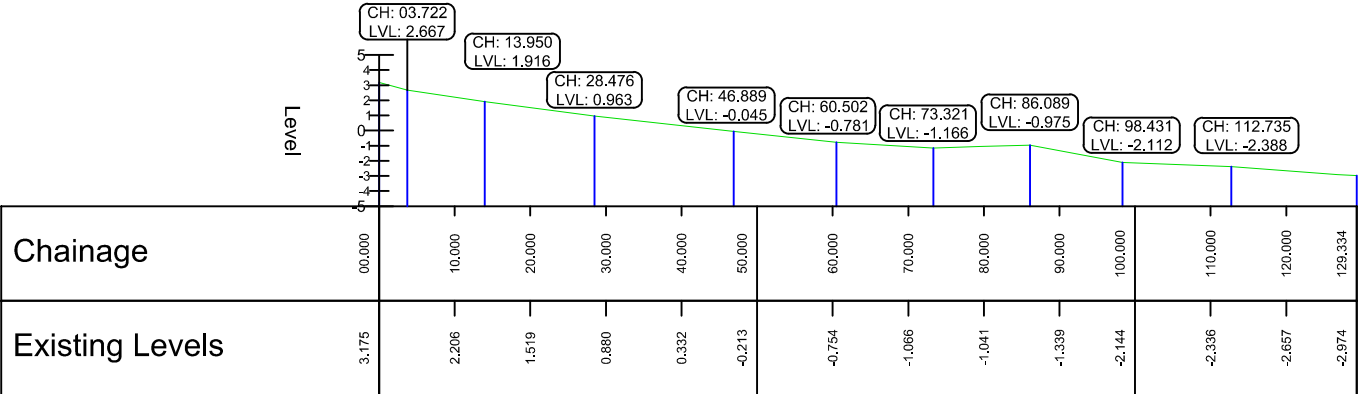


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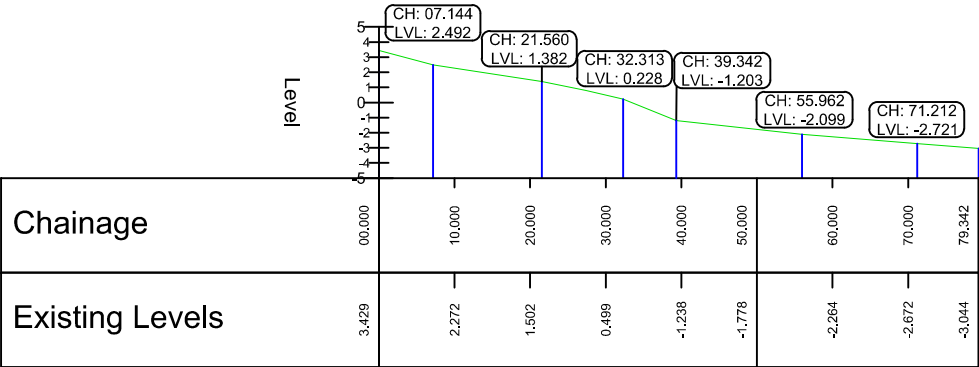
Drawing No.: 7476-1047	Revision: A
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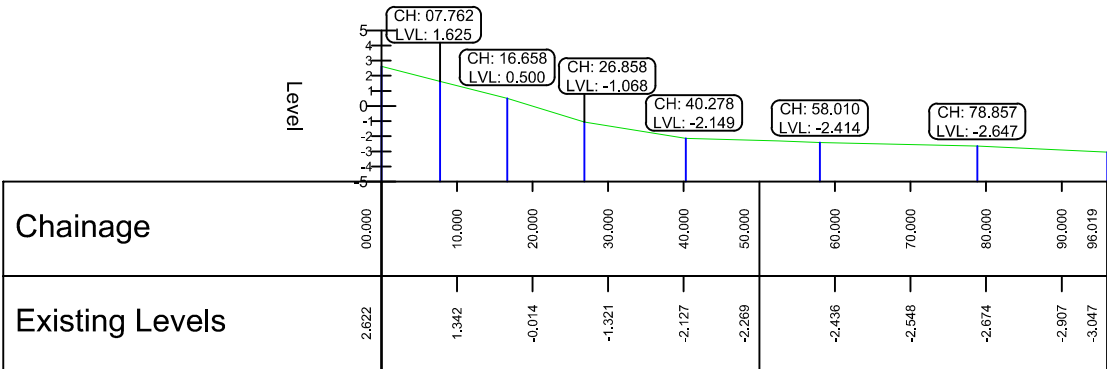
Transect 59



Transect 60



Transect 61



Transect 62

Scale @A3:
Horizontal 1:1000
Vertical 1:500

A	08/12/17	First Issue	MK	JPK
Rev	Date	Description	By	Chkd.

Client:

GALWAY HARBOUR COMPANY

Project:

GALWAY HARBOUR EXTENSION
COMPENSATORY MEASURES

Title:

Transect Profiles
Sheet 14 of 15

Scale @ A1: As Shown

Prepared by: MK
Checked: JPK
Date: Dec 17

Project Director: J.P. KELLY

Drawing Status: Compensatory Measures



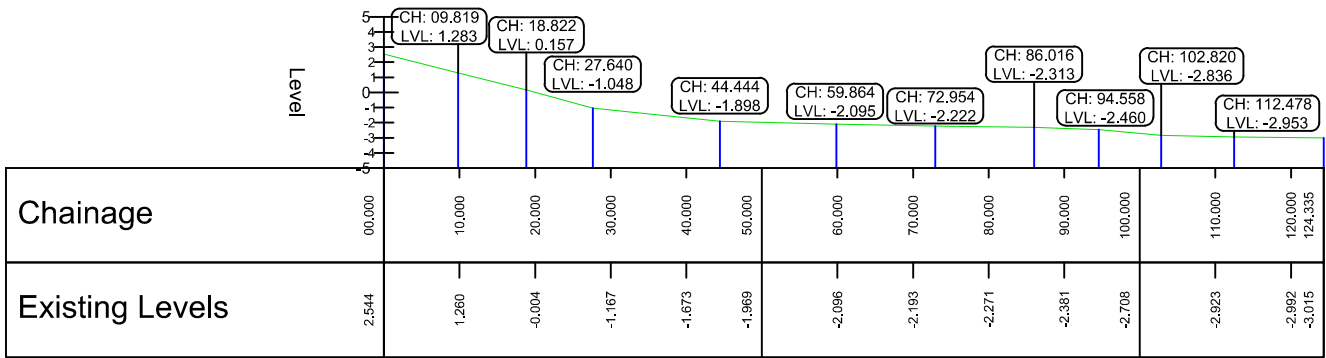
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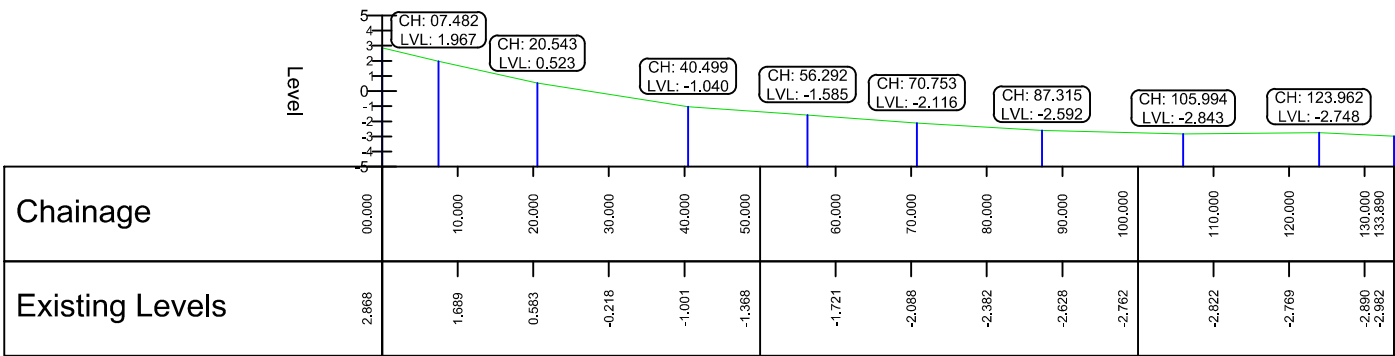
Drawing No.: 7476-1048

Revision:

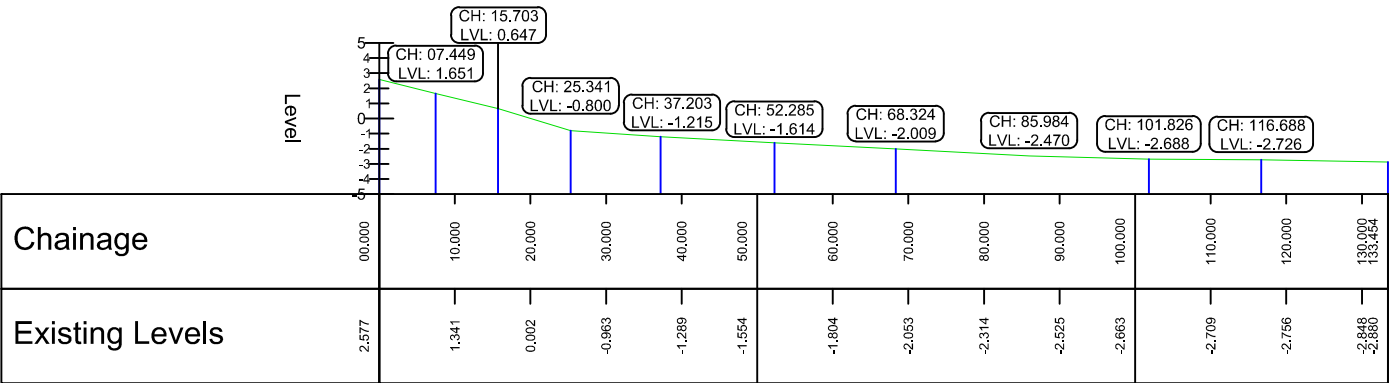
A



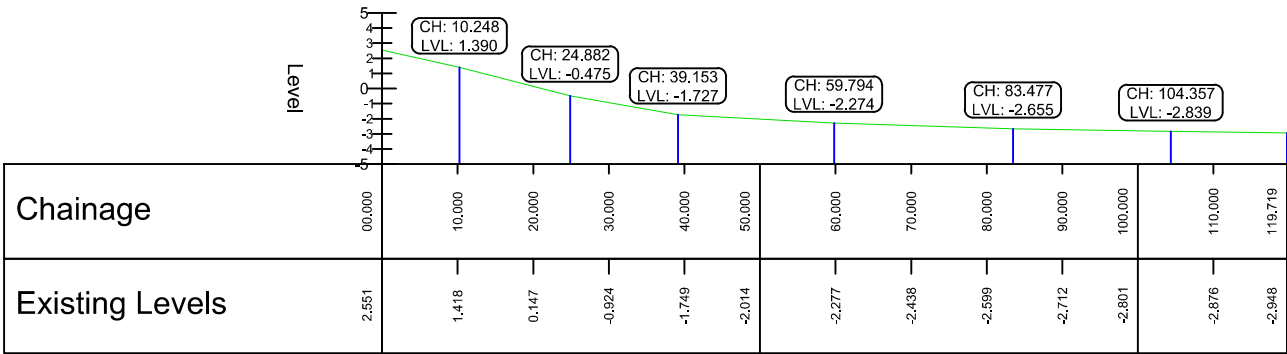
Transect 63



Transect 64



Transect 65



Transect 66

Scale @A3:
Horizontal 1:1000
Vertical 1:500

A	08/12/17	First Issue	MK	JPK
Rev	Date	Description	By	Chkd.

