

B-survey at Tjaldanes, 2026 (max biomass), Arnarlax ehf

Akvaplan-niva AS Report:
APN 2026 67226.B01



B survey at Tjaldanes 2026 (max biomass), Arnarlax ehf

Author(s) Snorri Gunnarsson
Date 23.02 2026
Report No. APN 2026 67226.B01
Number of pages 17
Distribution Through customer
Customer Arnarlax ehf
Contact person Kristian Leander Gillebo Sormo

Summary

Sediment was recovered at all the 10 stations (100% soft bottom). The sediment consisted mainly of mixture of clay, silt and gravel and valid sample was achieved in first attempt at all stations. Mixture of clay and silt was more apparent at the western part and mixture of clay and gravel at the eastern part of the local impact zone. Fauna was recorded to be present at all stations in the form of polychaetes. There were signs of out-gassing at one sampling station (st. 3). Light smell of H₂S was recorded at four stations and strong smell at two stations. The substrate was light/grey colour at two stations and brown/black at the resting eight stations. Consistency of the sediment was solid at all ten stations. Grab was $\frac{3}{4}$ full or more at five stations, $\frac{1}{4}$ - $\frac{3}{4}$ full at three stations and $\frac{1}{4}$ or less full at two sampling stations. The bacteria *Beggiota* was observed in the surface area at one sampling station (st. 3).

Based on the classification of sediment chemistry (pH/Eh) and the sensory assessment six stations received status 1 - "Very good", two station received status 2 - "Good" and two station received status 3 - "Bad". Overall, the index score for parameter III (sensory parameters) was slightly higher (1.19) compared with the index score for the parameter II (pH/Eh) (1.00). The status of the soft bottom stations within parameter II (pH/Eh) was eight stations with status 1 - "Very good" and two stations with status 3 - "Bad". However, the status of stations within parameter III (sensory) was five stations with status 1 - "Very good", four stations with status 2 - "Good" and one station with status 3 - "Bad".

In summary, the site receives the environmental status 1 - "Very good" (average group II-III index =1.09).

Approval



Snorri Gunnarsson
Project Manager



Kari Elisabeth Justad
Quality Control

©2026 Akvaplan-niva AS. The report may only be reproduced in its entirety. Copying of partial content (texts, figures, table, conclusions, etc.) or other methods of publication is only permitted after obtaining written consent from Akvaplan-niva AS.

Key information

| Site details and license holder information | | | |
|---|--------------|------------------------------|--------------------------------|
| Site name | Tjaldanes | Site coordinates | 65°45.060' N 23°32.995' V |
| County | Vesturbyggð | Municipality | Vesturbyggð |
| MTB (estimated max biomass) | 6.448 tonnes | Operations Manager / Contact | Kristian Leander Gillebo Sormo |
| License holder / customer | Arnarlax | | |

| Production status on date of survey | | | |
|---|-------------------------------------|------------------------|--------------|
| Biomass at site | 2.110 tonnes | Total feed use | 2.665 tonnes |
| Farmed species | Salmon | Total biomass produced | 2.235 tonnes |
| Type/time of survey | Indicated with X | Comments | |
| Maximum organic load cf. chapter 7.9 | <input checked="" type="checkbox"/> | | |
| Follow-up survey | <input type="checkbox"/> | | |
| Half maximum load | <input type="checkbox"/> | | |
| Pre-stock | <input type="checkbox"/> | | |
| Required by the state administrator - baseline survey | <input type="checkbox"/> | | |
| Other | <input type="checkbox"/> | | |
| Last fallowing period: | Sept 2023 – Sept 2024 | | |

| Results from B-survey in accordance with NS 9410:2016 (main results) | | | |
|--|------------|----------------------------|------------|
| Parameter group and index | | Parameter group and status | |
| Gr. II. pH/Eh | 1.00 | Gr. II. pH/Eh | 1 |
| Gr. III. Sensory | 1.19 | Gr. III. Sensory | 2 |
| GR. II + III | 1.09 | GR. II+ III | 1 |
| Date of fieldwork | 05.02 2026 | Date of report | 23.02 2026 |
| Environmental status (NS 9410:2016): | | | 1 |

