

23 February 2018



Marlborough District Council  
PO Box 443  
Blenheim 7240  
Attn: Peter Johnson

Landmark Lile Ltd  
PO Box 443  
Blenheim 7240  
New Zealand  
Email: [info@landmarklile.co.nz](mailto:info@landmarklile.co.nz)  
Phone: 06 348 1111  
Fax: 06 348 1112

Dear Peter

**Resource Consent Application U170080 – Marine Farm Symonds Hill, Squally Cove, Croisilles Harbour.**

Please find enclosed to this letter a revised set of application plans for consent U170080. The plans included are:

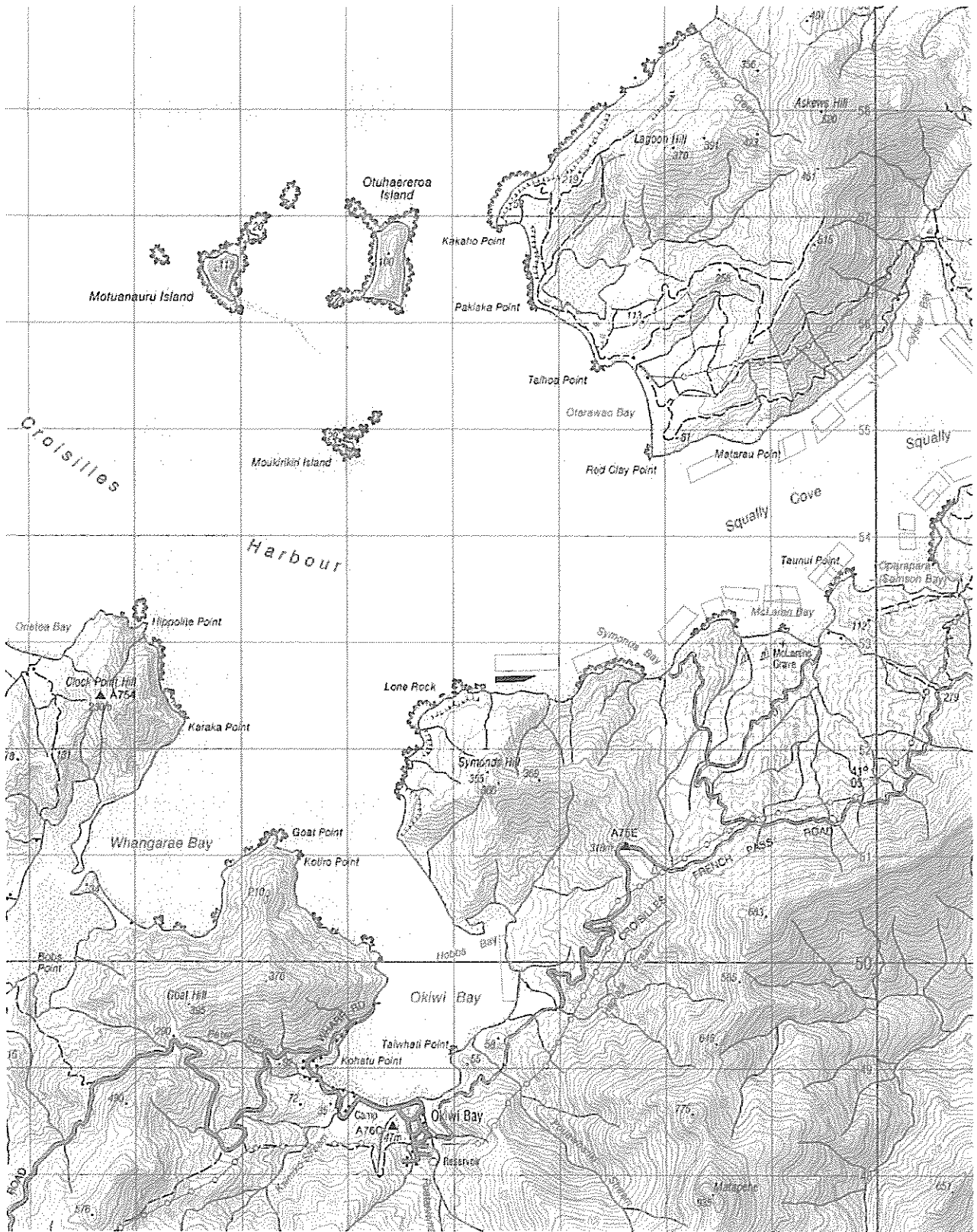
- Amended Layout Plan (dated 22 February 2018)
- Amended Site Plan (dated 22 February 2018)
- Landscape Overlay (dated 22 February 2018)
- Locality Map (dated 22 February 2018).

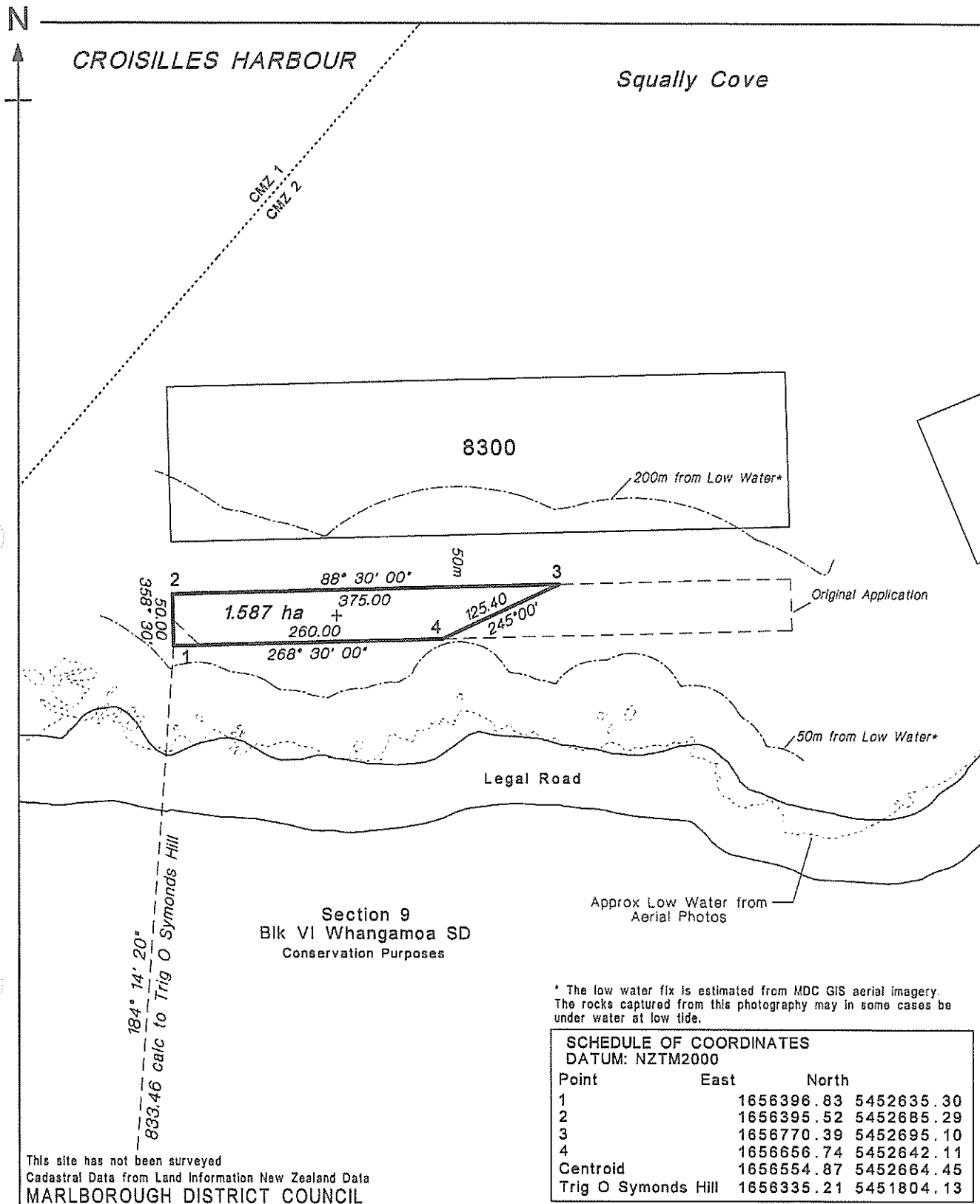
The reason for the updated plans is to reconfigure the area of the proposed marine farm to avoid the Area of Outstanding Landscape which is identified in the landscape overlay plan included within the attachments.

The amended application also seeks to alter the proposed duration to 20 years. It has been confirmed by Mr. Peter Johnson that this change can be made without the need to re-notify the resource consent application.

Please contact me if you have any queries.

Jeremy Butler  
**Landmark Lile Limited**  
*Resource Management Consultancy*





# **Proposed Coastal Permit** Amended 22 Feb 2018 *Squally Cove - Croisilles Harbour*

Prepared by  
Draughting Plus Ltd  
22 February 2018

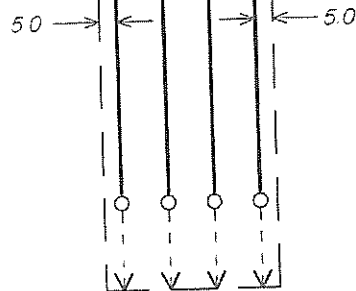
SCALE 1:5,000  
50 0 100 200 300 400 500 metres

MF\_2490c

N

CROISILLES HARBOUR

Squally Cove



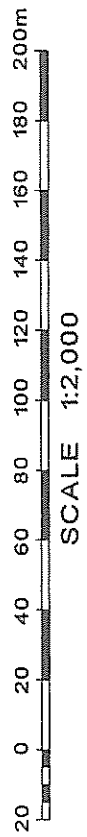
Amended 22 Feb 2018

NOTE: Longline Spacing = 13.33m  
Total Longlines = 4  
Warps = 25m  
Backbone Length = as shown  
Total Backbone Length = 1069m

REFERENCE

- Orange Float
- < Anchors
- Anchor Warp (32mm Rope)
- Backbone (24-28mm Rope)

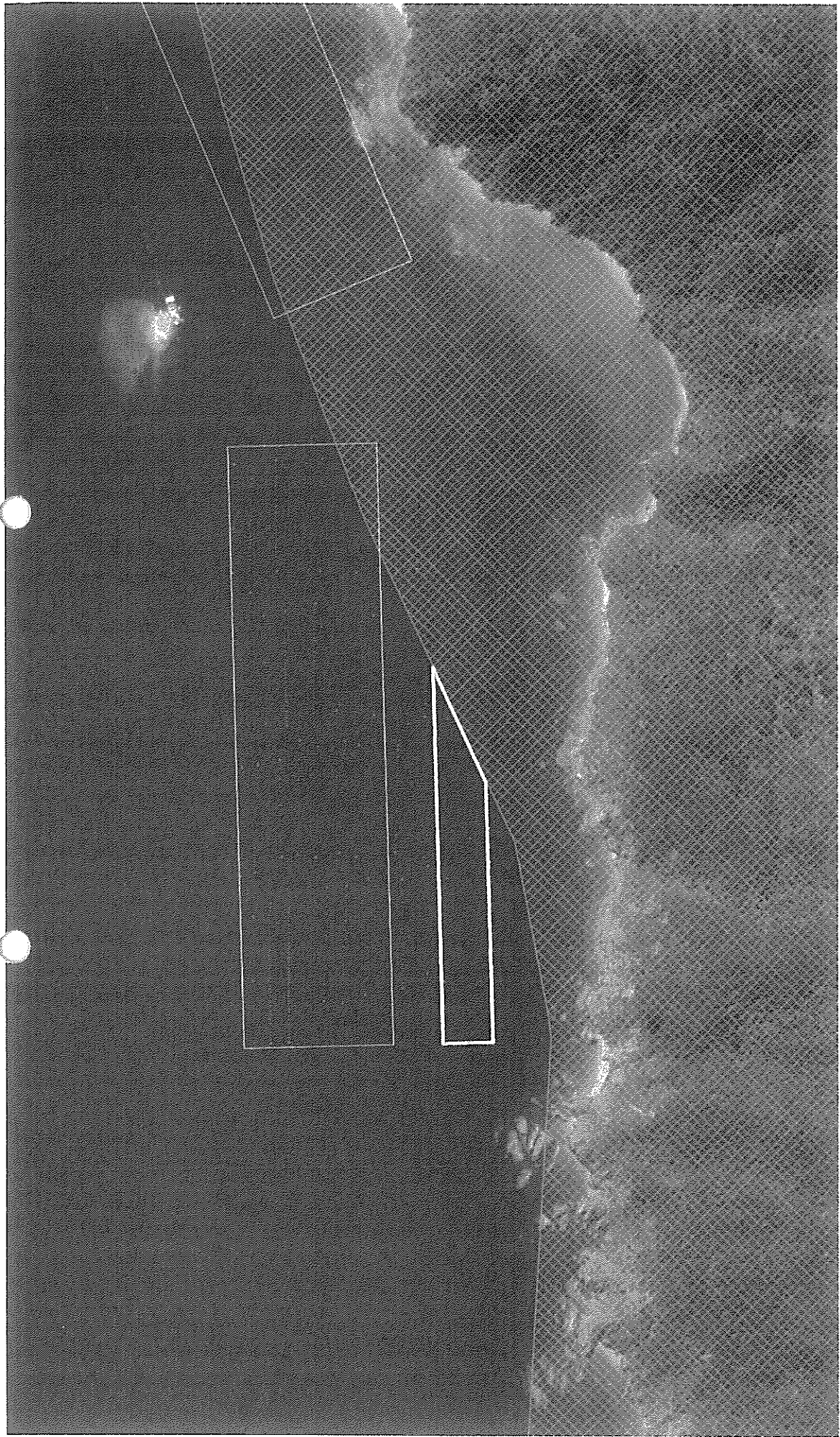
*Layout Details*  
*Proposed Marine Farm*  
*Squally Cove - Croisilles Harbour*



Prepared by  
Draughting Plus Ltd  
22 February 2018

MF\_2490c





# Benthic site assessment in Squally Cove, Croisilles Harbour: amended site plan February 2018

*Prepared for Jonathan Tester*

*February 2018*

Prepared by:  
Louis Olsen  
Ken Grange




For any information regarding this report please contact:

Louis Olsen  
Marine Ecology Technician  
Marine Ecology  
+64-3-545 7745  
louis.olsen@niwa.co.nz

National Institute of Water & Atmospheric Research Ltd  
PO Box 893  
Nelson 7040

Phone +64 3 548 1715

NIWA CLIENT REPORT No: 2017016NE  
Report date: February 2018  
NIWA Project: TES17402

Quality Assurance Statement		
Stephen Brown	Reviewed by:	
Ken Grange	Formatting checked by:	
Ken Grange	Approved for release by:	

© All rights reserved. This publication may not be reproduced or copied in any form without the permission of the copyright owner(s). Such permission is only to be given in accordance with the terms of the client's contract with NIWA. This copyright extends to all forms of copying and any storage of material in any kind of information retrieval system.

Whilst NIWA has used all reasonable endeavours to ensure that the information contained in this document is accurate, NIWA does not give any express or implied warranty as to the completeness of the information contained herein, or that it will be suitable for any purpose(s) other than those specifically contemplated during the Project or agreed by NIWA and the Client.

## Contents

<b>Executive summary .....</b>	<b>4</b>
<b>1 Introduction .....</b>	<b>5</b>
<b>2 Methods.....</b>	<b>6</b>
2.1 Side-scan sonar .....	6
2.2 Towed camera transects .....	6
2.3 Benthic grab.....	7
<b>3 Results.....</b>	<b>7</b>
3.1 Side-scan sonar .....	7
3.2 Towed camera .....	8
3.3 Benthic grab.....	10
<b>4 Discussion .....</b>	<b>12</b>
<b>5 Acknowledgements.....</b>	<b>14</b>
<b>6 References .....</b>	<b>16</b>
<b>Appendix A Images of representative habitat for each transect.....</b>	<b>17</b>
 Tables	
Table 1: Fauna in grab samples	11
 Figures	
Figure 1: Proposed Marine Farm location (pale green rectangle) inshore of Licence 8300	5
Figure 2: Squally Cove proposed marine farm site, with sampling positions.	6
Figure 3: Survey map showing farm location, side-scan swaths. Side-scan swaths are greyscale bands, small Images A, B & C are close up of areas mentioned.	8
Figure 4: Example of grain size sediment cores (Left: Grab2, Right Grab 3)	10
Figure 5: Sediment grain size distribution at each grab sample position	10
Figure 6: LINZ aerial photo from 2011 - 2012 survey showing existing mussel lines in and around the proposed site. Mussel lines are highlight with dotted line (LINZ, 2011 - 2012).	13

## Executive summary

A survey comprising side-scan sonar, grab sampling, and towed video transects was completed at a small (2.97 Ha) proposed marine farm site near the entrance to Squally Cove, Croisilles Harbour. The survey identified there were no rock outcrops or reefs within the proposed boundaries, although a small area of cobbles extended close to the inshore boundary at the western end. The benthic habitats reflected the sandy sediments and relatively exposed conditions of the site, while the benthic communities were comprised of species common and widespread in Croisilles Harbour, other than the presence of the lancelet *Epigonichthys hectori*, a primitive fish that is patchily common north of Cook Strait, and occasionally present in the outer Marlborough Sounds. Much of the site is already occupied with lines from a neighbouring marine farm, and there is little evidence of adverse effects from those lines, other than the accumulation of mussel shells. The presence of lancelets beneath the existing lines at the site suggests this species will not be significantly affected by the farm development.

Subsequent to the original benthic report (Olsen & Grange 2017), NIWA was advised that Mr Tester had reconsidered the initial proposed application and wished to amend (reduce) the size of the site. Accordingly, we have reconsidered the results and conclusions in the original benthic report. That reanalysis confirms the conclusions in the original report and is included as Section 5 in this report.

## 1 Introduction

NIWA was engaged to undertake an ecological site assessment survey to provide information for a coastal resource consent application to establish a marine farm at a proposed area of 2.97 hectares inshore of Licence 8300 in Squally Cove, Croisilles Harbour. The survey was designed to describe the benthic characteristics in the vicinity of the proposed farm site and ascertain whether there were any ecological features considered sensitive or significant. The survey used side-scan sonar (to characterise the seabed), a towed remotely-operated camera, and a Van Veen benthic grab (to ground truth the side-scan sonar and identify biota and sediment type).

Several areas within Croisilles Harbour have been identified as ecologically significant marine sites by Davidson et al. (2011). The closest ecologically significant marine zone (1.2, Croisilles Harbour Entrance) to the proposed marine farm site is greater than 1km away, and is said to have large areas of subtidal sand flats which are habitat to a variety of species, most notably scallop beds which are an important recreational fishery, and the NZ lancelet, a primitive small fish-like animal regarded as an evolutionary link between invertebrates and fish. The proposed marine farm site is situated near the entrance to Squally Cove between the shore and an existing mussel farm (Figure 1).

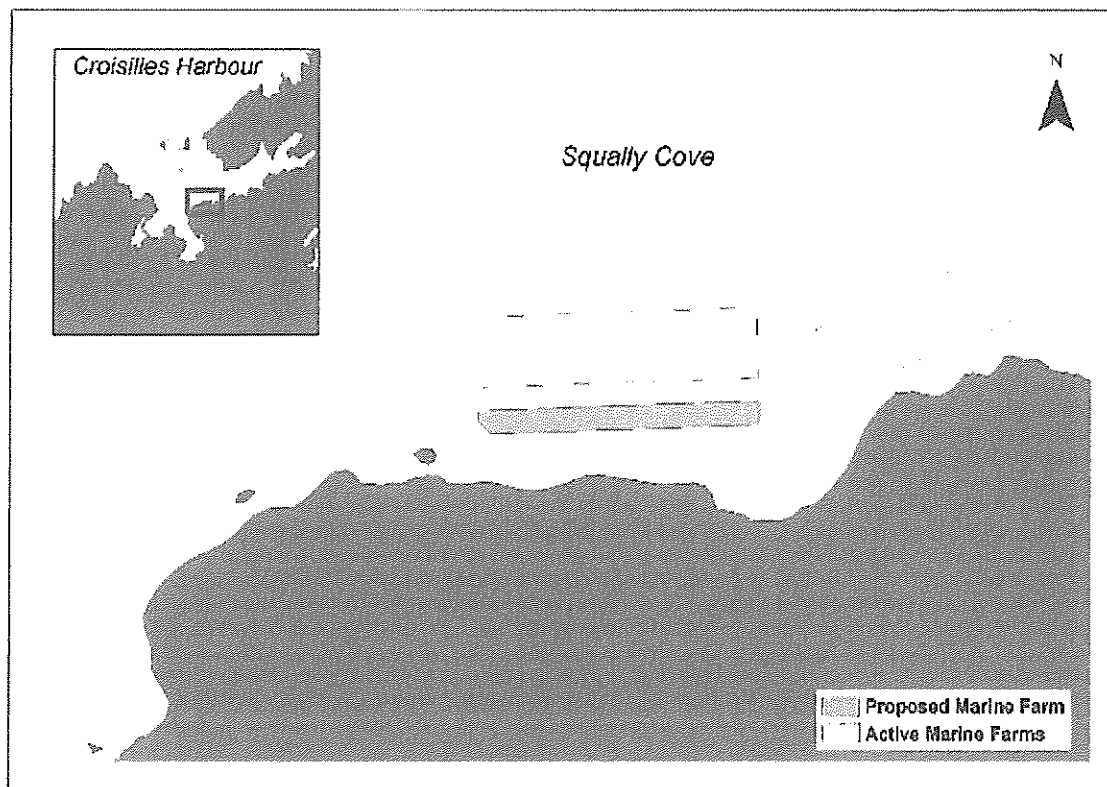


Figure 1: Proposed Marine Farm location (pale green rectangle) inshore of Licence 8300

## 2 Methods

The survey was conducted on 20 January 2017 by NIWA staff aboard the vessel RV Tio. All sample locations as shown in Figure 2 were located and recorded using either a hand-held Garmin GPS unit (GPSMAP64sx) or Lowrance chart plotter (L LCX-25C).