Client:
GALWAY HARBOUR COMPANY

Project:
GALWAY HARBOUR EXTENSION
COMPENSATORY MEASURES

Title:
Transect Profiles
Sheet 15 of 15

Scale @ A1: As Shown

Prepared by: MK
Checked: JPK
Date: Dec 17

Project Director: J.P. KELLY

Drawing Status: Compensatory Measures



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Drawing No.: 7476-1049

Revision:

A

Appendix 8-4

Tawin Intertidal Species List

Station	AphidID	T1 L	T2 L	T3 L	T4L	T5L	T6 L	T16 L	T41 L	T42 L	T50 L	T51 L	T52 L	T53 L	T54L	T55 L	T59 M	T59 L	T60 M	T60 L	T61 L	T62 L	T63 L	T64 L	T65 L	T66 L
Perinereis cultrifera	130408	0	0	1	2	2	2	3	0	0	0	0	0	0	0	0	1	1	0	1	0	0	0	0	0	0
Platynereis dumerilii	130417	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	1	5	14	0	2	0	0	0	0
Nephtyidae	956	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nephtys sp. (juv, partial/damaged)	129370	0	0	5	1	0	0	0	0	0	0	0	0	0	0	0	0	2	0	1	9	9	9	2	0	0
Nephtys cirrosa	130357	0	0	8	0	2	1	0	0	0	0	0	0	0	0	0	1	6	0	2	4	0	4	4	8	1
Nephtys hombergii	130359	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	4	13	8	2	5	3
EUNICIDA	895	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eunicidae	966	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eunicidae (juv.)	966	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
Marphysa sp. (damaged)	129281	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Dorvilleidae	971	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Protodorrillea kefersteini	130041	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	0	0	0	0	0
ORBINIIDA	884	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Orbitidae	902	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Scoloplos armiger	130537	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	9	3	4	15	3
Paraonidae	903	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aricidea (Arcidea) minuta	730747	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23	1	7	1
Paradoneis lyra	130585	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0
SPIONIDA	889	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spionidae	913	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spionidae (partial/damaged/juv.)	913	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	7	0	0	1	13	1	10	0
Aonides oxycephala	131106	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0
Maiaaceros vulgaris	131134	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Maiaaceros girardi	338471	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	3	5	0	0	0	0	0	0	0
Dipolydora coeca	131117	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0
Dipolydora quadrilobata	131121	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Prionospio sp. (damaged)	129620	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	2	0	11	3	4	3	0	3	13
Pseudopolydora pulchra	131169	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	0	0	0
Pygospio elegans	131170	1	0	0	0	0	0	98	0	1	0	0	0	0	0	0	1	1	0	0	1	0	1	2	163	0
Scolecipis sp. (partial/damaged)	129623	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0

Station	Aphaid	T1 L	T2 L	T3 L	T4 L	T5 L	T6 L	T16 L	T41 L	T42 L	T50 L	T51 L	T52 L	T53 L	T54 L	T55 L	T59 M	T59 L	T60 M	T60 L	T61 L	T62 L	T63 L	T64 L	T65 L	T66 L
Scolecipis (Scolecipis) foliosa	334741	0	0	0			0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Scolecipis (Scolecipis) squamata	157566	0	1	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Spio sp. (damaged)	129625	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0
Spio martinensis	131185	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	16	0	96	1	13	0
Chaetopteridae	918	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chaetopteridae (damaged)	918	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
CAPITELIDA	890	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Capitellidae	921	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Capitellidae (damaged)	921	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Capitella sp. complex	129211	0	0	1	3	0	1	0	40	55	97	19	61	30	27	48	0	0	1	1	0	0	0	0	2	0
Heteromastus filiformis	129884	0	0	0	0		0	0	6	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mediomastus fragilis	129892	0	0	0	1	0	32	16	2	0	0	0	0	0	0	0	0	0	7	0	2	0	0	0	3	18
Notomastus latericeus	129898	1	0	3	3	3	13	0	0	1	0	0	0	0	0	0	0	0	0	2	4	2	0	0	1	29
Arenicolidae	922	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Arenicola marina	129868	0	0	0	0		1	1	1	7	0	0	0	0	0	0	0	1	1	0	0	0	2	2	1	0
Maldanidae	923	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Clymenella torquata	130279	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0
Leiochone sp. (damaged)	146991	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0
Euclymeninae	152232	0	0	0	0		0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	2	0	0	0	2
Euclymene sp. (damaged)	129347	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Euclymene lombricoides	130293	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	10
Euclymene oerstedii	157376	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0
OPHELIDA	891	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ophellidae	924	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ophelia sp. (partial/damaged/juv)	129413	1	2	0	0		3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ophelia borealis	130491	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Polyophthalmus pictus	130510	0	0	0	2	1	12	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0
Travisidae	322534	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Travisia forbesii	130512	1	0	0	0	2	35	0	0	0	0	0	0	0	0	0	0	74	1	0	5	2	0	0	6	14
TEREBELLIDA	900	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Station	AphiaID	T1 L	T2 L	T3 L	T4L	T5L	T6 L	T16 L	T41 L	T42 L	T50 L	T51 L	T52 L	T53 L	T54L	T55 L	T59 M	T59 L	T60 M	T60 L	T61 L	T62 L	T63 L	T64 L	T65 L	T66 L
Heterolaophonte stroemii	116871	0	0	0	0	0	0	163	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Nannopodidae	513857	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Huntemannia jadensis	1884	0	0	0	0	0	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OSTRACODA	1078	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PODOCOPA	155944	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trachyleberididae	127509	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Carinocythereis carinata	128371	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
MALACOSTRACA	1071	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MYSIDA	149668	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mysidae	119822	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Praunus flexuosus	120177	0	0	0	0	0	0	0	0	0	3	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
AMPHIPODA	1135	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Calliopius laevisculus	102178	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0
Stenothoidae	101409	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stenothoe monoculoides	103169	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0
Atyllidae	146525	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nototropis swammerdami	488966	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Dexaminidae	101378	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dexamine spinosa	102135	0	0	0	0	1	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ampeliscidae	101364	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ampelisca brevicornis	101891	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0
Pontoporelidae	101406	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bathyporeia sp. (partial/damaged/juv.)	101742	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3
Bathyporeia guilliamsoniana	103060	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	1	8	24
Gammaridae	101383	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gammaridae (damaged)	101383	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0
Gammarus sp. (damaged)	101537	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	4	0	0	0	0	0	0
Melittidae	101397	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Melittidae (damaged)	101397	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	3	4	3	0	0	0	0	0	0	0

[illegible]

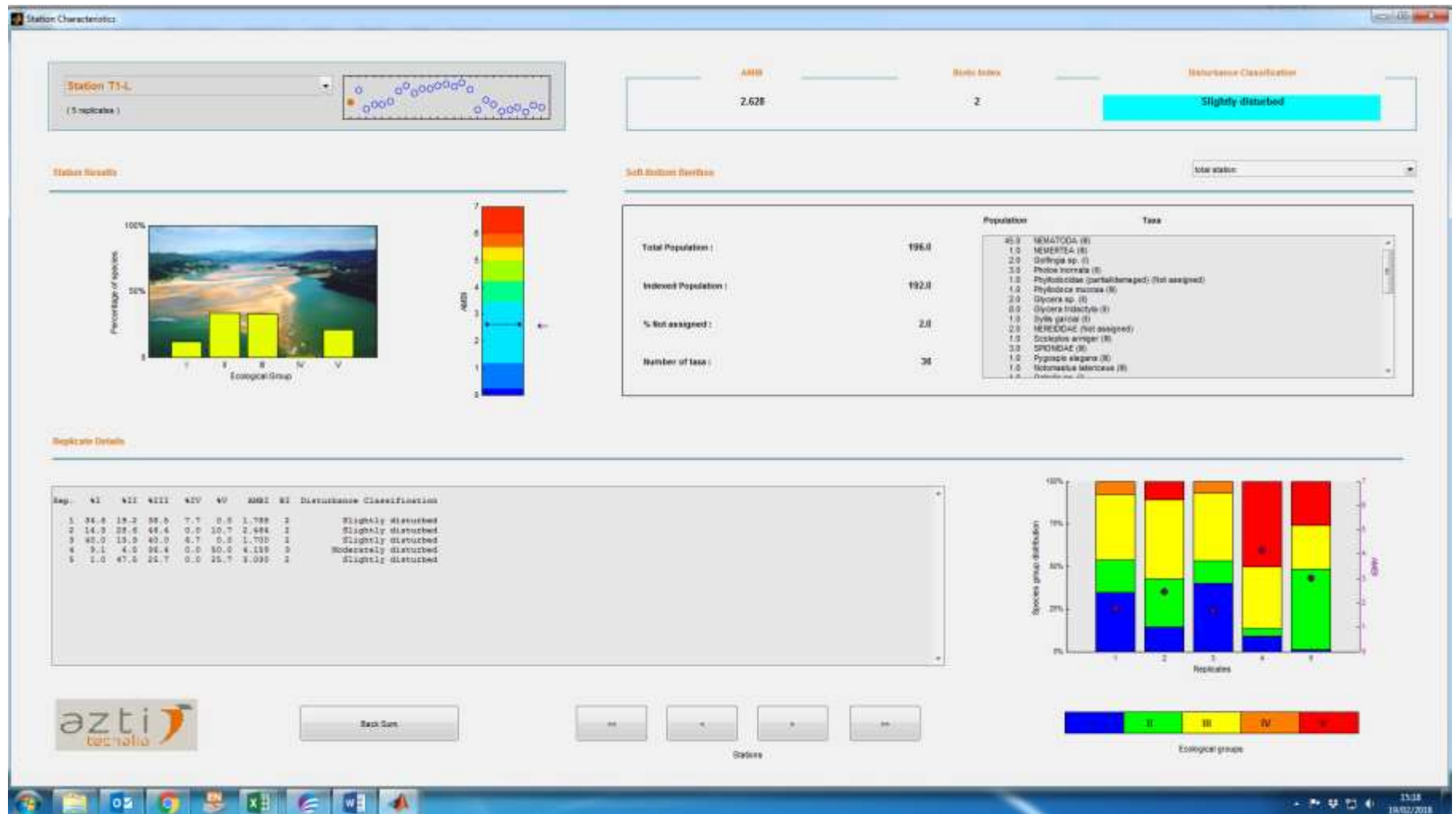
Station	AphlaID	T1	T2	T3	T4 L	T5 L	T6	T16	T41	T42	T50	T51	T52	T53	T54 L	T55	T59 M	T59 L	T60 M	T60	T61	T62	T63	T64	T65	T66
Sphaeromatidae	118277	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Lekanesphaera monodi	118956	0	3	0	0	0	0	2	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	
Janiridae	118258	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Jaera sp. (female)	118364	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	
Idoteidae	118283	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Idotea pelagica	119050	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	
TANAIDACEA	1133	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Tanailidae	798770	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Zeuxo holdichi	416601	0	0	2	4	7	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
CUMACEA	1137	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Bobotrilidae	110378	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Cumopsis goodsir	110465	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	1	2	0	0	
Vaunthompsonia cristata	110467	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	
Bobotria sp. (partial/damaged)	110387	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Bobotria scorioides	110445	1	0	2	1	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Pseudocumatidae	110384	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Pseudocuma sp.	110427	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
DECAPODA	1130	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Palaemonidae	106788	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Palaemon elegans	107614	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	
Palaemon varians	587704	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	
Crangonidae (juv.)	106782	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	
Crangon crangon	107552	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
Crangonidae	106782	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
PAGUROIDEA	106687	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Paguridae	106738	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Pagurus sp. (partial/damaged)	106854	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
Pagurus bernhardus	107232	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	
BRACHYURA	106673	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Polybiidae	557512	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Liocarcinus navigator	107392	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	

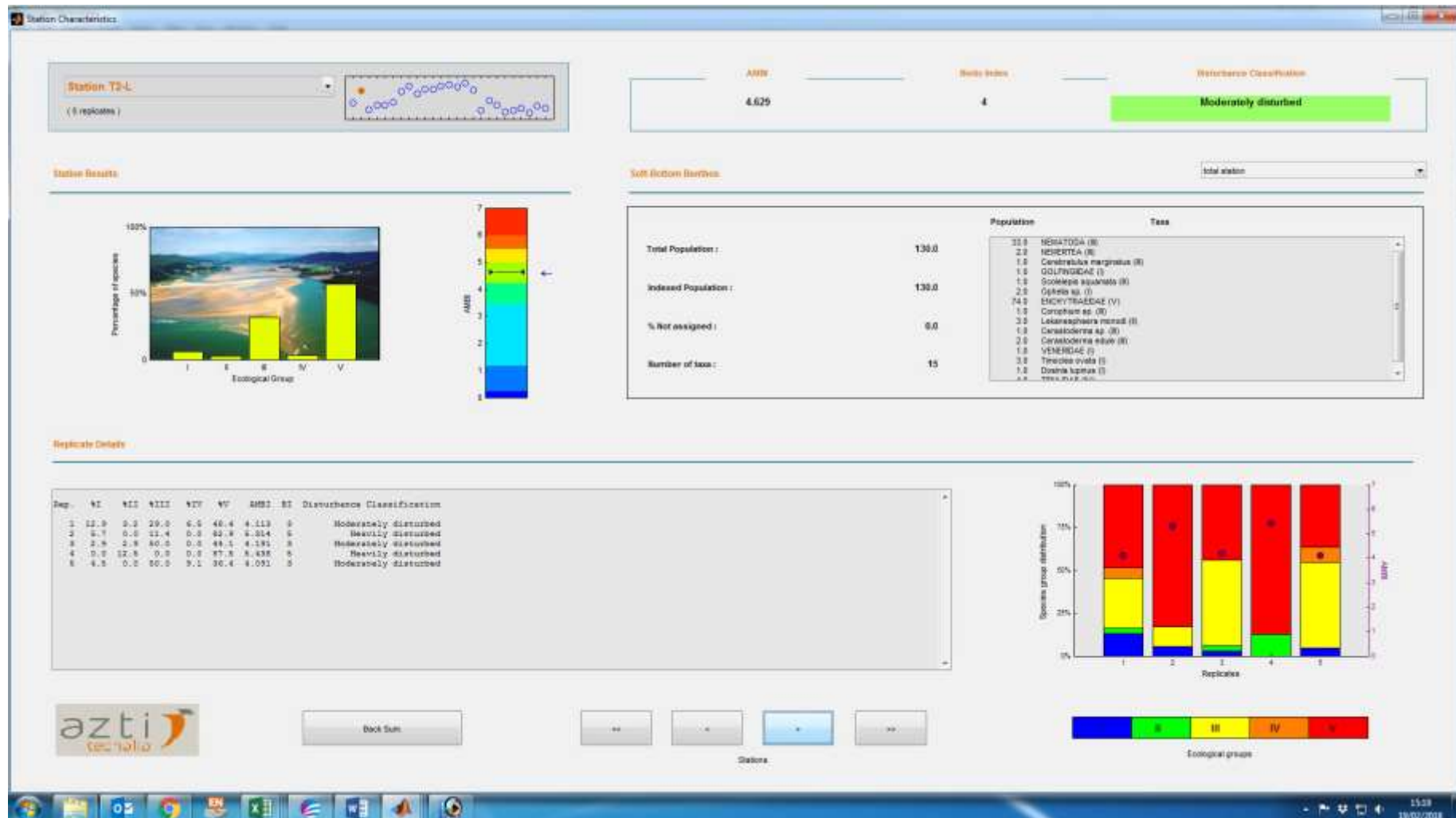
Station	Aphaid	T1	T2	T3	T4 L	T5 L	T6	T16	T41	T42	T50	T51	T52	T53	T54 L	T55	T59 M	T59 L	T60 M	T60 L	T61	T62	T63	T64	T65	T66
Carcinidae	557511	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	107381	2	0	0	1	0	2	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	
Pinnotheridae	106775	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Pinnotheres pisum	107473	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
MOLLUSCA	51	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
POLYPLACOPHORA	55	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
LEPIDOPLEURIDA	58	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Leptochitonidae	59	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Leptochiton cancellatus	140201	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	
CHITONIDA	382003	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Lepidochitonidae	488020	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Lepidochitona cinerea	152774	5	0	6	61	37	15	0	0	0	0	0	0	0	0	0	10	29	15	31	0	0	0	0	0	3
Acanthochitonidae	91	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Acanthochitona crinita	138675	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
GASTROPODA	101	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Lottidae	7173	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Tectura virginea	153552	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	
Cerithiidae	128	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Bittium reticulatum	139054	1	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	4	18	2	3	2	10	0	1	2
LITTORINIMORPHA	382213	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Littorinidae	119	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Littorina fabalis	140261	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Littorina saxatilis	140264	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	
Rissoidae	123	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Rissoa parva	141365	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	
Hydrobiidae	120	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Peringia ulvae	151628	0	0	0	0	0	0	8	0	33	8	23	1	18	367	3	0	0	0	0	0	0	5	0	1	0
Caecidae	126	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Caecum trachea	138957	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Caecum glabrum	138952	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	0	0	0	0	0	0	
Buccinidae	149	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Buccinidae (juv)	149	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