Table of contents

| | | |
|-----|---|----|
| 1 | INTRODUCTION..... | 6 |
| 2 | METHODS..... | 7 |
| 3 | SITE, PRODUCTION AND SURVEY DESIGN | 8 |
| 3.1 | Site characteristics and production | 8 |
| 3.2 | Current and past surveys..... | 8 |
| 3.3 | Hydrodynamic conditions | 8 |
| 3.4 | Survey design..... | 8 |
| 4 | RESULTS..... | 10 |
| 5 | SUMMARY | 11 |
| 6 | REFERENCES | 12 |
| 7 | ATTACHMENTS | 13 |
| 7.1 | Form (B.1 and B.2) NS 9410:2016 | 13 |
| 7.2 | Images of samples at Tjaldanes..... | 15 |
| 7.3 | 3D-bathymetry | 17 |

1 Introduction

The present survey was conducted by Akvaplan-niva AS on behalf of Arnarlax in connection with the company's fish farming activities at the site Tjaldanes in Arnarfjörður, Vesturbyggð municipality.

The purpose of a B-survey is to document the environmental status in the near zone of a fish farm by evaluating sediment condition (chemistry, sensory and presence/absence of fauna) in accordance with NS 9410:2016.

The B-survey is a tool for trend monitoring and allows to assess the status of organic enrichment beneath the net pens at different stages of the production cycle.

Figure 1 shows a map of the fjord Arnarfjörður where Tjaldanes farm is located.

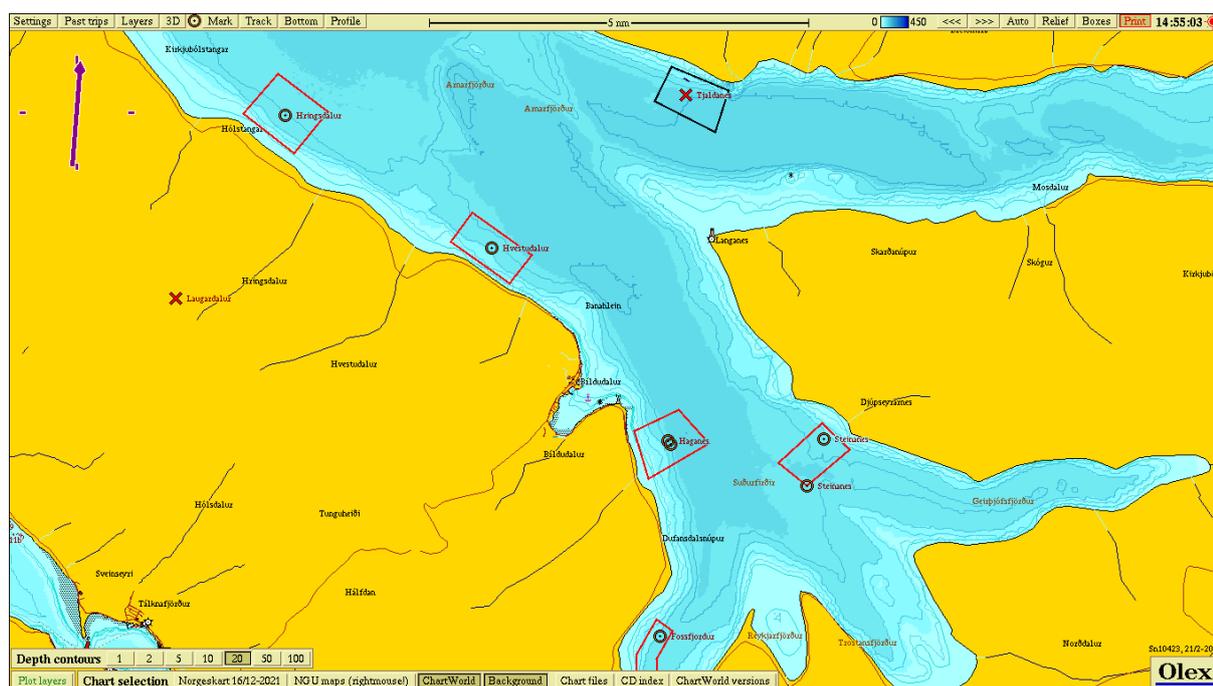


Figure 1. Overview map of Arnarfjörður where Tjaldanes is marked by black square and a red X. Other fish farming areas in the nearest vicinity (Arnarfjörður) are also shown.