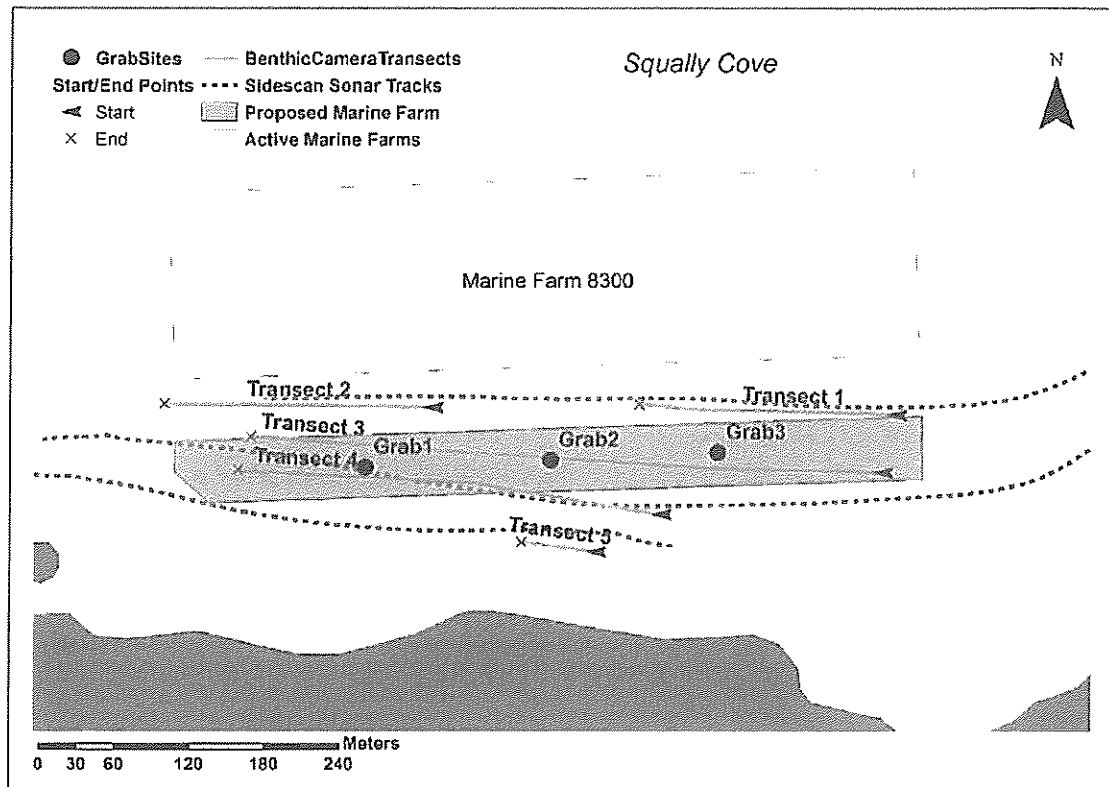


Figure 2: Squally Cove proposed marine farm site, with sampling positions.

### 2.1 Side-scan sonar

Three side-scan sonar swaths, each 100m wide (50 m either side of the vessel) were recorded using a high-frequency (675 kHz) Triton towfish. The position of the side-scan sonar was automatically recorded every 2 seconds along each swath from a GPS and saved in real time to a laptop on board the vessel using SeaNet Pro software and post-processed with Triton Perspective software to produce geo-referenced images that could be opened in ArcGIS v10 or Google Earth, where locations of features of interest could be determined.

### 2.2 Towed camera transects

A high-definition camera system (Ocean Systems Inc., Delta vision industrial HD underwater video camera) mounted on a sled was used to characterise seabed substratum and biological features. Five video transects were conducted, each traveling from west to east and towed at approximately 0.5 – 1 knots.

Video footage and still images were analysed to describe the ecological features.

## 2.3 Benthic grab

A Van Veen benthic grab (bite area ca 0.13 m<sup>2</sup>, maximum bite depth 22 cm) was used to obtain samples to describe sediment physicochemical characteristics, and infaunal species assemblages at three locations within the proposed site.

### 2.3.1 Sediment physicochemistry

From each grab sample, a single (8 cm diameter) core sub-sample was taken. The depth of the core was determined by the depth of the sediment in the grab. Each core was photographed, and the sediment colour and smell was noted. The top 3 cm of the core from each of the grabs was returned to the laboratory for analysis of sediment grain size.

The proportion of gravel, sand, and mud was determined by oven drying each sediment sample at 100°C overnight and washing a weighed subsample through stacked 200 µm and 63 µm sieves. The fraction retained on each sieve was dried and weighed and the weight of material passing through the 63 µm sieve obtained by subtraction from the original weight. Dry weights for each fraction were expressed as percentages of the total dry weight.

### 2.3.2 Infauna

To sample the infaunal community (animals living within the sediment), the entire contents of the grab sample were transferred to a mesh bag (mesh size 1.0 mm), and sieved by gently washing the bag in seawater. Following sieving, the infaunal samples were preserved in a solution of 70% ethanol in seawater and transported back to the NIWA lab for taxonomic identification and counting.

## 3 Results

### 3.1 Side-scan sonar

The side-scan sonar images showed that the seabed within the proposed site was relatively level uniform soft sediment with no indication of 3-dimensional features such as bedrock reef. The speckles in the backscatter imagery indicate that there is shell and/or rocky fragments mixed in with the soft sediment, however the presence of existing mussel lines suggest it is likely to be shell drop from the lines.

The pale horizontal bands seen in the side-scan image are shadows of the droppers from the existing mussel lines (on Licence 8300) and the isolated spots of white either side are indicative of screw anchors for the mussel lines (Figure 3, A & C).

There is one area within the site which indicate a soft low-lying mound, this is likely to be debris from the overlying mussel farm (Figure 3, C).

3-dimensional boulder reef extends from the shore line to within ~30m of the southern boundary along most of its length, with the exception of the western end of the site where an arm of cobble/small boulders extends from the main reef to the proposed southern boundary (Figure 3, B). The reef seen in this side scan image is likely to be typical of the area with low diversity and limited cover of macroalgae, inhabited by typical reef fauna of the region (Davidson et al., 2011).



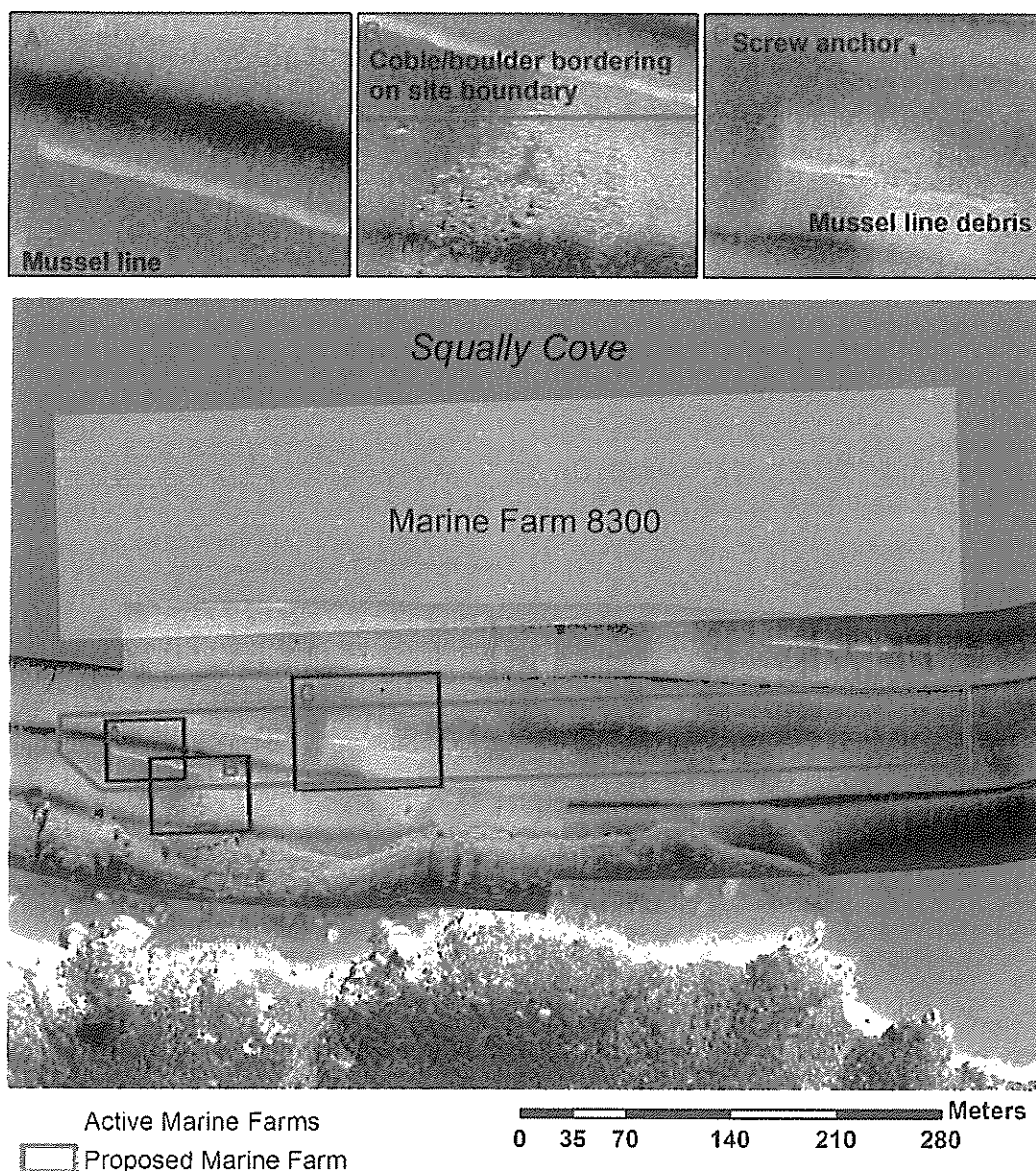


Figure 3: Survey map showing farm location, side-scan swaths. Side-scan swaths are greyscale bands, small Images A, B & C are close up of areas mentioned.

### 3.2 Towed camera

#### 3.2.1 Habitat and epibiota (animals and seaweeds at the sediment surface)

Five video transects were taken of the seabed within and outside the proposed marine farm site. It should be noted that the entire area of the proposed site was taken up by existing mussel lines that are outside of their consented boundaries (Licence 8300). It may be possible, therefore, that the

benthic habitat beneath the proposed site may already be influenced to some degree by mussels and other fauna and flora dropping from the mussel lines to the seabed.

Visual analysis of the towed camera footage showed that the proposed site is situated over sand, and shell drop from the existing mussel lines. The habitat on the eastern side of the site was predominantly small sand waves with numerous invertebrate burrows and tracks and scatterings of blue and green mussel shell. Epibiota on this side of the site was sparse, and dominated by species such as 11 armed starfish (*Coscinasterias muricata*), cushion star (*Patiriella* sp), screw shell (*Maoricolpus roseus*), hermit crabs and drift filamentous algae (Figure Appendix A 1). Additionally, 3 seahorse (*Hippocampus abdominalis*) were seen on terrestrial detritus (a tree branch) near the end of the video transect (Figure Appendix A 1).

The density of the mussel shell drop increased substantially from east to west, with areas of the seafloor on the western side of the site completely covered in mussel shell drop. The presence of the mussel shell was also associated with less sand wave formation and a slight increase in fine sediment. The epibiota on the seabed in the western portion of the site where mussel shell deposition was greatest was similar to the sand wave habitat, although much more abundant. Fewer cushion stars were seen on the shell debris. The shelly substrate provided structure for attachment of mussel spat (predominantly blue) and filamentous algae. Gastropods were more numerous on this side of the site, with aggregations of *Maoricolpus roseus* commonly seen (Figure Appendix A 2, Figure Appendix A 3). Brittlestars (*Ophiopsammus maculata*) were more abundant on the western side of the site as well (Figure Appendix A 2).

The variation in water depth from ~8.5m at the eastern boundary to ~12m at the western boundary may also contribute to some of the changes to habitat and benthic community composition.

The towed camera was dropped over a reef area identified on the side-scan sonar to ground truth this habitat (transect 5). The video footage showed boulder reef down to sand. No macroalgae were seen on the reef, only patches of fine algae covering sections of boulders. Other species identified from the footage include spotties (*Notolabrus celidotus*), blue cod (*Parapercis colias*), kina (*Evechinus chloroticus*), 11 armed starfish (*Coscinasterias muricata*), the large sponge (*Ecionemia alata*) and several white-striped anemones (*Anthothoe albocincta*) (Figure Appendix A 5).

Croisilles harbour is known for its scallop beds (Davidson et al., 2011) which are of particular environmental importance and a valuable recreational fishery. Particular attention was paid when analysing the video to determine the presence of scallops within the proposed site, however no live scallops were observed in the video, only the odd shell.

### 3.3 Benthic grab

#### 3.3.1 Sediment

The sediment within the proposed site was composed primarily of sand with a small portion of shell gravel and mud/silt (Figure 4 & Figure 5).

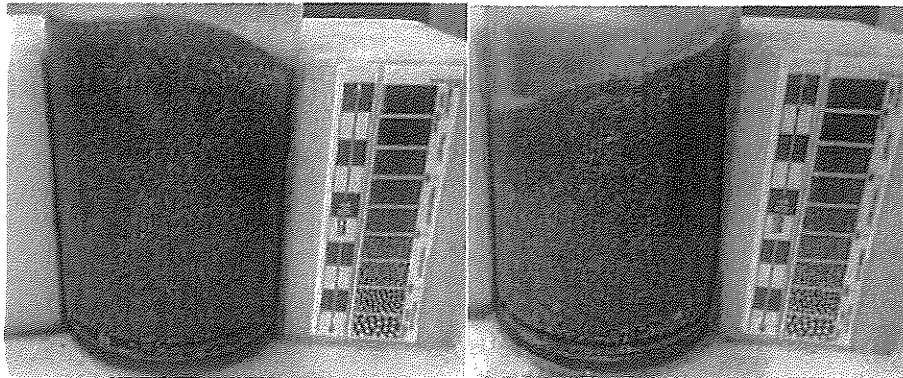


Figure 4: Example of grain size sediment cores (Left: Grab2, Right Grab 3)

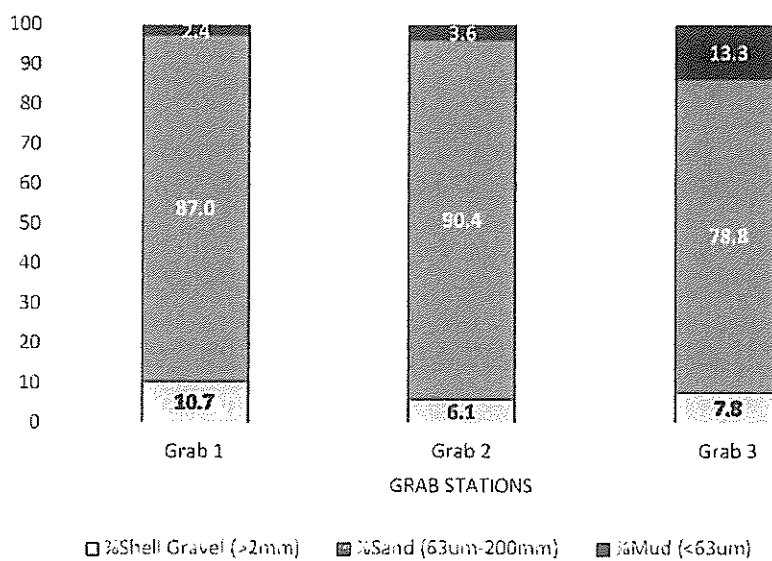


Figure 5: Sediment grain size distribution at each grab sample position

### 3.3.2 Infauna – animals living within the sediment

Table 1: Fauna in grab samples

Phylum	Group	Taxon	Grab 1	Grab 2	Grab 3	Total	Frequency
Annelida	Polychaeta	Ampharetidae			1	1	1
Annelida	Polychaeta	Capitellidae		2	6	8	2
Annelida	Polychaeta	Cirratulidae			1	1	1
Annelida	Polychaeta	Lumbrineridae			1	1	1
Annelida	Polychaeta	Maldanidae		2	3	5	2
Annelida	Polychaeta	Opheliidae	3	2	1	6	3
Annelida	Polychaeta	Orbiniidae	1			1	1
Annelida	Polychaeta	Oweniidae	3		1	4	2
Annelida	Polychaeta	Phyllodocidae	2	2		4	2
Annelida	Polychaeta	Polynoidae	1			1	1
Annelida	Polychaeta	Sigalionidae	1	1	2	4	3
Annelida	Polychaeta	<i>Spiochaetopterus</i> sp.			10	10	1
Annelida	Polychaeta	Spionidae			1	1	1
Annelida	Polychaeta	Syllidae		2		2	1
Chordata	Leptocardii	<i>Epigonichthys hectori</i>		2	2	4	2
Crustacea	Malacostraca	Amphipoda	40	14	28	82	3
Crustacea	Malacostraca	Callianassidae	38	19	12	69	3
Crustacea	Malacostraca	Cumacea	15		5	20	2
Crustacea	Malacostraca	Isopoda	3	5		8	2
Crustacea	Malacostraca	Mysida	1			1	1
Crustacea	Malacostraca	<i>Notomithrax</i> sp.			1	1	1
Crustacea	Malacostraca	<i>Pagurus</i> sp.			4	4	1
Crustacea	Malacostraca	Tanaidacea			1	1	1
Crustacea	Ostracoda	Ostracoda	5		3	8	2
Echinodermata	Asteroidea	<i>Patiriella</i> sp.			1	1	1
Mollusca	Bivalvia	<i>Corbula zelandica</i>	7	6	19	32	3
Mollusca	Bivalvia	<i>Gari</i> sp.		1	2	3	2
Mollusca	Bivalvia	<i>Myadora striata</i>		1	1	2	2
Mollusca	Bivalvia	<i>Nucula nitidula</i>	1	2		3	2
Mollusca	Bivalvia	<i>Scalpomactra scalpellum</i>		2		2	1
Mollusca	Bivalvia	<i>Zemysia globus</i>	2	5	16	23	3
Mollusca	Bivalvia	<i>Zemysia zelandica</i>		2	2	4	2
Mollusca	Gastropoda	<i>Euterebra tristis</i>	2			2	1
Mollusca	Gastropoda	<i>Turbonilla zelandica</i>		1		1	1
Mollusca	Polyplacophora	<i>Chiton</i> sp. A			1	1	1
Mollusca	Polyplacophora	<i>Rhyssoplax canaliculata</i>			1	1	1
Total individuals			125	71	126		
Number species			16	18	26		

A total of 36 taxa was identified over all three grab samples. The species richness (number of species) increased from grab 1 – 3, with grab 3 on the western side of the proposed site having substantially more species ( $n = 26$ ). Grab 1 had the lowest density of infauna ( $n=16$ ).

The majority of the benthic fauna comprised species that are generally common and widespread in sand/mud habitats in the Marlborough Sounds (McKnight & Grange, 1991). The most abundant taxa found in the grab sampled were crustaceans from the orders Amphipoda and Callinassidae (commonly known as ghost shrimp). The bivalve taxa *Corbula zelandica* and *Zemysia globus* were also relatively numerous in the samples, follow by several Polychaete taxa.

The presence of New Zealand lancelet (*Epigonichthys hectori*) was also noted in 2 of the 3 grabs (Grab 2 & 3). This species is generally regarded as being found north of Cook Strait, but it has been recorded previously in sandy areas at the entrance to Croisilles Harbour (Davidson et al., 2011).

## 4 Discussion

The majority of biota and benthic features identified during the survey of the proposed marine farm site are not considered to be of particular ecological significance. The fauna and flora observed in the towed camera footage and benthic grab samples are common assemblages found in Tasman Bay and Marlborough Sounds region (McKnight & Grange, 1991; Newcombe, Clark, Gillespie, Morrissey, & Mackenzie, 2015). Many of the more conspicuous species such as 11 armed starfish (*Coscinasterias muricata*), cushion star (*Patiriella* sp.), screw shell (*Maoricolpus roseus*), kina (*Evechinus chloroticus*) and the sponge *Ecionemia alata* are common, and not considered to be "important species" (Davidson et al., 2011). Scallops, which are categorised as an important species (Davidson et al., 2011) were not observed within the proposed marine farm site by any of the methods conducted in this survey. Blue cod (*Parapercis colias*), was seen in the near shore area amongst the cobble and boulder reef near the western portion of the inshore boundary of the proposed farm.