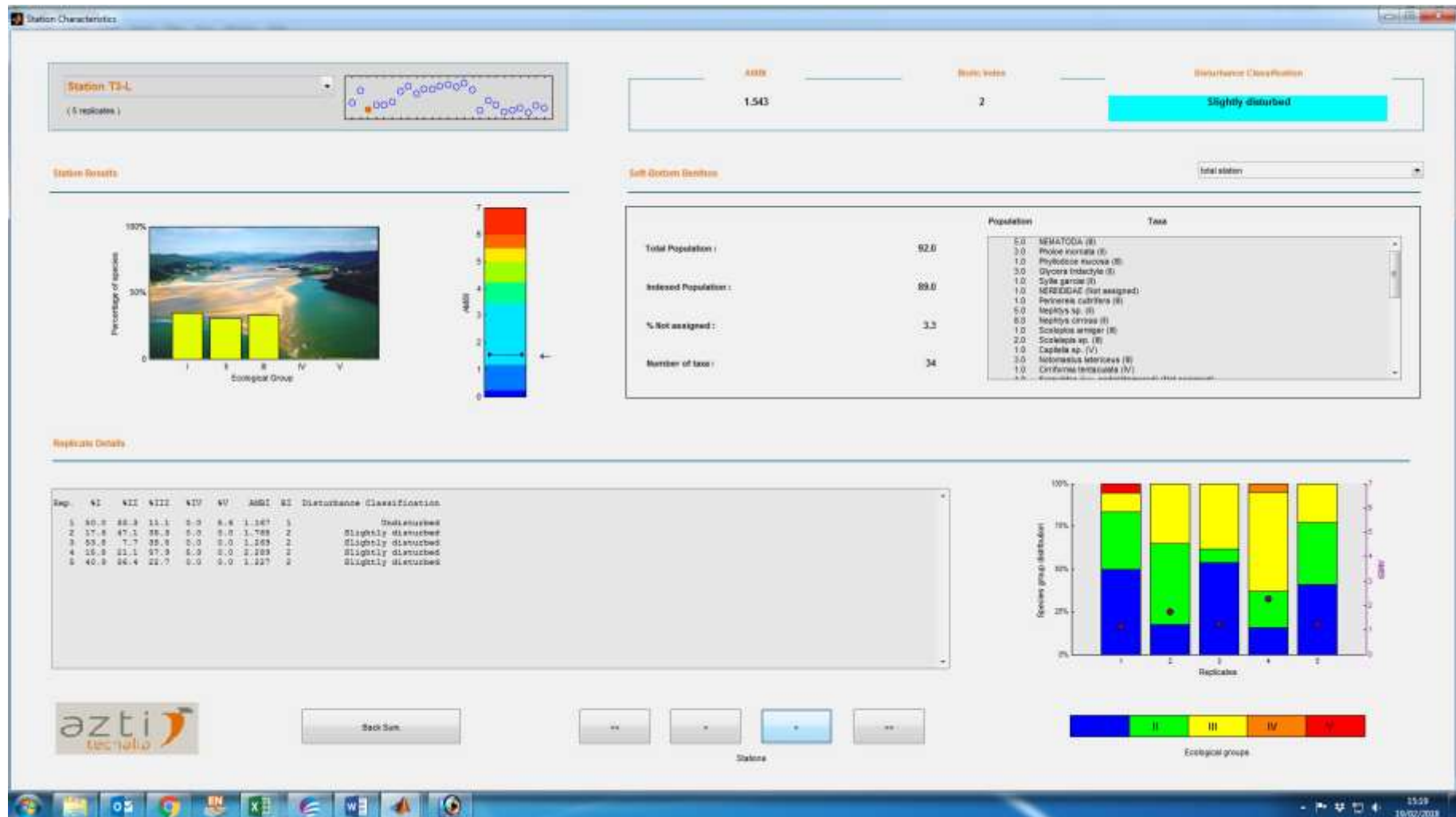
Station	AphidID	T1 L	T2 L	T3 L	T4 L	T5 L	T6 L	T16 L	T41 L	T42 L	T50 L	T51 L	T52 L	T53 L	T54 L	T55 L	T59 M	T59 L	T60 M	T60 L	T61 L	T62 L	T63 L	T64 L	T65 L	T66 L
Montacutidae	225	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Kurtiella bidentata	345281	4	0	2	44	9	25	0	0	1	0	0	0	0	0	0	0	2	5	0	4	9	9	4	11	31
Mactridae	230	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spisula subtruncata	140302	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1	0	0	0	0
CARDITIDA	382256	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Astartidae	228	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Goodallia triangularis	138831	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
CARDIIDA	869602	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cardiidae	229	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cardiidae (juv)	229	0	0	0	0	0	1	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Parvicardium exiguum	139008	0	0	0	2	0	19	0	0	0	0	0	0	0	0	0	0	1	0	2	0	1	1	0	0	0
Parvicardium pinnulatum	181343	0	0	0	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cerastoderma sp. (juv)	137735	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cerastoderma edule	138998	1	2	5	5	1	0	5	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	1	1	0
Cerastoderma glaucum	138999	0	0	0	0	0	0	6	0	0	3	2	0	4	1	1	0	0	0	0	0	0	0	0	0	0
Tellinidae	235	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tellinidae (juv)	235	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	8	13	3	24	0	1	25
Macromangulus tenuis	878470	13	0	12	2	1	5	1	0	0	0	0	0	0	0	0	3	68	0	26	66	37	41	46	49	94
Fabulina fabula	146907	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	8	2	0	0
Asbjornsenia pygmaea	879714	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Limecola balthica	880017	0	0	0	1	0	0	0	1	10	0	0	0	3	12	2	0	0	0	0	0	1	1	1	0	1
Psammobidae	237	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gari tellinella	140873	0	0	0	0	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Semelidae	1781	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Abra sp. (juv)	138474	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Abra alba	141433	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
ADAPEDONTA	869601	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pharidae	23091	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ensis magnus	140731	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VENERIDA	217	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Veneridae	243	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Veneridae (juv)	243	0	1	7	1	1	5	1	0	1	0	0	0	0	0	0	0	0	0	1	7	2	1	2	1	20

