

## THE BRYGGEN MONITORING PROJECT, PART 15

Report on the archaeological investigation of two boreholes, Bredsgården, Bryggen, 2011.

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	Forsidebilde Naverboring for miljøbrønn MB42. Foto: Dunlop, NIKU	
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<p>Sammendrag</p> <p>Rapporten beskriver resultatene fra den arkeologiske undersøkelsen av to grunnboringer foretatt i Bredsgårdens passasje, Bryggen, i midten av desember 2011. Grunnboringenes formål var anleggelsen av korte miljøbrønn for å overvåke eventuelle forandringer i de øvre kulturlagene når diverse tiltak rettet mot heving av grunnvannsstanden i Bryggens nordre hjørne er blitt gjennomført.</p>
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Emneord Bryggen, Bredsgården, grunnboring, registrering
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Avdelingsleder

K. Paasche

## **Forord**

Stiftelsen Bryggen takkes for hjelpen med tilrettelegging av undersøkelsesstedene.

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## 1 Introduction

On 15th and 16th December 2011 two new monitoring wells – designated MB41 and MB42 – were installed in the passageway of the Bredsgården tenement. 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 the area adjacent to the northern corner of the Bryggen world heritage site, the northern corner being the area that has been mostly severely affected by drainage of groundwater into the neighbouring hotel-site. Both monitoring wells were short, only ca. three metres in length; this is because they will be used primarily to monitor the effects of the measures currently being implemented that are designed to raise the water-table in Bryggen's northern corner.

Rory Dunlop from the Bergen office of the Norwegian Institute for Cultural Heritage Research (NIKU) was responsible for the archaeological side of things, with the local firm of *Multiconsult AS* doing the drilling work and monitoring-well installation. 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.

MB41 and MB42 come under NIKU project number 156132935. The work was funded by *Statsbygg* and carried out on behalf of *Riksantikvaren* (the Norwegian Directorate for Cultural Heritage).

## 2 Background information

The two new drillings are located in the upper part of the Bredsgården passageway, along which has been laid sub-surface infrastructure (a waterpipe, and power and telecommunication cables). In addition, the central section of the passageway is occupied by a large stone-lined drain (*kisteveit*). One was therefore prepared for some problems in carrying out the drilling, but the drill bosses from *Multiconsult AS* were equal to the task, so the drilling and installation work went off without any major hitches.