A species that may be considered as significant is the NZ lancelet (*Epigonichthys hectori*), where two specimens were collected in each of two of the three grab samples. This species is generally regarded as being found mostly north of Cook Strait (Paulin et al, 1989), and has been reported previously in Croisilles Harbour, where the population was regarded as significant as it is the only one known in the South Island (Davidson et al, 2011). Policy 11(a) of the NZ Coastal Policy Statement lists factors to be considered when protecting indigenous biological diversity in the coastal environment, including the need to avoid adverse effects of activities on "habitats of indigenous species where the species are at the limit of their natural range, or are naturally rare" (paragraph (iv)). The presence of the NZ lancelet at the proposed site could be considered to fall under the criteria in the above policy. There are, however, reports of populations elsewhere in the Marlborough Sounds, such as near Stephens Is (K. Grange, NIWA, pers. comm.), and Te Papa have records from several outer sound locations (C. Duffy, DOC, pers. comm.). The population in the Croisilles Harbour has been reported as abundant, with densities reaching 450 per  $m^2$  (Davidson et al, 2011). The distribution of the species is considered to be common, but localised, north of Cook Strait (Paulin et al, 1989). This description fits the above reports from the Marlborough Sounds, where the species may be localised, but abundant.

The presence of the NZ lancelet would suggest that this site has not been significantly impacted by deposition from the existing mussel lines as lancelets are known to prefer well irrigated sandy habitats (Crossland, 1979) and may be susceptible to physical disturbance and siltation (Davidson et al., 2011). The samples that contained the lancelets in the present survey were those with greater abundance of shell deposition from the existing mussel lines above. It is likely, then, that lancelets will still be present beneath any new mussel farm developed on the site.

The sand dominated benthos of the proposed site closely resembles that of sandy habitats found in central Croisilles Harbour area (Davidson et al., 2011) rather than the mid to inner Squally Cove area where sediments are finer (Brown, 2009). The sediment characteristics and the geographic location of the site suggest that it has good water movement from tidal and wind driven currents, which are likely to mitigate the sedimentation effects of mussel faeces and pseudofaeces. The effect of good circulation can be seen at this site under the existing lines, where there is limited silt accumulation on the sediment or fallen shell debris. Furthermore, the infaunal community found in this site was taxonomically diverse which is more representative of undeveloped sites with natural sediment loading (Kaspar, Gillespie, Boyer, & MacKenzie, 1985).

There are 13 existing mussel lines currently within the proposed site that appear to be part of marine farm Licence 8300, and, as such, they may be located outside their consented area. These lines can be seen in aerial photos from a LINZ survey during 2011 - 2012 which suggest they have been in place for at least 5 years (Figure 6), and it is likely that deposition beneath the lines from mussel faeces, pseudofaeces and whole mussels, as well as other organisms associated with the mussel lines, will already have had some influence on the benthos at this site. However, there were no significant adverse effects to the seabed at the site observed during this survey. This may be expected to continue with the development of the proposed mussel farm.

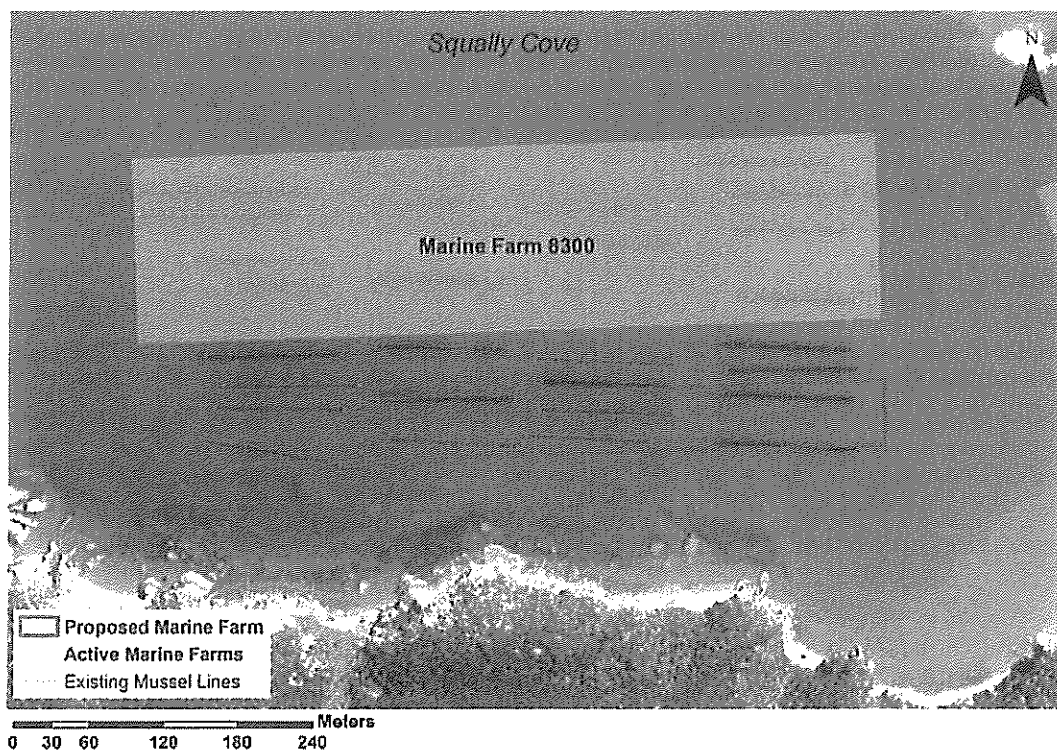
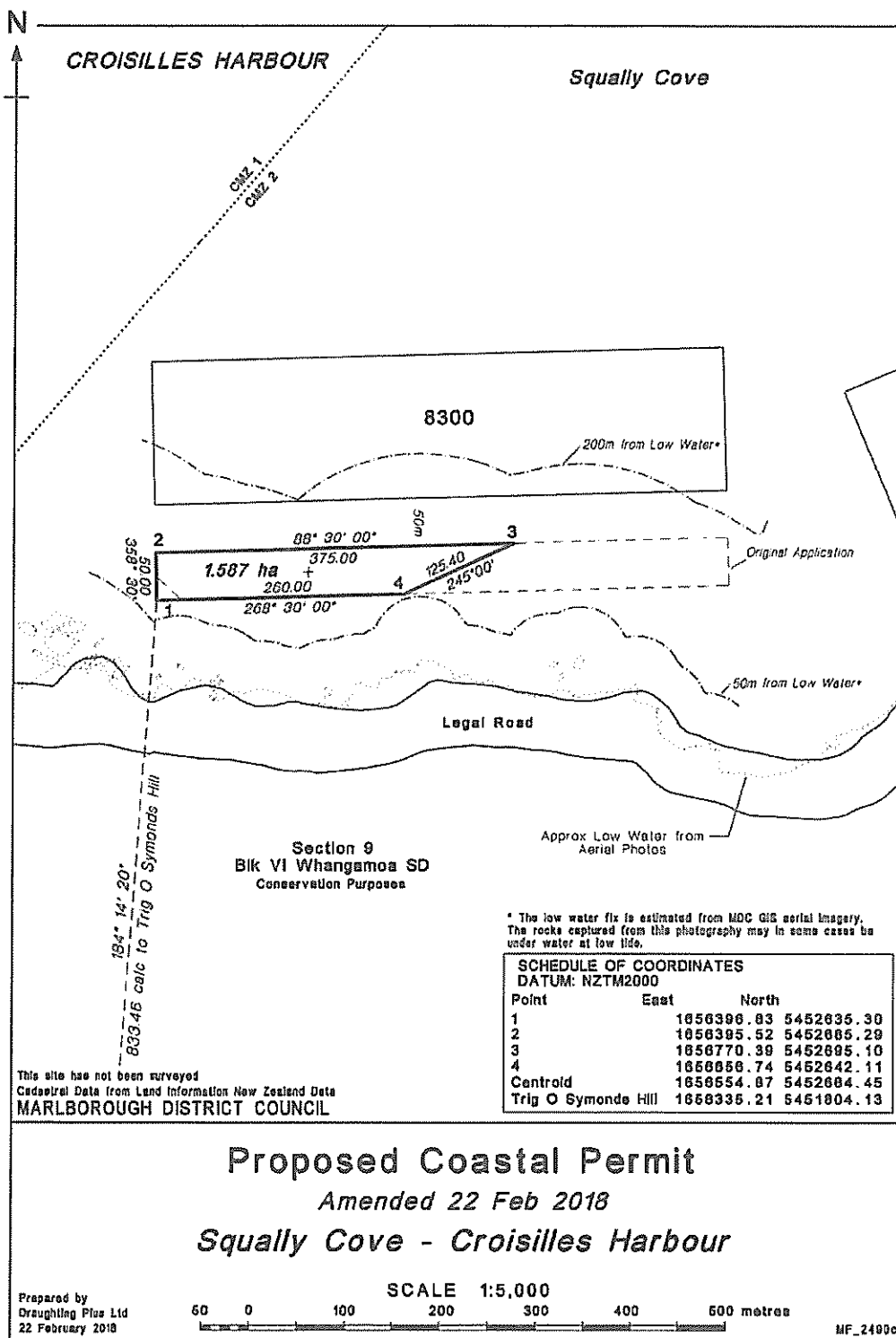


Figure 6: LINZ aerial photo from 2011 - 2012 survey showing existing mussel lines in and around the proposed site. Mussel lines are highlight with dotted line (LINZ, 2011 - 2012).

## 5 Amended proposal February 2018

A reduction in the size of the application has been proposed following the January 2017 site benthic assessment. The amended site boundaries are contained within the western half of the original boundaries, but add a small triangle to the south-western corner. The amended size of the site is 1.587 Ha, rather than the original 2.7 Ha (See below).





The area of the amended application site was sampled during the original survey. This area had mussel lines from Site 8300 over it, with the associated shell drop that had accumulated on the sea floor. There was, however, a typical benthic fauna present amongst the shell material. No rocky outcrops or reefs were recorded in the area of the amended site, the sediment being dominated by sand. Of note, the grab samples taken from within the amended site did not contain lancelets. The conclusions are that the amended site will not impact on sensitive species or habitats, is potentially already affected by the crop lines of Site 8300, which lie within the boundaries, and is a suitable site for the establishment of the small mussel farm.

## 6 Acknowledgements

The authors thanks Henry Barrett and Jon Stead for assistance in the field, Megan Carter and Stephen Brown for macrofaunal identifications.

## 7 References

- Brown, S. (2009). Seabed ecological survey: Resource consent U001552, Croisilles Harbour, Marlborough Sounds *FR109401* (Vol. NEL2009-14, pp. 8 p.). Nelson: NIWA.
- Crossland, J. (1979). Occurrence of the New Zealand lancelet in the plankton. *New Zealand Journal of Marine and Freshwater Research*, 13(2), 277-277.
- Davidson, R., Duffy, C., Gaze, P., Baxter, A., DuFresne, S., Courtney, S., & Hamill, P. (2011). *Ecologically significant marine sites in Marlborough, New Zealand*.
- Kaspar, H. F., Gillespie, P. A., Boyer, I. C., & MacKenzie, A. L. (1985). Effects of mussel aquaculture on the nitrogen cycle and benthic communities in Kenepuru Sound, Marlborough Sounds, New Zealand. *Marine Biology*, 85(2), 127-136. doi:10.1007/bf00397431
- LINZ. (2011 - 2012). Marlborough 0.4m Rural Aerial Photos (2011 - 2012). In B. BP27\_18\_21\_2000, BP27\_18\_23\_2000 (Ed.), *LINZ data service: LINZ - Land Information New Zealand*.
- McKnight, D. G., & Grange, K. (1991). *Macrobenthos-sediment-depth relationships in Marlborough Sounds* (DSIR Marine and Freshwater 19p.). Retrieved from
- Newcombe, E., Clark, D., Gillespie, P., Morrissey, D., & Mackenzie, L. (2015). *Marine Environment in Tasman Bay and Golden Bay*. (2716). Cawthron Institute.
- Paulin, C.; Stewart, A.; Roberts, C.; McMillan, P. (1989). New Zealand fish: a complete guide. *National Museum of New Zealand Miscellaneous Series No 19*. 279 p.

## Appendix A Images of representative habitat for each transect

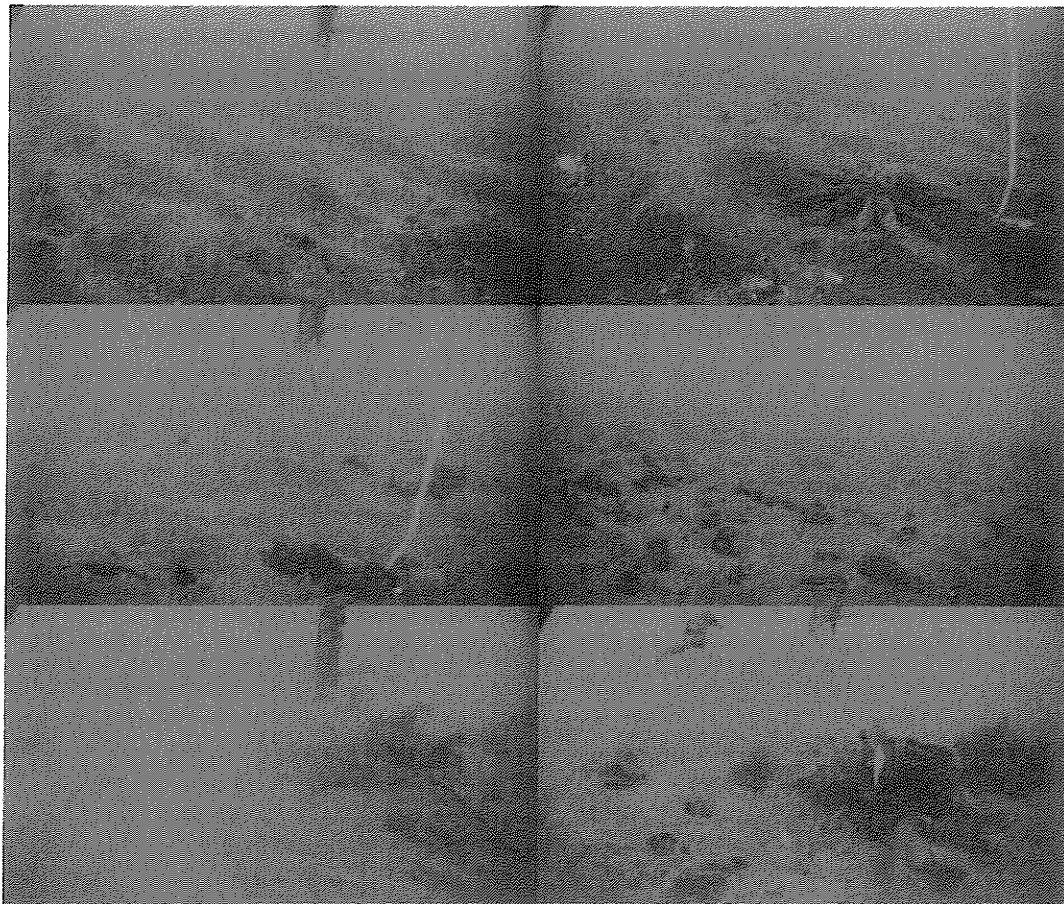


Figure Appendix A 1: Transect 1, still images taken from the video. Image progression through the video from left to right.

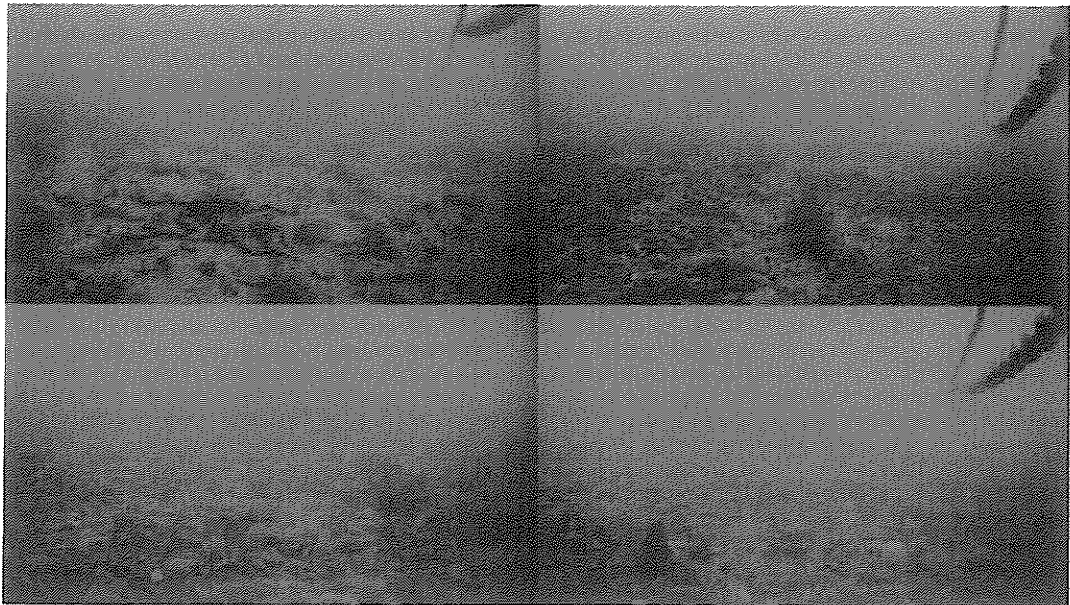
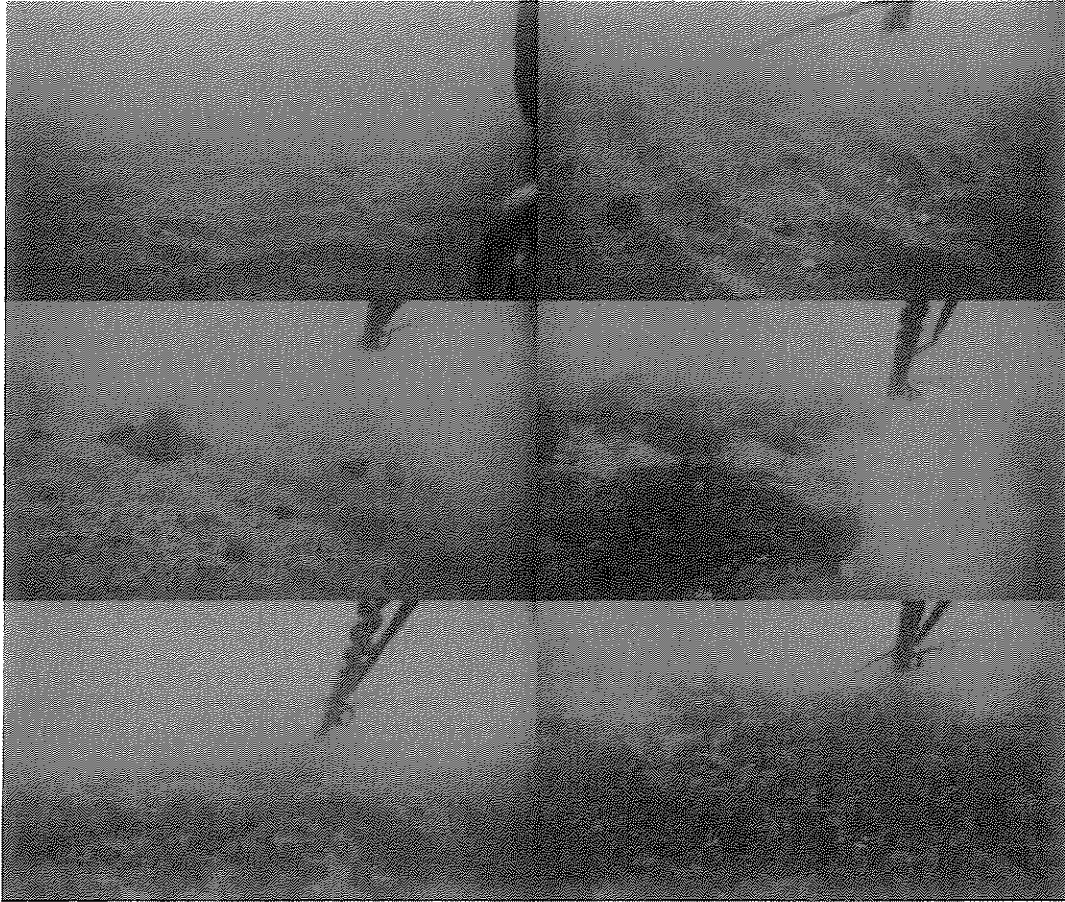
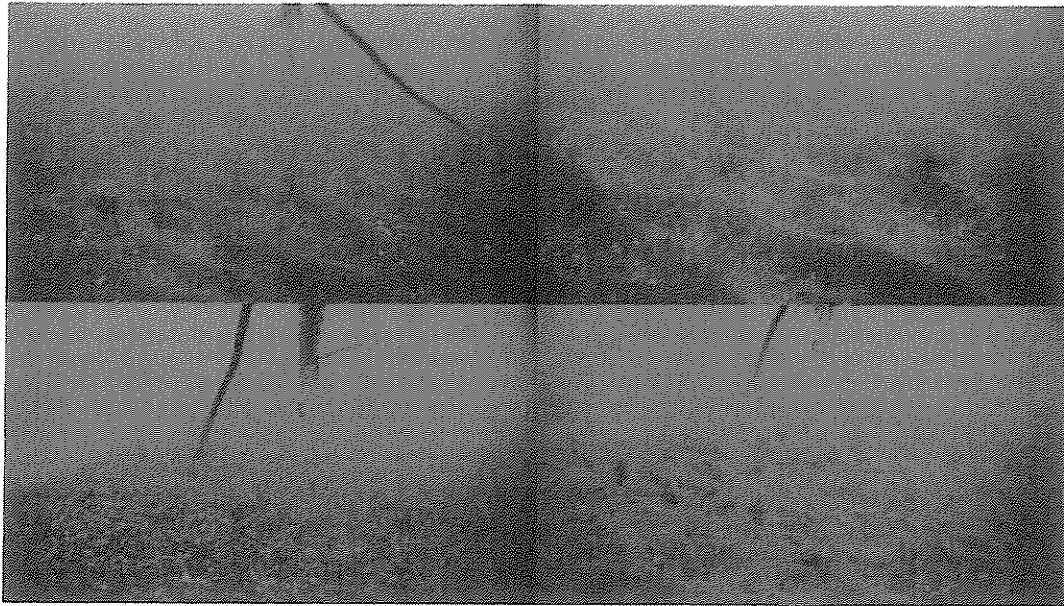