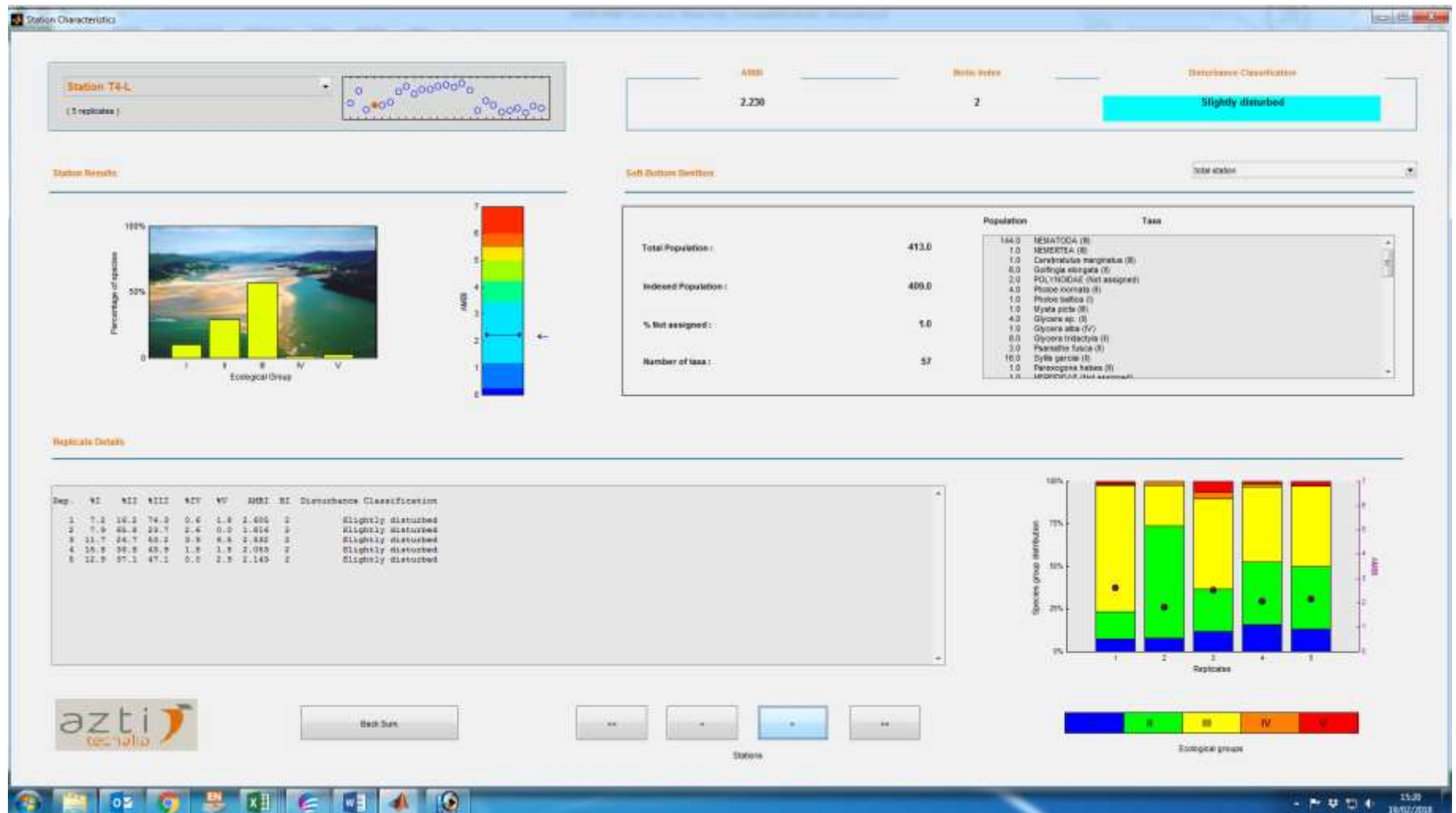
Appendix 8-5

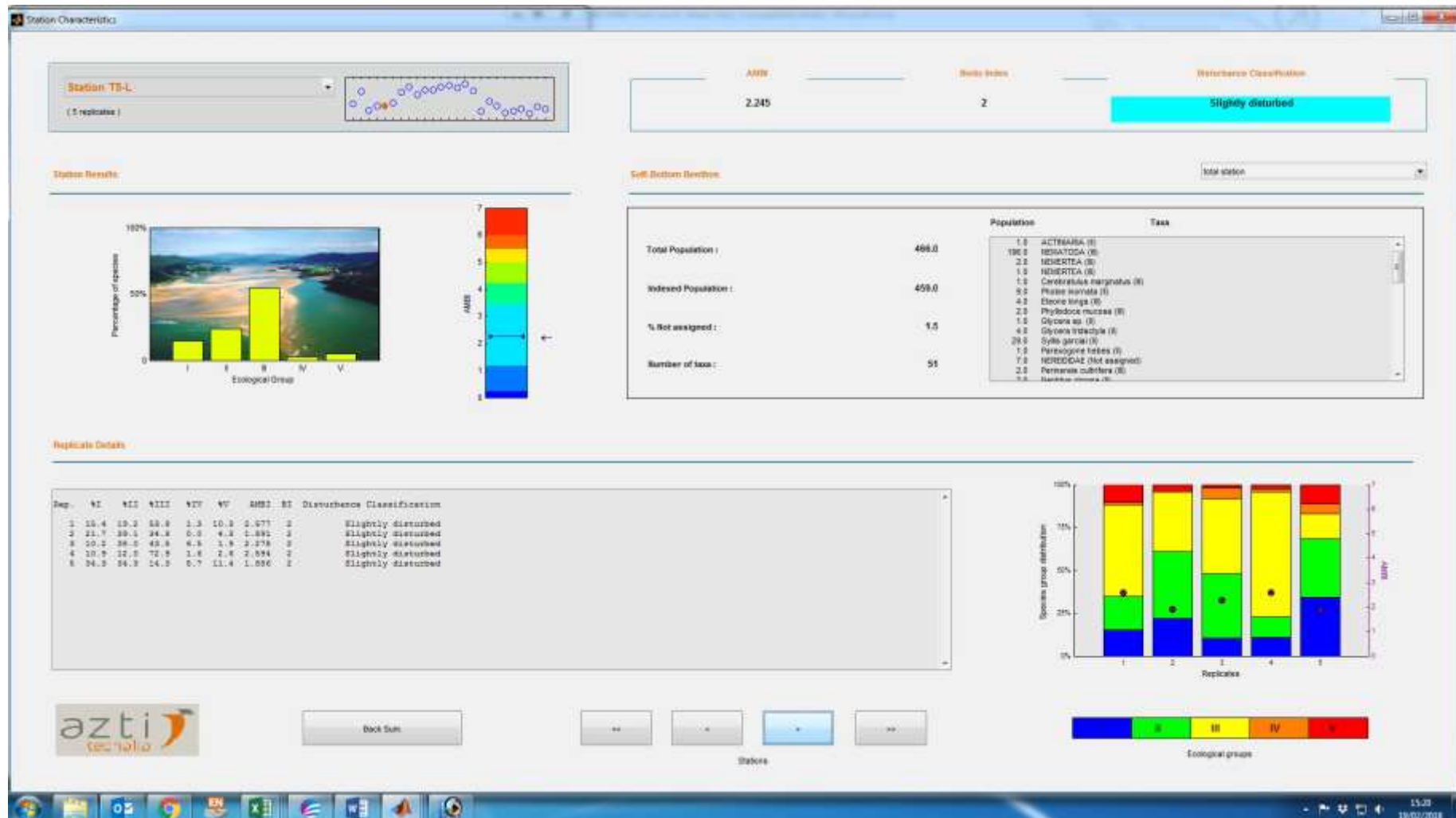
AMBI Results

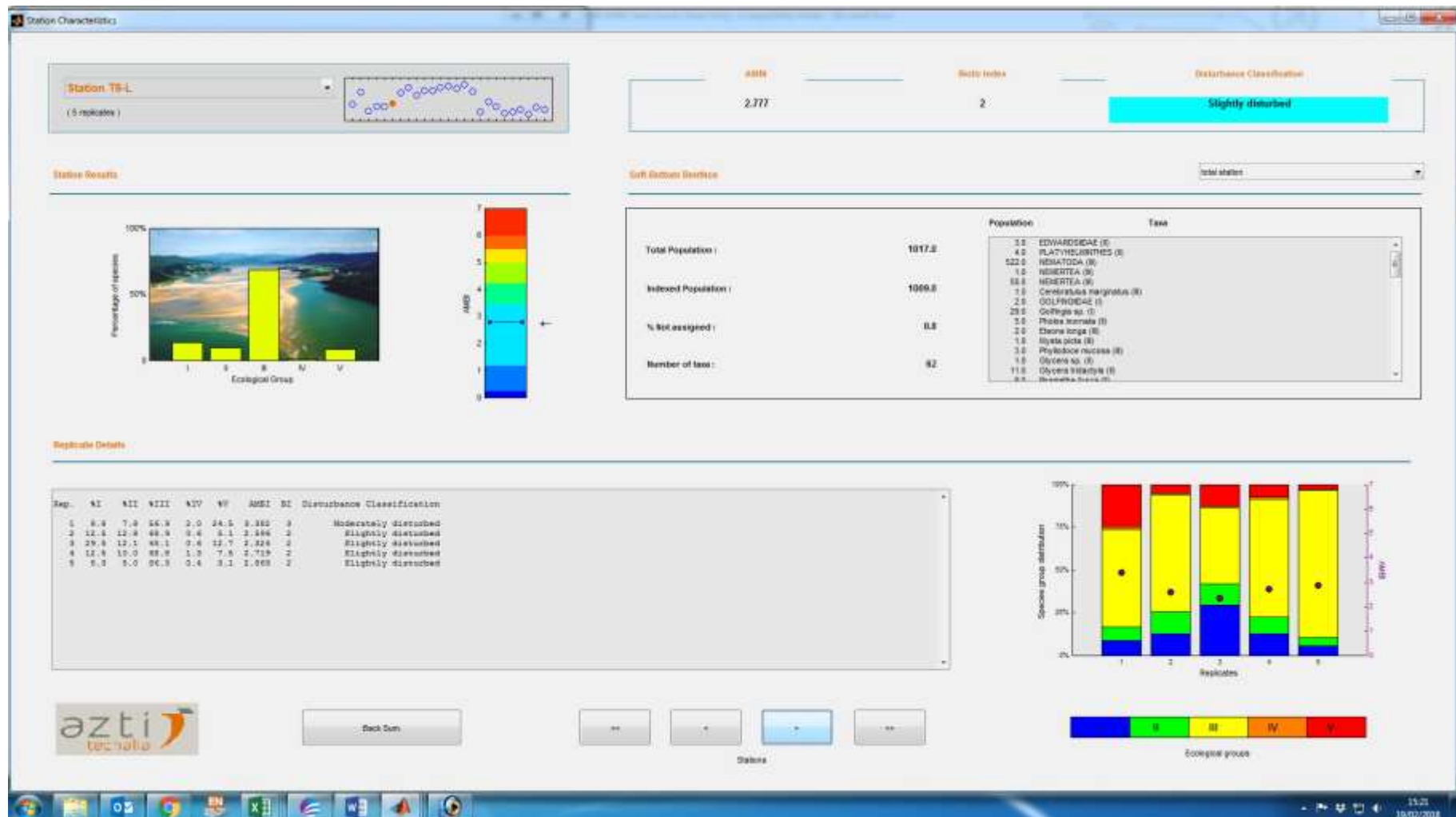




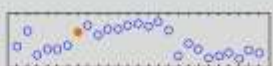








(5 replicates)

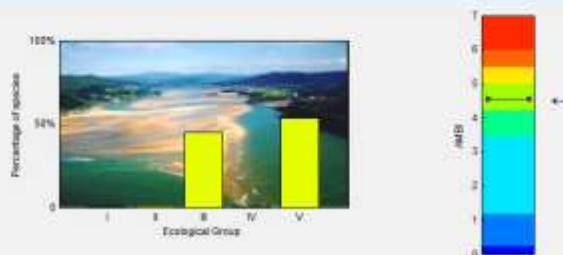


4.538

Moderately disturbed

Moderately disturbed

Statistical Significance



549 Bottoms Hereford

The best solution is:

Number of Soot: 38

17.0 PLATYHELMINTHES (II)

17.0 PLATYHELMINTHES (II)

TS7.0	NEMATODA (N)
3.0	NEMERTEA (N)

8.0 NEMERTEA (R)

1.D Coffey sp. (I)

1.0	<i>Diadema</i> sp. (3)
1.0	<i>Micropterus</i> sp. (3)
2.0	<i>Thalassoma</i> sp. (3)

3.0	<i>Peridroma castaneus</i> (R)
95.0	<i>Pygospio elegans</i> (R)

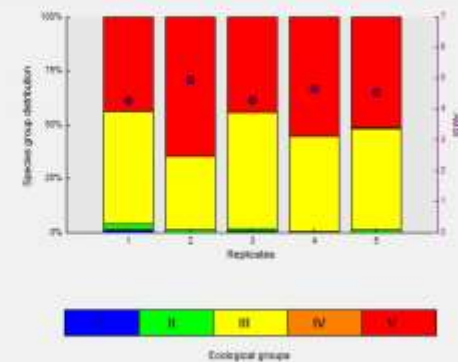
10.0	<i>Medomastus fragile</i> (R)
1.0	<i>Arenicola marina</i> (R)

10	<i>Manayunkia aestuaria</i> (H)
10	<i>Spirontocaris tatarcki</i> (H)

138 Dr. T. de Waard and others

Hydrocarbon Chart 6

Exp.	SE	W1	W11	W2	W2	W3	SE	Survivance Classification
1	1.1	2.7	82.0	0.8	44.0	4.751	3	Moderately disturbed
2	0.0	1.1	39.3	0.0	60.0	4.332	4	Moderately disturbed
3	0.2	1.0	54.4	0.0	44.2	4.200	4	Moderately disturbed
4	0.2	0.8	44.1	0.0	55.7	4.666	4	Moderately disturbed
5	0.0	1.1	46.8	0.8	61.7	4.940	3	Moderately disturbed

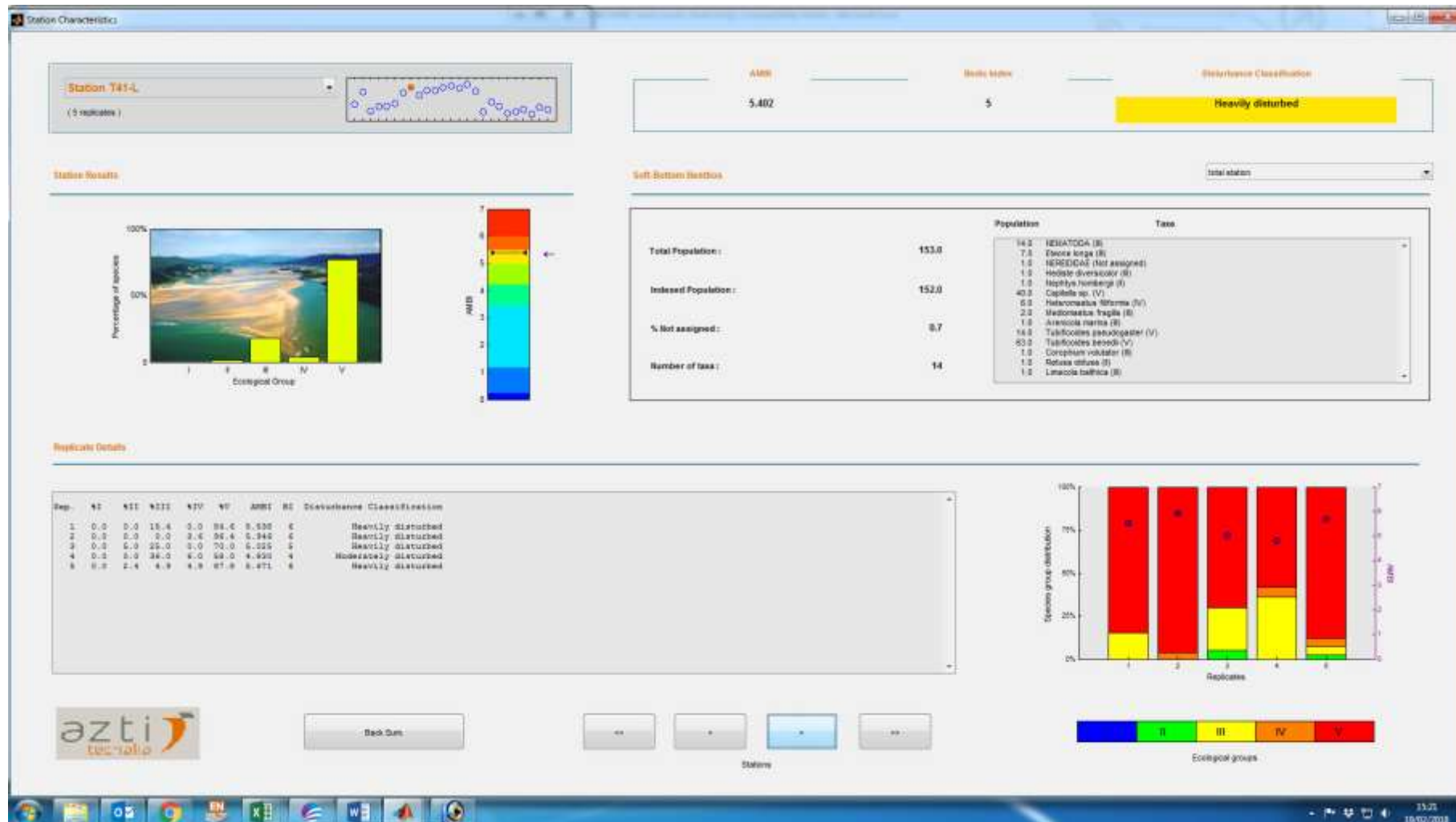
[Back to Top](#)

