B-survey at Vatneyri, October 2025 (max biomass), Arnarlax ehf

Akvaplan-niva AS Report:
APN 2025 66911.B01

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Author(s)	Snorri Gunnarsson

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Distribution	Through customer
Customer	Arnarlax ehf
Contact person	Silja Baldvinsdóttir

Summary

Sediment was recovered at all 20 stations (100% soft bottom). The sediments were in general homogenous at the site and consisted primarily of clay in the whole near zone of the fish. Fauna was recorded to be present at all stations mainly in the form of polychaetes. There was out-gassing at one station in the north-eastern part of the local impact zone (St. 11). Strong smell of H_2S was recorded at four sampling stations, light smell at six stations and no smell at ten stations. The substrate was light/grey colour at thirteen stations and brown/black at seven stations. The consistency of the sediment was solid at sixteen stations and soft at four stations. Grab was full or up to ¾ full at all 20 stations. Thickness of sludge was between 2-8 cm thick at one station but less than 2 cm at other stations. Some feed was detected in grab samples at four stations and faeces at five stations.

Based on the classification of sediment chemistry (pH/Eh) and the sensory assessment sixteen stations received status 1 - "Very good", one station received status 2 - "Good", two stations received status 3 - "Bad" and one station received status 4 - "Very bad". Overall, the index score for parameter III (sensory parameters) was higher (1.05) than the index score for parameter II (pH/Eh) (0.60). Status of stations within parameter II (pH/Eh) was seventeen stations with status 1 – "Very good" and one station each with status 2, 3 and 4, while within parameter III (sensory) fourteen stations had status 1 – "Very good", three stations had status 2 – "Good", two stations with status 3 – "Bad" and one station with status 4 – "Very bad".

In summary, the site receives the environmental status 1 - "Very good" (average group II-III index =0.82).

Approval

Snorri Gunnarsson
Project Manager

Rikke Stabell
Quality Control

Key information

Site details and license holder information			
Site name	Vatneyri	Site coordinates	65°40.388' N 23°28.123' W
County	Patreksfjörður	Municipality	Vesturbyggð
MTB (estimated max biomass)	8.325 tonnes	Operations Manager / Contact	Silja Baldvinsdóttir
License holder / customer	Arnarlax ehf		

Production status on date of survey			
Biomass at site	8.218 tonnes	Total feed use	9.940 tonnes
Farmed species	Salmon	Total biomass produced	8.208 tonnes
Type/time of survey	Indicated with X	Comments	
Maximum organic load cf. chapter 7.9	☒	First production at site.	
Follow-up survey	☐		
Half maximum load	☐		
Pre-stock	☐		
Required by the state administrator - baseline survey	☐		
Other	☐		
Last fallowing period:	NA		

Results from B-survey in accordance with NS 9410:2016 (main results)			
Parameter group and index		Parameter group and status	
Gr. II. pH/Eh	0.60	Gr. II. pH/Eh	1
Gr. III. Sensory	1.05	Gr. III. Sensory	1
GR. II + III	0.82	GR. II+ III	1
Date of fieldwork	10.10 2025	Date of report	10.11 2025
Environmental status (NS 9410:2016):			**1**

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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 Vatneyri in Patreksfjörður in Vesturbyggð county.

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 Patreksfjörður where Vatneyri farm is located (marked with a red cross).

