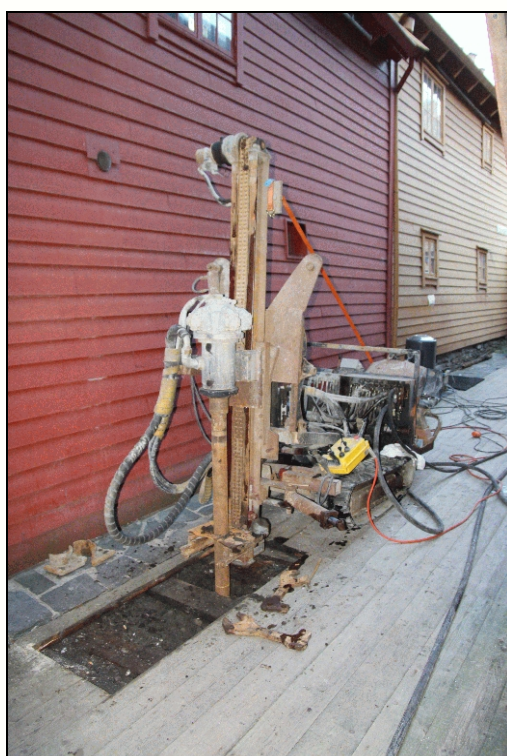


THE BRYGGEN MONITORING PROJECT, PART 14

Report on the archaeological investigation of four
monitoring-well drillings, Bryggen, 2011-2

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<p>Sammendrag</p> <p>Rapporten presenterer resultatene av den arkeologiske undersøkelsen av fire naverboringer utført for anleggelsen av miljøbrønner MB36 og MB37 samt fjellbrønner FJB1 og FJB3 som en del av miljøovervåkingsprogrammet for verdensarvstedet Bryggen.</p>
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<p>Emneord</p> <p>Bryggen, Dreggen, naverboring, fjellbrønn, miljøbrønn, registrering, karbondatering</p>

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1 Introduction

In late 2011 four new monitoring wells were installed in various parts of the Bryggen area. The work was undertaken in connection with the general monitoring project in the Bryggen area, and with particular regard to the mapping/modelling of the hydrogeology and geochemical make-up of area.

MB36 and MB37 were installed on December 12th 2011 at the seaward end of the thoroughfare of Dreggsallmenning. The drilling work and monitoring-well installations were carried out by *Multiconsult ASA*.

FJB1 – which is a deep monitoring well with its lower end placed some way down in the bedrock – was drilled down to natural by *Multiconsult ASA* on October 27th 2011, while drilling to bedrock was carried out by *Bergen Bydrift AS* on November 26th 2011. The actual monitoring well was installed by *Multiconsult* early in December 2011.

FJB3 – which is a deep monitoring well with its lower end placed some 25 metres down in the bedrock – was drilled by *Vestnorsk Brunnboring AS* on February 1st-7th 2012.

Rory Dunlop and Katharina Lorvik from the Bergen office of the Norwegian Institute for Cultural Heritage Research (NIKU) were responsible for the archaeological side of things. The purpose of the work was two-fold:

- a) to install the monitoring wells, naturally with full archaeological investigation of the soil sequence in each of the boreholes; and
- b) to obtain soil and wood samples from various depths in each borehole. These samples will be subjected to chemical analysis, which is the responsibility of Henning Matthiesen (from the Department of Conservation at the National Museum of Denmark). Analysis of a variety of parameters will provide a detailed picture of preservation conditions at different depths in the deposits, and the results can then be compared to the archaeological assessment – based on visual inspection – of the state of preservation.

MB36, MB37, FJB1 and FJB3 come under NIKU project number 156132932. The work was funded by *Statsbygg* and carried out on behalf of *Riksantikvaren* (the Norwegian Directorate for Cultural Heritage).

2 Background information

The new drillings were located in different parts of the Bryggen area, and one expected that both the state of preservation of the archaeological deposits and the preservation conditions would be quite variable. In fact as far as FJB1 was concerned, it was thought that there was only a slim chance of cultural deposits being present at all, since this area was investigated by Koren-Wiberg early in the 20th century.