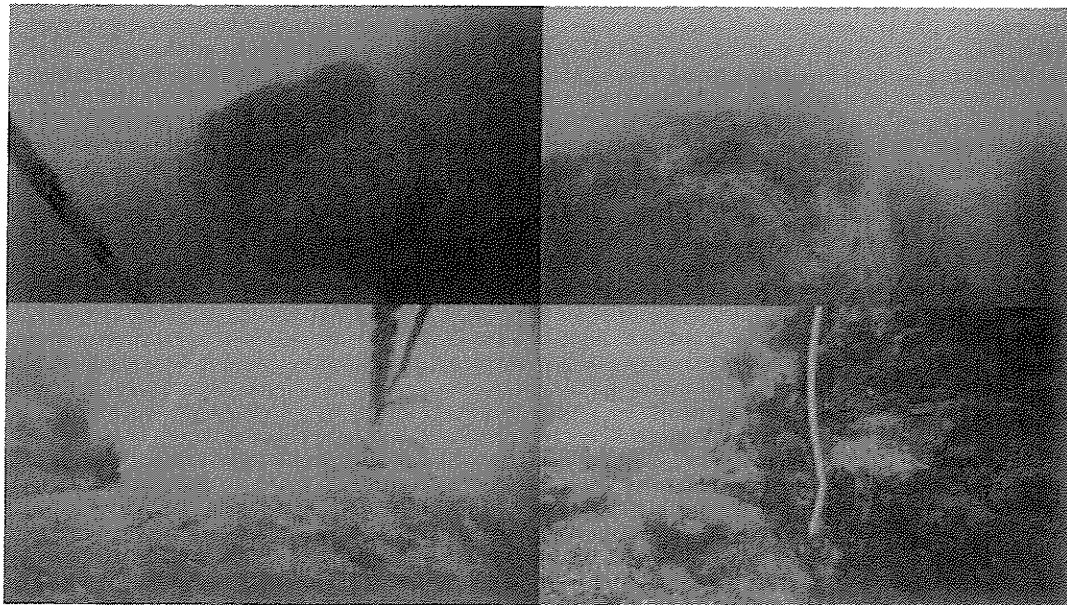
Figure Appendix A 2: Transect 2, still images taken from the video. Image progression through the video from left to right.



**Figure Appendix A 3: Transect 3, still images taken from the video. Image progression through the video from left to right.**



**Figure Appendix A 4: Transect 4, still images taken from the video. Image progression through the video from left to right.**



**Figure Appendix A 5: Transect 5, still images taken from the video. Image progression through the video from left to right.**





*Application for Resource Consent – Coastal Permit  
to the Marlborough District Council*

<b>APPLICANT:</b>	Jonathan Tester and Ciaran Hughes
<b>LOCATION:</b>	Symonds Hill, Squally Cove
<b>CONSENTS SOUGHT AND DESCRIPTION OF ACTIVITIES</b>	<p><b>Coastal Permit</b></p> <p>To establish a marine farm in Symonds Hill including the following activities:</p> <ul style="list-style-type: none"><li>- Undertake marine farming activity;</li><li>- Construct and maintain marine farming structures;</li><li>- Disturb the bed of the CMA; and</li><li>- Undertake harvesting activities.</li></ul> <p><b>Discharge Permit</b></p> <p>To discharge contaminants to the coastal environment area, including:</p> <ul style="list-style-type: none"><li>- Faeces and pseudofaeces from marine farm organisms;</li><li>- Organic and biodegradable waste particularly during harvest.</li></ul>
<b>ASSESSMENT OF EFFECTS</b>	<p>Attached is an assessment of the environmental effects that the proposed activity may have on the environment in accordance with Section 88 and the Fourth Schedule of the Resource Management Act 1991. Consideration has been given to the Marlborough Sounds Resource Management Plan.</p>

Signed by Jonathan Tester on behalf of the applicants on 09 February 2017

Deposit: The deposit will be paid by direct credit.

---

## ASSESSMENT OF ENVIRONMENTAL EFFECTS

Prepared in accordance with Section 88 and the Fourth Schedule  
of the Resource Management Act 1991

---

### Contents

1. Description of the Activity .....	4
1.1 Background .....	4
1.2 Proposal .....	8
2. Status of Application .....	11
2.1 The Marlborough Sounds Resource Management Plan .....	11
2.2 Summary .....	12
3. Actual or Potential Effects on the Environment .....	13
3.1 Benthic Ecology .....	13
3.2 Natural Character .....	14
3.3 Landscapes, Seascapes and Natural Features .....	15
3.4 Public Access and Navigation .....	16
3.5 Amenity Values .....	16
3.6 Cumulative Effects .....	16
3.7 Cultural Heritage Values .....	17
4. Statutory Framework and Considerations .....	18
4.1 Support for Marine Farming Where Appropriate .....	18
4.2 Natural Character and Landscape .....	19
4.3 Water Quality .....	19
4.4 Public access and Recreation .....	20
4.5 Precautionary Approach .....	20
4.6 Cultural Heritage .....	20
5. The Proposed Marlborough Environmental Plan .....	20
6. Part 2 RMA Assessment and Overall Assessment .....	21
7. Term .....	22
8. Overall Assessment .....	22



**ATTACHMENTS:**

- A. Location and layout plans (Draughting Plus Ltd)
- B. Benthic Site Assessment (National Institute of Water & Atmospheric Research Ltd)
- C. Resource consent U100797

## 1. Description of the Activity

### 1.1 Background

The applicant and their family have been involved in aquaculture within Marlborough since the early 1980's. The following proposal would enhance their aquaculture operations in the Marlborough Sounds.

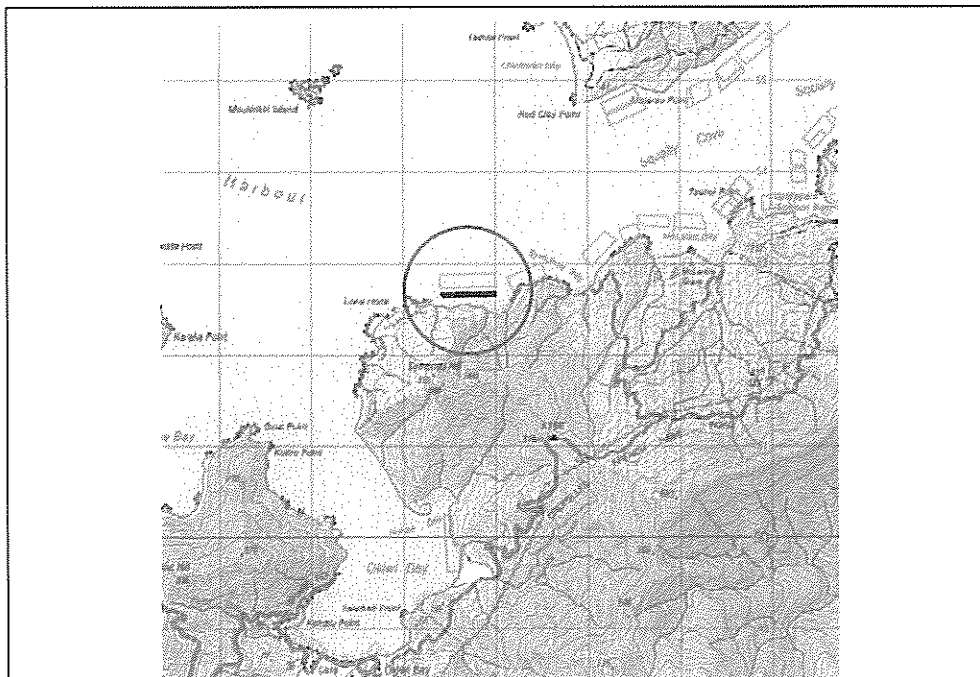
Squally Cove is a large embayment running south-west/north-east and is within the Croisilles part of the Marlborough Sounds. Symonds Hill is located on the southern coast at the western end of Squally Cove. A location map is provided in Attachment A and an excerpt of the location map is shown in Figure 1 below.

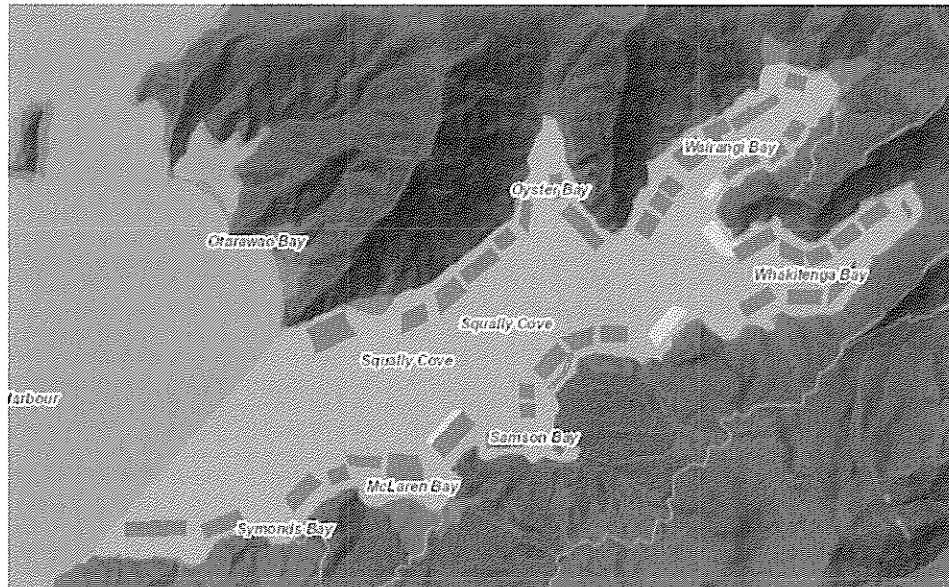
Topographically, Squally Cove is isolated from the rest of the Marlborough Sounds and, by sea, is accessed from Okiwi Bay.

The landward backdrop of the site is currently in regenerating native vegetation interspersed with wilding pines.

Marine farms are extensively developed around the coastline of Squally Cove. The extent of marine farming developments in the area is evident from the plans and drawings provided in Attachment A.

The aquaculture located around the coastline of Squally Cove can also be seen in Figure 1 (bottom) which is reproduced from the Council's marine farm mapping system. It is clear that there is a strong pattern of concentration of marine farms within the CMZ2 zone.



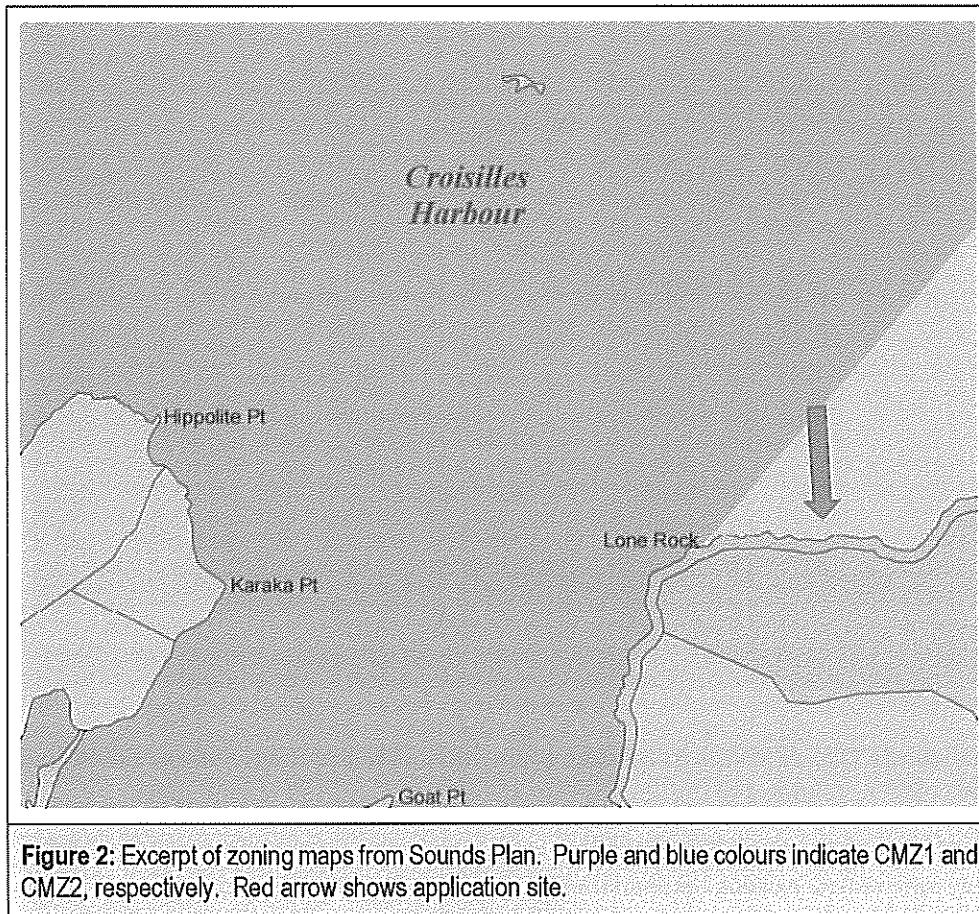


**Figure 1:** Top: Location of subject site at Symonds Hill. Bottom: existing marine farming (blue).

The application site falls within the jurisdiction of the Marlborough Sounds Resource Management Plan ("the Sounds Plan"). Volume 3 of the Sounds Plan identifies two coastal marine zones:

- Coastal Marine Zone 1 (CMZ1) is shown in a purple colour on the planning maps and identifies a zone where most existing marine farms are provided for but new marine farm developments are prohibited; and
- Coastal Marine Zone 2 (CMZ2) where new marine farms are provided for as a discretionary activity subject to compliance with the relevant rules and performance criteria.

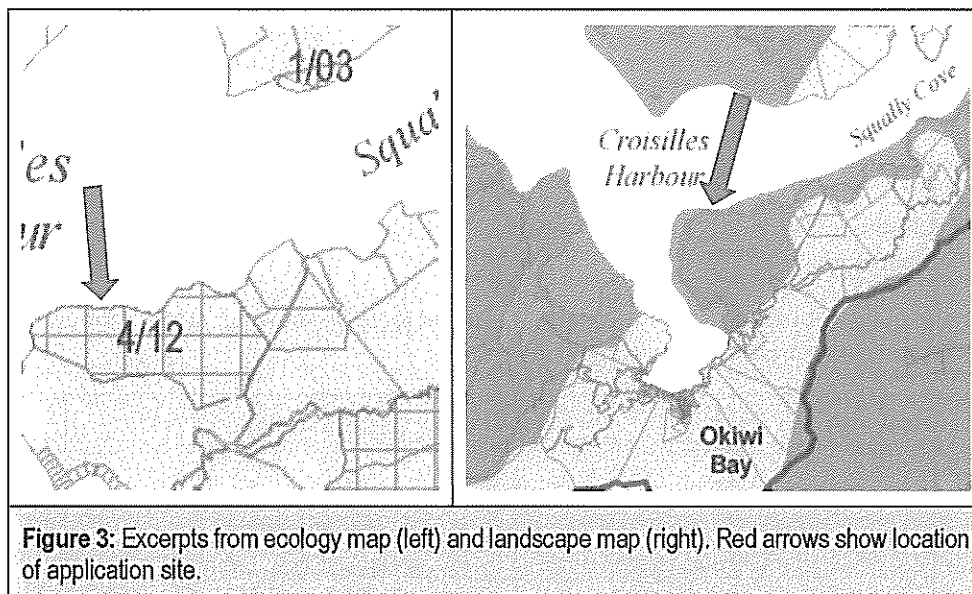
Figure 2 shows an excerpt from Map 22 of the Sounds Plan. The subject location in Symonds Hill is shown as being within CMZ2.



Volume 3 of the Sounds Plan also contains maps that identify Areas of Ecological Value (Map 71 is relevant) and Areas of Outstanding Landscape Value (Map 77). The relevant excerpts from these maps are reproduced in Figure 3. In terms of areas of ecological value there is one small location that is referenced in Figure 3 as "4/12". This location cross-references to Appendix B of the Plan which describes area 4/12 as:

*"Localised value. No threatened land species. Together areas form very large but fragmented habitat for smaller bird species. Some uncommon plant species or species associations which are becoming increasingly uncommon."*

The backdrop of the application site is also identified as an area of outstanding natural feature and landscape this corresponds to the 'Whangarae Inlet, Okiwi Bay.



The subject application site has an active consent history. The following table outlines the consent history of the site.

Resource Consent Number	Resource Consent Status
U100797	Active – coastal permit (replacing U941356) for a 9ha marine farm for the farming of mussels, oysters, scallops, cockles and seaweed. The existing farm was offsite and oversize, this application was made with the intentions of validating the site area.
U941356	Surrendered – To establish a 9ha marine farm for the purpose of spat catching and on-growing of mussels, oysters, scallops and cockles. Consent has been renewed and replaced by U100797
U920038	Refused - Coastal permit to establish a 9ha marine farm for mussels, scallops and pacific oysters. Reason for refusal: <ul style="list-style-type: none"> <li>▪ The site was not designated for marine farming in the proposed Plan</li> <li>▪ The land adjacent to the site was in conservation stewardship and was a Protected Natural Area under the Conservation Act 1987</li> <li>▪ Croisilles Harbour was a popular recreational, boating and fishing area and a marine farm could impact on these activities</li> </ul>

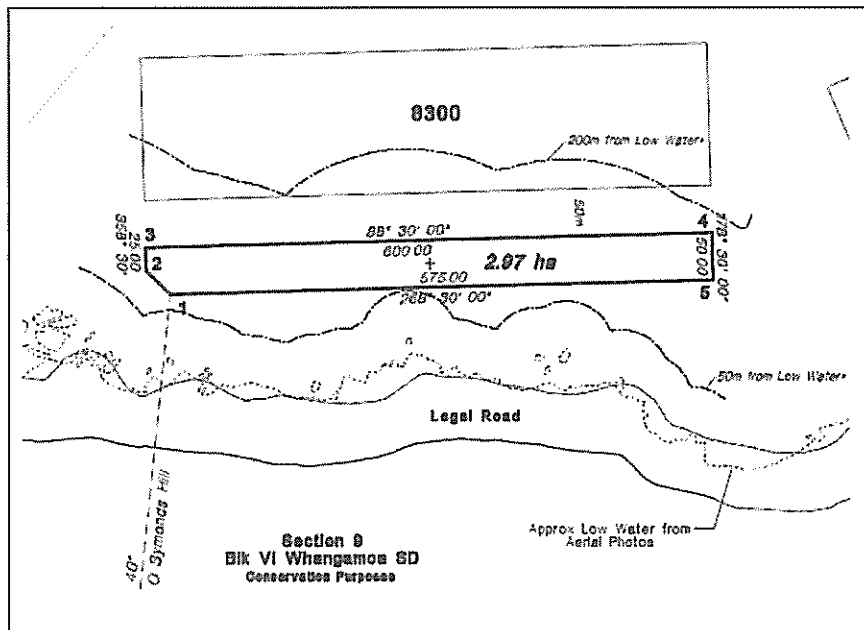
U930681

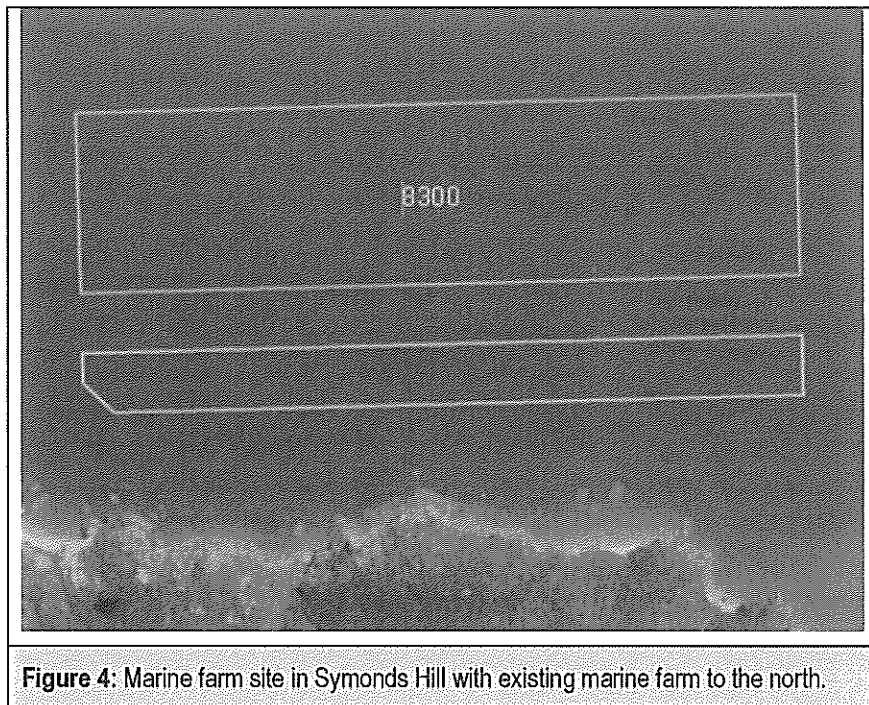
Withdrawn – Coastal permit to establish a 9ha marine farming scallops, green shell mussels, pacific oyster, dredge oyster, paua and seaweed.