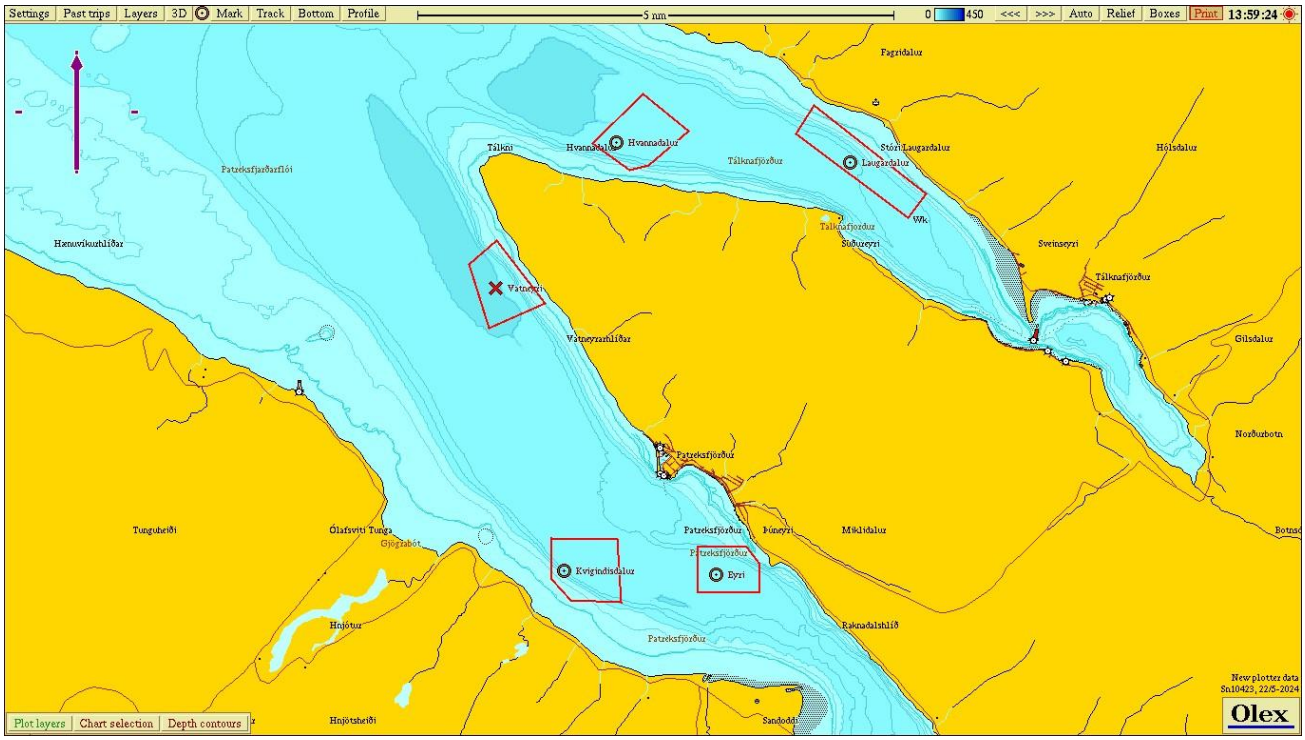


Figure 1. Overview map where Vatneyri farm is marked (red cross). Other fish farming areas in the nearest vicinity (Patreksfjörður and Tálknafjörður) are also shown.

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 cm^2). 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. 8.325 ton (Personal reference, Per Gunnar Hallan, 2025).

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 m^2)
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 Vatneyri site is in Patreksfjörður, in the outer and northern part of Patreksfjörður and about 5.5 km northwest from Patreksfjörður harbour. The cages are lined in a northwest-southeast direction. The depth under cages ranges from about 50-63 m. The fish farm at the site is a 2x8 setup, total 16 cages each with 200 m circumference. 12 out of the 16 cages were used during farming of the current generation.

The current generation is the first generation farmed salmon at the site. Table 2. shows production and feed use for present and previous generations.

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

Generation of fish (G)	Production (tonnes)	Feed use (tonnes)
Current generation until day of survey	8.208	9.940

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
10.10.2025	APN 66911.B01	Maximum organic load	1
08.05.2024	APN 65907.B01	Pre survey new site	1

3.3 Hydrodynamic conditions

Measurement of dispersing current was done at the site in May-June 2020 measurements at 48 m depth (Hermansen, 2020). Dominating current (48 m) is in direction north (345 degrees). Average current speed is measured to be 6.4 cm/s. Highest current speed is measured to be 25.2 cm/s and 4.6 % 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 total 20 sampling stations can be found in Figure 2 with coordinates and depth provided in Table 4. Regarding the number of sampling stations, they should be minimum 4 according to guidance in ISO 12878 but additional samples should be considered *depending on the size of the operation* and placed so that they *represent as greatly as possible, the entire local impact zone*. We follow that with taking 20 sampling stations despite that according to NS 9410:2016 the number of sampling stations is 23 given the estimated max biomass as ISO 12878 is the minimum requirement according to Icelandic officials. The 20 sampling stations are giving 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 typical depth in the local impact zone is in the range from 50-63 m. Samples were collected from depths ranging from 58-62 metres. The station placement is considered representative for an environmental survey of the farm's near-zone and in accordance with the requirements outlined in NS 9410:2016.