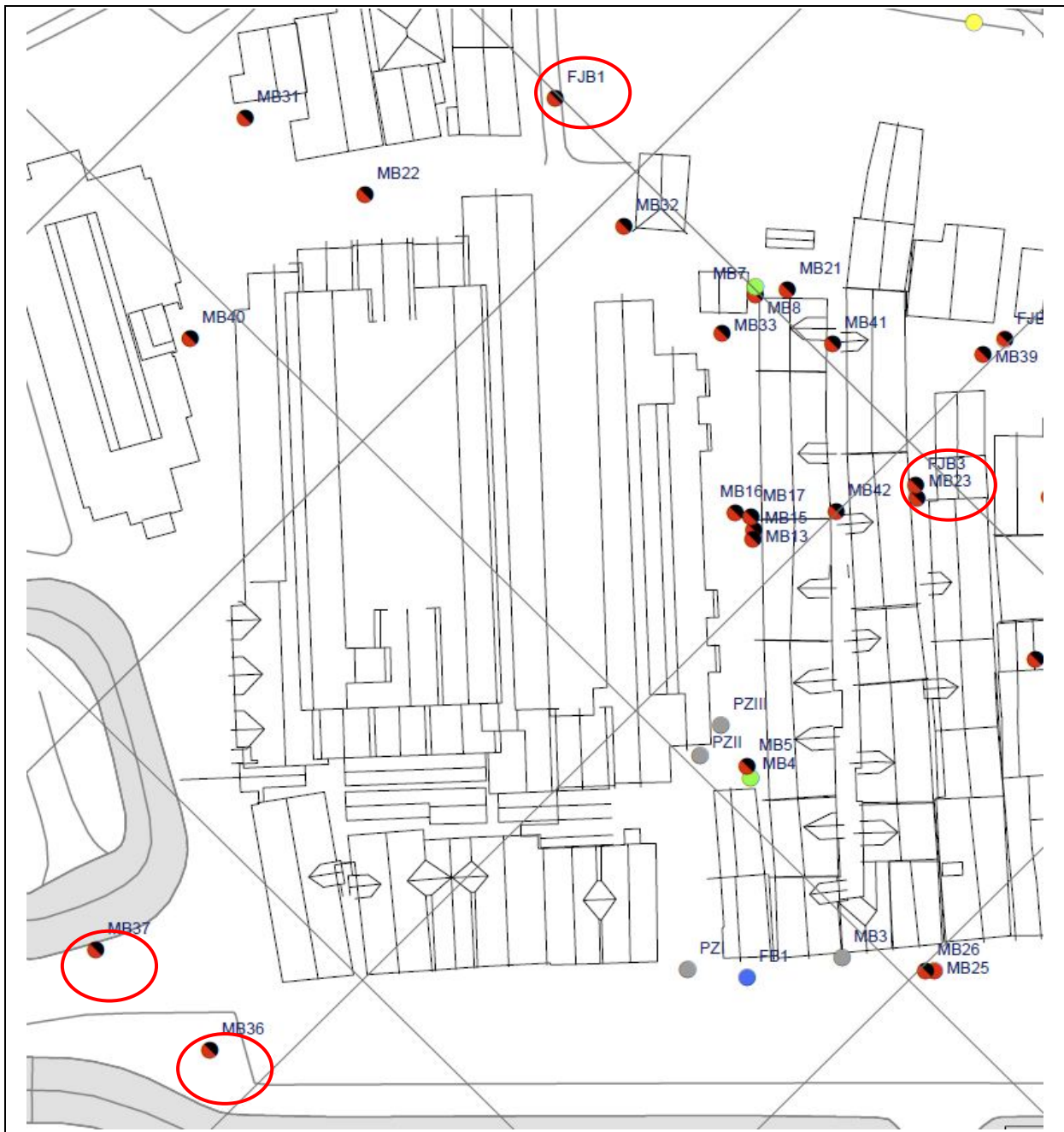


Figure 1. Map showing approximate positions of monitoring wells MB36, MB37, FJB1 and FJB3.

3 Methods

As in most previous monitoring-well installations, the drilling was done using an auger, a rotary drill, whose total “thread” length was 1.0 metre. The drill was driven down under rotation one metre at a time, and then retracted without rotation so that the adhering soil could be inspected (after having scraped away the outermost material, which could readily become “contaminated” as a result of contact with higher strata).

Documentation/recording adhered to the standard procedures employed by NIKU, and all photography was done using a digital camera. Three ^{14}C -dating samples were collected, and these have been registered in accordance with the principles laid down by Bergen Museum’s *Middelalder-samlingen* (the Medieval Collections). One should note that each borehole has its own reference

number for the purposes of finds recording (or just general identification): «BRM 961» for MB36; «BRM 965» for MB37; «BRM 969» for FJB1; and «BRM 971» for FJB3.

4 Description of the archaeological sequences in the boreholes

4.1 General remarks

In this report, the stratigraphic sequence in each drilling is presented in tabular form. One of the columns is headed PC, which stands for Preservation Category, and the values in this column are in accordance with the State of Preservation Scale.

The various strata distinguished in the drillings have been numbered in the following way. First comes “MBXX” (for the monitoring well in question: MB stands for *miljøbrønn*, the Norwegian for “monitoring well”) – or “FJBX – followed by sequential numbering of the individual strata (from top to bottom). Thus “MB36-01” denotes the first archaeological stratum in monitoring well MB36.