## 1.2 Proposal

The applicant seeks resource consent for a coastal permit to occupy space in the coastal marine area, disturb the seabed and use and maintain structures.

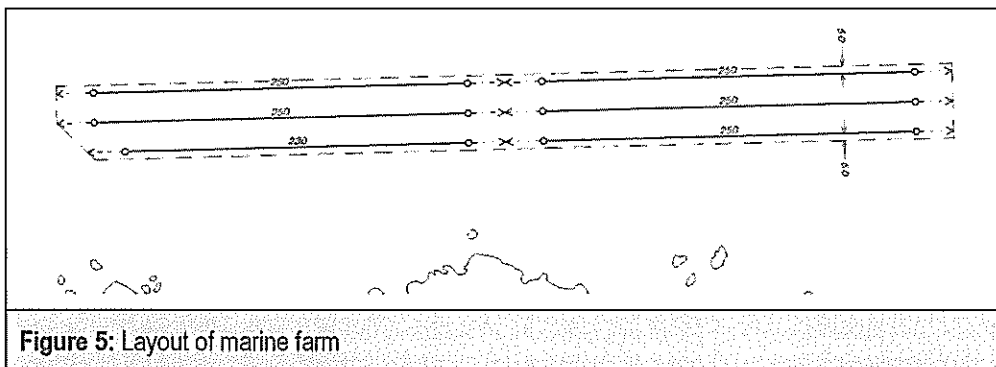
A 2.97ha marine farm would be established in the form and location shown in Figure 4 below. The farm will be at least 50 metres from mean low water.





**Figure 4:** Marine farm site in Symonds Hill with existing marine farm to the north.

The proposed marine farm layout is evident in Figure 5 below and on the site plan in Attachment A.



**Figure 5:** Layout of marine farm

The proposed site layout will involve establishment of two blocks of 3 longlines of variable length providing a total backbone length of 1480 metres.

It is proposed to farm and harvest the following species using conventional longline methods with variable length backbone to warps and anchors:

- Green Shell Mussels (*Perna canaliculus*)
- Scallops (*Pecten novaezelandiae*)
- Blue Shell Mussels (*Mytilus edulis*)
- Flat Oysters (*Toistrea lutaria*)
- Pacific Oysters (*Crassostrea gigas*)

The following algae are also likely to be propagated at the site:

- *Macracystis pyrifera*
- *Ecklonia radiata*
- *Gracilaria*
- *Pterocladia lucida*

Consent is also sought to disturb the seabed with anchoring devices and to harvest marine farm produce from the site, including the taking and discharge of seawater and the discharge of biodegradable and organic waste matter during harvesting of produce in Symonds Hill, Squally Cove.

The proposed site is bound by a marine farm to the north (8300) which is owned by Sanford Limited and illustrated in Figure 4 below. From the aerial photo in Figure 4 it is evident that the physical location of the longlines extends southwards beyond the farm's boundaries. The applicant understands that Sanford has been directed by the MDC to remove or relocate these longlines back into within farm 8300. The longlines are believed to have been in their current position for a number of years, possibly having never been relocated following the revalidation of the site(8300) under U100797.



## 2. Status of Application

The following table identifies the relevant rules of the Sounds Plan for the purpose of determining the status of these two applications under the Resource Management Act 1991:

### 2.1 The Marlborough Sounds Resource Management Plan

Rule	Activity Status	Reason
<b>Marine Farm Structures and Activities</b>		
35.4	Discretionary	The activity involves the occupation of the coastal marine area and as such is provided for by this rule and a discretionary activity.  The marine farm will be located at a distance of 50m from the mean low water mark and will not be located further than 200m from the mean low water mark.
<b>Disturbance of the bed of the CMA and placement of structures</b>		
35.4	Discretionary	The activity involves the disturbance of the seabed and the placement of structures as a component of the establishment of the marine farm. Such activities are provided for by this rule as a discretionary activity.
<b>Harvesting marine farming produce</b>		
35.4	Discretionary	The activity involves harvesting of marine farming produce from a marine farm which was not previously authorized. As such, this is provided for by this rule as a discretionary activity.
<b>Discharges</b>		
35.4	Discretionary	The activity involves the discharge faeces and pseudofaeces from the marine farm to the coastal marine area. As such this is provided for by this rule as a discretionary activity.
35.4	Discretionary	The activity involves the discharge of organic and biodegradable waste during harvest to the coastal marine area. This is provided for by this rule as a discretionary activity.

## 2.2 Summary

The application shall be classified as a discretionary activity under the Marlborough Sounds Resource Management Plan.

### 3. Actual or Potential Effects on the Environment

The following assessment has been prepared after having regard to the scale and significance of the actual or potential effects (s88(2)(b)) and has been prepared in accordance with the Fourth Schedule to the Act. The 'actual or potential effects' have been identified from the relevant 'assessment criteria' of the Plan.

#### 3.1 Benthic Ecology

NIWA has been engaged to conduct a benthic survey to inform this AEE. The NIWA report is provided in Attachment B.

The report confirms that the survey identified there were no rock outcrops or reefs within the proposed boundaries. The report also confirms that the entire area of the proposed site was taken up by existing mussel lines that were outside their consented boundaries.

Camera footage shows that the proposed site is situated over sand, and shell drop from the existing mussel lines. The habitat on the eastern side of the site was predominantly small sand waves with numerous invertebrate burrows and tracks and scatterings of blue and green mussel shell. The density of the mussel shell drop increased substantially from east to west, with areas of the seafloor on the western side of the site completely covered in mussel shell drop. The report mentions that it may be possible that the benthic habitat beneath the proposed site may already be influenced to some degree by mussels and other fauna and flora droppings from the mussels lines to the seabed.

Regardless, the majority of biota and benthic features identified during the survey of the proposed marine farm site are not considered to be of particular ecological significance. While all ecosystems have a level of intrinsic value (a point identified in Section 7 RMA), the NIWA report points out that the fauna and flora observed in the towed camera footage and benthic grab samples are common assemblages found in Tasman Bay and Marlborough Sounds region.

However, a notable find was the New Zealand lancelet (*Epigonichthys hectori*) which was found within two of the three grab samples. The species is a primitive small fish-like species. This species is generally regarded as being found north of Cook Strait, but it has been recorded previously in sandy areas at the entrance to Croisilles Harbour. It is a species that may be considered as significant and while generally regarded as being found north of the Cook Strait it has been reported previously in Croisilles Harbour where the population was regarded as significant. The NIWA report states:

*Policy 11(a) of the NZ Coastal Policy Statement lists factors to be considered when protecting indigenous biological diversity in the coastal environment, including the need to avoid adverse effects of activities on "habitats of indigenous species where the species are at the limit of their natural range, or are naturally rare" (paragraph (iv)). The presence of the NZ lancelet at the proposed site could be considered to fall under the criteria in the above policy. There are, however, reports of populations elsewhere in the Marlborough Sounds, such as near Stephens Is (K. Grange, NIWA, pers. comm.), and Te Papa have records from several outer sound locations (C. Duffy, DOC, pers. comm.). The population in the Croisilles Harbour has been reported as abundant, with densities reaching 450 per m<sup>2</sup> (Davidson et al, 2011). The distribution of the species is considered to be common, but localised, north of Cook Strait (Paulin et al, 1989). This description fits the above reports from the Marlborough Sounds, where the species may be localised, but abundant.*

As the NIWA report sums up above, it does not appear that populations of the lancelet are localised, but where it does occur it is abundant. In this location it appears that the populations are very low. The report concludes:

*The presence of the NZ lancelet would suggest that this site has not been significantly impacted by deposition from the existing mussel lines as lancelets are known to prefer well irrigated sandy habitats (Crossland, 1979) and may be susceptible to physical disturbance and siltation (Davidson et al., 2011). The samples that contained the lancelets in the present survey were those with greater abundance of shell deposition from the existing mussel lines above. It is likely, then, that lancelets will still be present beneath any new mussel farm developed on the site. (emphasis added)*

As a result it is concluded that adverse effects on the lancelet will be avoided, as is sought by Policy 11 of the NZCPS. This is particularly the case since the proposed farm will be replacing existing long lines that will be relocated back within the boundaries of the existing farm to the immediate north.

### 3.2 Natural Character

As can be seen from the supporting maps, all of the Squally Cove is zoned CMZ2 which allows for applications for marine farming to be made.

Marine farming is clearly evident and established within the entire Squally Cove inlet and there is an array of marine farms scatter around the edges. The proposed marine farm is planned to sit near an existing marine farm and will not protrude or exhibit visibility beyond the effects of the existing marine farm. Compliance history of this neighbouring marine farm confirms that previously lines have been evident within the proposed application site of Symonds Hill.

Chapter 2 of the Sounds Plan sets the context for the consideration of natural character:

*Natural character can generally be described as being those characteristics (qualities and features) of a particular environment. The particular environment in the case of the Plan, is the coastal environment, freshwater environments or wetlands, lakes, rivers and their margins.*

*The natural character of the coastal environment and freshwater bodies is comprised of a number of key elements which include:*

- *Coastal or freshwater landforms;*
- *Indigenous flora and fauna, and their habitats;*
- *Water and water quality, including marine and freshwater ecosystems;*
- *Scenic or landscape values;*
- *Cultural heritage values; and*
- *Habitat of trout.*

*All parts of the Marlborough Sounds coastal and freshwater environments have some or all of these qualities and to that extent, all have some degree of natural character (MSRMP, p2-1).*

Given that there are no defined CMZ1 zones within Squally Cove it can be concluded that development and marine farming is anticipated in this area. Figure 6 below provides a photo of the site of the marine farm. It is evident that the natural character values of the site are reduced by the modification of the sea surface by a mussel farm offshore to the north of the proposed site. Nevertheless, the Sounds Plan

identifies that the land to the immediate south of the application site is an area of Outstanding Landscape Value. As a result any applications that result in a significant reduction in the natural character of such a site are unlikely to be appropriate.



However, in the case of this application the proposed marine farm will be positioned entirely between the existing farm and the shore. It will also replace the existing long-lines which are on the application site, but which must be moved back within the boundaries of the neighbouring farm. On that basis it is considered that the adverse effects on natural character will be less than minor.

It is acknowledged that the above assessment is predicated on the existence of the Sandford farm 8300. The existing consent for that farm (see Attachment C) expires on 7 April 2031. As such it is proposed that the expiry date sought for the current application be set at the same day to allow the two farms to be reassessed together.

Overall, while the coastal marine area and coastal margin will always retain some inherent natural character, at this site it is considered that the reduction in natural character will be no more than minor. From the zoning and development pattern within Squally Cove it is clear that marine farming is located around the border of the greater cove, and marine farm development is not inappropriate.

### 3.3 Landscapes, Seascapes and Natural Features

The proposed marine farm will fill a small gap next to the existing larger marine farm, separated at a distance that is consistent to the surrounding existing marine farms. The proposed location is currently farmed.

Recognition is given to the site specific location in which there are no residential dwellings and the farm is not located within a prominent or strategic location at the headlands of the cove, and exotic forestry is evident in the backdrop of the greater area. There are no public roads or walkways adjacent the site and

the farm would nestle in behind the existing farm and is considered to be of a size that would not generate adverse effects on the values of the landscape, seascape and natural features.

### 3.4 Public Access and Navigation

Symonds Hill is not recognized as a particular recreation destination. The shoreline does not promote recreational uses as access is difficult due to steep terrain and due to the rocky nature of the shoreline. The positioning of the proposed farm means there is 50m from the mean low water mark.

Access is maintained around the farm to allow vessels to navigate further along the coast or to access the coast directly. The nearest farm is approximately 50m distant which is owned by Sanford Limited. A distance of 50m is deemed adequate to not interfere with the operations and movements associated with this farming operation. The proposed separation distances between the shore and between farms is typical and appropriate.

There are no jetties, moorings or log loading sites in the area of the application.

Symonds Hill is adjacent to a well-used navigational route, however the farm structures continue a line of farms down the southern side of Squally cove. Given the nature of the cove, recognition that farms have previously existed in this location and the positioning within 200m of the shore it is not considered to interfere with the greater Squally Cove navigational routes.

### 3.5 Amenity Values

There are no dwellings on the land that forms the backdrop to the site. There are also no other sensitive land uses. As a result there are no adverse effects on the amenity of any dwelling or sensitive activity as a result of this activity.

Visual amenity effects may arise from people on the water, however, the proposed farm is small, in comparison to surrounding farms, and is not considered to generate adverse visual effects. The proposed farm will contribute to the existing cluster of marine farms in Squally Cove.

### 3.6 Cumulative Effects

The proposed farm will cause a very small increase in the density of farms within this CMZ2 on the southern side of the Cove.

Cumulative effects will occur in relation to several of the spheres of effect discussed above including, benthic ecology, natural character, public access and amenity values. However, in all cases the magnitude of incremental adverse effect are very small and assessed as less than minor.

As stated below, the Sounds Plan intends that the development of further marine farming should (all else being equal) be *"encouraged in areas where the natural character of the coastal environment has already been compromised ..."* (Policy 2.1.2.2)

The CMZ2 zoning is a management tool for addressing the cumulative effects of marine farms within the sounds. As mentioned previously, Squally Cove is entirely zoned CMZ2. Therefore marine farming is anticipated and may be appropriate within this Cove and such aspirations and visions are established during the construction of the Regional Plan which controls and develops the zone.

The farm is proposed to be of a size that will not dominate the seascape or generate adverse cumulative effects. Furthermore, weight is also given to the notion of the non-compliance associated with the

neighbouring marine farm which results in this location having already previously been farmed. Consequently, the use of this area, while still being minimal on the greater environment, is a sustainable and efficient use of the space without the generation of adverse cumulative effects.

### 3.7 Cultural Heritage Values

Statutory Acknowledgements are in place for all Te Tau Ihu Iwi for the Coastal Marine Area.

Te Tau Ihu Iwi have not been consulted for this application. However, based on experience it is not anticipated that this proposal will have adverse effects either on the interest of the Iwi, or on their cultural values.

## 4. Statutory Framework and Considerations

### 4.1 Support for Marine Farming Where Appropriate

The Sounds Plan and the NZCPS provide a level of support for marine farming in locations and ways that it is “appropriate”. Determining the appropriateness or otherwise of a given application is to be based on the outcome that the objective or policy is seeking to achieve.

Policy 8 of the NZCPS is to “recognise the significant existing and potential contribution of aquaculture to the social, economic and cultural well-being of people and communities ...” The policy notes the social and economic benefits of aquaculture.

In relation to natural character, Objective 2.2.1 of the MSRMP is as follows:

*Objective 2.2.1: The preservation of the natural character of the coastal environment, wetlands, lakes and rivers and their margins and the protection of them from inappropriate subdivision, use and development.*

This objective is consistent with the higher statutory documents: the NZCPS and Part 2 of the Act. Also consistent is its use of the term “inappropriate”. What is inappropriate in the context of the objective should be informed by analysis of the relevant supporting policies and what is to be achieved by the objective.

Policies 2.2.1.1 and 2.2.1.2 are as follows:

*Policy 2.2.1.1: Avoid the adverse effects of subdivision, use or development within those areas of the coastal environment and freshwater bodies which are predominantly in their natural state and have natural character which has not been compromised.*

*Policy 2.2.1.2: Appropriate use and development will be encouraged in areas where the natural character of the coastal environment has already been compromised, and where the adverse effects of such activities can be avoided, remedied or mitigated.*

Broadly, when read in conjunction these policies seek to avoid development where the coastal environment is predominantly in its natural state, and to encourage development in areas where the natural character of the coastal environment has already been compromised. This approach is supported by the zoning framework (CMZ1 and CMZ2) employed in the Sounds Plan.

In Squally Cove there are, as already described, a border of marine farms around the inlet, whereas beyond the entrance to the cove is CMZ1 where new marine farming is prohibited and marine farms are non-existent. Squally Cove however is reasonably developed and the opportunities for new large marine farms are limited. Policy 2.2.1.2 supports this intensity and seeks that where additional farming is appropriate, that it be located within developed areas. Logically, additional farming would be placed within the existing ribbon around the border of the Cove.

At a smaller scale, Symonds Bay is already farmed by Sanford Limited and the size of the pocket allows the establishment of the current proposal without generating a visually overdeveloped area. The development of the CMZ2 in the Sounds Plan were subjected to availability and community input. It was anticipated that the greater Squally Cove would be used as a marine farm site at some point. The subject proposal utilises this space without overdeveloping this area.



Chapter 9.0 of the Sounds Plan provides an extensive suite of provisions to guide development in the CMA. Objective 9.2.1.1 makes it clear that appropriate activities may be accommodated in the coastal marine area.

Policy 9.2.1.1.14 is:

*“To enable a range of activities in appropriate places in the waters of the Sounds including marine farming, tourism and recreation and cultural uses”*

As such, marine farming is specifically identified as an activity that may be appropriate in the Sounds.

Overall, it is considered that there is support within the statutory documents for marine farming in appropriate locations.

#### 4.2 Natural Character and Landscape

The backdrop of the site is identified as an Area of Outstanding Landscape Value. Therefore the provisions of Chapter 5 of the MSRMP apply. While the intentions of this chapter is to protect the landscapes within the Marlborough Sounds which are unique in New Zealand, the policies require remedying or mitigating adverse effects of development.

While most of the southern inlet of Squally Cove is zoned an area of outstanding natural value, it is noted that the coastline has been modified by marine farming for several decades. Policy 2.2.1.2 provides for additional development in amongst the existing farmed area. Objective 8.1.2 of the RPS requires the maintenance and enhancement of the visual character of the indigenous, working and built landscapes. Marine farms fall within the working landscape as it involves economic benefits from the use of water and includes rafts and other structures which form part of the character of the working environment.

Consequently, given the above and the nature of the application site, in which the presence of established marine farms in the vicinity the proposed site is strong, it is not considered that this small scale farm will damage the identified outstanding natural values of the landscape. Importantly, concentrating marine farming in the CMZ2 will help retain the natural character of the greater Croisilles Harbour and maintain the unmodified area of Okiwi Bay and Whangarae Bay.

As such, it is considered that there will be no additional landscape effects on this area and the small farm will be positioned behind an existing larger marine farm which has previously farmed the subject area due to non-compliance.

Policy 13 of the NZCPS recognises that the natural character is not the same as the natural features and landscapes. While the marine farm is not a natural feature, marine farms in general are naturally a part of the character of the Marlborough sounds and do not jeopardized the natural landforms or headlands and cliffs within these areas.

#### 4.3 Water Quality

The regional policy statement outlines costal marine water quality as an objective (5.3.2) outlining that water quality must be maintained at a level which provides for the sustainable management of marine ecosystems. Policy 5.3.5 seeks to avoid, remedy or mitigate the reduction of costal water quality by contaminants arising from activities occurring within the coastal marine area. Objective 5.3.10 requires the natural species diversity and integrity or marine habitats be maintained or enhanced. Policy 5.3.11

seeks the avoidance, remediation or mitigation of habitat disruption arising from activities occurring within the coastal marine area. The NIWA report included outlines that the proposed small scale marine farm would not adversely impact on the quality of the coastal water nor damage the physical integrity of marine habitats.

#### 4.4 Public access and Recreation

Objective 7.2.2 of the RPS ensures the sustainable management of water and Policy 7.2.10 outlines allocation of coastal space, ensuring that public access and recreational use will be considered when assessing all proposals for the development of the coastal marine area. Chapters 8 and 9 of the Sounds Plan emphasizes that the recreational activities and public access is a priority in the Sounds, particularly in certain locations.