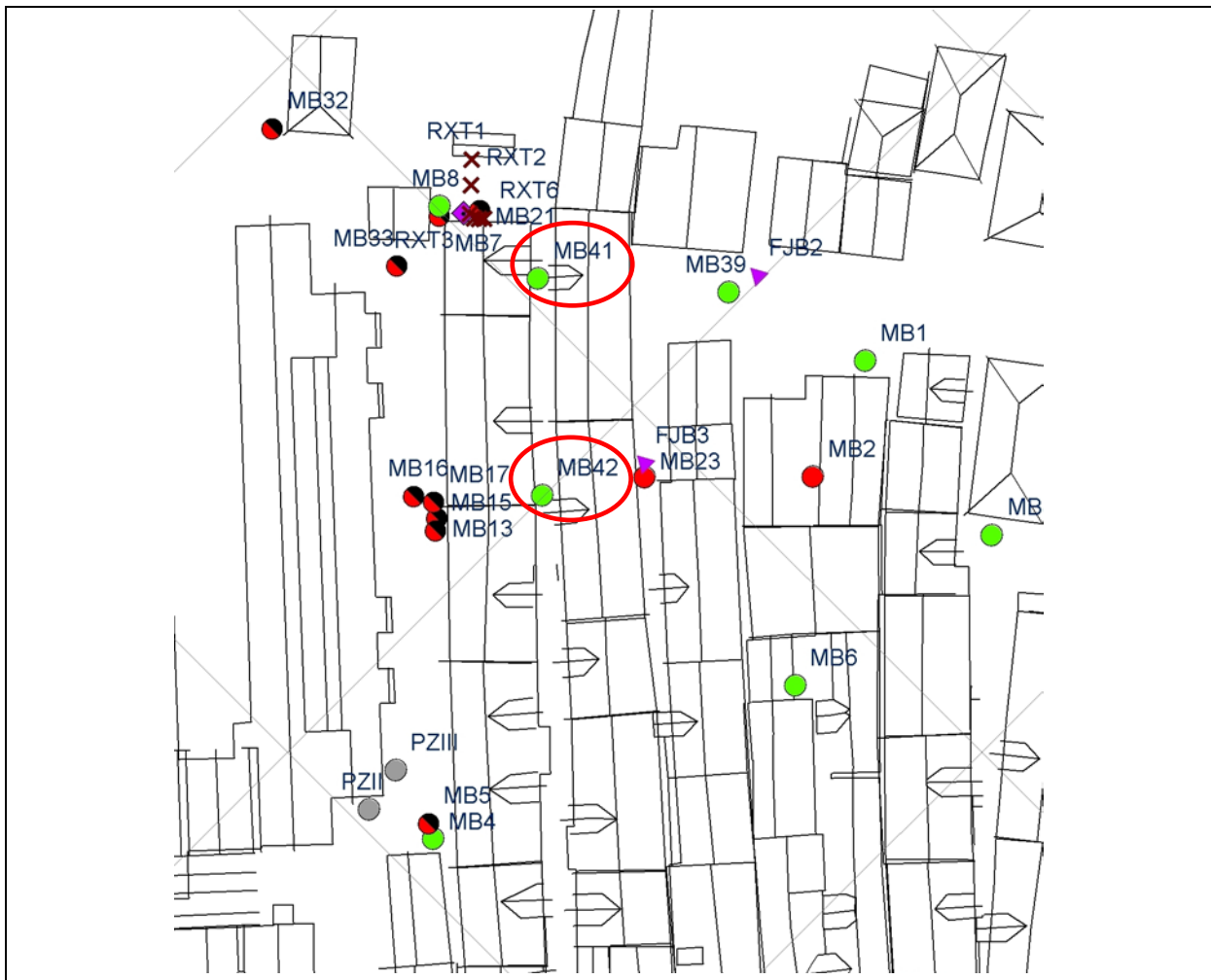


Fig. 1. Map showing positions of monitoring wells MB41 and MB42.

### 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. Each borehole has been assigned its own reference number for identification purposes by Bergen Museum’s *Middelaldersamlingen* (the Medieval Collections): «BRM 966» for MB41; and «BRM 967» for MB42.



## 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 dipwell in question: MB stands for *miljøbrønn*, the Norwegian for “monitoring well”) followed by sequential numbering of the individual stratum (from top to bottom). Thus “MB41-01” denotes the first archaeological stratum in monitoring well MB41.

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

### 4.2 Drilling MB41: sediment sequence (visual inspection)

This hole was roughly at the mid-point of Bredsgården tenement’s building 1f, and on the north-western side of the passageway. Multiconsult AS determined its coordinates as N6701366.05/E297502.08 (UTM EUREF 32N), and the modern planked surface was at an elevation of 3.50 masl (datum NN1954). Weather conditions during the investigation were poor, with heavy overcast and the surrounding buildings making it very dark.

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/ <sup>14</sup> C-dating/ finds	Accession number	Period	PC	Description
From	To							
3.50	3.20	MB41-01				Mod	D0	Planked passageway over pebbles/small stones
3.20	2.85	MB41-02				Recent	D0	Stones (north-western side of the central drain)
2.85	2.70	MB41-03				?	-	Indeterminable; the stratum may represent soil that was disturbed/redeposited when the central drain was built (and certainly disturbed by the drill’s having to smash through the overlying stones)
2.70	2.50?	MB41-04				Post med	-	Semi-compact, grey, fine sand and silt with a few very poorly preserved woodchips (most inclined parallel to plane of deposition) Looked like a layer that might have accumulated over the bottom of a drain – might be from an older stone-lined drain No odour No darkening Preservation indefinable