The abbreviation “masl” stands for “metres above sea-level”. Depths below sea-level are therefore prefixed with a minus sign.

4.2 Drilling MB36: sediment sequence (visual inspection)

This hole was between the road along Bryggen and the seaward end of the thoroughfare of Dreggsallmenningen. *Multiconsult ASA*’s surveyors determined its coordinates as N6701357.48/E297379.50 (UTM EUREF 32N), and the modern asphalt surface was at an elevation of ca. 1.20 masl (datum NN1954). Weather conditions during the investigation were poor, overcast with some rain.

The grey shading indicates the strata that are more or less spanned by the monitoring well’s filter.

Masl		Stratum number	Same as stratum no.	Samples/ ¹⁴ C-dating/ finds	Accession number	Period	PC	Description
From	To							
1.20	-0.10	MB36-01				Mod	D0	Thick asphalt over sand, gravel, pebbles, small stones and stones with some pieces of red brick/tile Groundwater at ca. 0.51 masl (as measured 21.2.2012)
-0.10	-1.20	MB36-02				Mod	D0	Black, very sandy soil with much gravel, many stones, some pieces of red brick/tile, and a few badly preserved woodchips Faint H ₂ S odour Almost certainly deposited in connection with the building of the modern quay at the start of the 20 th century

Masl		Stratum number	Same as stratum no.	Samples/ ¹⁴ C-dating/ finds	Accession number	Period	PC	Description
From	To							
-1.20	-1.80	MB36-03		Sample: MB36-01 from -1.50 to -1.60 masl		Mod or post- med	C2	Wet, loose mixture of cultural-deposit material (dark-grey humus with some poorly preserved woodchips, sparse pieces of birch-bark) and a lot of sand and numerous small stones, along with a few pieces of red brick/tile; most of the components were randomly inclined Possible timber/plank at -1.50 to -1.55 masl Possible timber at -1.70 to -1.80 masl 1 sherd of quite recent glass at -1.60 masl (not retained) Medium H ₂ S odour No darkening Poor preservation Uncertain whether or not this is an in-situ cultural deposit
-1.80	-2.05	MB36-04		Sample: MB36-02 from -1.90 to -1.95 masl		Post- med	C3	Semi-compact, relatively dry, grey/brown, mostly sawchips and small woodchips with a little humus and quite a lot of fine to medium-fine sand, some gravel and pebbles, along with a few pieces of red brick/tile; ca. 50 % of the components were randomly inclined Medium H ₂ S odour No darkening Medium preservation
-2.05	-2.25	MB36-05				Post- med	-	Loose material, so not a lot of soil adhered to the auger Probably a mixture of sand and stones with some cultural-deposit material (incl. a couple of hazelnut shells) Odour uncertain Darkening uncertain Preservation indefinable
-2.25	-2.40	MB36-06				Post- med	-	Possible timber, but shredded by the auger, so only loose wood fibres present Preservation indefinable

Masl		Stratum number	Same as stratum no.	Samples/ ¹⁴ C-dating/ finds	Accession number	Period	PC	Description
From	To							
-2.40	-2.80	MB36-07		Sample: MB36-03 from -2.55 to -2.65 masl		Post-med	C3	Loose, wet, fine to coarse sand and stones with some medium-well preserved woodchips (mostly quite fresh in colour, but relatively easy to snap) and a few hazelnut shells, along with a few pieces of red brick/tile; most components were randomly inclined Some possible timber remains present in between 50% organic, 50% mineral Strong H ₂ S odour No darkening Medium preservation, all in all
-2.80	↓	MB36-08				Post-med	-	Probable timber (obstacle that auger could not penetrate)
								Rotary drilling abandoned at ca. -2.80 masl

The thickness of the archaeological deposits, likewise the thickness of the medieval deposits, cannot be determined in the case of this drilling.

4.3 Drilling MB37: sediment sequence (visual inspection)

This hole was in the cobbled pavement immediately seaward of the south-western end of the thoroughfare of Dreggsallmenningen. *Multiconsult ASA's* surveyors determined its coordinates as N6701377.25/E297378.40 (UTM EUREF 32N), and the modern cobbled surface was at an elevation of ca. 1.45 masl (datum NN1954). Weather conditions during the investigation were poor to adequate.

The grey shading indicates the strata that are more or less spanned by the monitoring well's filter.