As previously discussed, the marine farm is positioned in a manner which is not subject to high public usage. The outer boundaries of the farm will not protrude southwards beyond the line formed by the farm to the east and the point to the west, and as such will not pose a risk to east west navigation.

Areas within the CMZ1 within Okiwi Bay are considerably more attractive and accessible to fishing and other forms of informal recreation.

Objective 7.1.2 – Quality of Life – of the RPS seeks to maintain and enhance the life of the people of Marlborough while ensuring that activities do not adversely affect the environment. The proposed marine farm would be established with the CMZ2, an area where marine farming is anticipated.

#### 4.5 Precautionary Approach

Both the NZCPS and the Sounds Plan promote a precautionary approach be taken to decisions on resource consents where the effects on the coastal environment are uncertain, unknown, or little understood, but potentially significantly adverse.

In the case of this application the applicant has obtained a benthic survey and there is a good level of knowledge about the potential effects.

#### 4.6 Cultural Heritage

Objective 7.3.2 in the RPS requires significant cultural or heritage values to be retained for the continued benefit of the community and Policy 7.3.3 requires the protection of identified cultural and heritage features. The coastal marine area is a defined Statutory Acknowledgement area. However, recognition has been given to the zoning of the cove and previous resource consent experience with marine farms. The application will not result in deterioration of the coastal environment and it is noted that iwi consultation is undertaken during regional plan preparation which determines the zone of areas within the region.

### 5. The Proposed Marlborough Environmental Plan

The PMEP was publicly notified on 9 June 2016 and submissions have been received; the council is now reviewing the submissions in preparation for a public hearing.

The PMEP does not include provisions managing marine farming, and is therefore of very limited relevance to this application. However, while specific marine farming provisions are beyond the scope of the PMEP, a range of relevant objectives and policies are included for which it is appropriate that a brief assessment

is made. The PMEP is at an early stage of the Schedule 1 (RMA) process and therefore does not yet hold a high level of weight under the assessment of resource consents.

Volume 4 of the PMEP contains the maps. The following maps are relevant:

- Landscapes (Map 5)
- Ecologically Significant Marine Sites (Map 14)

Chapter 6 of the PMEP contains policy guidance in relation to natural character. The Chapter 6 policy framework emphasises the retention of natural character in areas with high or better natural character. Proposed Policy 6.2.5 is to “recognise that development in parts of the coastal environment ... that have already been modified by past and present resource use activities is less likely to result in adverse effects on natural character.”

Overall, a broad general read of the PMEP does not indicate that the proposed is likely to be inconsistent with the direction of the PMEP.

## 6. Part 2 RMA Assessment and Overall Assessment

This application is to be primarily assessed under the provisions of the Sounds Plan and the NZCPS. These relevant statutory documents were both promulgated under the current Part 2 provisions and therefore give effect to those provisions. Nevertheless, Schedule 4 of the Act (under which this application is made) requires an assessment of the activity against the matters set out in Part 2.

Section 6 of the Act sets out the matters of national importance. The act requires that all persons shall recognise and provide for these matters. The matters that are relevant to this application are:

- a) *the preservation of the natural character of the coastal environment (including the coastal marine area), wetlands, and lakes and rivers and their margins, and the protection of them from inappropriate subdivision, use, and development;*
- d) *the maintenance and enhancement of public access to and along the coastal marine area, lakes, and rivers;*
- e) *the relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga;*

With the establishment of Squally Cove being entirely CMZ2 the future development of marine farms in this location was anticipated and the neighbouring CMZ1 in Okiwi Bay ensures that the natural character is maintained.

Public access remains appropriately provided for in the areas of high public usage. Access to Symonds Hill remains practicable.

The marine farm will not compromise the values of Maori.

Section 7 of the Act sets out other matters to which particular regard must be had. The matters that are relevant to this application are:

- a) *kaitiakitanga;*
- b) *the efficient use and development of natural and physical resources;*
- c) *the maintenance and enhancement of amenity values;*

- d) *intrinsic values of ecosystems:*
- f) *maintenance and enhancement of the quality of the environment:*

It is an efficient use of the available sea-space to allow additional marine farming in areas that are already compromised, and where adverse effects on the environment are no more than minor.

Ecosystems and the overall quality of the environment will be maintained.

Section 8 of the Act states that:

*In achieving the purpose of this Act, all persons exercising functions and powers under it, in relation to managing the use, development, and protection of natural and physical resources, shall take into account the principles of the Treaty of Waitangi (Te Tiriti o Waitangi).*

While the Coastal Marine Area is significant to all Te Tau Ihu tribes, it is not anticipated that a small marine farm in this location will be of concern.

Section 5 sets out the purpose and principles of the Act.

This proposal will provide for the wellbeing of the applicant and the contractors undertaking the farming operations. It will also provide for the greater Marlborough community who also see flow down benefit from aquaculture farming within the region. There are no resources that will be consumed by this activity such that future generations cannot provide for their own wellbeing.

The life-supporting capacity of the environment will not be affected to anything more than a minor extent. The benthic habitat is not rare or unusual and is well represented in the Sounds, including in the CMZ1 zone for which marine farming is prohibited.

Overall the proposal is consistent with the purpose of the Act.

## 7. Term

An expiry date of 7 April 2031 is sought to align the term with farm 8300 and ensure that greater adverse effects do not remain in the event that farm 8300 is removed once it expires.

## 8. Overall Assessment

The location of this application is within the area of existing marine farming in Squally Cove. A small marine farm is sought to be established adjacent to a larger farm at Symonds Hill.

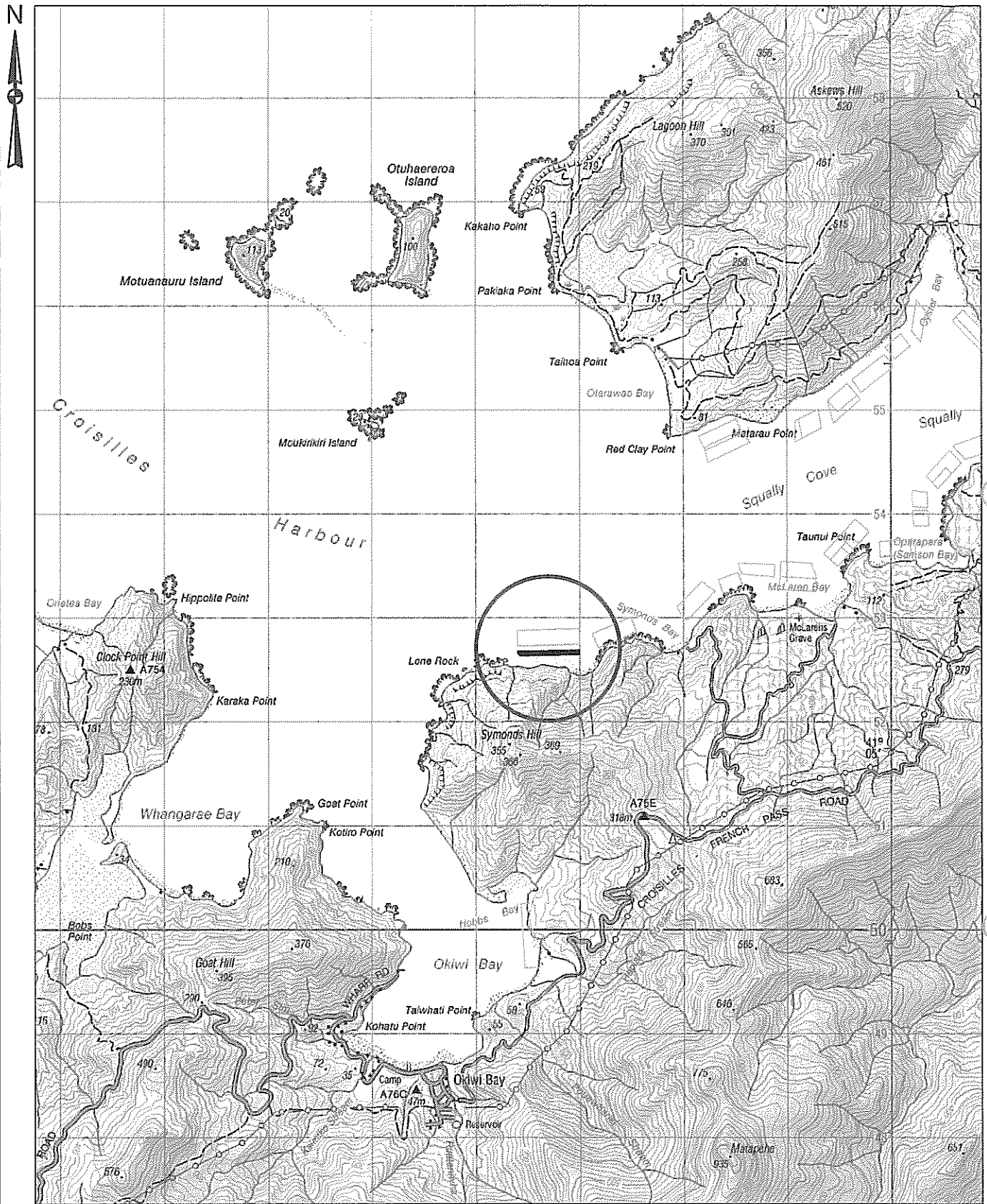
The benthic environment has been described as relatively uniform and with a substrate and community assemblage that is typical of a large area of the Sounds.

The marine farm will extend seaward of the line that is 50 metres from MLWS and within the line that is 200 metres from MLWS. As a result the application is for a discretionary activity.

The application will have only minor or less than minor effects on natural character, landscape values, ecological values, public access and navigation.

The application is not inconsistent with the provisions of the Sounds Plan, the NZCPS and Part 2 of the Act. As such, it is appropriate that the application be granted under Sections 104 and 104B of the Act.

**ATTACHMENT A**  
Location Map and Site Plans



Topomap 50 Sheet: BP27

Base Topographical Data sourced  
from Land Information New Zealand Data.  
Crown Copyright Reserved.

## Locality Map

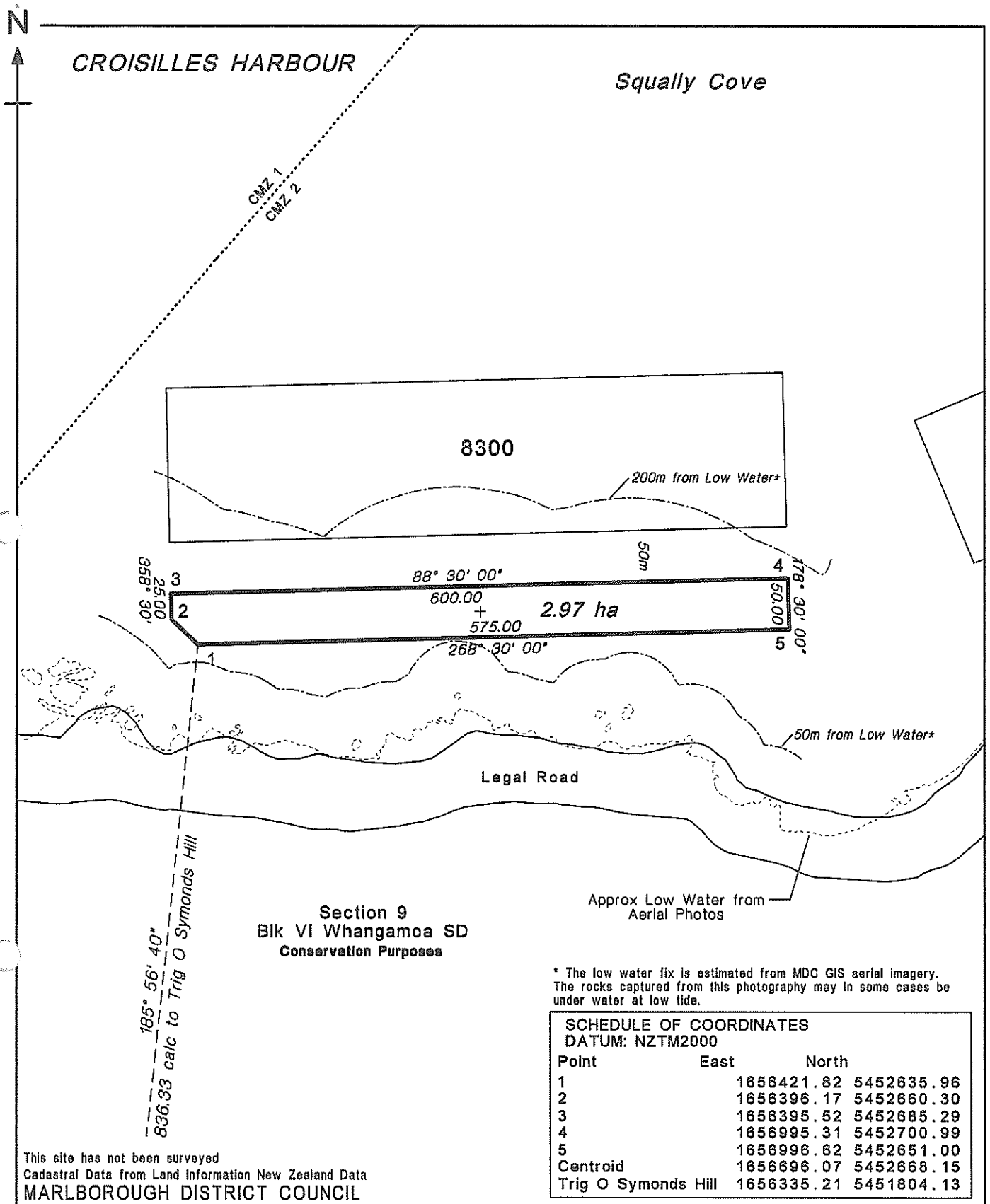
Proposed Marine Farm  
Squally Cove, Croisilles Harbour

**DPL**  
Draughting Plus Limited

Prepared  
28 October 2016

Scale 1:50,000  
500 0 500 1000 1500 2000 2500 3000 3500 Meters

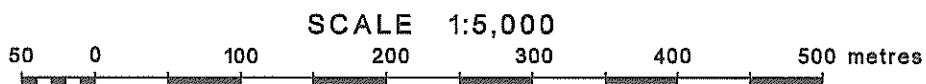
MF\_2490



## Proposed Coastal Permit

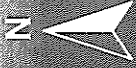
### Squally Cove - Croisilles Harbour

Prepared by  
Draughting Plus Ltd  
28 October 2016



MF\_2490





Squally Cove

Croisilles Harbour

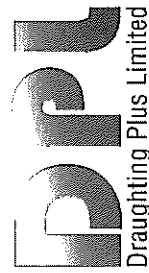
Produced by Draughting Plus Ltd from Marine Farm Data supplied by Marlborough District Council.

The accompanying material has been released by Council from its information repositories as they exist as at January 2016. Council does not accept any responsibility for the initial and ongoing accuracy of the material. It is the responsibility of the recipient to make such checks as the recipient considers appropriate to ensure accuracy.

REFERENCE

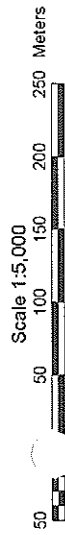
- Existing Marine Farm
- Proposed Marine Farm

Aerial Photo image from MDC GIS dated 2012

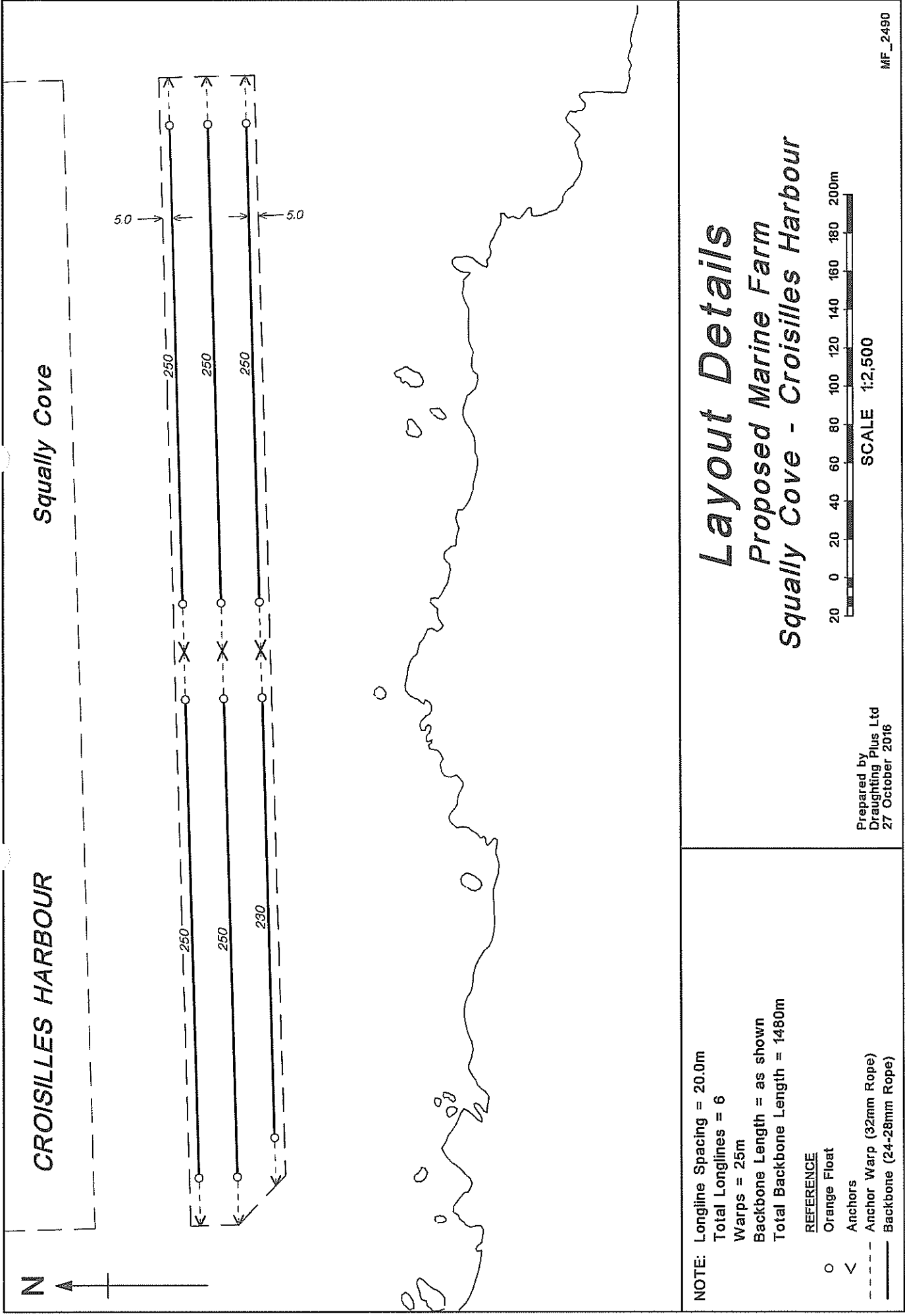


October 2016

Proposed Marine Farm  
Squally Cove - Croisilles Harbour  
Aerial Overlay







## **ATTACHMENT B**

### **NIWA Report**

# Benthic site assessment in Squally Cove, Croisilles Harbour

*Prepared for Jonathan Tester*

*January 2017*

Prepared by:  
Louis Olsen  
Ken Grange




For any information regarding this report please contact:

Louis Olsen  
Marine Ecology Technician  
Marine Ecology  
+64-3-545 7745  
louis.olsen@niwa.co.nz

National Institute of Water & Atmospheric Research Ltd  
PO Box 893  
Nelson 7040

Phone +64 3 548 1715

NIWA CLIENT REPORT No: 2017016NE  
Report date: January 2017  
NIWA Project: TES17402

Quality Assurance Statement		
Stephen Brown	Reviewed by:	
Ken Grange	Formatting checked by:	
Ken Grange	Approved for release by:	

© All rights reserved. This publication may not be reproduced or copied in any form without the permission of the copyright owner(s). Such permission is only to be given in accordance with the terms of the client's contract with NIWA. This copyright extends to all forms of copying and any storage of material in any kind of information retrieval system.

Whilst NIWA has used all reasonable endeavours to ensure that the information contained in this document is accurate, NIWA does not give any express or implied warranty as to the completeness of the information contained herein, or that it will be suitable for any purpose(s) other than those specifically contemplated during the Project or agreed by NIWA and the Client.