2 Methods

Monitoring of the environmental impact of fish farming activities on the seabed is standardised and regulated. All fish farming sites that are in use must be regularly assessed. This B-survey follows guidelines and methods outlined in NS 9410:2016 and ISO 12878. The Icelandic Environment and Energy Agency (Umhverfis og orkustofnun) can also set specific requirements regarding frequency of surveys for different fish farming sites, which can overrule the above-mentioned standards.

The B survey is a trend monitoring tool with the focus on sediment condition (benthic impact) under and in the immediate vicinity of an aquaculture site. Sediment samples are taken using a grab (min. 250 cm²). Sediment condition for each sample is assessed applying three indicators: sediment chemistry (pH and redox potential), sensory evaluation (gas bubbles; smell, texture, colour of substrate and thickness of deposited sludge) and the presence or absence of fauna. The performance of these indicators against predefined thresholds allows to categorise the site into four different environmental statuses (Table 1), which are used to determine subsequent sampling frequency. The number of sampling stations is based on the site's allocated MTB, here the estimated max biomass of the current generation i.e. 2.110 ton (Personal reference, Per Gunnar Hallan, 2026).

Table 1. Frequency of B-survey based on environmental status at site.

| Environmental status at maximum organic load (near zone) | Monitoring frequency for B survey |
|--|--|
| 1-very good | At the next maximum load |
| 2-good | Pre-stock and again at maximum load |
| 3-poor | Pre-stock If the survey prior to restocking / end of fallowing provides: Status 1 – survey should be carried out at next maximum load. Status 2 – survey should be carried out at half the maximum load and at the next maximum load. Status 3 – survey should be carried out at half the maximum load and at maximum load. Implementation of measures to reduce impact should be planned for the next production cycle. If any surveys show the environmental status to be 4 – "very poor", the site's environmental capacity has been exceeded. |
| 4- very poor | Environmental capacity at site is exceeded. The authorities decide further measures. |

The following equipment was used in this survey:

Grab: Van Veen grab (0.1 m²)

Sieve 1 mm: Akvaplan-niva

pH meter: Electrode, YSI Professional Plus

Redox meter: Electrode, YSI Professional Plus

Position determination – GPS map 62s

Digital camera

3 Site, production and survey design

3.1 Site characteristics and production

The Tjaldanes site is in Arnarfjörður, about 7.5 km north from town Bíldudalur. The cages are lined in a northerly direction towards land (21 degrees). The depth under cages ranges from about 60 - 104 m. The fish farm at the site is a 3x5 setup, total 15 cages each with 160 m circumference.

The current generation and the third farmed at the site started with smolt output fall 2024.

Table 2 shows production and feed use for present generation.

Table 2. Production and feed use for farm site Tjaldanes. Data provided by customer.

| Generation of fish (G) | Production (tonnes) | Feed use (tonnes) |
|------------------------|---------------------|-------------------|
| Current generation | 2.235 | 2.665 |
| Generation 2021-2023 | 8.616 | 11.218 |
| Generation 2019-2021 | 6.617 | 8.378 |

3.2 Current and past surveys

Table 3 provides an overview on results and time of sampling for current and the last B-surveys at site.

Table 3. Present and previously conducted B-surveys at the site.

| Date of sampling | Report number | Production status | Location condition |
|------------------|---------------|---------------------|--------------------|
| 05.02.2026 | APN 67226.B01 | Max biomass | 1 |
| 17.09 2024 | APN-66114.B01 | Fallow period | 1 |
| 01.02 2023 | APN-64661.B01 | Max biomass | 2 |
| 04.06 2021 | APN 63266.B01 | Fallow period | 1 |
| 15.07.2020 | APN-62351.B01 | Max biomass | 2 |
| 07.03.2019 | APN-60976.01 | Pre survey new site | 1 |

3.3 Hydrodynamic conditions

Measurement of dispersing current was done at the site in November 2013 – January 2014 measurements at 60 m depth (Moe and Ottesen, 2014). Dominating current (60 m) is in direction southeast (130 degrees). Average current speed is measured to be 5.0 cm/s. Highest current speed is measured to be 53 cm/s and 2.7 % of the measurements are < 1 cm/s.