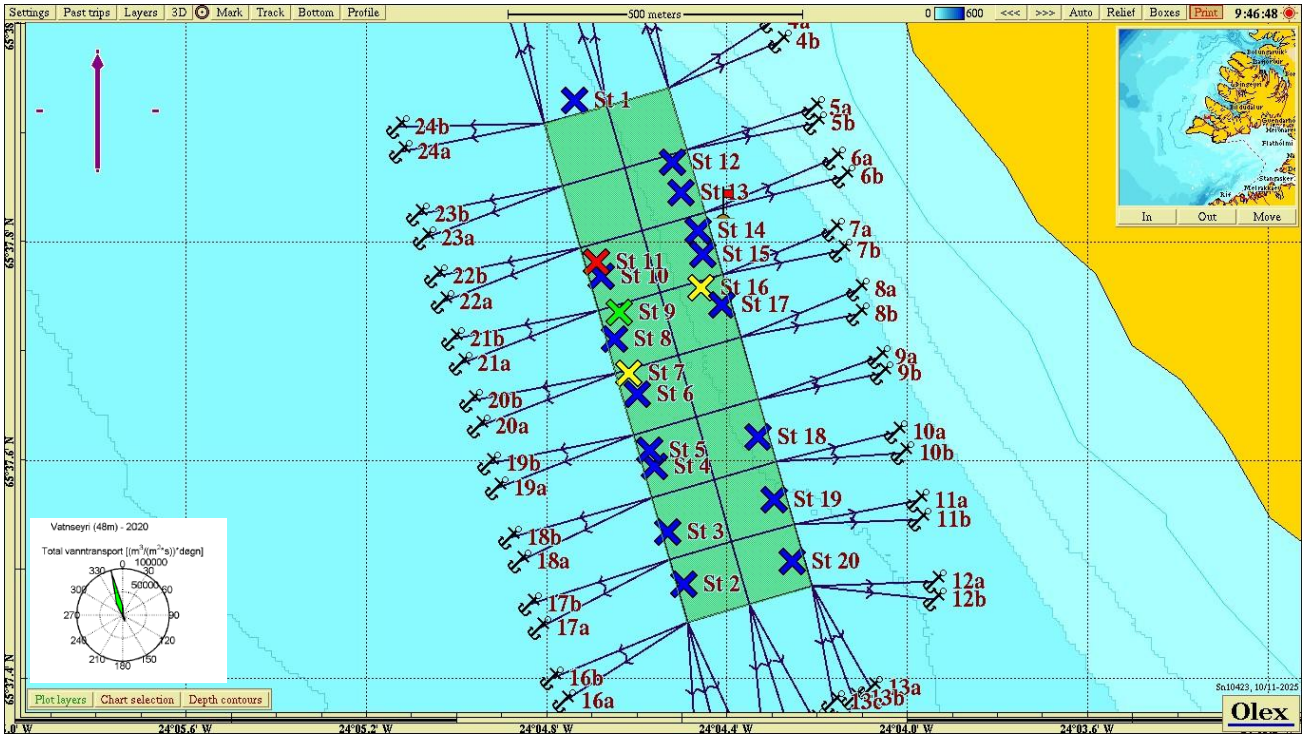


Figure 2. Overview map showing site configuration and local bathymetry at Vatneyri. Sampling stations are marked by crosses and colour coded to visualise the environmental status at the respective station following the classification outlined in NS 9410:2016, chapter 7.11 (1 = blue, 2 = green, 3 = yellow, 4 = red). The current rose in the left corner shows the direction of water transport at 48 m depth and placement of current meter is marked with a red flag (Hermansen, 2020).