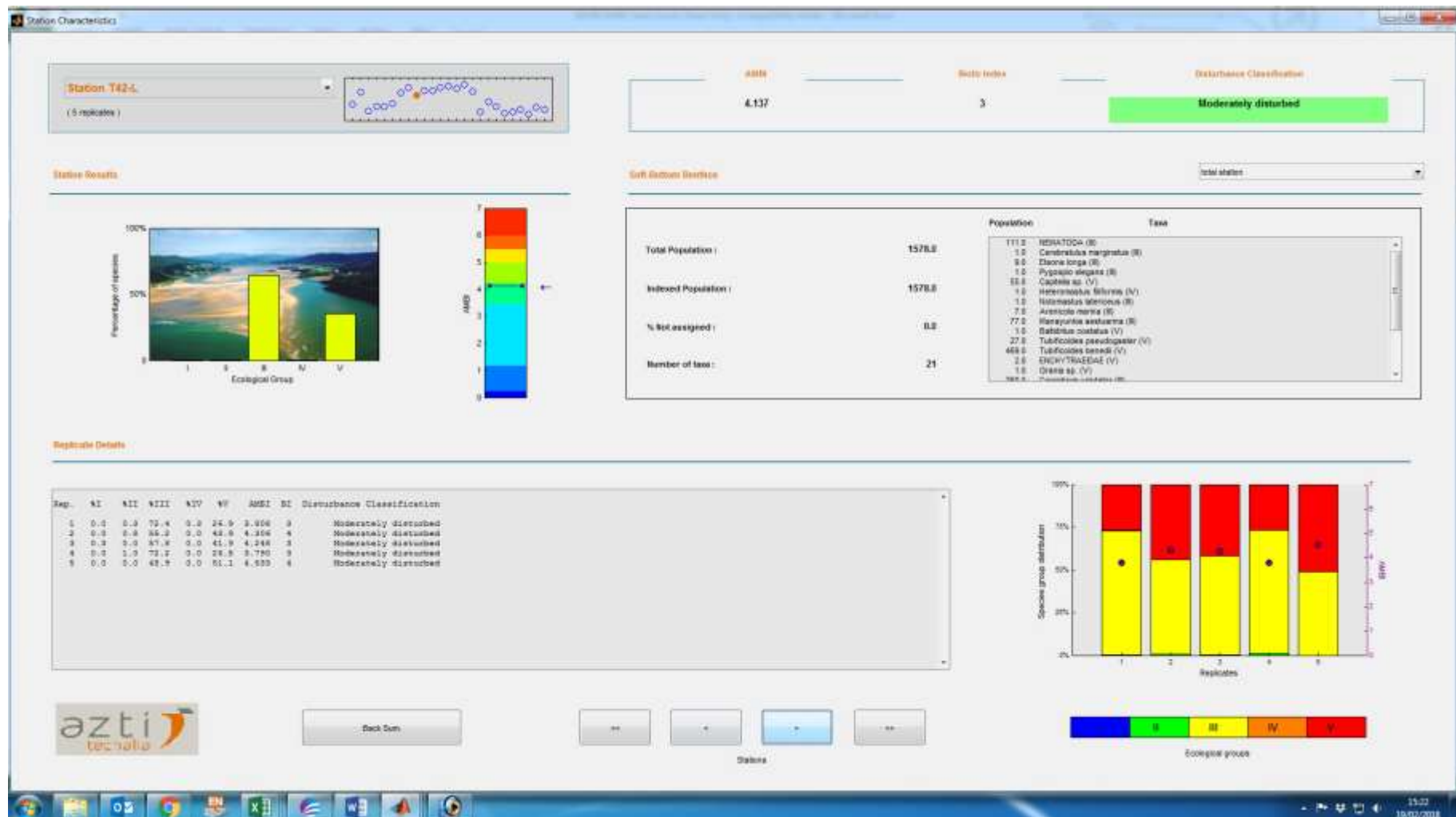
1996

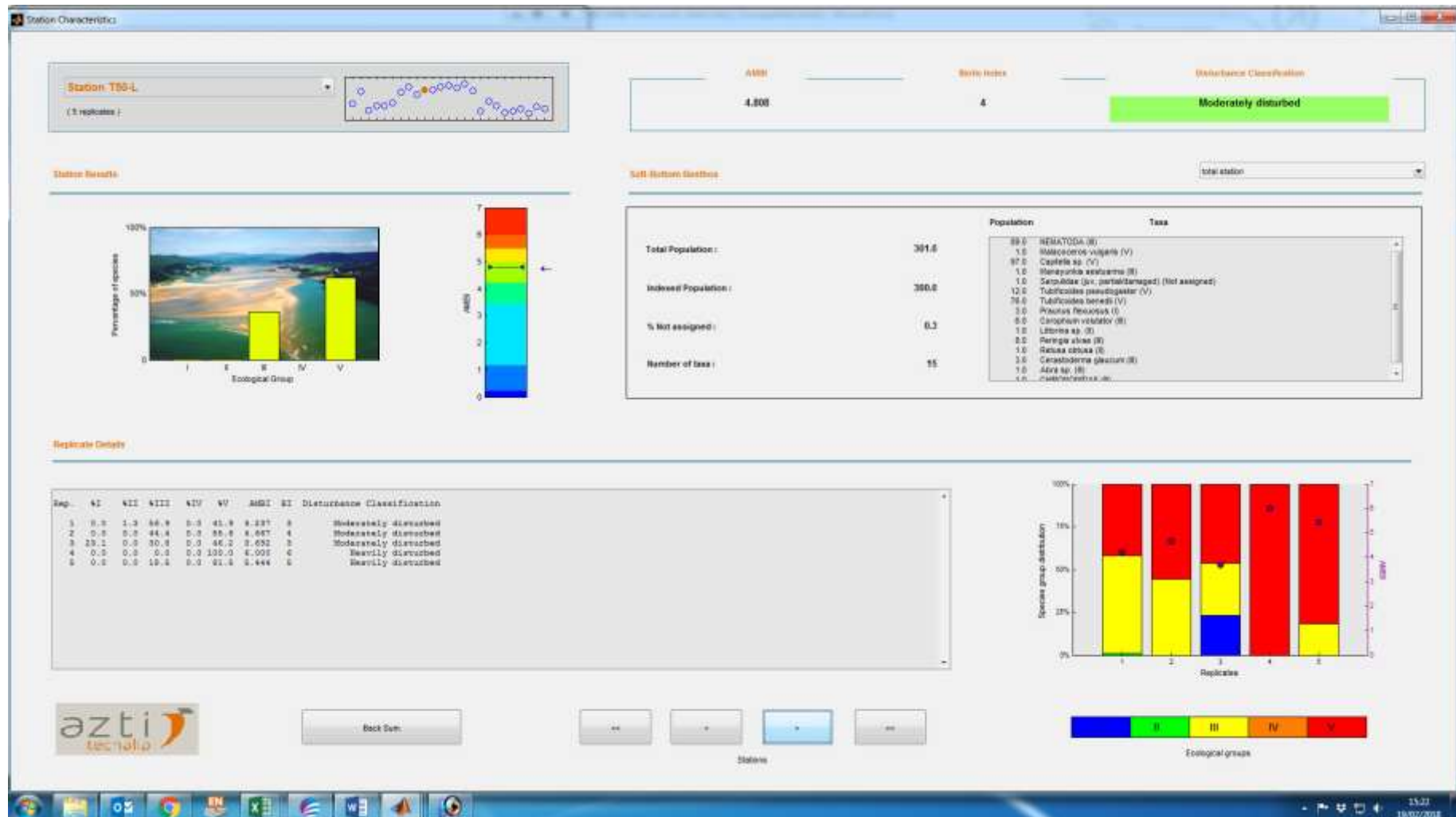
1

1998

Staff Nurse







(5-replication)



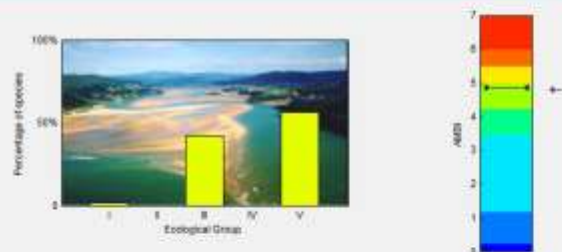
4844

4

Moderately disturbed

Moderately disturbed

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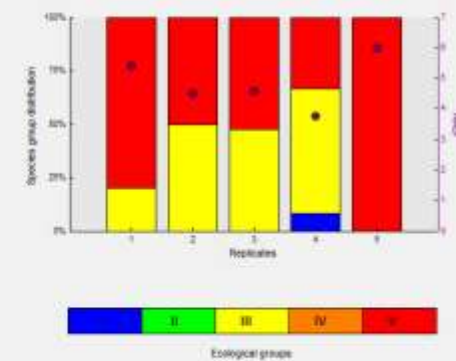
© 2013 Pearson Education, Inc. or its affiliate(s). All rights reserved. Pearson Education, Inc., publishing as Pearson Benjamin Cummings, 101 Philip Drive, Assinippi Park, New York, NY 10984-2135. Printed in the United States of America. This book is published under the name Pearson Education, Inc. or its affiliate(s) in all other countries. All trademarks are the property of their respective owners. Printed in the United States of America. 10 9 8 7 6 5 4 3 2 1

8088 8086

Total Population :	65.0
Indexed Population :	65.0
% Not assigned :	0.0
Number of taxa :	7

Population	
3.0	HEMATO (a) (R)
19.0	Capitella sp. (V)
20.0	Tubificoides benedii (V)
1.0	Corophium volutator (R)
1.0	Paraprionospio elegans (I)
23.0	Perinereis utica (R)
2.0	Cerastoderma glaucum (R)

Exp.	41	411	4111	42V	40	4021	41	Disturbance Classification
1	0.0	0.0	20.0	0.0	90.0	0.000	0	Severely disturbed
2	0.0	0.0	50.0	0.0	50.0	0.000	0	Moderately disturbed
3	0.0	0.0	47.6	0.0	52.4	0.571	4	Moderately disturbed
4	0.0	0.0	68.0	0.0	32.0	0.760	3	Moderately disturbed
5	0.0	0.0	0.0	0.0	100.0	0.000	0	Severely disturbed

[Back to Top](#)

2146

(5-replication)

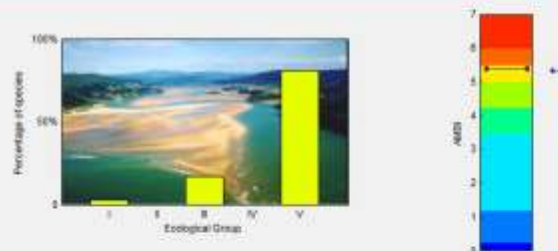


5.383

\$

Heavily disturbed

Heavily disturbed



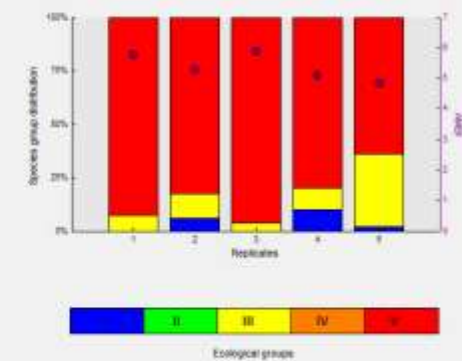
Soal nomor:

Total Population :	129.0
Indexed Population :	129.0
% Not assigned :	0.0
Number of taxa :	11

Time

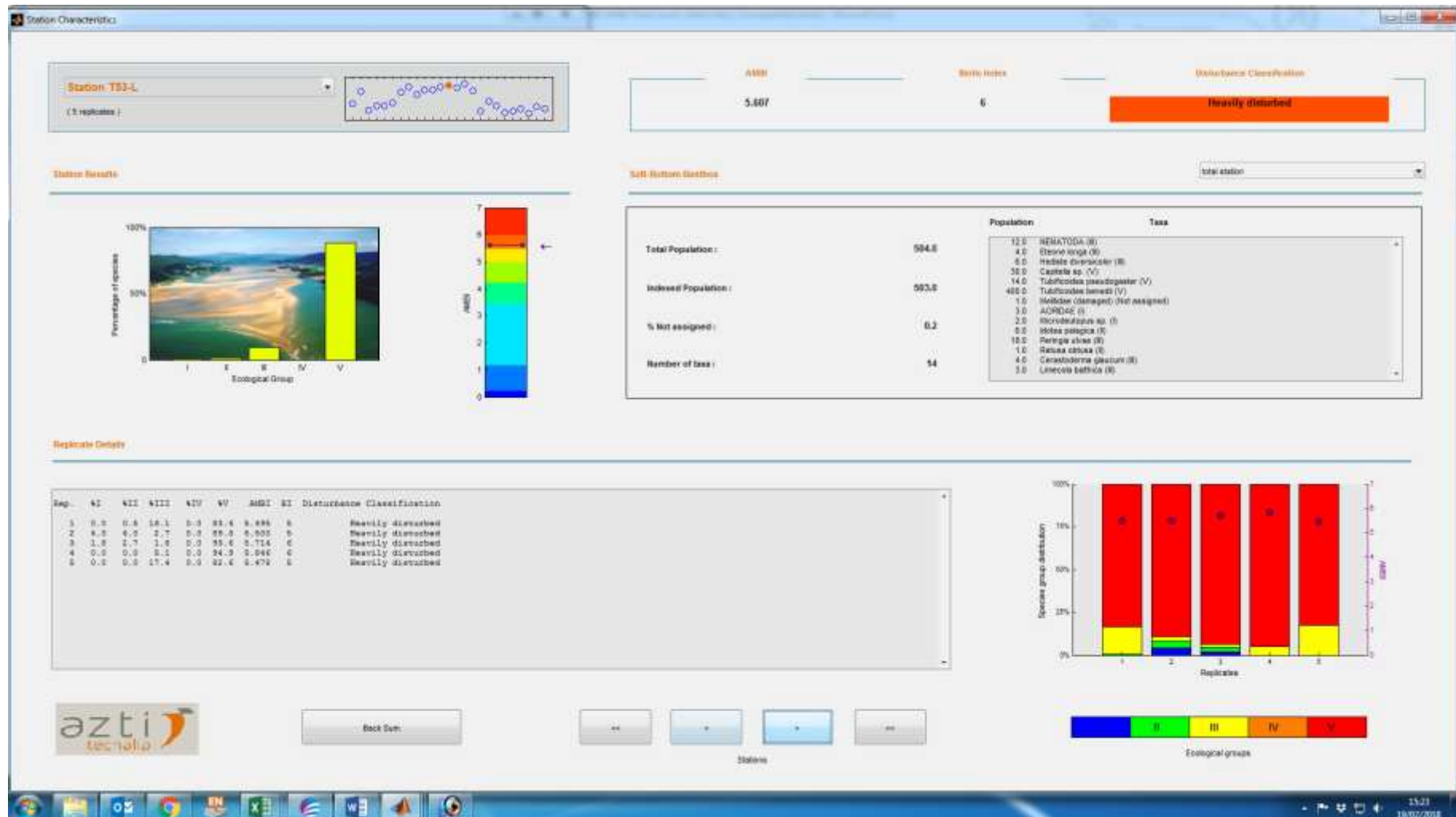
17.8	MEMPHIDAE
2.0	<i>Hedraea diversicornis</i> (H)
81.0	<i>Cacidea</i> sp. (V)
3.9	<i>Tetracodes pseudogaster</i> (V)
2.8	<i>Tetracodes variati</i> (V)
1.0	ELCHYTRAIDAE (V)
1.0	<i>Griaux</i> sp. (V)
2.0	<i>Praon</i> (Scutellid) (I)
2.0	<i>Comptosia volutaria</i> (H)
1.0	<i>Phosoma elegans</i> (I)
1.0	<i>Pemphigus</i> (H)