3.4 Survey design

Sampling stations were placed following an assessment of site configuration and local environmental conditions, i.e. bathymetry and hydrodynamics. An overview of the sampling stations can be found in Figure 2 with coordinates and depth provided in Table 4. The number of sampling stations were 10 according to guidance in ISO 12878 and NS 9410:2016. The placement of the sampling stations gives good coverage of the local impact zone of the fish farm. Sampling stations were placed to represent the environmental conditions within the near zone and cover thus

both the deeper and shallower areas. The deeper areas are further into the fjord in the southern and eastern part of the fish farming area. The depth in the local impact zone is in the range from about 60-104 m. Samples were collected from depths ranging from 69-103 metres. The station placements are considered representative for an environmental survey of the farm's near-zone and in accordance with the requirements outlined in NS 9410:2016.

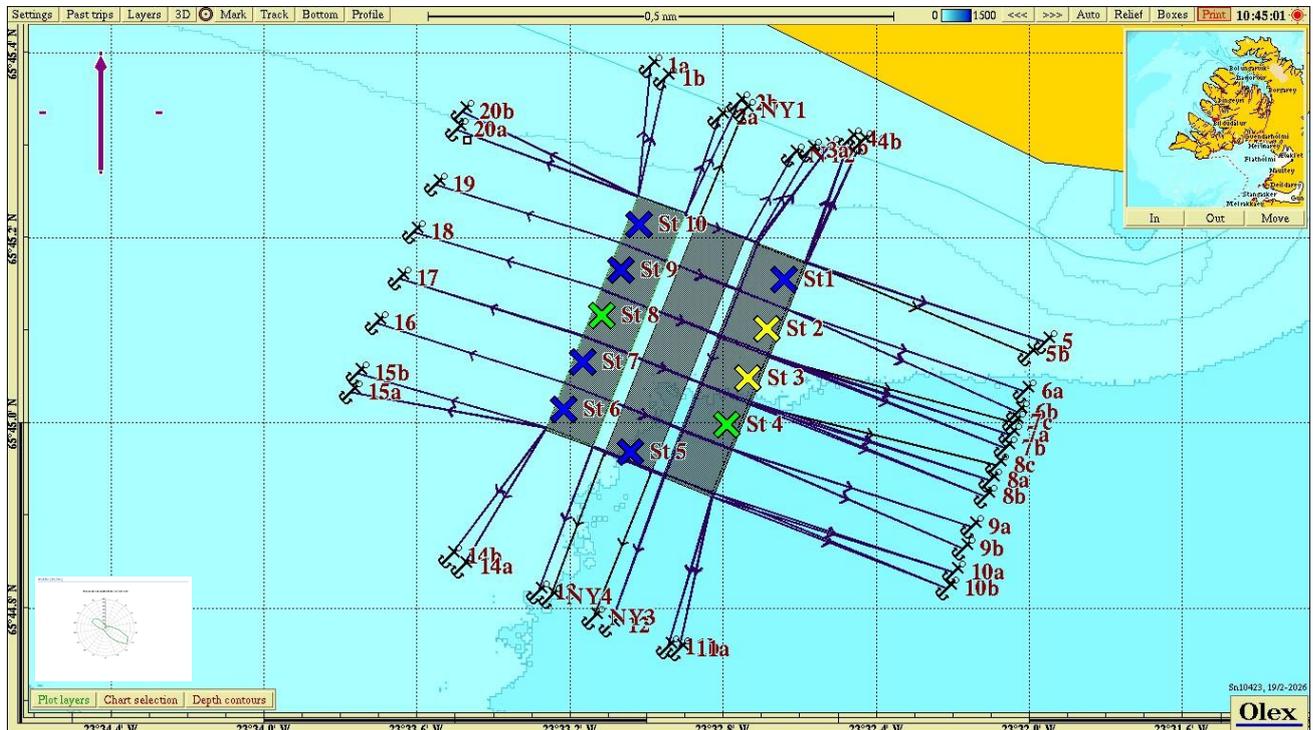


Figure 2. Overview map showing site configuration and local bathymetry at Tjaldanes. Sampling stations are marked by crosses and colour coded to visualise the environmental status at the respective station following the classification outlined in NS 9410:2016, chapter 7.11 (1 = blue, 2 = green, 3 = yellow, 4 = red). The current rose in the left corner shows the direction of water transport of the dispersal current at 60 m depth (Moe and Ottesen, 2014).