# Contents

<b>Executive summary .....</b>	<b>4</b>
<b>1 Introduction .....</b>	<b>5</b>
<b>2 Methods.....</b>	<b>6</b>
2.1 Side-scan sonar .....	6
2.2 Towed camera transects.....	6
2.3 Benthic grab.....	7
<b>3 Results .....</b>	<b>7</b>
3.1 Side-scan sonar .....	7
3.2 Towed camera .....	8
3.3 Benthic grab.....	10
<b>4 Discussion .....</b>	<b>12</b>
<b>5 Acknowledgements .....</b>	<b>14</b>
<b>6 References.....</b>	<b>14</b>
<b>Appendix A           Images of representative habitat for each transect .....</b>	<b>15</b>
 Tables	
Table 1: Fauna in grab samples	11
 Figures	
Figure 1: Proposed Marine Farm location (pale green rectangle) inshore of Licence 8300	5
Figure 2: Squally Cove proposed marine farm site, with sampling positions.	6
Figure 3: Survey map showing farm location, side-scan swaths. Side-scan swaths are greyscale bands, small Images A, B & C are close up of areas mentioned.	8
Figure 4: Example of grain size sediment cores (Left: Grab2, Right Grab 3)	10
Figure 5: Sediment grain size distribution at each grab sample position	10
Figure 6: LINZ aerial photo from 2011 - 2012 survey showing existing mussel lines in and around the proposed site. Mussel lines are highlight with dotted line (LINZ, 2011 - 2012).	13

## Executive summary

A survey comprising side-scan sonar, grab sampling, and towed video transects was completed at a small (2.97 Ha) proposed marine farm site near the entrance to Squally Cove, Croisilles Harbour. The survey identified there were no rock outcrops or reefs within the proposed boundaries, although a small area of cobbles extended close to the inshore boundary at the western end. The benthic habitats reflected the sandy sediments and relatively exposed conditions of the site, while the benthic communities were comprised of species common and widespread in Croisilles Harbour, other than the presence of the lancelet *Epigonichthys hectori*, a primitive fish that is patchily common north of Cook Strait, and occasionally present in the outer Marlborough Sounds. Much of the site is already occupied with lines from a neighbouring marine farm, and there is little evidence of adverse effects from those lines, other than the accumulation of mussel shells. The presence of lancelets beneath the existing lines at the site suggests this species will not be significantly affected by the farm development.

## 1 Introduction

NIWA was engaged to undertake an ecological site assessment survey to provide information for a coastal resource consent application to establish a marine farm at a proposed area of 2.97 hectares inshore of Licence 8300 in Squally Cove, Croisilles Harbour. The survey was designed to describe the benthic characteristics in the vicinity of the proposed farm site and ascertain whether there were any ecological features considered sensitive or significant. The survey used side-scan sonar (to characterise the seabed), a towed remotely-operated camera, and a Van Veen benthic grab (to ground truth the side-scan sonar and identify biota and sediment type).

Several areas within Croisilles Harbour have been identified as ecologically significant marine sites by Davidson et al. (2011). The closest ecologically significant marine zone (1.2, Croisilles Harbour Entrance) to the proposed marine farm site is greater than 1km away, and is said to have large areas of subtidal sand flats which are habitat to a variety of species, most notably scallop beds which are an important recreational fishery, and the NZ lancelet, a primitive small fish-like animal regarded as an evolutionary link between invertebrates and fish. The proposed marine farm site is situated near the entrance to Squally Cove between the shore and an existing mussel farm (Figure 1).

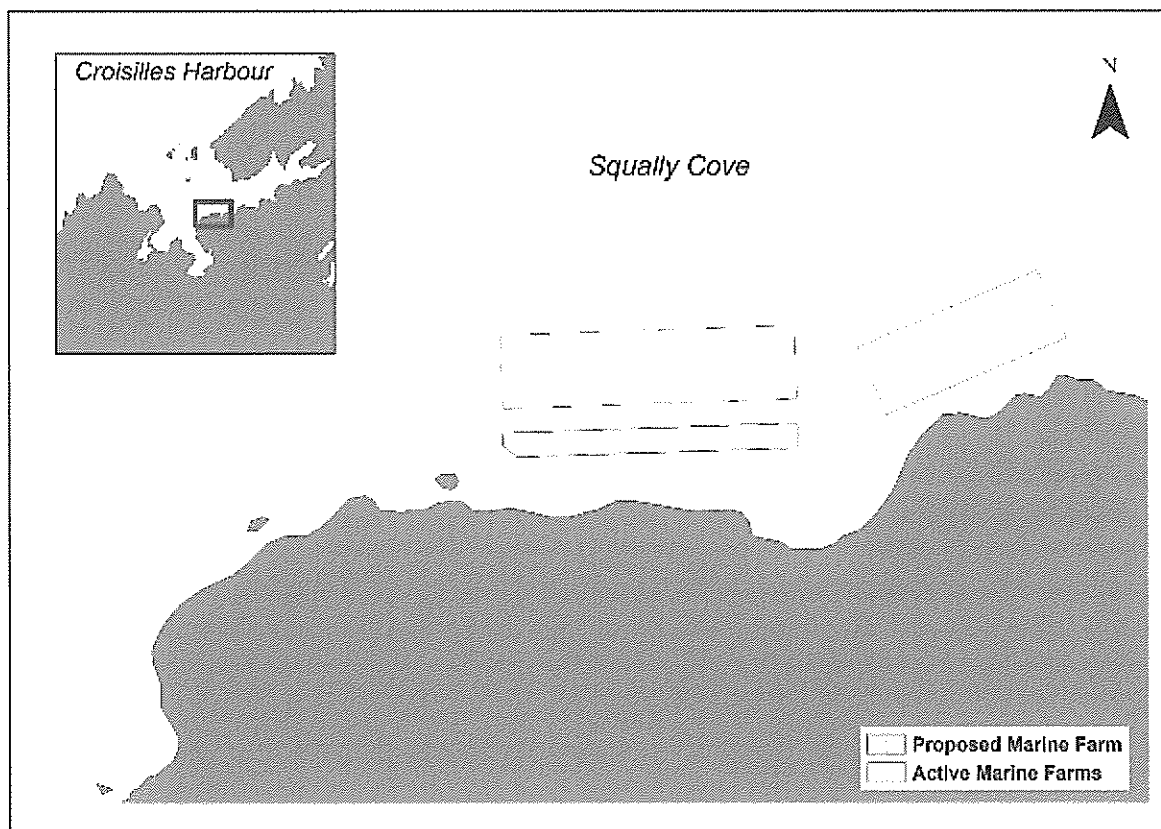


Figure 1: Proposed Marine Farm location (pale green rectangle) inshore of Licence 8300

## 2 Methods

The survey was conducted on 20 January 2017 by NIWA staff aboard the vessel RV Tio. All sample locations as shown in Figure 2 were located and recorded using either a hand-held Garmin GPS unit (GPSMAP64sx) or Lowrance chart plotter (L LCX-25C).

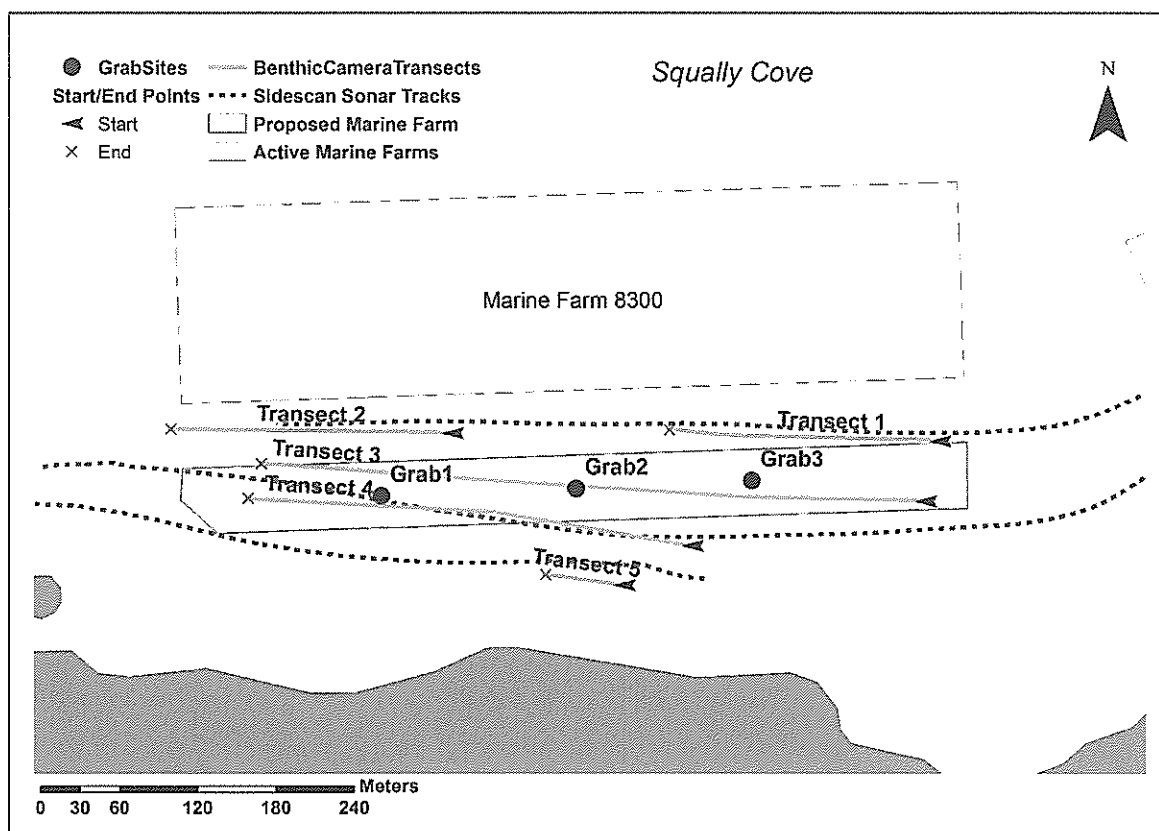


Figure 2: Squally Cove proposed marine farm site, with sampling positions.

### 2.1 Side-scan sonar

Three side-scan sonar swaths, each 100m wide (50 m either side of the vessel) were recorded using a high-frequency (675 kHz) Tritech towfish. The position of the side-scan sonar was automatically recorded every 2 seconds along each swath from a GPS and saved in real time to a laptop on board the vessel using SeaNet Pro software and post-processed with Triton Perspective software to produce geo-referenced images that could be opened in ArcGIS v10 or Google Earth, where locations of features of interest could be determined.

### 2.2 Towed camera transects

A high-definition camera system (Ocean Systems Inc., Delta vision industrial HD underwater video camera) mounted on a sled was used to characterise seabed substratum and biological features. Five video transects were conducted, each traveling from west to east and towed at approximately 0.5 – 1 knots.

Video footage and still images were analysed to describe the ecological features.



## 2.3 Benthic grab

A Van Veen benthic grab (bite area ca 0.13 m<sup>2</sup>, maximum bite depth 22 cm) was used to obtain samples to describe sediment physicochemical characteristics, and infaunal species assemblages at three locations within the proposed site.

### 2.3.1 Sediment physicochemistry

From each grab sample, a single (8 cm diameter) core sub-sample was taken. The depth of the core was determined by the depth of the sediment in the grab. Each core was photographed, and the sediment colour and smell was noted. The top 3 cm of the core from each of the grabs was returned to the laboratory for analysis of sediment grain size.

The proportion of gravel, sand, and mud was determined by oven drying each sediment sample at 100°C overnight and washing a weighed subsample through stacked 200 µm and 63 µm sieves. The fraction retained on each sieve was dried and weighed and the weight of material passing through the 63 µm sieve obtained by subtraction from the original weight. Dry weights for each fraction were expressed as percentages of the total dry weight.

### 2.3.2 Infauna

To sample the infaunal community (animals living within the sediment), the entire contents of the grab sample were transferred to a mesh bag (mesh size 1.0 mm), and sieved by gently washing the bag in seawater. Following sieving, the infaunal samples were preserved in a solution of 70% ethanol in seawater and transported back to the NIWA lab for taxonomic identification and counting.

## 3 Results

### 3.1 Side-scan sonar

The side-scan sonar images showed that the seabed within the proposed site was relatively level uniform soft sediment with no indication of 3-dimensional features such as bedrock reef. The speckles in the backscatter imagery indicate that there is shell and/or rocky fragments mixed in with the soft sediment, however the presence of existing mussel lines suggest it is likely to be shell drop from the lines.

The pale horizontal bands seen in the side-scan image are shadows of the droppers from the existing mussel lines (on Licence 8300) and the isolated spots of white either side are indicative of screw anchors for the mussel lines (Figure 3, A & C).

There is one area within the site which indicate a soft low-lying mound, this is likely to be debris from the overlying mussel farm (Figure 3, C).

3-dimensional boulder reef extends from the shore line to within ~30m of the southern boundary along most of its length, with the exception of the western end of the site where an arm of cobble/small boulders extends from the main reef to the proposed southern boundary (Figure 3, B). The reef seen in this side scan image is likely to be typical of the area with low diversity and limited cover of macroalgae, inhabited by typical reef fauna of the region (Davidson et al., 2011).

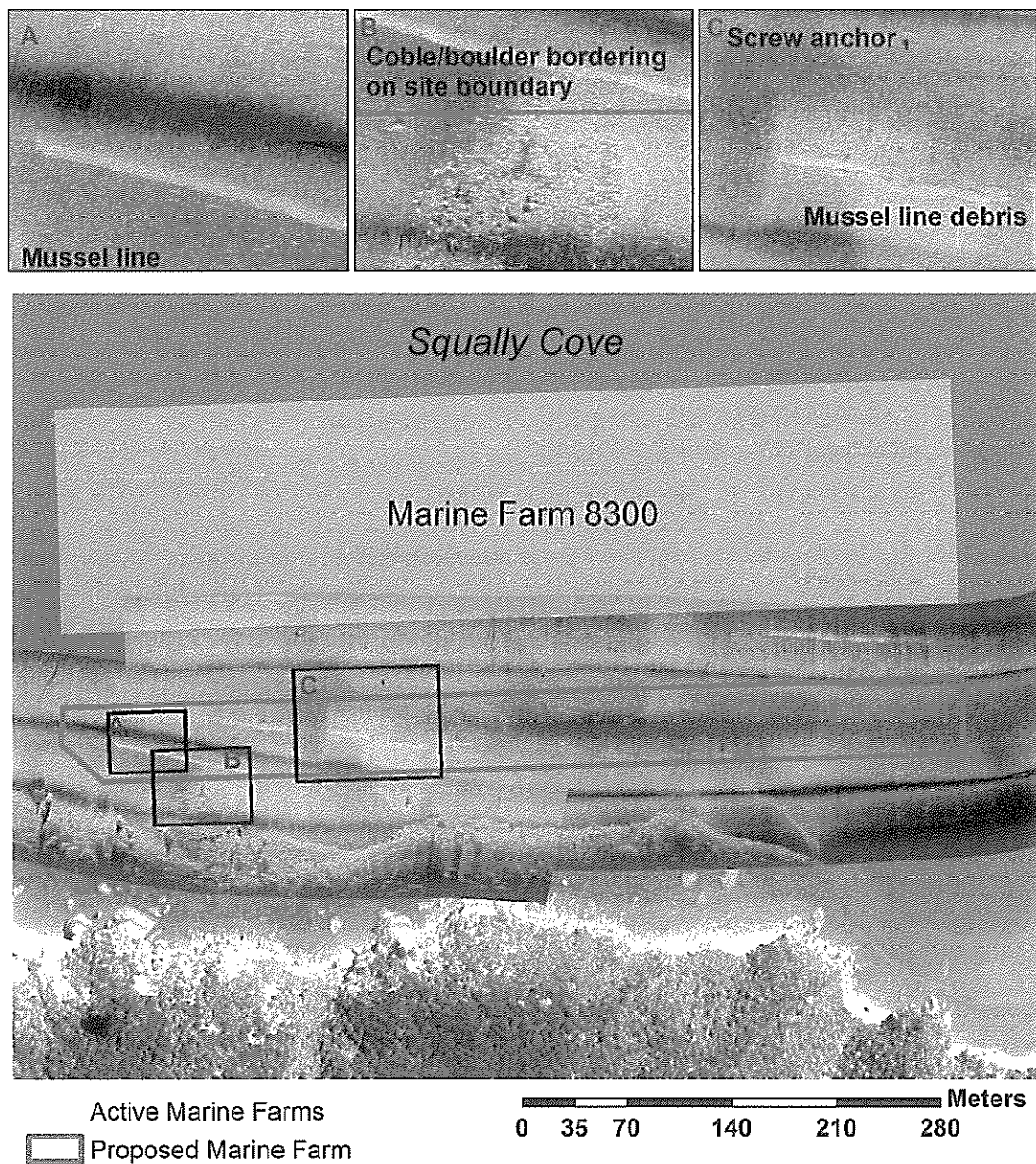


Figure 3: Survey map showing farm location, side-scan swaths. Side-scan swaths are greyscale bands, small Images A, B & C are close up of areas mentioned.

### 3.2 Towed camera

#### 3.2.1 Habitat and epibiota (animals and seaweeds at the sediment surface)

Five video transects were taken of the seabed within and outside the proposed marine farm site. It should be noted that the entire area of the proposed site was taken up by existing mussel lines that are outside of their consented boundaries (Licence 8300). It may be possible, therefore, that the

benthic habitat beneath the proposed site may already be influenced to some degree by mussels and other fauna and flora dropping from the mussel lines to the seabed.

Visual analysis of the towed camera footage showed that the proposed site is situated over sand, and shell drop from the existing mussel lines. The habitat on the eastern side of the site was predominantly small sand waves with numerous invertebrate burrows and tracks and scatterings of blue and green mussel shell. Epibiota on this side of the site was sparse, and dominated by species such as 11 armed starfish (*Coscinasterias muricata*), cushion star (*Patiriella* sp), screw shell (*Maoricolpus roseus*), hermit crabs and drift filamentous algae (Figure Appendix A 1). Additionally, 3 seahorse (*Hippocampus abdominalis*) were seen on terrestrial detritus (a tree branch) near the end of the video transect (Figure Appendix A 1).

The density of the mussel shell drop increased substantially from east to west, with areas of the seafloor on the western side of the site completely covered in mussel shell drop. The presence of the mussel shell was also associated with less sand wave formation and a slight increase in fine sediment. The epibiota on the seabed in the western portion of the site where mussel shell deposition was greatest was similar to the sand wave habitat, although much more abundant. Fewer cushion stars were seen on the shell debris. The shelly substrate provided structure for attachment of mussel spat (predominantly blue) and filamentous algae. Gastropods were more numerous on this side of the site, with aggregations of *Maoricolpus roseus* commonly seen (Figure Appendix A 2, Figure Appendix A 3). Brittlestars (*Ophiopsammus maculata*) were more abundant on the western side of the site as well (Figure Appendix A 2).

The variation in water depth from ~8.5m at the eastern boundary to ~12m at the western boundary may also contribute to some of the changes to habitat and benthic community composition.

The towed camera was dropped over a reef area identified on the side-scan sonar to ground truth this habitat (transect 5). The video footage showed boulder reef down to sand. No macroalgae were seen on the reef, only patches of fine algae covering sections of boulders. Other species identified from the footage include spotties (*Notolabrus celidotus*), blue cod (*Parapercis colias*), kina (*Evechinus chloroticus*), 11 armed starfish (*Coscinasterias muricata*), the large sponge (*Ecionemia alata*) and several white-striped anemones (*Anthothoe albocincta*) (Figure Appendix A 5).

Croisilles harbour is known for its scallop beds (Davidson et al., 2011) which are of particular environmental importance and a valuable recreational fishery. Particular attention was paid when analysing the video to determine the presence of scallops within the proposed site, however no live scallops were observed in the video, only the odd shell.

### 3.3 Benthic grab

#### 3.3.1 Sediment

The sediment within the proposed site was composed primarily of sand with a small portion of shell gravel and mud/silt (Figure 4 & Figure 5).