Masl		Stratum number	Same as stratum no.	Samples/ <sup>14</sup> C-dating/ finds	Accession number	Period	PC	Description
From	To							
2.50?	2.35?	MB41-05		Sample: MB41-01 from 2.45 to 2.35 masl		Post med	B2	Semi-compact, grey(?) humus with a few woodchips (both poorly and very poorly preserved), sparse pieces of birch-bark, and quite a lot of fine to coarse sand Weak H <sub>2</sub> S odour No darkening Poor preservation, all in all
2.35?	1.50	MB41-06		Sample: Treprøve 1 from 1.80 masl		Med	B2 / C2 B3 / C3 B4 / C4	Wooden post (drill probably penetrated along the side rather than dead centre, as there was some bark present on some of the churned-up wood pieces) Sourish pinewood odour Preservation varied: heart-wood was well preserved, sapwood poorly preserved <a href="#">Groundwater at ca. 2.07 masl (as measured 26-3-2012)</a>
1.50	0.50	MB41-07		Samples: MB41-02 from 1.30 to 1.20 masl MB41-03 from 0.80 to 0.70 masl		Med	C2	Semi-compact, grey/brown(?) humus with some poorly preserved woodchips, a few hazelnut shells and small pieces of birch-bark, and a minor amount of fine sand with a few small-sized stones Impossible to detect any differentiation in this length Medium H <sub>2</sub> S odour No darkening Poor preservation
								Rotary drilling abandoned at ca. 0.50 masl

The thickness of the archaeological deposits, likewise the thickness of the medieval deposits, cannot be determined in the case of this drilling. It is also difficult to provide a meaningful culture-historical interpretation of the observations, but the presence of the post (stratum MB41-06) might indicate that the drilling encountered part of a building's external covered gallery (*svalgang*).

**Worryingly, the groundwater-level is about 1.4 m below the passageway surface.**

### 4.3 Drilling MB42: sediment sequence (visual inspection)

This hole was roughly at the junction of Bredsgården tenement's buildings 1e and 1d, and on the north-western side of the passageway. Multiconsult AS determined its coordinates as N6701350.10/E297486.80 (UTM EUREF89 32N), and the modern planked surface was at an elevation of ca. 2.15 masl (datum NN1954). Weather conditions during the investigation were adequate, though the closeness of the surrounding buildings made for poor light.

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/ <sup>14</sup> C-dating/ finds	Accession number	Per-iod	PC	Description
From	To							
2.15	1.75	MB42-01				Mod	D0	Planked passageway over pebbles/small stones
1.75	1.05	MB42-02				Mod	D0	Stones (north-western side of the central drain) The drain may have had a plank bottom
1.05	0.80	MB42-03				Post med	-	Loose, grey, fine to coarse sand, gravel and a few pebbles, with a few poorly preserved woodchips and pieces of birch-bark, and a little humus; the stratum may represent soil that was disturbed/redeposited when the central drain was built No pieces of brick/tile visible No odour Preservation indefinable <a href="#">Groundwater at ca. 1.04 masl (as measured 26-3-2012)</a>
0.80	0.45	MB42-04		Sample: MB42-01 from 0.65 to 0.55 masl		Med ?	C2	Compact, very homogeneous, dark-grey mud/silt/humus with some excrement mixed in, and with numerous poorly preserved woodchips and a few pieces of birch-bark; most of the organic components were inclined parallel with the plane of deposition No pieces of brick/tile visible Medium H <sub>2</sub> S odour No darkening Poor preservation
0.45	0.00	MB42-05		Sample: Treprøve 1		Med	C3	Timber, relatively fresh colour Medium odour of freshly cut pinewood Medium preservation
0.00	-0.10	MB42-06		Sample: MB42-02		Med	C3	Semi-compact, brown/grey humus with numerous medium-well-preserved woodchips and one piece of animal bone Medium H <sub>2</sub> S odour No darkening Medium preservation
-0.10	-0.25	MB42-07				Med	-	In situ firelayer, with red/orange ash/sand over charcoal Preservation indefinable