Table 4. Position and depth of the sampling stations of this survey.

| Station number | Northing | Westing | Depth [m] |
|----------------|-----------|-----------|-----------|
| St 1 | 65°45,154 | 23°32,641 | 81 |
| St 2 | 65°45,101 | 23°32,686 | 93 |
| St 3 | 65°45,048 | 23°32,735 | 100 |
| St 4 | 65°44,998 | 23°32,790 | 103 |
| St 5 | 65°44,968 | 23°33,043 | 100 |
| St 6 | 65°45,014 | 23°33,218 | 97 |
| St 7 | 65°45,065 | 23°33,167 | 96 |
| St 8 | 65°45,116 | 23°33,116 | 89 |
| St 9 | 65°45,165 | 23°33,068 | 79 |
| St 10 | 65°45,214 | 23°33,019 | 69 |

4 Results

Classified survey results for the different parameter categories as well as the assigned environmental status of the site are shown in Table 5. The complete survey assessment form with results and classifications for each station can be found in the attachment.

Table 5. Results from the environmental assessment of the near zone of Tjaldanes.

| Parameter | Status |
|------------------------------------|--------|
| Group II parameters (pH/Eh) | 1 |
| Group III parameters (sensory) | 2 |
| Group II + III – parameters (mean) | 1 |
| Environmental status (site) | 1 |

Sediment was recovered at all the 10 stations (100% soft bottom). The sediment consisted mainly of mixture of clay, silt and gravel and valid sample was achieved in first attempt at all stations. Mixture of clay and silt was more apparent at the western part and mixture of clay and gravel at the eastern part of the local impact zone. Fauna was recorded to be present at all stations in the form of polychaetes. There were signs of out-gassing at one sampling station (st. 3). Light smell of H₂S was recorded at four stations and strong smell at two stations. The substrate was light/grey colour at two stations and brown/black at the resting eight stations. Consistency of the sediment was solid at all ten stations. Grab was $\frac{3}{4}$ full or more at five stations, $\frac{1}{4}$ - $\frac{3}{4}$ full at three stations and $\frac{1}{4}$ or less full at two sampling stations. The bacteria *Beggiota* was observed in the surface area at one sampling station (st. 3).

Based on the classification of sediment chemistry (pH/Eh) and the sensory assessment six stations received status 1 – "Very good", two station received status 2 – "Good" and two station received status 3 – "Bad". Overall, the index score for parameter III (sensory parameters) was slightly higher (1.19) compared with the index score for the parameter II (pH/Eh) (1.00). The status of the soft bottom stations within parameter II (pH/Eh) was eight stations with status 1 – "Very good" and two stations with status 3 – "Bad". However, the status of stations within parameter III (sensory) was five stations with status 1 – "Very good", four stations with status 2 – "Good" and one station with status 3 – "Bad".

In summary, the site receives the environmental status 1 - "Very good" (average group II-III index =1.09).

5 Summary

Applying the indicator thresholds and classification outlined in NS 9410:2016 it is shown that the site Tjaldanes receives overall site status of 1 – "Very good" at the time of this B survey (max biomass) indicating moderate organic load in the local impact zone. Samples were collected with a Van Veen grab at 10 stations. Six stations received status 1 – "Very good", two stations received status 2 – "Good" and two stations received status 3 – "Bad". Three stations with reduced status were in the eastern part of the local impact zone and one in the western part. Station 3, with noticeable gas bubbles in the sediment and where bacteria *Beggiotoa* was observed, is in the middle of the eastern part of the farming area. In the eastern part of the site is the deeper part of the local impact zone and the sediment is more mixture of clay and silt contra more clay and gravel at the western part. This indicates higher currents at the bottom in the western part. Indication of higher accumulation of organic material at the eastern part of the local impact zone is also in line with direction of spread current at the site in SE direction.

In a previous B pre survey at the time of max biomass of the second generation farmed salmon at the site carried out in February 2023 the overall environmental status was 2 – "Good" (Gunnarsson, 2023) and seven sampling stations out of total seventeen received status 1 – "Very good", two stations received status 2 – "Good", five stations received status 3 – "Bad" and three stations received status 4 – "Very bad". The current results from sampling at max biomass in February 2026 show that there has been significantly less build-up of organic enrichment during farming of the present generation at the Tjaldanes site compared to the previous one. This is indicated both by higher site status and higher portion of stations with status 1 and 2 in current survey. This is most likely due to significantly less production during the current generation 2.235 tonnes compared to 8.616 tonnes produced for the 2021 – 2023 generation.