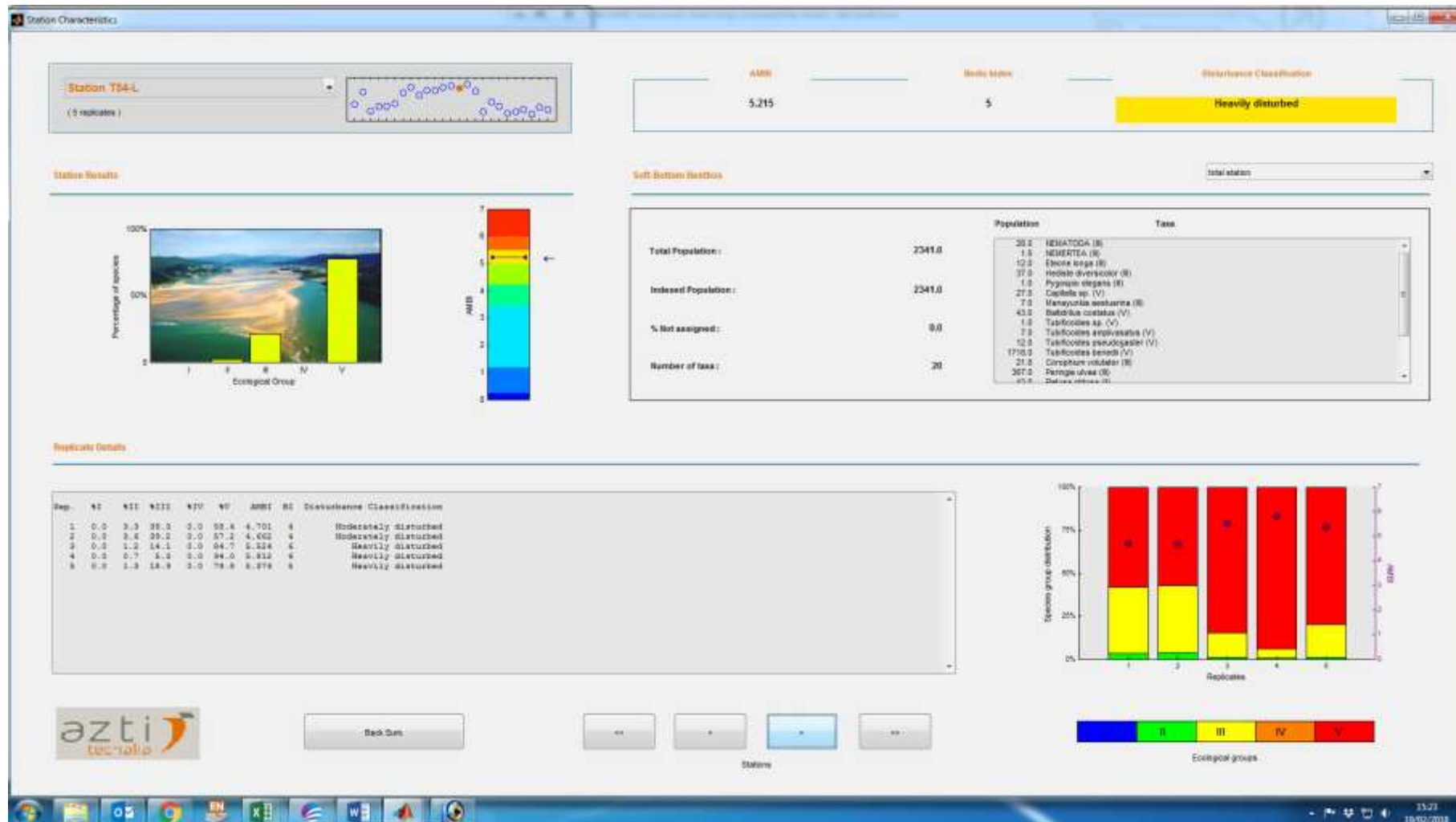
Age	41	42	43	44	45	46	47	48	49	50	51	52	Disturbance Classification
1	8.0	8.0	7.4	0.0	32.8	8.778	4						Severely disturbed
2	8.8	9.0	11.8	0.0	52.4	9.284	5						Severely disturbed
3	9.0	9.0	8.8	0.0	36.4	8.953	6						Severely disturbed
4	10.0	9.0	10.0	0.0	30.0	9.130	5						Severely disturbed
5	7.1	9.0	84.0	0.0	43.8	9.881	4						Moderately disturbed



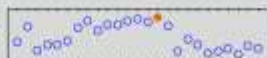
[Back: Sun](#)

Contents





(2. rectification)



Executive Summary

Hilbert & Wagner: 1.7. Moving Offshore

5.003

6

Heavily disturbed

Ergebnis: 56 auf 56.

NOTE: Students: Read this!

total stations



Total Population:

588.0

Indexed Population:

500.0

% Not assigned:

9.0

Number of taxa:

14

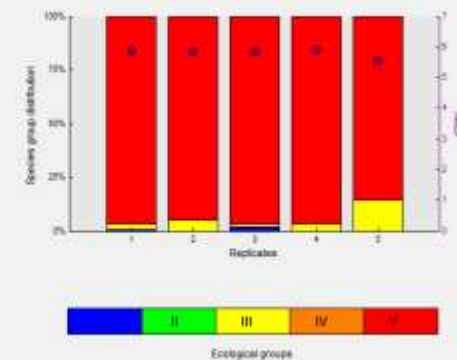
Population

Taxa

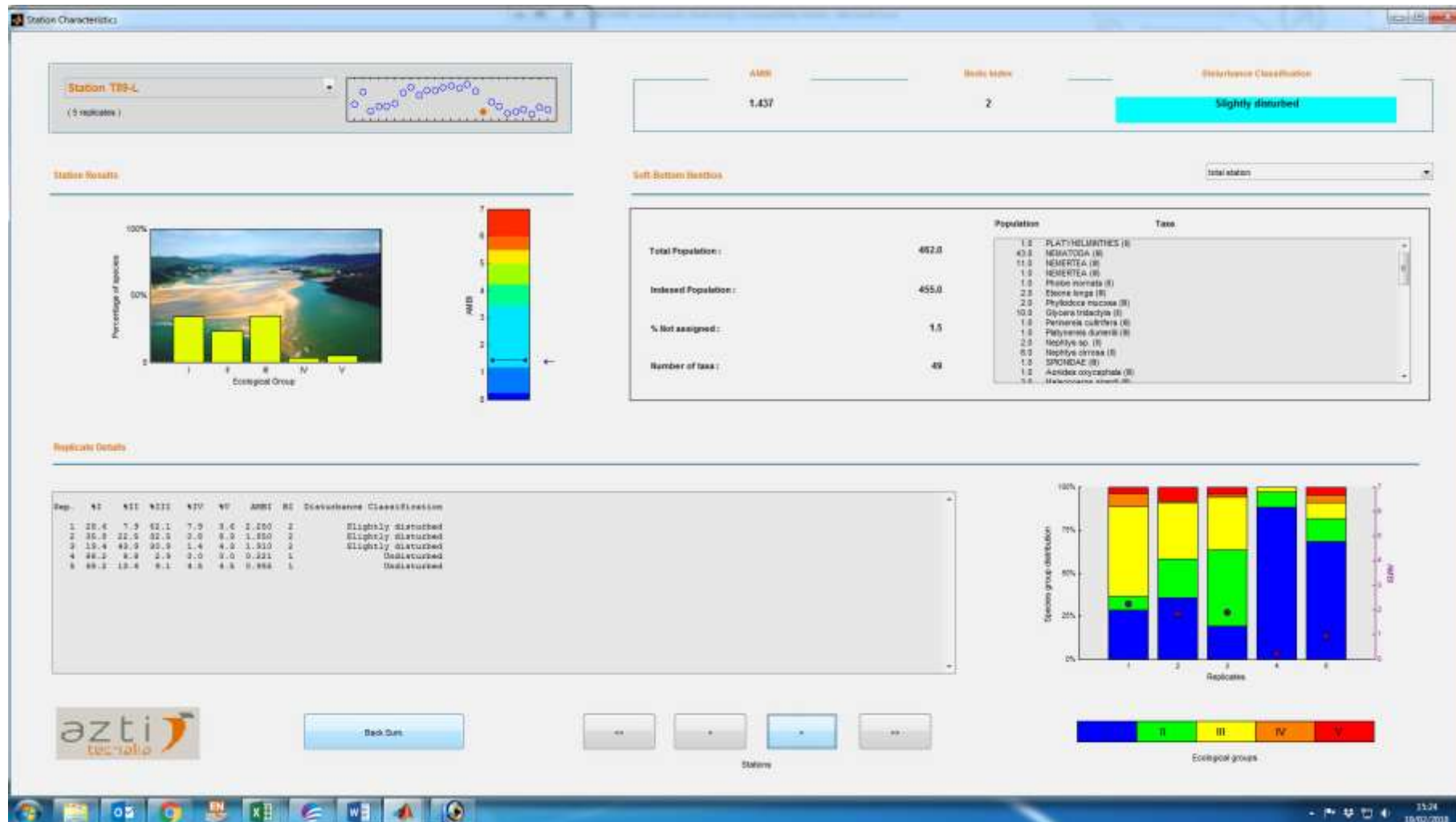
6.0	NEMATODA (8)
2.0	<i>Strongyloides</i> (8)
6.0	<i>Paratuberculosis</i> (8)
40.0	<i>Capitella</i> sp. (V)
30.0	<i>Marangyenia nebulosa</i> (8)
3.0	<i>Bathynellus costatus</i> (V)
30.0	<i>Tubificoides pseudogaster</i> (V)
476.0	<i>Typhlocyba borealis</i> (V)
2.0	AOREAE (5)
3.0	<i>Ceraphron volutator</i> (8)
1.0	<i>Pezomachus varians</i> (5)
3.0	<i>Pimpla</i> sp. (8)
1.0	<i>Ceratostoma glaucum</i> (8)
2.0	<i>Urocyba latifolia</i> (8)

Maplestar Contacts

Exp.	W1	W2	W3	W4	W5	ASD1	SI	Disturbance Classification
1	0.8	0.3	2.8	0.3	96.7	0.378	8	Heavily disturbed
2	0.8	0.3	0.7	0.2	94.8	0.343	6	Heavily disturbed
3	1.2	0.3	2.1	0.2	97.8	0.337	6	Heavily disturbed
4	0.8	0.3	2.3	0.2	96.5	0.334	6	Heavily disturbed
5	0.3	0.3	14.3	0.2	85.6	0.265	6	Heavily disturbed

[Back To Top](#)

2009-10-26 10:00:00



(*S. reissmannii*)



Planning Worksheet

4775

4

Hilbert & Wagner: 1.7 Money #1 (continued)

Moderately disturbed

Ergebnis: 56 auf 56.



NOTE: Students should be able to identify the following:

total stations

Total Population :

505.1

Indexed Population :

509.0

% Not assigned :

12

Number of taxa:

41

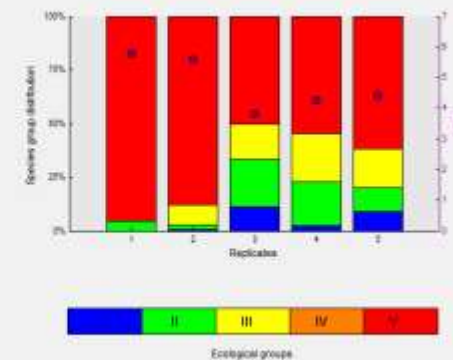
Population

Taxa

1.0	Ecdarisia capensis (E)
1.0	PLATYHELMINTHES (H)
20.0	NEMATODA (E)
4.0	SEMERIA (E)
1.0	SEMERIA (E)
1.0	Pisces noronae (E)
2.0	Polychaete mucosa (E)
11.0	Glycera laticauda (E)
1.0	Oncaria maculata (E)
1.0	Caecilia bonariensis (E)
1.0	Chirostylus variabilis (E)
1.0	Penaeus habes (E)
1.0	Penaeus subtilis (E)
1.0	Leptochela cincta (E)
1.0	Isopoda bonariensis (E)

Maplestar Contacts

Exp.	W1	W2	W3	W4	W5	W6	W7	W8	Disturbance Classification
1	0.2	4.8	0.3	2.3	86.2	0.782	0		Slightly disturbed
2	0.8	2.3	9.8	5.0	87.7	0.679	0		Slightly disturbed
3	11.1	21.2	16.7	0.0	80.0	0.393	3		Moderately disturbed
4	1.3	20.5	21.7	0.0	94.8	0.261	3		Moderately disturbed
5	9.1	10.3	18.2	0.0	41.0	0.419	4		Moderately disturbed



Back Sum:

Strong belief in

(*S. recticollis*)