Masl		Stratum number	Same as stratum no.	Samples/ <sup>14</sup> C-dating/ finds	Accession number	Per-iod	PC	Description
From	To							
-0.25	-0.40	MB42-08		Sample: MB42-03 from -0.30 to -0.40 masl		Med	C3	Semi-compact, brown/grey humus mixed with a good deal of excrement, and with numerous medium-well-preserved woodchips; most of the organic components were inclined parallel with the plane of deposition Medium H <sub>2</sub> S odour No darkening Medium preservation
-0.40	↓	MB42-09		Sample: Treprøve 2		Med	C3	Timber, relatively fresh colour Medium odour of freshly cut pinewood Preservation varied: heartwood was medium-well to well preserved, sapwood poorly preserved
								Rotary drilling abandoned at -0.85 masl

The thickness of the archaeological deposits, likewise the thickness of the medieval deposits, cannot be determined in the case of this drilling. It is also difficult to provide a meaningful culture-historical interpretation of the observations, though the presence of an in situ firelayer (stratum MB42-07) could indicate that the deposits encountered by this drilling were located inside rather than outside a building.

The groundwater-level could definitely do with being raised in this area too.

## 5 Finds & dating

### 5.1 MB41

No dating material of any kind was recovered from this drilling.

### 5.2 MB42

No dating material of any kind was recovered from this drilling.

### 5.3 Dating: conclusions

In the case of MB41 it is not easy to tell at exactly what level the transition from post-medieval to medieval deposits takes place, but the post (stratum MB41-06) starts at such a depth relative to the surface that it has to be part of a medieval structure. One might tentatively suggest that the transition from post-medieval to medieval deposits takes place at ca. 2.35 masl in MB41.

Regarding MB42, there is really nothing to indicate where the transition from post-medieval to medieval deposits takes place, but 0.80 masl is probably not far off the mark. The firelayer stratum MB42-07 must represent a medieval fire, probably the fire of either 1476 or 1413.

## 6 State of preservation assessments

Assessments of the “health” of the archaeological sequences are presented in table 1 below. Generally, the situation can be characterized as poor (though it must be pointed out, as always, that archaeological assessments of the state of preservation of strata in boreholes cannot provide a sure determination as to whether, in the case of remains exhibiting poor preservation, the observed decomposition is due to on-going processes, or took place at the time of, or even prior to, the layer’s deposition instead). The medium state of preservation displayed in MB41 is due to the presence of a wooden post – and this value is in fact an average, because the post’s state of preservation ranged from poor (sapwood) to good (heartwood). We can assume that the state of preservation in this spot would improve with increasing depth, but the picture in the uppermost three metres is not encouraging.

As for MB42, we can safely leave all of the uppermost metre out of consideration, as this consisted mostly of stones of the central drain. The state of preservation of the underlying deposits was from poor to medium, and the assessments seem to reflect a situation where the state of preservation improves with increasing depth – as one would expect.

Table 1. Schematic comparative presentation of state of preservation (archaeological assessment) of the deposits in MB41 and MB42; the upper three metres of MB39 – a monitoring well situated not far away in the firebreak street called Bryggstredet (Dunlop 2011) – is shown for purposes of comparison with MB41. 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 individual monitoring well’s filter.

MB41	MB39	MB42	Masl
§§			4.0 – 3.0
§?XXX	§§§§§	§	3.0 – 2.0
XXXXX	XXXXX	§§§§§	2.0 – 1.0
XXA	XXXXX	?XXXX	1.0 – 0.0
		?XA	0.0 – -1.0

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

All in all, the prognosis for most of the organic deposits seems uncertain, and their survival – particularly in the immediate vicinity of MB41 – depends heavily on achieving and maintaining a high, stable water-table in this threatened part of the Bryggen area.