The site is given environmental status 1 – "Very good" following the criteria outlined in NS 9410:2016.

6 References

Forskrift om drift av akvakulturanlegg (akvakulturdriftsforskriften) §§ 35 og 36.

Gunnarsson, S. 2019. Tjaldaneseyrar, Arnarlax hf, Forundersøkelse (B-undersøkelse) mars 2019. APN report nr. 60976.01.

Gunnarsson, S. 2020. Tjaldanes, Arnarlax, B-bottom survey, July 2020 (maximum biomass survey). APN report nr. 62351.01.

Gunnarsson, S. 2021. Tjaldanes, Arnarlax, B-bottom survey, (fallow period) June 2021. APN report nr. 63266.B01.

Gunnarsson, S. 2023. Tjaldanes, Arnarlax, B survey, February 2023 (max biomass). APN report nr. 64661.B01.

Gunnarsson, S. 2024. B-survey at Tjaldanes, September 2024 (fallow period), Arnarlax ehf. APN report nr. 66114.B01.

Moe, A.A. and Ottesen, K. 2014. Current investigation at finfish farm site Tjaldaneseyrar November 2013. Helgeland Havbruksstasjon AS. 30 s.

ISO 12878:2012. Environmental monitoring of the impacts from marine finfish farms on soft bottom.

ISO 5667-19:2004. Guidance on sampling of marine sediments.

Norsk Standard NS 9410:2016. Miljøovervåking av bunnpåvirkning fra marine akvakulturanlegg.

Personal reference. Per Gunnar Hallan, Biological controller, Arnarlax 2026.