Masl		Stratum number	Same as stratum no.	Samples/ ¹⁴ C-dating/ finds	Accession number	Period	PC	Description
From	To							
1.45	0.75	MB37-01				Mod	D0	Cobblestones over sand, gravel, pebbles, small stones and stones with some pieces of red brick/tile
0.75	0.0	MB37-02				Mod	A0 / B0	Light-grey(brownish) fine to medium-fine sand, quite homogeneous and dry, with some gravel and pieces of red brick/tile, and some sea-shell fragments Sherd of post-medieval/recent glass at 0.20 masl (not retained) No odour

Masl		Stratum number	Same as stratum no.	Samples/ ¹⁴ C-dating/ finds	Accession number	Period	PC	Description
From	To							
0.0	-0.30	MB37-03		Sample: MB37-01 from -0.20 to -0.30 masl		Post-med	B2 / C2	Semi-compact, dry, dark-grey, very sandy humus with gravel, stones, some pieces of red brick/tile, a few pieces of badly preserved wood (one charred), and a few sea-shell fragments No odour Poor preservation Groundwater at ca. -0.02 masl (as measured 21.2.2012)
-0.30	-0.90	MB37-04				Post-med	-	Loose, grey, fine to coarse sand with some sea-shell fragments and a small amount of organic matter (mostly small woodchips) One piece of leather – front part of upper from shoe – at ca. -0.85 masl (not retained) No odour Preservation indefinable
-0.90	-1.40	MB37-05		Samples: MB37-02 from -1.15 to -1.25 masl (+ sample for freezer) Treprøve 1 from -1.25 masl		Post-med	C3	Compact, dry, brown, medium-preserved woodchips (mostly small and inclined parallel to the plane of deposition) and wood pieces, a few hazelnut shells, small pieces of birch-bark and twigs, a couple of small pieces of animal bone, and a small amount of fine sand in between No pieces of red brick/tile visible Strong H ₂ S odour Darkening? Medium preservation
-1.40	-1.65	MB37-06				Post-med	-	Not much soil adhered to the auger Probably a mixture of grey, fine sand and woodchips Preservation indefinable
-1.65	-2.00	MB37-07		Samples: MB37-03 from -1.85 to -1.95 masl Treprøve 2 from -1.75 masl		Post-med	C3	Semi-compact, moist, brown, medium-preserved woodchips (mostly inclined parallel to the plane of deposition) and sawchips, a fair amount of hazelnut shells, pieces of birch-bark and twigs, some moss here and there, a couple of fish-bones, and a small amount of fine sand in between Two pieces of red pantile Strong H ₂ S odour Darkening? Medium preservation

Masl		Stratum number	Same as stratum no.	Samples/ ¹⁴ C-dating/ finds	Accession number	Per-iod	PC	Description
From	To							
-2.00	-2.25	MB37-08				Post-med	C3	Mixture of 50% organic and 50% inorganic (alternating strips) Grey sand and woodchips with other organic remains (nuts, bark, twigs), somewhat randomly inclined Medium H ₂ S odour No darkening Medium preservation (all in all)
-2.25	-2.35	MB37-09				Early post-med / late med ?	-	Semi-compact ash and small pieces of charcoal Probable firelayer Preservation indefinable
-2.35	>-2.55	MB37-10		Sample: ¹⁴ C-sample (hazelnuts) from -2.45 masl AD 1465-1620	965/1	Early post-med / late med ?	C3	Not much soil adhered to the auger Loose, medium-preserved woodchips with some hazelnut shells Medium H ₂ S odour? No darkening Medium preservation
								Rotary drilling abandoned at -2.55 masl

The thickness of the archaeological deposits, likewise the thickness of the medieval deposits, cannot be determined in the case of this drilling.

4.4 Drilling FJB1: sediment sequence (visual inspection)

This hole was in the grassy area between Schøtstuene and Arent Meyers Kjeller. *Multiconsult ASA's* surveyors determined its coordinates as N6701406.61/E297497.95 (UTM EUREF89 32N), and the modern turf surface was at an elevation of ca. 5.55 masl (datum NN1954). Weather conditions during the investigation were good.

Masl		Stratum number	Same as stratum no.	Samples/ ¹⁴ C-dating/ finds	Accession number	Per-iod	PC	Description
From	To							
5.55	5.45	FJB1-01				Mod	-	Modern turf
5.45	4.95	FJB1-02				Mod	D0	Demolition deposit and/or building refuse (pieces of brick, clumps of mortar, some pieces of charcoal)