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

Station number	Northing	Westing	Depth [m]
St 1	65°37,929	24°04,739	62
St 2	65°37,486	24°04,495	61
St 3	65°37,534	24°04,531	61
St 4	65°37,594	24°04,561	61
St 5	65°37,609	24°04,572	61
St 6	65°37,660	24°04,598	61
St 7	65°37,679	24°04,619	61
St 8	65°37,711	24°04,649	61
St 9	65°37,735	24°04,640	61
St 10	65°37,768	24°04,680	62
St 11	65°37,781	24°04,690	62
St 12	65°37,873	24°04,520	58
St 13	65°37,845	24°04,501	58
St 14	65°37,810	24°04,646	59
St 15	65°37,788	24°04,453	59
St 16	65°37,758	24°04,457	60
St 17	65°37,742	24°04,412	60
St 18	65°37,621	24°04,332	60
St 19	65°37,564	24°04,296	60
St 20	65°37,507	24°04,255	61

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 Vatneyri.

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

Sediment was recovered at all 20 stations (100% soft bottom). The sediments were in general homogenous at the site and consisted primarily of clay in the whole near zone of the fish. Fauna was recorded to be present at all stations mainly in the form of polychaetes. There was out-gassing at one station in the north-eastern part of the local impact zone (St. 11). Strong smell of H_2S was recorded at four sampling stations, light smell at six stations and no smell at ten stations. The substrate was light/grey colour at thirteen stations and brown/black at seven stations. The consistency of the sediment was solid at sixteen stations and soft at four stations. Grab was full or up to ¾ full at all 20 stations. Thickness of sludge was between 2-8 cm thick at one station but less than 2 cm at other stations. Some feed was detected in grab samples at four stations and faeces at five stations.

Based on the classification of sediment chemistry (pH/Eh) and the sensory assessment sixteen stations received status 1 - "Very good", one station received status 2 - "Good", two stations received status 3 - "Bad" and one station received status 4 - "Very bad". Overall, the index score for parameter III (sensory parameters) was higher (1.05) than the index score for parameter II (pH/Eh) (0.60). Status of stations within parameter II (pH/Eh) was seventeen stations with status 1 – "Very good" and one station each with status 2, 3 and 4, while within parameter III (sensory) fourteen stations had status 1 – "Very good", three stations had status 2 – "Good", two stations with status 3 – "Bad" and one station with status 4 – "Very bad".

In summary, the site receives the environmental status 1 - "Very good" (average group II-III index =0.82).

5 Summary

Applying the indicator thresholds and classification outlined in NS 9410:2016 the site Vatneyri receives overall site status of 1 – "Very good" at the time of this B survey (max biomass). Samples were collected with a Van Veen grab (0.1 m^2) at 20 stations distributed around the twelve cages in use during last production cycle. Based on the classification of sediment chemistry (pH/Eh) and the sensory assessment, sixteen stations received status 1 - "Very good", one station received status 2 - "Good", two stations received status 3 - "Bad" and one station received status 4 - "Very bad". Three stations with reduced condition were found in the north-eastern part of the local impact zone (stations 7, 9 and 11) and one station at the western part of the local impact zone. This is in line with the main spread current at the site in direction north and depth being slightly deeper to east in direction from land. Overall, the site condition is "Very good" but with some clear signs of more organic enrichment in patches of the local impact zone.

In a previous B survey that was pre-survey at the site before first put out of smolt at the site, carried out in May 2024 (Gunnarsson, 2024) the overall site status was 1 "Very good" and all of the total 10 sampling stations received status 1 – "Very good". The current results from sampling at max biomass in October 2025 show the environmental status has deteriorated during farming of the first generation at the site as there are signs of some organic enrichment in patches of the local impact zone.

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., 2024. B survey at Vatneyri, May 2024 (pre-survey), Arnarlax ehf. Akvaplan-niva AS report nr. 65907.B01.

Hermansen, S., 2020. Strømmålinger Vatneyri. 5 m, 15 m og spredningsstrøm. Akvaplan-niva AS report nr. 62191.05.

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, 2025. Per Gunnar Hallan, Biological controller, Arnarlax ehf.