7 Attachments

7.1 Form (B.1 and B.2) NS 9410:2016

| Sample scheme B.1 | | | | | | | | | | | | | | | |
|-------------------|-----------------------------------|--------------------|----------------|-------------|--------|------|--------|----------|-------|---------------------|---------------|-----------|-------|------------|--|
| Company: | | Amarlax | | | | | | | | | | Date: | | 05.02 2026 | |
| Site: | | Tjaldanes | | | | | | | | | | Site no.: | | Tjaldanes | |
| Fieldworker: | | Snorri Gunnarsson | | | | | | | | | | | | | |
| Gr | Parameter | Point | Sample number | | | | | | | | | | Index | | |
| | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | S% | H% | |
| | Bottom type: S (soft) or H (hard) | | S | S | S | S | S | S | S | S | S | S | 100 | 0 | |
| I | Animals > 1mm | | Yes (0) No (1) | | | | | | | | | | | | |
| II | pH | value | 7,35 | 7,07 | 6,84 | 7,65 | 7,61 | 7,73 | 7,29 | 7,11 | 7,49 | 7,39 | | | |
| | Eh (mV) | ORP | -32 | -166 | -236 | -150 | -49 | -25 | -121 | -119 | -93 | -114 | | | |
| | | plus ref. value | 168 | 34 | -36 | 50 | 151 | 175 | 79 | 81 | 107 | 86 | | | |
| | pH/Eh | from figure | 0 | 3 | 3 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 1,00 | | |
| | Status station | | 1 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | |
| | Status group II | | 1 | Buffer temp | 10,0 C | | | Sea temp | 2,9 C | | Sediment temp | 2,7 C | | | |
| | pH sea | 7,99 | ORP sea | 199 mV | | | Eh sea | 399 mV | | Reference electrode | 200 mV | | | | |
| III | Gas bubbles | Yes (4) No (0) | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | |
| | Colour | Light/grey (0) | | | | | 0 | | 0 | | | | | | |
| | | Brown/black (2) | 2 | 2 | 2 | 2 | | 2 | | 2 | 2 | 2 | | | |
| | Smell | None (0) | | | | | 0 | 0 | 0 | | 0 | | | | |
| | | Light (2) | | 2 | | 2 | | | | 2 | | 2 | | | |
| | | Strong (4) | 4 | | 4 | | | | | | | | | | |
| | Consistency | Solid (0) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | |
| | | Soft (2) | | | | | | | | | | | | | |
| | | Aqueous (4) | | | | | | | | | | | | | |
| | Grab - volume (v) | v < 1/4 (0) | | | | | | | | | 0 | 0 | | | |
| | | 1/4 < v < 3/4 (1) | | | 1 | | 1 | | | 1 | | | | | |
| | | v > 3/4 (2) | 2 | 2 | | 2 | | 2 | 2 | | | | | | |
| | Thickness of sludge (t) | t < 2 cm (0) | | | | | 0 | 0 | 0 | | 0 | 0 | | | |
| | | 2 < t < 8 cm (1) | 1 | 1 | 1 | 1 | | | | 1 | | | | | |
| | | t > 8 cm (2) | | | | | | | | | | | | | |
| | Sum | | 9,0 | 7,0 | 12,0 | 7,0 | 1,0 | 4,0 | 2,0 | 6,0 | 2,0 | 4,0 | | | |
| | Corrected (*0,22) | | 2,0 | 1,5 | 2,6 | 1,5 | 0,2 | 0,9 | 0,4 | 1,3 | 0,4 | 0,9 | 1,19 | | |
| | Status station | | 2 | 2 | 3 | 2 | 1 | 1 | 1 | 2 | 1 | 1 | | | |
| | Status group III | | 2 | | | | | | | | | | | | |
| | Average group II & III | | 1,0 | 2,3 | 2,8 | 1,3 | 0,1 | 0,4 | 0,7 | 1,2 | 0,2 | 0,9 | 1,09 | | |
| | Status station | | 1 | 3 | 3 | 2 | 1 | 1 | 1 | 2 | 1 | 1 | | | |
| | Status group II & III | | 1 | | | | | | | | | | | | |
| | pH/Eh | | | | | | | | | | | | | | |
| | Corr.sum | | | | | | | | | | | | | | |
| | Index | | | | | | | | | | | | | | |
| | Average | | | | | | | | | | | | | | |
| | < 1,1 | | | | | | | | | | | | 1 | | |
| | 1,1 - <2,1 | | | | | | | | | | | | 2 | | |
| | 2,1 - <3,1 | | | | | | | | | | | | 3 | | |
| | ≥3,1 | | | | | | | | | | | | 4 | | |
| | Status site: | | | | | | | | | | | | 1 | | |
| Grabb ID | | K-3 | | | | | | | | | | | | | |
| pH / Eh ID | | Ysi proff plus #25 | | | | | | | | | | | | | |

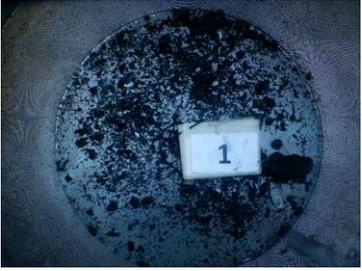
Sample Scheme B.2

| | |
|--------------|-------------------|
| Company: | Arnarlax |
| Site: | Tjaldanes |
| Fieldworker: | Snorri Gunnarsson |

| | |
|-----------|------------|
| Date: | 05.02.2026 |
| Site no.: | Tjaldanes |

| Sample number | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|----------------------------------|---|-----|-----|-----|-----|---------|------|-----|-----|-------------------|
| Depth (m) | 81 | 93 | 100 | 103 | 100 | 97 | 96 | 89 | 79 | 69 |
| Number of trials | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Gas bubbles (in sample) | No | No | Yes | No | No | No | No | No | No | No |
| Sediment type | Clay | X | X | X | X | X | X | X | X | X |
| | Silt | | X | X | | X | | | X | X |
| | Sand | | | | | | | | | |
| | Gravel | | | | | X | | X | X | X |
| | Shellsand | | | | | | | | | |
| Reef | | | | | | | | | | |
| Rocky bottom (cobbles, boulders) | | | | | | | | | | |
| Echinodermata, count | | | | | | | | | | |
| Crustaceans, count | | | | | | | | | | |
| Molluscs, count | | | | | | | | | | |
| Polychaetes, count | 4 | 6 | 9 | 5 | >20 | >100 | >100 | >10 | >20 | >20 |
| Other animals, count | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| Beggiatoa | | | X | | | | | | | |
| Feed | | | | | | | | | | |
| Faeces | | | | | | | | | | |
| Comments | St. 3. black and oily - beggiotoa | | | | | | | | | |
| Grab | Area [m ²] | 0,1 | | | | Grab ID | | | | K-3 |
| Signature fieldworker: |  | | | | | | | | | page 2 of 2 pages |