Masl		Stratum number	Same as stratum no.	Samples/ ¹⁴ C-dating/ finds	Accession number	Period	PC	Description
From	To							
4.95	4.30	FJB1-03				Mod (?)	A1	Garden soil (probably) Semi-compact, grey, very sandy earth with a little humus, some mortar and pieces of brick/tile, a few fragments of badly preserved bone, and numerous pebbles Piece of clay-pipe at 4.35 masl (not retained)
4.30	3.85	FJB1-04				Mod (?)	A0	Very little soil adhered to the auger, so difficult to be sure Probably quite loose, light-grey sand with some pebbles; seemed to be jumbled No brick/tile visible
3.85	3.55 (?)	FJB1-05				Mod (?)	C0	Quite loose, grey sand with gravel and some soapstone fragments (ranging from very small chips to pebble size) No brick/tile visible
3.55 (?)	2.55 (?)	FJB1-06				Mod (?)	C0	Unstructured, loose, grey, coarse sand, gravel and small stones with some sea-shell fragments, a couple of soapstone pieces (one with faint traces of working), and a fragment of animal bone Possibly redeposited natural deposit mixed with a little cultural-deposit material
2.55 (?)	2.20 (?)	-						All the soil from this length was lost and replaced by soil from higher up as a result of the auger's almost getting stuck in a very compact deposit (moraine?) at ca. 2.20 masl
2.20 (?)	↓	FJB1-07						Moraine?
								Rotary drilling abandoned at ca. 2.15 masl

The archaeological deposits would seem to have been entirely removed by the excavations carried out by Koren-Wiberg in the early 20th century.

Drilling continued deep down into bedrock.

4.5 Drilling FJB3: sediment sequence (visual inspection)

This hole was in the passageway running up the Enhjørningsgården tenement, and only ca. 60 cm to the north-east of MB23 (installed 30th Nov. 2006; Dunlop 2008). *Multiconsult ASA's* surveyors determined the borehole's coordinates as X6701344.40/Y297495.80 (UTM 84 EUREF 32N), and the modern planked surface was at an elevation of ca. 2.00 masl.

Masl		Stratum number	Same as stratum no.	Samples/ ¹⁴ C-dating/ finds	Accession number	Period	PC	Description
From	To							
2.00	0.90	FJB3-01				Mod and Post-med ?	-	No soil adhered to the auger, but the stratum consisted of disturbed soil down to at least 1.50 masl
0.90	0.65	FJB3-02	MB23-03?	Sample: Treprøve 1		Post-med	C2	Timber, relatively badly churned up by the auger Somewhat sourish odour of pinewood Poorly preserved
0.65	0.35	FJB3-03	MB23-04	Sample: FJB3-01 from 0.50 to 0.60 masl		Post-med ?	C3	Relatively compact, dark-brown humus with many woodchips (most lying parallel to plane of deposition), and some pieces of birch-bark, hazelnut shells and animal bones Medium-strong H ₂ S odour Darkened slowly Medium preservation
0.35	0.15	FJB3-04		Sample: Treprøve 2		Med	C4	Timber Medium-strong odour of freshly cut pinewood Good preservation
0.15	-0.05 ca.	FJB3-05	MB23-04			Med	C3	Relatively compact, dark-brown humus with many woodchips (most lying parallel to plane of deposition), and some pieces of birch-bark, hazelnut shells and animal bones Medium-strong H ₂ S odour Darkened slowly Medium preservation
								The length from 0.0 to -1.0 masl is more or less dubious, because the drill boss had to rotate the auger a lot in order to free it after it got stuck in timber
-0.05 ca.	-0.30 (?)	FJB3-06	MB23-05 ?	Sample: Treprøve 3		Med	C4	Timber, badly churned up by the auger Medium-strong odour of freshly cut pinewood Good preservation

Masl		Stratum number	Same as stratum no.	Samples/ ¹⁴ C-dating/ finds	Accession number	Per-iod	PC	Description
From	To							
-0.30 (?)	-0.80 ca.	FJB3-07	MB23-07 ?	Samples: FJB3-02 from -0.40 to -0.50 masl ¹⁴ C-sample (hazelnuts) from -0.65 masl AD 1160-1225	BRM 971/1	Med	C3	Semi-compact, wet, dark-grey, sticky humus with a large amount of woodchips and wood pieces (inclined at all angles; varied in colour, but were mainly medium preserved), a few hazelnut shells and fish bones, a little straw and a couple of birch-bark pieces Stratum seemed to be very churned up by the auger Medium-strong H ₂ S odour No colour change Medium preservation
-0.80 ca.	-1.10 ca.	FJB3-08				Med	-	Probable timber (just loose wood fibres due to churning by auger)
-1.10 ca.	-2.00							Nothing adhered to the auger due to (presumably) loose deposit and jerky withdrawal of auger up through water and churned-up timbers
-2.00 ca.	-2.10 ca.	FJB3-09	MB23-09 ?			Med	-	Probable timber (just loose wood fibres due to churning by auger)
-2.10 ca.	-2.40	FJB3-10		Sample: FJB3-03 from -2.20 to -2.30 masl		Med	C3	Very wet, soft, unstructured moss with some woodchips Medium-strong H ₂ S odour No darkening Medium preservation
-2.40	-3.90	FJB3-11	MB23-10	Samples: FJB3-04 from -2.70 to -2.80 masl FJB3-05 from -3.20 to -3.30 masl FJB3-06 from -3.70 to -3.80 masl Treprøve 4 from -3.60 masl		Med	C4	Highly organic and semi-compact (but more compact from ca. -2.70 to -3.30 masl), many woodchips (most lying parallel to plane of deposition, and medium preserved: most snapped easily), quite a few hazelnut shells and patches of very well-preserved moss in places, some birch-bark pieces, a couple of animal bones, and just a little humus in between; some fine sand and a few pebbles Wood-fibre rope at -2.50 and from -2.90 to -3.00 masl Medium-strong H ₂ S odour Darkened slowly Good preservation
-3.90	-4.00	FJB3-12				Med	-	Possible timber (no wood on auger, but felt during drilling)