7 Attachments

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

Sample scheme B.1

Company	Arnarlax	Date:	10.10 2025
Site:	Vatneyri	Site no.:	SiteItem.LokalitetsID
Fieldworker:	Snorri Gunnarsson		

Gr	Parameter	Point	Sample number									
			1	2	3	4	5	6	7	8	9	10
	Bottom type: S (soft) eller H (hard)		S	S	S	S	S	S	S	S	S	S
I	Animals > 1mm	Yes (0) No (1)	0	0	0	0	0	0	0	0	0	0
II	pH	value	7,22	7,78	7,71	7,68	7,73	7,69	7,15	7,57	7,20	7,68
	Eh (mV)	ORP	36	81	32	39	-69	23	-188	-53	-148	-52
		plus ref. verdi	236	281	232	239	131	223	12	147	52	148
	pH/Eh	from figure	1	0	0	0	0	0	2	0	1	0
	Status station		1	1	1	1	1	1	2	1	1	1
			Buffer-temp	12,0 C		Sea temp	9,3 C		Sediment temp		9,1 C	
	pH sea	8,05	ORP sea	163,0 mV		Eh sea	363,0 mV		Reference electrode		200,0 mV	
III	Gas bubbles	Yes (4) No (0)	0	0	0	0	0	0	0	0		0
	Colour	Light/grey (0)	0	0	0	0	0	0		0	0	
		Brown/black (2)							2			2
	Smell	None (0)	0			0		0				
		Light (2)		2	2		2			2		2
		Strong (4)							4		4	
	Consistency	Solid (0)	0	0	0	0	0	0		0		0
		Soft (2)							2		2	
		Aqueous (4)										
	Grab volume (v)	v < 1/4 (0)										
		1/4 < v < 3/4 (1)										
		v > 3/4 (2)	2	2	2	2	2	2	2	2	2	2
	Thickness of slidge (t)	t < 2 cm (0)	0	0	0	0	0	0	0	0	0	0
		2 < t < 8 cm (1)										
		t > 8 cm (2)										
		Sum	2,0	4,0	4,0	2,0	4,0	2,0	10,0	4,0	8,0	6,0
		Corrected (*0,22)	0,4	0,9	0,9	0,4	0,9	0,4	2,2	0,9	1,8	1,3
		Status station	1	1	1	1	1	1	3	1	2	2
		Average group II & III	0,7	0,4	0,4	0,2	0,4	0,2	2,1	0,4	1,4	0,7
		Status station	1	1	1	1	1	1	3	1	2	1

Grab ID	K-3
pH / Eh ID	Ysi proff. Plus

page 1 of 4 pages

Sample scheme B.1

Company:	**Arnarlax**	**Date:**	**10.10 2025**
Site:	**Vatneyri**	**Site no.:**	**eltem.Lokalitets**
Fieldworker:	**Snorri Gunnarsson**		

Gr	Parameter	Point	Sample number 11	12	13	14	15	16	17	18	19	20	Index S%	Index 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)	0	0	0	0	0	0	0	0	0	0		
II	pH	value	6,75	7,63	7,71	7,76	7,42	6,85	7,65	7,69	7,62	7,63		
	Eh (mV)	ORP	-211	41	-11	42	-57	-213	-88	-36	-46	-33		
		plus ref. verdi	-11	241	189	242	143	-13	112	164	154	167		
	pH/Eh	from figure	5	0	0	0	0	3	0	0	0	0	0,60	
	Status station		4	1	1	1	1	3	1	1	1	1		
	Status group II		1	Buffer temp	12,0 C		Sea temp	9,3 C		Sediment temp	9,1 C			
	pH sea	8,05	ORP sea	163 mV		Eh sea	363 mV		Reference electrode		200 mV			
III	Gas bubbles	Yes (4) No (0)	4	0	0	0	0	0	0	0	0	0		
	Colour	Light/grey (0)		0	0		0				0	0		
		Brown/black (2)	2			2		2	2	2				
	Smell	None (0)		0	0	0	0		0		0	0		
		Light (2)								2				
		Strong (4)	4					4						
	Consistency	Solid (0)		0	0	0	0		0	0	0	0		
		Soft (2)	2					2						
		Aqueous (4)												
	Grab volume (v)	v < 1/4 (0)												
		1/4 < v < 3/4 (1)												
		v > 3/4 (2)	2	2	2	2	2	2	2	2	2	2		
	Thickness of slidge (t)	t < 2 cm (0)		0	0	0	0	0	0	0	0	0		
		2 < t < 8 cm (1)	1											
		t > 8 cm (2)												
		Sum	15,0	2,0	2,0	4,0	2,0	10,0	4,0	6,0	2,0	2,0		
		Corrected (*0,22)	3,3	0,4	0,4	0,9	0,4	2,2	0,9	1,3	0,4	0,4	1,05	
		Status station	4	1	1	1	1	3	1	2	1	1		
		Status group III	1											
		Average group II & III	4,2	0,2	0,2	0,4	0,2	2,6	0,4	0,7	0,2	0,2	0,82	
		Status station	4	1	1	1	1	3	1	1	1	1		
		Status group II & III	1											