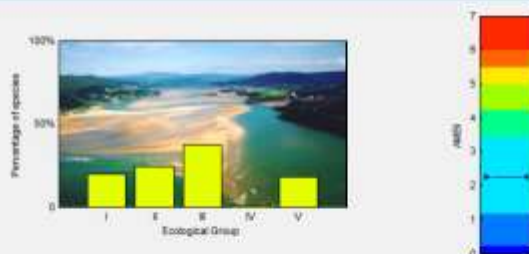


2.267

2

Slightly disturbed

U. Hoffmann: *Die Kunst des...*



Unit 11: Effective Communication

total stations

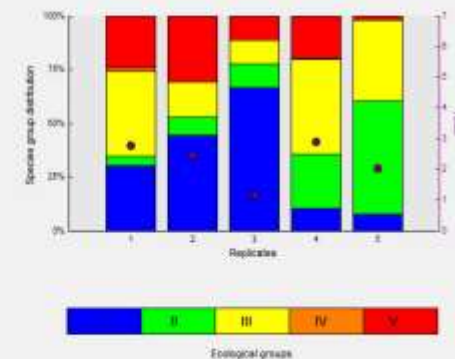
Total Population :	347.8
Indexed Population :	332.0
% Not assigned :	4.3
Number of taxa :	96

Time

74.9	HEMATODA (8)
11.0	REMERITA (6)
3.0	Proct. variata (8)
1.0	Proct. taenia (8)
	Phylodocidae (partially damaged) (Not assigned)
	Ocenebridae (8)
2.0	Phylodocae murex (8)
3.0	Ocenebr. sp. (8)
1.0	Glycyca trioculata (8)
1.0	Glycyca nodulosa (8)
1.0	Strophocentrus variabilis (8)
1.0	Peromyscus californicus (8)
14.0	Myrmica ruginodis (8)
1.0	Myrmica sp. (8)
1.0	Myrmica sp. (8)

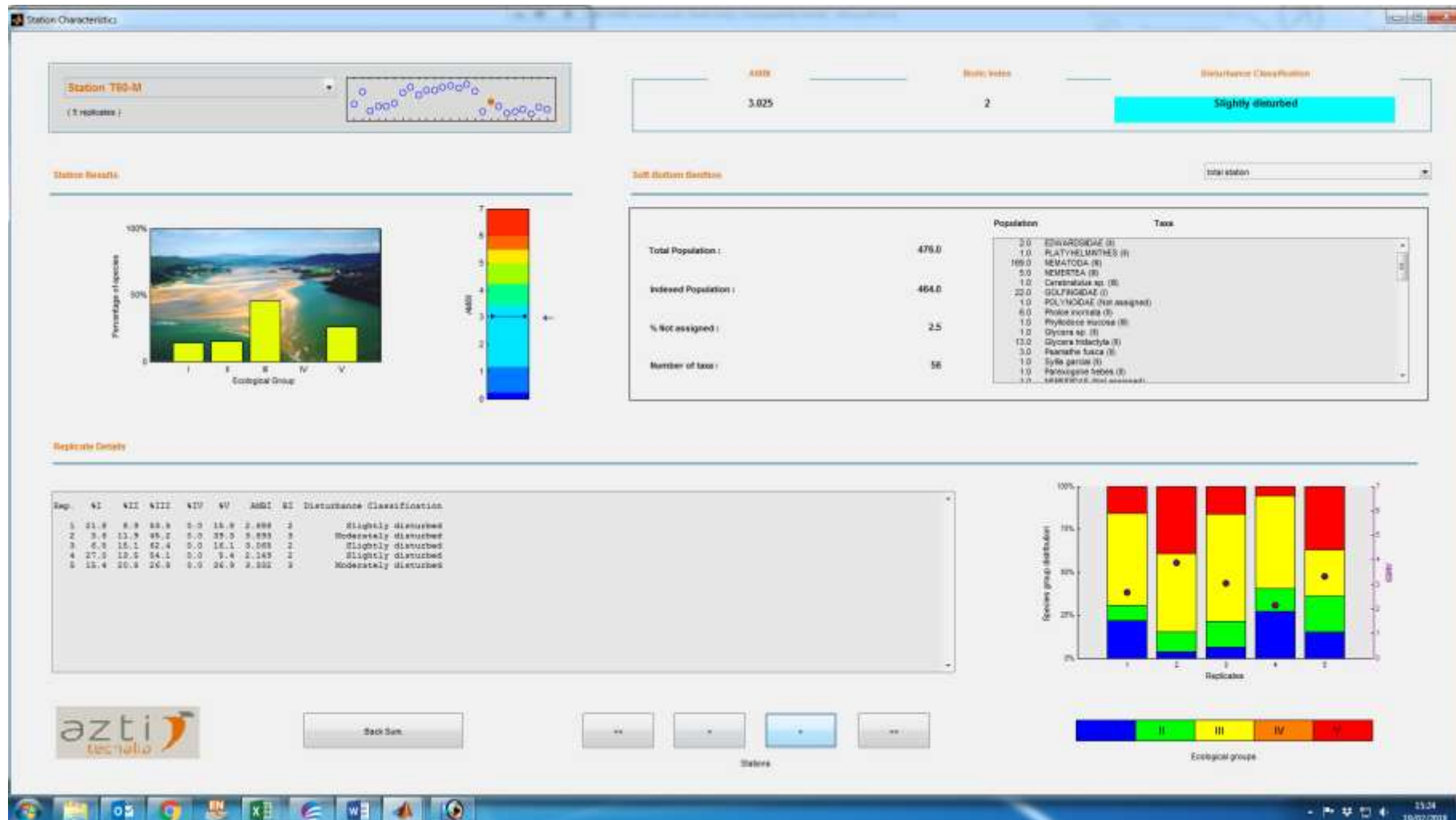
Regenerative Dietetics

Tag	W	WII	WIII	WIV	WV	WVI	W	Disturbance Classification
1	30.4	4.3	30.1	2.2	23.9	2.772	2	Slightly disturbed
2	44.8	9.3	16.7	5.3	35.4	2.459	2	Slightly disturbed
3	66.7	11.1	11.1	9.0	12.1	1.167	1	Undisturbed
4	10.6	20.1	44.1	0.6	19.4	2.899	2	Slightly disturbed
5	7.5	22.8	37.7	0.0	1.9	0.093	2	Slightly disturbed

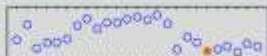


Back Turn:

References



(9 replicates)



Left: Brian Hastings



1.150

1

Charakteristisches

tested substances
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2110

207.0

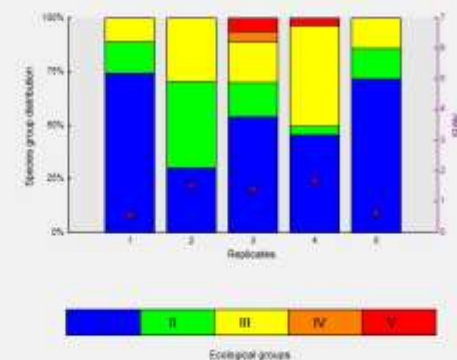
28

48

Taxo

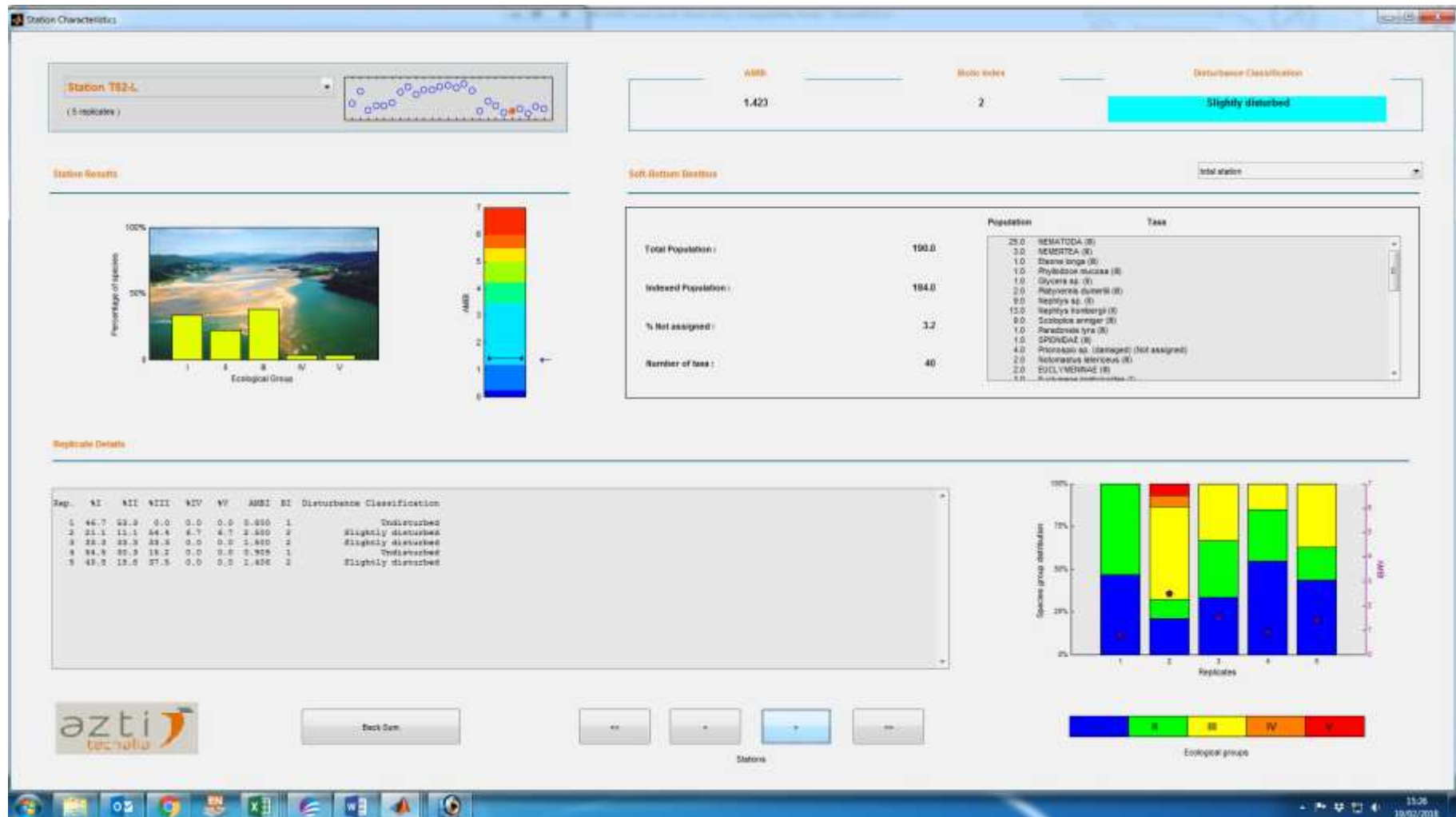
15.2 NEMATODA (8)
3.0 NEMATEA (6)
1.0 GLYPHIDAE (2)
3.0 *Oenone levis* (2)
3.0 *Phyllocolpa mucicola* (8)
1.0 *Glycine* sp. (8)
1.0 *Enagronas* (damaged) (Not assigned)
1.0 *Parnopone helios* (3)
0.0 *Nephtys* sp. (6)
4.0 *Nephtys cirrosa* (8)
4.0 *Nephtys hombergi* (8)
1.0 *EURICAE* (6)
2.0 *Scotopelia avenger* (8)
3.0 *Decapoda* cox 2 (14)
3.0 *Dissipatus* sp. (damaged) (Not assigned)

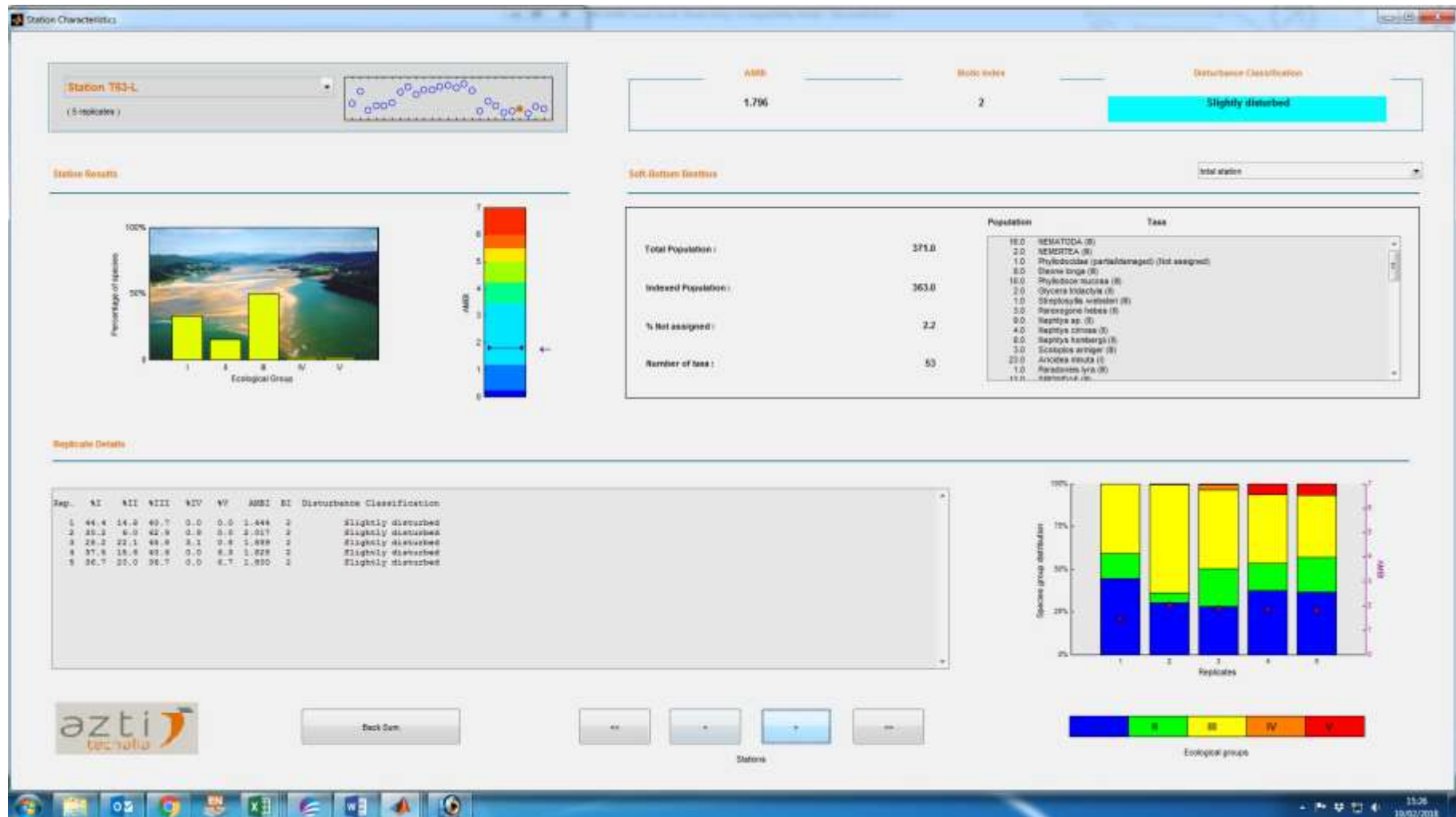
Rep.	WT	WII	WIII	WIV	WV	WVI	W7	Disturbance Classification
1	74.1	14.8	11.1	3.0	0.0	0.868	1	Undisturbed
2	39.3	48.0	30.0	3.0	0.0	1.500	2	Slightly disturbed
3	54.2	15.9	19.0	4.0	4.2	1.400	2	Slightly disturbed
4	45.4	3.8	46.8	3.0	2.8	1.260	2	Slightly disturbed
5	71.4	13.4	14.2	3.0	0.0	0.842	1	Undisturbed