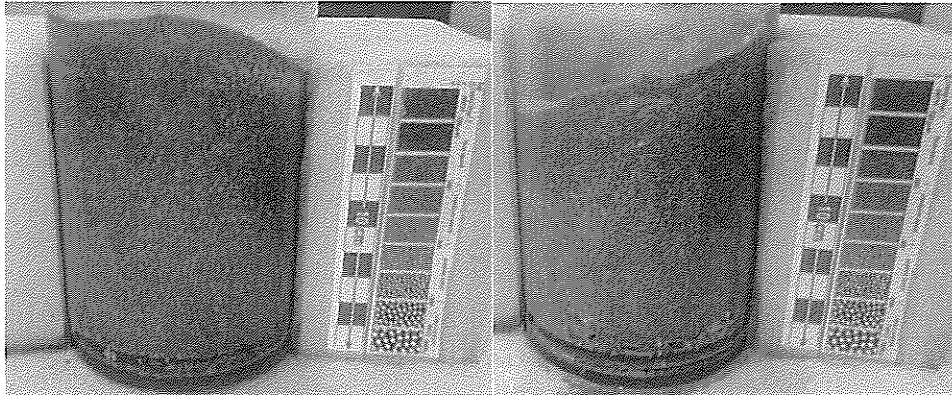


Figure 4: Example of grain size sediment cores (Left: Grab2, Right Grab 3)

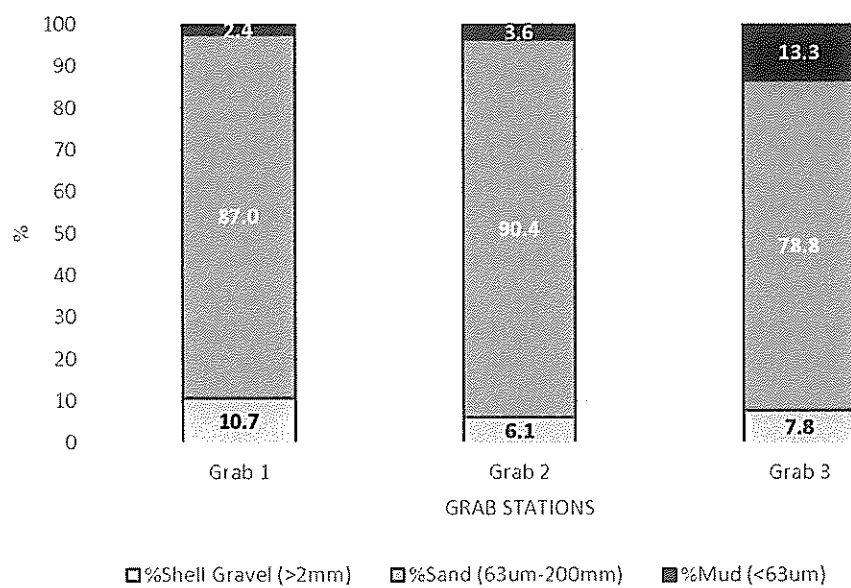


Figure 5: Sediment grain size distribution at each grab sample position

### 3.3.2 Infauna – animals living within the sediment

Table 1: Fauna in grab samples

Phylum	Group	Taxon	Grab 1	Grab 2	Grab 3	Total	Frequency
Annelida	Polychaeta	Ampharetidae			1	1	1
Annelida	Polychaeta	Capitellidae		2	6	8	2
Annelida	Polychaeta	Cirratulidae			1	1	1
Annelida	Polychaeta	Lumbrineridae			1	1	1
Annelida	Polychaeta	Maldanidae		2	3	5	2
Annelida	Polychaeta	Opheliidae	3	2	1	6	3
Annelida	Polychaeta	Orbiniidae	1			1	1
Annelida	Polychaeta	Oweniidae	3		1	4	2
Annelida	Polychaeta	Phyllodocidae	2	2		4	2
Annelida	Polychaeta	Polynoidae	1			1	1
Annelida	Polychaeta	Sigalionidae	1	1	2	4	3
Annelida	Polychaeta	<i>Spiochaetopterus</i> sp.			10	10	1
Annelida	Polychaeta	Spionidae			1	1	1
Annelida	Polychaeta	Syllidae		2		2	1
Chordata	Leptocardii	<i>Epigonichthys hectori</i>		2	2	4	2
Crustacea	Malacostraca	Amphipoda	40	14	28	82	3
Crustacea	Malacostraca	Callianassidae	38	19	12	69	3
Crustacea	Malacostraca	Cumacea	15		5	20	2
Crustacea	Malacostraca	Isopoda	3	5		8	2
Crustacea	Malacostraca	Mysida	1			1	1
Crustacea	Malacostraca	<i>Notomithrax</i> sp.			1	1	1
Crustacea	Malacostraca	<i>Pagurus</i> sp.			4	4	1
Crustacea	Malacostraca	Tanaidacea			1	1	1
Crustacea	Ostracoda	Ostracoda	5		3	8	2
Echinodermata	Asteroidea	<i>Patiriella</i> sp.			1	1	1
Mollusca	Bivalvia	<i>Corbula zelandica</i>	7	6	19	32	3
Mollusca	Bivalvia	<i>Gari</i> sp.		1	2	3	2
Mollusca	Bivalvia	<i>Myadora striata</i>		1	1	2	2
Mollusca	Bivalvia	<i>Nucula nitidula</i>	1	2		3	2
		<i>Scalpomactra</i>					
Mollusca	Bivalvia	<i>scalpellum</i>		2		2	1
Mollusca	Bivalvia	<i>Zemysia globus</i>	2	5	16	23	3
Mollusca	Bivalvia	<i>Zemysia zelandica</i>		2	2	4	2
Mollusca	Gastropoda	<i>Euterebra tristis</i>	2			2	1
Mollusca	Gastropoda	<i>Turbonilla zealandica</i>		1		1	1
Mollusca	Polyplacophora	Chiton sp. A			1	1	1
		<i>Rhyssoplax</i>					
Mollusca	Polyplacophora	<i>canaliculata</i>			1	1	1
		Total individuals	125	71	126		
		Number species	16	18	26		

A total of 36 taxa was identified over all three grab samples. The species richness (number of species) increased from grab 1 – 3, with grab 3 on the western side of the proposed site having substantially more species ( $n = 26$ ). Grab 1 had the lowest density of infauna ( $n=16$ ).

The majority of the benthic fauna comprised species that are generally common and widespread in sand/mud habitats in the Marlborough Sounds (McKnight & Grange, 1991). The most abundant taxa found in the grab sampled were crustaceans from the orders Amphipoda and Callianassidae (commonly known as ghost shrimp). The bivalve taxa *Corbula zelandica* and *Zemysia globus* were also relatively numerous in the samples, follow by several Polychaete taxa.

The presence of New Zealand lancelet (*Epigonichthys hectori*) was also noted in 2 of the 3 grabs (Grab 2 & 3). This species is generally regarded as being found north of Cook Strait, but it has been recorded previously in sandy areas at the entrance to Croisilles Harbour (Davidson et al., 2011).

## 4 Discussion

The majority of biota and benthic features identified during the survey of the proposed marine farm site are not considered to be of particular ecological significance. The fauna and flora observed in the towed camera footage and benthic grab samples are common assemblages found in Tasman Bay and Marlborough Sounds region (McKnight & Grange, 1991; Newcombe, Clark, Gillespie, Morrissey, & Mackenzie, 2015). Many of the more conspicuous species such as 11 armed starfish (*Coscinasterias muricata*), cushion star (*Patiriella* sp.), screw shell (*Maoricolpus roseus*), kina (*Evechinus chloroticus*) and the sponge *Ecionemia alata* are common, and not considered to be “important species” (Davidson et al., 2011). Scallops, which are categorised as an important species (Davidson et al., 2011) were not observed within the proposed marine farm site by any of the methods conducted in this survey. Blue cod (*Parapercis colias*), was seen in the near shore area amongst the cobble and boulder reef near the western portion of the inshore boundary of the proposed farm.

A species that may be considered as significant is the NZ lancelet (*Epigonichthys hectori*), where two specimens were collected in each of two of the three grab samples. This species is generally regarded as being found mostly north of Cook Strait (Paulin et al, 1989), and has been reported previously in Croisilles Harbour, where the population was regarded as significant as it is the only one known in the South Island (Davidson et al, 2011). Policy 11(a) of the NZ Coastal Policy Statement lists factors to be considered when protecting indigenous biological diversity in the coastal environment, including the need to avoid adverse effects of activities on “habitats of indigenous species where the species are at the limit of their natural range, or are naturally rare” (paragraph (iv)). The presence of the NZ lancelet at the proposed site could be considered to fall under the criteria in the above policy. There are, however, reports of populations elsewhere in the Marlborough Sounds, such as near Stephens Is (K. Grange, NIWA, pers. comm.), and Te Papa have records from several outer sound locations (C. Duffy, DOC, pers. comm.). The population in the Croisilles Harbour has been reported as abundant, with densities reaching 450 per m<sup>2</sup> (Davidson et al, 2011). The distribution of the species is considered to be common, but localised, north of Cook Strait (Paulin et al, 1989). This description fits the above reports from the Marlborough Sounds, where the species may be localised, but abundant.

The presence of the NZ lancelet would suggest that this site has not been significantly impacted by deposition from the existing mussel lines as lancelets are known to prefer well irrigated sandy habitats (Crossland, 1979) and may be susceptible to physical disturbance and siltation (Davidson et al., 2011). The samples that contained the lancelets in the present survey were those with greater abundance of shell deposition from the existing mussel lines above. It is likely, then, that lancelets will still be present beneath any new mussel farm developed on the site.

The sand dominated benthos of the proposed site closely resembles that of sandy habitats found in central Croisilles Harbour area (Davidson et al., 2011) rather than the mid to inner Squally Cove area where sediments are finer (Brown, 2009). The sediment characteristics and the geographic location of the site suggest that it has good water movement from tidal and wind driven currents, which are likely to mitigate the sedimentation effects of mussel faeces and pseudofaeces. The effect of good circulation can be seen at this site under the existing lines, where there is limited silt accumulation on the sediment or fallen shell debris. Furthermore, the infaunal community found in this site was taxonomically diverse which is more representative of undeveloped sites with natural sediment loading (Kaspar, Gillespie, Boyer, & MacKenzie, 1985).

There are 13 existing mussel lines currently within the proposed site that appear to be part of marine farm Licence 8300, and, as such, they may be located outside their consented area. These lines can be seen in aerial photos from a LINZ survey during 2011 - 2012 which suggest they have been in place for at least 5 years (Figure 6), and it is likely that deposition beneath the lines from mussel faeces, pseudofaeces and whole mussels, as well as other organisms associated with the mussel lines, will already have had some influence on the benthos at this site. However, there were no significant adverse effects to the seabed at the site observed during this survey. This may be expected to continue with the development of the proposed mussel farm.

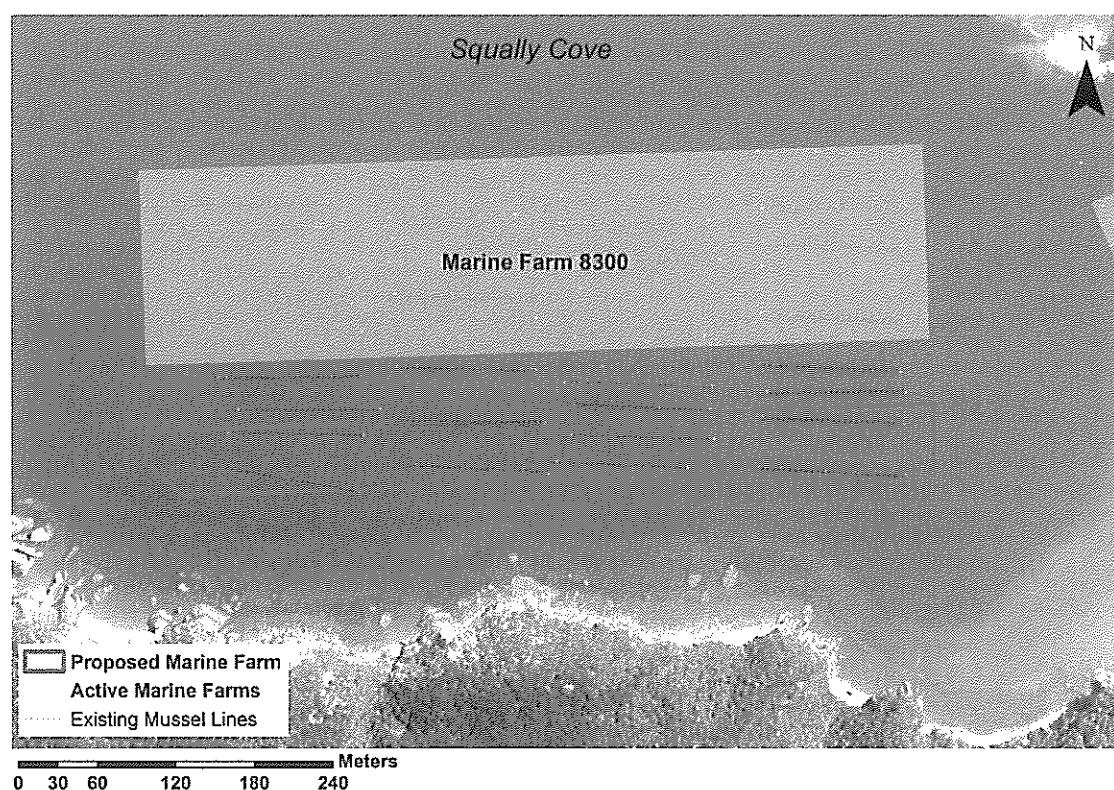


Figure 6: LINZ aerial photo from 2011 - 2012 survey showing existing mussel lines in and around the proposed site. Mussel lines are highlight with dotted line (LINZ, 2011 - 2012).



## 5 Acknowledgements

The authors thanks Henry Barrett and Jon Stead for assistance in the field, Megan Carter and Stephen Brown for macrofaunal identifications.

## 6 References

- Brown, S. (2009). Seabed ecological survey: Resource consent U001552, Croisilles Harbour, Marlborough Sounds *FRI09401* (Vol. NEL2009-14, pp. 8 p.). Nelson: NIWA.
- Crossland, J. (1979). Occurrence of the New Zealand lancelet in the plankton. *New Zealand Journal of Marine and Freshwater Research*, 13(2), 277-277.
- Davidson, R., Duffy, C., Gaze, P., Baxter, A., DuFresne, S., Courtney, S., & Hamill, P. (2011). *Ecologically significant marine sites in Marlborough, New Zealand*.
- Kaspar, H. F., Gillespie, P. A., Boyer, I. C., & MacKenzie, A. L. (1985). Effects of mussel aquaculture on the nitrogen cycle and benthic communities in Kenepuru Sound, Marlborough Sounds, New Zealand. *Marine Biology*, 85(2), 127-136. doi:10.1007/bf00397431
- LINZ. (2011 - 2012). Marlborough 0.4m Rural Aerial Photos (2011 - 2012). In B. BP27\_18\_21\_2000, BP27\_18\_23\_2000 (Ed.), *LINZ data service: LINZ - Land Information New Zealand*.
- McKnight, D. G., & Grange, K. (1991). *Macrobenthos-sediment-depth relationships in Marlborough Sounds* (DSIR Marine and Freshwater 19p.). Retrieved from
- Newcombe, E., Clark, D., Gillespie, P., Morrissey, D., & Mackenzie, L. (2015). *Marine Environment in Tasman Bay and Golden Bay*. (2716). Cawthron Institute.
- Paulin, C.; Stewart, A.; Roberts, C.; McMillan, P. (1989). New Zealand fish: a complete guide. *National Museum of New Zealand Miscellaneous Series No 19*. 279 p.



## Appendix A Images of representative habitat for each transect



Figure Appendix A 1: Transect 1, still images taken from the video. Image progression through the video from left to right.

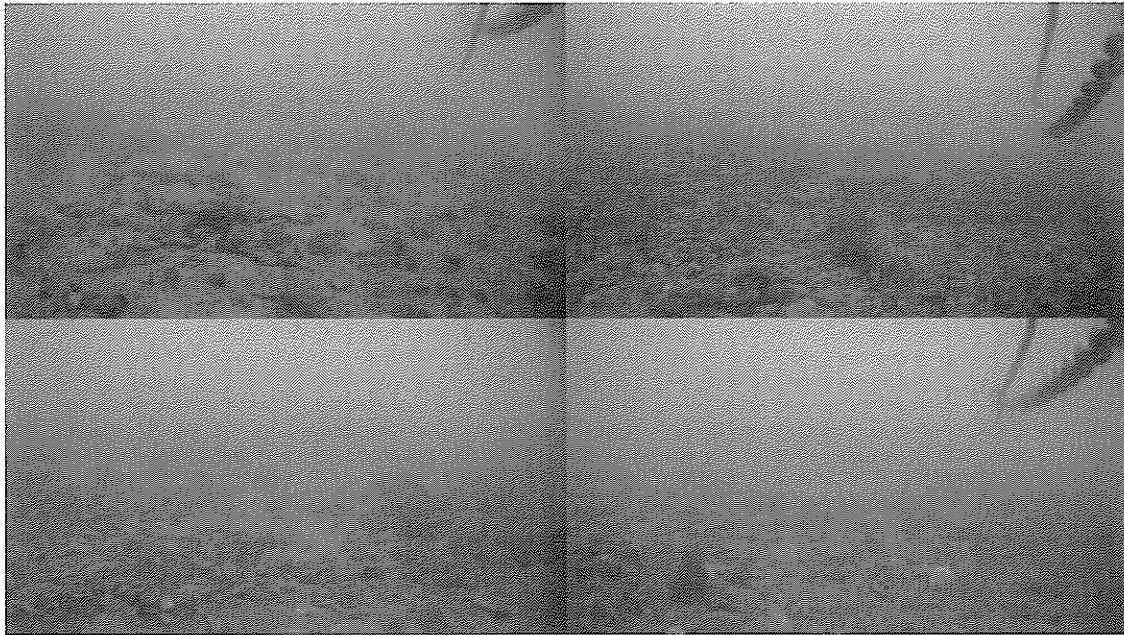
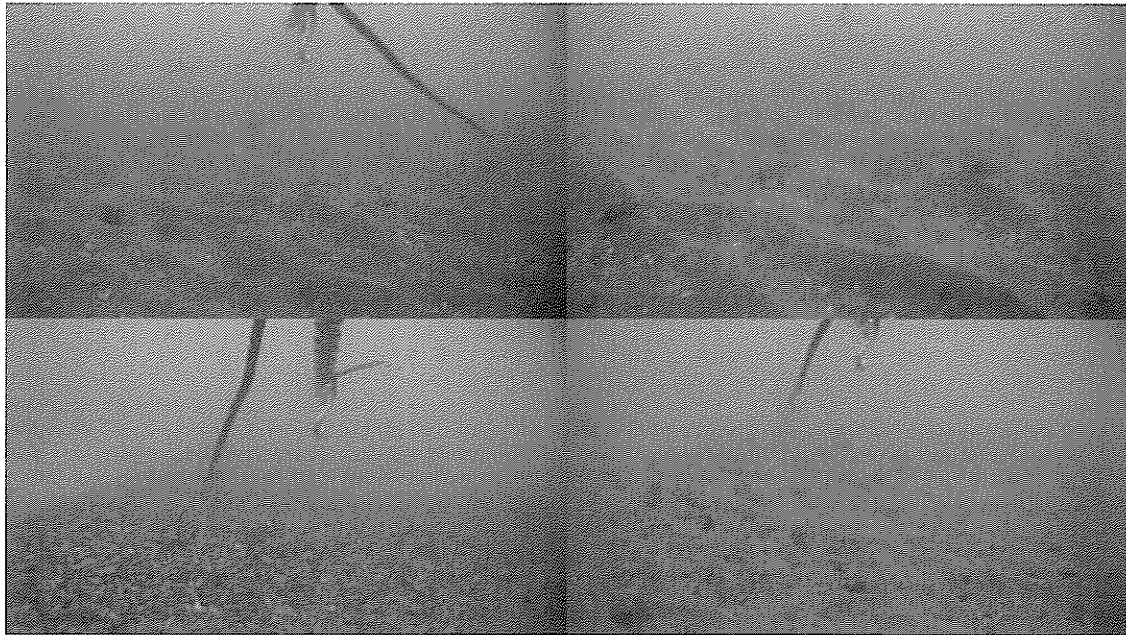


Figure Appendix A 2: Transect 2, still images taken from the video. Image progression through the video from left to right.

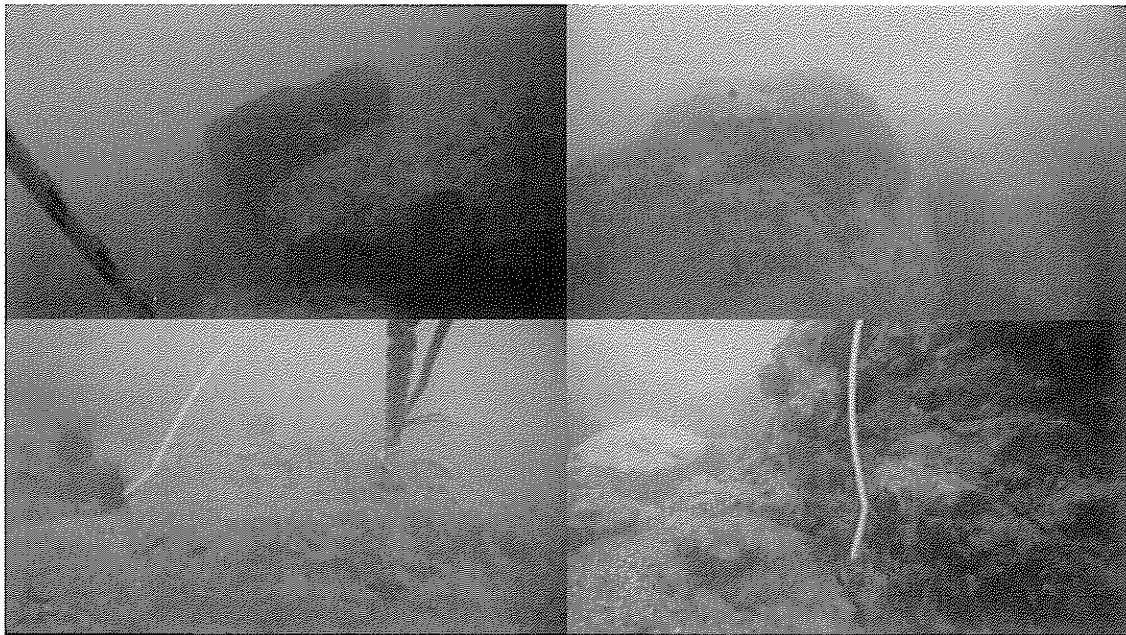


**Figure Appendix A 3: Transect 3, still images taken from the video. Image progression through the video from left to right.**





**Figure Appendix A 4: Transect 4, still images taken from the video. Image progression through the video from left to right.**



**Figure Appendix A 5: Transect 5, still images taken from the video. Image progression through the video from left to right.**