7.2 Images of samples at Tjaldanes

| <i>St</i> | <i>Image before sieving</i> | <i>Image after sieving</i> |
|-------------|---|--|
| <i>St 1</i> |  |  |
| <i>St 2</i> |  |  |
| <i>St 3</i> |  |  |
| <i>St 4</i> |  |  |
| <i>St 5</i> |  |  |

| | | |
|---------------------|---|--|
| <p>St 6</p> |  |  |
| <p>St 7</p> |  |  |
| <p>St 8</p> |  |  |
| <p>St 9</p> |  |  |
| <p>St 10</p> |  |  |

7.3 3D-bathymetry

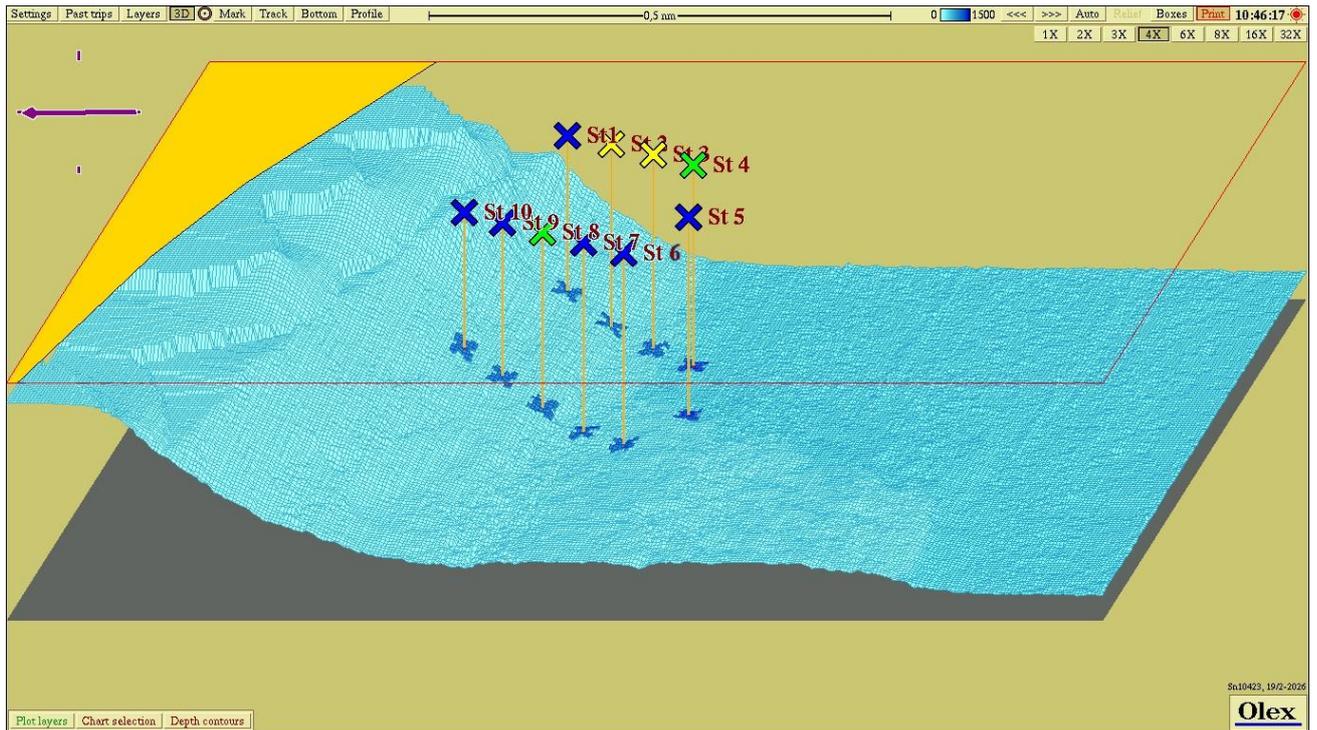


Figure 3. 3D-view of bathymetry at Tjaldanes with stations as shown in Figure 2 and Table 4. The map is oriented towards the west.