Masl		Stratum number	Same as stratum no.	Samples/ ¹⁴ C-dating/ finds	Accession number	Per-iod	PC	Description
From	To							
-4.00	-4.40	FJB3-13	MB23-11	Sample: FJB3-07 from -4.20 to -4.30 masl		Med	C4	Highly organic and compact, many woodchips (50% lying parallel to plane of deposition, and medium to well preserved), many hazelnut shells in places, some birch-bark pieces and twigs, some fish-bones, and just a little humus and fine sand in between Medium-strong H ₂ S odour Darkened medium fast Good preservation
-4.40	-5.20	FJB3-14	MB23-12	Samples: FJB3-08 from -4.70 to -4.80 masl FJB3-09 from -5.10 to -5.20 masl ¹⁴ C-sample (hazelnuts) from -4.70 masl AD 1010-1035	BRM 971/2	Early med /Vik- ing Age	C5	Yellow-brown, very compact, highly organic stratum consisting mainly of laminated moss (H1/H2 on Von Post scale of preservation) and a varying quantity of woodchips, twigs and hazelnut shells, and some humus Very high concentration of moss from -4.40 to -4.50 masl Wood-fibre rope at -4.50 masl Medium-strong H ₂ S odour Darkened medium fast Excellent preservation
-5.20	-5.30			Sample: Treprøve 5 from -5.25 masl		Vik- ing Age	-	Transitional zone between strata FJB3-14 and FJB3-15
-5.20	-8.50	FJB3-15	MB23-14	Sample: FJB3-10 from -5.40 to -5.50 masl			-	Light-grey silt/sand with sea-shell fragments: sea-bed
								Rotary drilling abandoned at -6.00 masl
-8.50	-10.55						-	Moraine (data from drilling deep down into bedrock)
-10.55								Bedrock

As in MB23, the total deposit thickness in FJB3 was about 6.5 metres (discounting the uppermost metre) – which is about what one would expect in this part of the Bryggen area – while the medieval deposits may have reached as much as 5.8 metres in thickness.

Drilling continued down into bedrock to a total depth of 38.65 metres below the surface.

5 Finds & Dating

5.1 MB36

No archaeological material or dating samples were recovered from MB36.

5.2 MB37

5.2.1 Archaeological material

No archaeological material was recovered from MB37.

5.2.2 Radiometric dating

One sample was taken for ¹⁴C-dating. Hazelnuts (accession no. 965/1) from -2.40 masl in stratum MB37-10 were dated to 380±25 BP, calibrated to AD 1465-1620.

The dating is unfortunately inconclusive: stratum MB37 could be from the late medieval period, but just as easily from early post-medieval times. Both results fit equally well with the stratum's stratigraphic and topographic position.

5.3 FJB1

No archaeological material or dating samples were recovered from FJB1. One piece of clay-pipe (not retained) was observed at 4.35 masl in stratum FJB1-03.

5.4 FJB3

5.4.1 Archaeological material

No archaeological material was recovered from FJB3.

5.4.2 Radiometric dating

Two samples were taken for ¹⁴C-dating. Hazelnuts (accession no. 971/1) from -0.65 masl in stratum FJB3-07 have been dated to 875±35 BP, calibrated to AD 1160-1225. And hazelnuts (accession no. 971/2) from -4.70 masl in stratum FJB3-14 have been dated to 1000±35 BP, calibrated to AD 1010-1035.

The datings fit quite nicely with the stratigraphic positions, even if the one from stratum FJB3-14 is a little older than what one might have expected beforehand.

5.5 Dating: conclusions

In the case of MB36 and MB37 we can conclude with a high degree of certainty that virtually all the investigated deposits are from post-medieval and modern times.

The firelayer stratum MB37-09 could represent the fire of 1527 – if the stratum is from the late medieval period. If it is from early post-medieval times, on the other hand, it could represent the fire of 1675. There is no way to decide between these two possibilities at the moment.