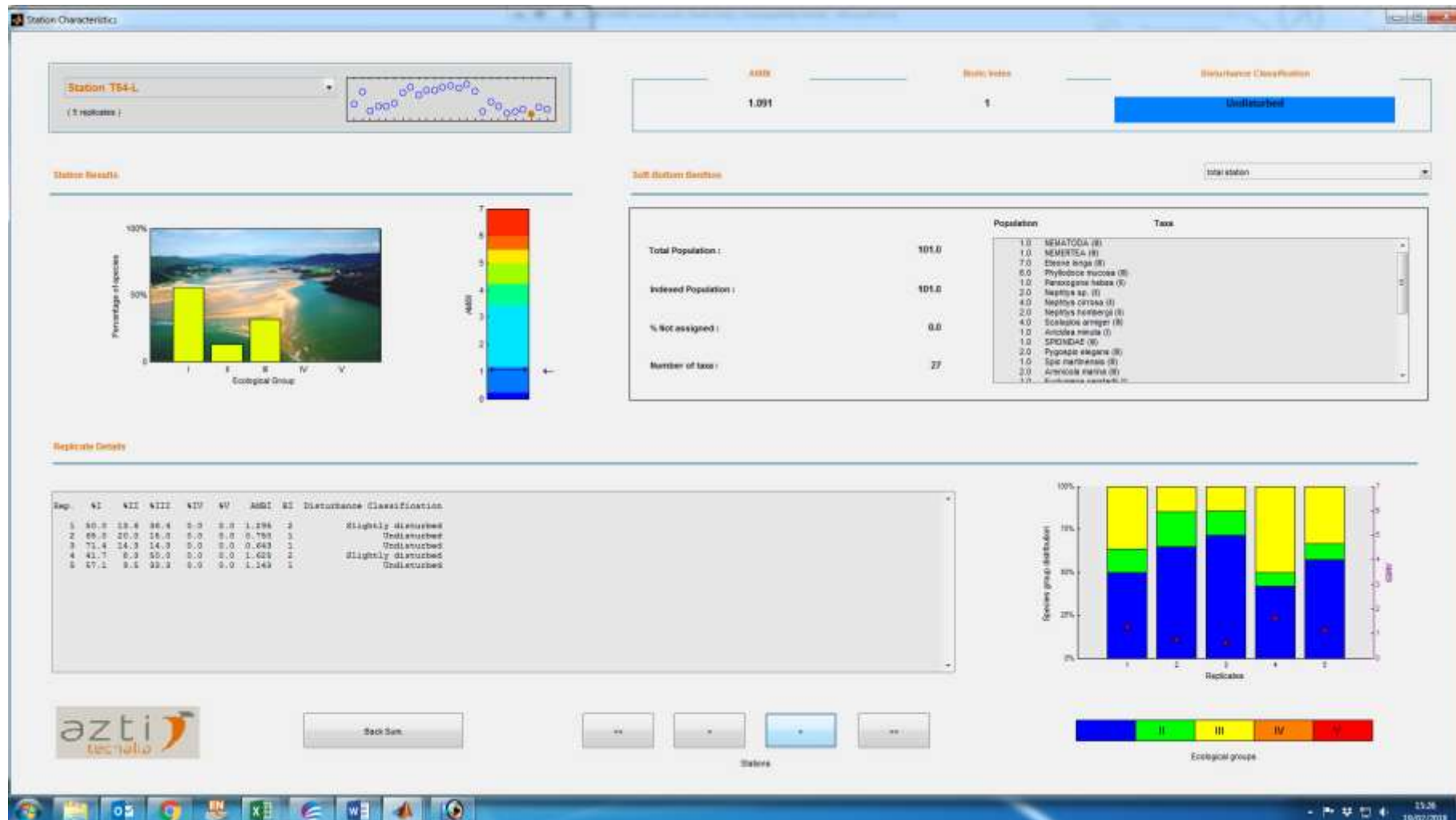


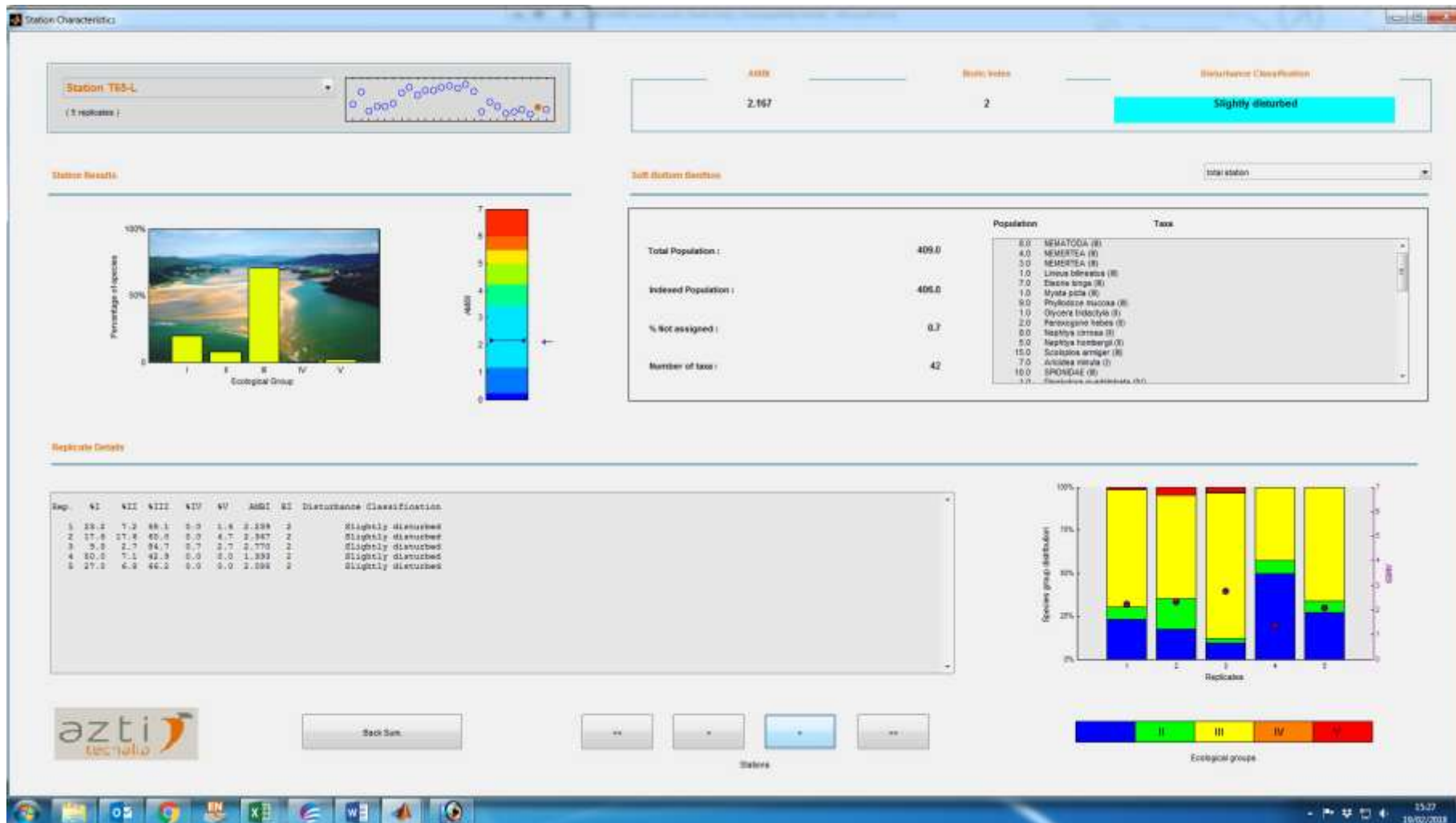
Back Cover

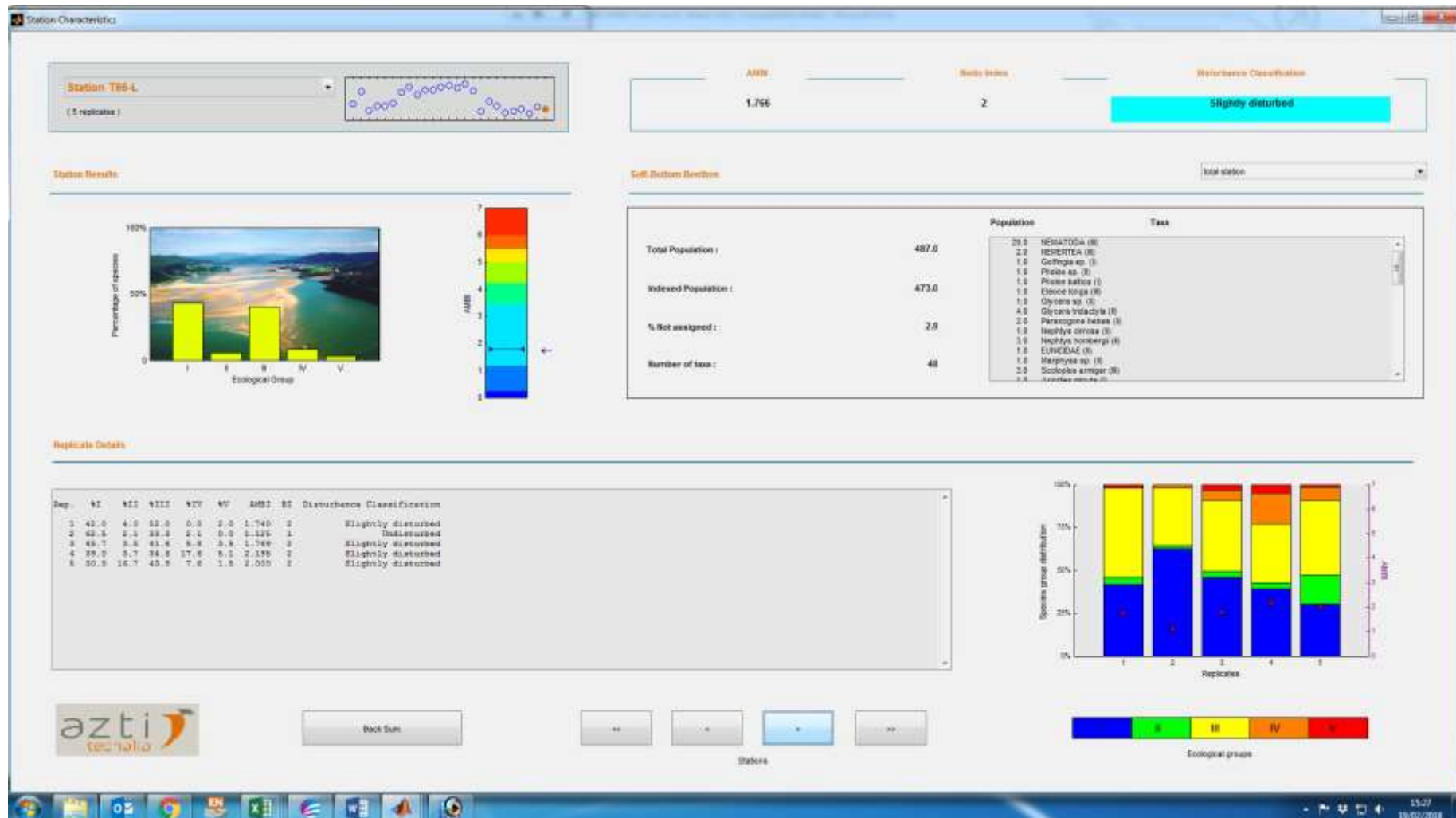
Platform











Stations Distribution