pH/Eh Corr.sum Index Average	**Status**
< 1,1	1
1,1 - <2,1	2
2,1 - <3,1	3
≥3,1	4

Status site: 1

Grab ID	K-3
pH / Eh ID	Ysi proff. Plus

Sample scheme B.2

Company:	**Arnarlax**	**Date:**	**10.10 2025**
Site:	**Vatneyri**	**Site no.:**	**{{SiteItem.LokalitetsID}}**
Fieldworker:	**Snorri Gunnarsson**		

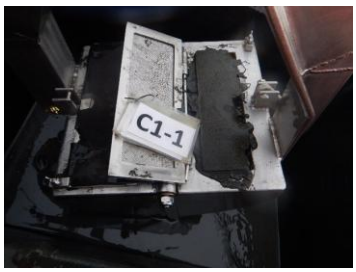
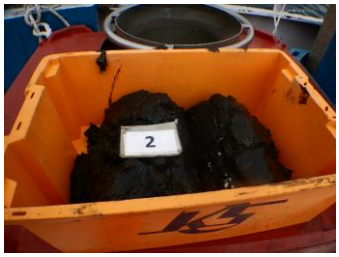
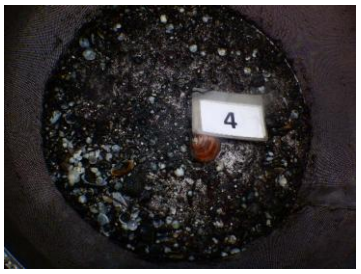
Sample number		1	2	3	4	5	6	7	8	9	10
Depth (m)		62	61	61	61	61	61	61	61	61	62
Number of trials		1	1	1	1	1	1	1	1	1	1
Gas bubbles (in sample)		No	No	No	No	No	No	No	No	No	No
Sediment type	**Clay**	X	X	X	X	X	X	X	X	X	X
	Silt										
	Sand										
	Gravel										
	Shellsand										
Reef											
Rocky bottom (cobbles, boulders)											
Echinodermata, count											
Crustaceans, count											
Molluscs, count		4	2						2		
Polychaetes, count		>20	>50	>50	>100	>50	>100	>10	>10	>10	>10
Other animals, count											
Beggiatoa											
Feed							X		X		
Faeces					X						
Comments											
Grab	**Area [m^2]**	0,1			**Grab ID**		K3				

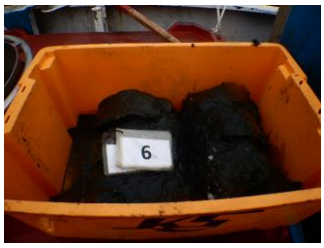
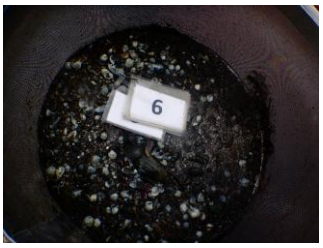
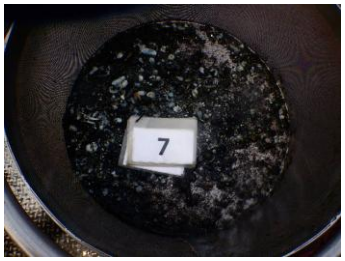
Sample scheme B.2

Company:	**Arnarlax**	**Date:**	**10.10 2025**
Site:	**Vatneyri**	**Site no.:**	**{{SiteItem.LokalitetsID}}**
Fieldworker:	**Snorri Gunnarsson**		