6 State of preservation assessments

Assessments of the "health" of the archaeological sequences are presented in table 1 below – with the usual proviso that, in the case of layers exhibiting poor preservation, archaeological assessments

of the state of preservation of strata in boreholes cannot provide a sure determination as to whether the observed decomposition is due to on-going processes, or took place at the time of the layer's deposition instead.

Table 1. Schematic comparative presentation of state of preservation (archaeological assessment) of the deposits in MB36 and MB37. Each individual symbol represents a length of about 20 centimetres, and depth from the surface increases from left to right. Grey shading indicates the approximate position of the monitoring well's filter.

MB36	MB37	Masl
§	§§	2.0 – 1.0
§§§§§	§§§§§	1.0 – 0.0
§§§§§	XX???	0.0 – -1.0
§XXX?	XX?XX	-1.0 – -2.0
??XXA	XXXA	-2.0 – -3.0

SYMBOLS	
X - VERY POOR	? - INDEFINABLE
X - POOR	0 - NO SOIL RECOVERED
X - MEDIUM	N - NATURAL
X - GOOD	A - DRILLING ABANDONED
X - VERY GOOD	§ - INORGANIC
	F - BEDROCK

Table 2. Schematic comparative presentation of state of preservation (archaeological assessment) of the deposits in FJB1 and FJB3 (MB23 – installed in 2006 – is shown for purposes of comparison with FJB3). Each individual symbol represents a length of about 20 centimetres, and depth from the surface increases from left to right.

FJB1	FJB3	MB23 (2006)	Masl
§§§			6.0 – 5.0
XXXX§			5.0 – 4.0
§§§§§			4.0 – 3.0
§§??N			3.0 – 2.0
	00000	?????	2.0 – 1.0
	XXXXX	?XXXX	1.0 – 0.0
	XXXX?	XXXXX	0.0 – -1.0
	00000	XXXX0	-1.0 – -2.0
	XXXXX	XXXXX	-2.0 – -3.0
	XXXXX	XXXXX	-3.0 – -4.0
	XXXXX	XXXXX	-4.0 – -5.0
	XN	XXN	-5.0 – -6.0

In both MB36 and MB37, the situation is much as one would expect concerning high-lying deposits in a quayfront context. It is possible that the state of preservation of the deposits may have been affected by saltwater intrusion, but this is a question for others to address. At any rate, there would seem to be no great cause for alarm.

FJB1 can be left out of consideration quite safely in this context, as it contained no organic deposits.

In FJB3, the few differences from the situation recorded in MB23 five years earlier are negligible. There are no signs that the state of preservation of any of the directly corresponding strata has deteriorated in the intervening period. The situation in FJB3 can be characterized as completely satisfactory.

7 Concluding remarks

It is difficult to be categorical about the archaeological context of deposits found in boreholes, but some thoughts can be offered.

MB36 lies in an area that was reclaimed from the sea at a fairly late stage – as is reflected by the fact that the deposits contained a lot of sand. Surprisingly, however, there was very little in the way of sea-shell fragments. One would not expect to find buildings this far out into the former harbour area.

In MB37, the picture is much the same as in MB36, but the deepest strata probably represent in-situ occupation levels, as reflected by the presence of the firelayer stratum MB37-09.

FJB1 would seem to be in a previously excavated area, apart possibly from the two deepest strata.

In FJB3, we find probable occupation deposits down to – and including – stratum FJB3-08. Below this come infill deposits dumped in connection with reclamation of land from the original harbour area.

8 References

Dunlop, A. R., 2008. The Bryggen Monitoring Project, Part 6: report on the archaeological investigation of three monitoring well boreholes, Bryggen, 2006. – NIKU Arkeologi avdeling, Arkivrapport 63-2008. NIKU distriktskontor Bergen.

9 Documentation (NIKU)

- Sequences noted down in *Boreprøvebok* (drilling logbook) 6 and in NIKU's FEDOBA
- 41 digital photos (6 for MB36, 8 for MB37, 6 for FJB1, and 21 for FJB3)
- Finds/samples information entered into *Gjenstandsbasen*, Bergen Museum

Photo list

Bildendr.	Undersøkelsestype	Motiv
niku_ark_103094	MOV brønnboring (naverboring, kort)	MB36: lengde -0,8 til -1,8 moh
niku_ark_103095	MOV brønnboring (naverboring, kort)	MB36: lengde -0,8 til -1,3 moh
niku_ark_103096	MOV brønnboring (naverboring, kort)	MB36: lengde -1,3 til -1,8 moh
niku_ark_103097	MOV brønnboring (naverboring, kort)	MB36: lengde -1,8 til -2,8 moh
niku_ark_103098	MOV brønnboring (naverboring, kort)	MB36: lengde -1,8 til -2,3 moh
niku_ark_103099	MOV brønnboring (naverboring, kort)	MB36: lengde -2,3 til -2,8 moh
niku_ark_103100	MOV brønnboring (naverboring, kort)	MB37: oversikts-/arbeidsbilde
niku_ark_103101	MOV brønnboring (naverboring, kort)	MB37: lengde 0,45 til -0,55 moh
niku_ark_103102	MOV brønnboring (naverboring, kort)	MB37: lengde 0,45 til -0,05 moh
niku_ark_103103	MOV brønnboring (naverboring, kort)	MB37: lengde -0,05 til -0,55 moh
niku_ark_103104	MOV brønnboring (naverboring, kort)	MB37: lengde -1,55 til -2,55 moh
niku_ark_103105	MOV brønnboring (naverboring, kort)	MB37: lengde -1,55 til -2,55 moh (u/ blitz)
niku_ark_103106	MOV brønnboring (naverboring, kort)	MB37: lengde -1,55 til -2,05 moh
niku_ark_103107	MOV brønnboring (naverboring, kort)	MB37: lengde -2,05 til -2,55 moh
niku_ark_102893	MOV brønnboring (naver, fjellbrønn)	FJB1: lengde 5,55 til 4,55 moh
niku_ark_102894	MOV brønnboring (naver, fjellbrønn)	FJB1: lengde 5,05 til 4,55 moh
niku_ark_102895	MOV brønnboring (naver, fjellbrønn)	FJB1: lengde 4,55 til 3,55 moh
niku_ark_102896	MOV brønnboring (naver, fjellbrønn)	FJB1: lengde 4,05 til 3,55 moh
niku_ark_102897	MOV brønnboring (naver, fjellbrønn)	FJB1: lengde 3,55 til 2,55 moh
niku_ark_102898	MOV brønnboring (naver, fjellbrønn)	FJB1: lengde 3,55 til 2,55 moh
niku_ark_103178	Mov-brønnboring (naverboring, fjellbrønn)	FJB3: lengde 1,0 til 0 moh
niku_ark_103179	Mov-brønnboring (naverboring, fjellbrønn)	FJB3: lengde 1,0 til 0,5 moh
niku_ark_103180	Mov-brønnboring (naverboring, fjellbrønn)	FJB3: lengde 0,5 til 0 moh
niku_ark_103181	Mov-brønnboring (naverboring, fjellbrønn)	FJB3: Vestnorsk Brunnborings borerigg
niku_ark_103182	Mov-brønnboring (naverboring, fjellbrønn)	FJB3: lengde 0 til -1,0 moh
niku_ark_103183	Mov-brønnboring (naverboring, fjellbrønn)	FJB3: lengde 0 til -0,5 moh
niku_ark_103184	Mov-brønnboring (naverboring, fjellbrønn)	FJB3: lengde -0,5 til -1,0 moh
niku_ark_103185	Mov-brønnboring (naverboring, fjellbrønn)	FJB3: lengde -2,0 til -3,0 moh
niku_ark_103186	Mov-brønnboring (naverboring, fjellbrønn)	FJB3: lengde -2,0 til -2,5 moh
niku_ark_103187	Mov-brønnboring (naverboring, fjellbrønn)	FJB3: lengde -2,5 til -3,0 moh
niku_ark_103188	Mov-brønnboring (naverboring, fjellbrønn)	FJB3: lengde -3,0 til -4,0 moh
niku_ark_103189	Mov-brønnboring (naverboring, fjellbrønn)	FJB3: lengde -3,0 til -3,5 moh
niku_ark_103190	Mov-brønnboring (naverboring, fjellbrønn)	FJB3: lengde -3,5 til -4,0 moh
niku_ark_103191	Mov-brønnboring (naverboring, fjellbrønn)	FJB3: lengde -4,0 til -5,0 moh
niku_ark_103192	Mov-brønnboring (naverboring, fjellbrønn)	FJB3: lengde -4,0 til -4,5 moh
niku_ark_103193	Mov-brønnboring (naverboring, fjellbrønn)	FJB3: lengde -4,5 til -5,0 moh
niku_ark_103194	Mov-brønnboring (naverboring, fjellbrønn)	FJB3: stemningsbilde Enhjørningsgården
niku_ark_103195	Mov-brønnboring (naverboring, fjellbrønn)	FJB3: stemningsbilde Enhjørningsgården
niku_ark_103196	Mov-brønnboring (naverboring, fjellbrønn)	FJB3: lengde -5,0 til -6,0 moh
niku_ark_103197	Mov-brønnboring (naverboring, fjellbrønn)	FJB3: lengde -5,0 til -5,5 moh
niku_ark_103198	Mov-brønnboring (naverboring, fjellbrønn)	FJB3: lengde -5,5 til -6,0 moh

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