Sample number		11	12	13	14	15	16	17	18	19	20
Depth (m)		62	58	58	59	59	60	60	60	60	61
Number of trials		1	1	1	1	1	1	1	1	1	1
Gas bubbles (in sample)		Yes	No	No	No	No	No	No	No	No	No
Sediment type	**Clay**	X	X	X	X	X	X	X	X	X	X
	Silt										
	Sand										
	Gravel										
	Shellsand										
Reef											
Rocky bottom (cobbles, boulders)											
Echinodermata, count											
Crustaceans, count											
Molluscs, count								3			
Polychaetes, count		4	>100	>100	>100	>100	9	>10	>10	>50	>100
Other animals, count											
Beggiatoa											
Feed		X			X						
Faeces						X		X		X	X
Comments											
Grab	**Area [m^2]**	0,1			**Grab ID**		K-3				
Signature fieldworker:											

7.2 Images of samples at Vatneyri

St	*Image before sieving*	*Image after sieving*
St 1		
St 2		
St 3		
St 4		
St 5		

St 6		
St 7		
St 8		
St 9		
St 10		NA

St 11		
St 12		
St 13		
St 14		
St 15		

St 16		
St 17		
St 18		
St 19		
St 20		

7.3 3D-bathymetry

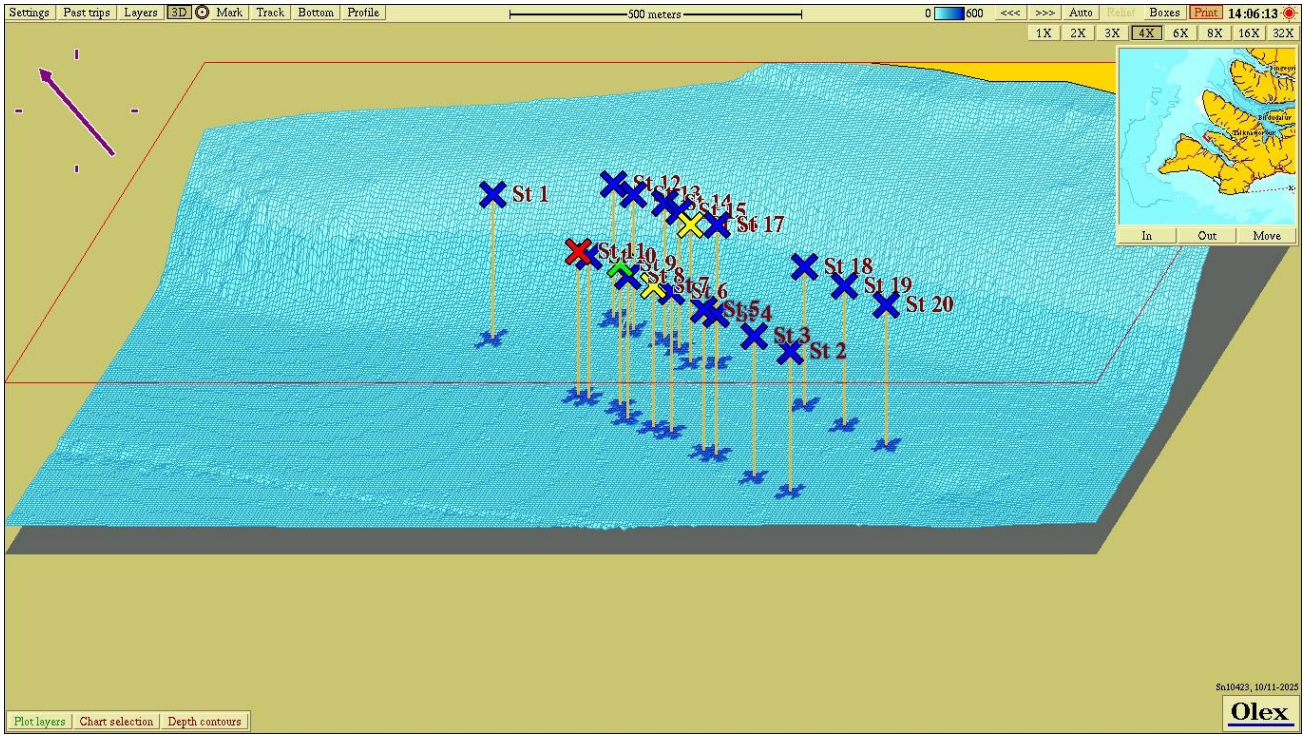


Figure 3. 3D-view of bathymetry at Vatneyri with stations as shown in Figure 2 and Table 4. The map is oriented towards the NV.