## 7 Concluding remarks

It is difficult to be categorical about the archaeological context of deposits found in boreholes, but it can be suggested that the lower strata in both MB41 and MB42 were associated more with buildings – possibly the external covered gallery (*svalgang*) that represents a kind of transitional zone between

the actual building and the adjacent passageway – rather than the passageway as the situation is today. This would imply a slight shift in the position of the earlier property boundary.

The groundwater-level situation under the Bredsgården passageway is not satisfactory and should be monitored diligently.

## **8 References**

Dunlop, A.R., 2011. The Bryggen Monitoring Project, Part 12: report on the archaeological investigation of two dipwell boreholes, Bryggestredet and Bellgården, Bryggen, 2011. – NIKU Oppdragsrapport 271/2011. NIKU distriktskontor Bergen.

## **9 Documentation (NIKU)**

- Sequences noted down in *Boreprøvebok* (drilling logbook) 7 and in NIKU's FEDOBA
- 15 digital photos (7 for MB41, 8 for MB42)

NIKU prosjektnummer	156132935 (2011)
Berørt område	Bryggen: Bredsgården
Gnr/Bnr	167/1635
Oppdragets art	Arkeologisk undersøkelse av grunnboringer
Vedtaksdato; saksnummer	15.12.2011; 08/00262
Oppdragsgiver	Riksantikvaren Distriktskontor Vest
Oppdraget utført av	NIKU distriktskontor Bergen v/ A. R. Dunlop
Oppdraget utført dato	15-16.12.2011
Koordinater	Se i teksten
Overflate, dagens	Se i teksten
Tilstedeværelse av automatisk fredete kulturminner	Ja
Kulturhistorisk tolkning	Kisteveit, tømmerstokker og -stolpe, bosetningslag

#### Photo list

Bilde nr.	Undersøkelsestype	Motiv
niku_ark_103108	MOV brønnboring (naverboring, kort)	MB41: lengde 2,9 til 2,5 moh
niku_ark_103109	MOV brønnboring (naverboring, kort)	MB41: lengde 2,5 til 1,5 moh
niku_ark_103110	MOV brønnboring (naverboring, kort)	MB41: lengde 2,5 til 2,0 moh
niku_ark_103111	MOV brønnboring (naverboring, kort)	MB41: lengde 2,0 til 1,5 moh
niku_ark_103112	MOV brønnboring (naverboring, kort)	MB41: lengde 1,5 til 0,5 moh
niku_ark_103113	MOV brønnboring (naverboring, kort)	MB41: lengde 1,5 til 1,0 moh
niku_ark_103114	MOV brønnboring (naverboring, kort)	MB41: lengde 1,0 til 0,5 moh
niku_ark_103115	MOV brønnboring (naverboring, kort)	MB42: lengde 1,15 til 0,15 moh
niku_ark_103116	MOV brønnboring (naverboring, kort)	MB42: lengde 1,15 til 0,65 moh
niku_ark_103117	MOV brønnboring (naverboring, kort)	MB42: lengde 0,65 til 0,15 moh
niku_ark_103118	MOV brønnboring (naverboring, kort)	MB42: lengde 0,15 til -0,85 moh
niku_ark_103119	MOV brønnboring (naverboring, kort)	MB42: lengde 0,15 til -0,35 moh
niku_ark_103120	MOV brønnboring (naverboring, kort)	MB42: lengde -0,35 til -0,85 moh
niku_ark_103121	MOV brønnboring (naverboring, kort)	MB42: oversiktsbilde
niku_ark_103122	MOV brønnboring (naverboring, kort)	MB42: oversiktsbilde

Photos: MB41



niku\_ark\_103108



niku\_ark\_103110



niku\_ark\_103111



niku\_ark\_103113



niku\_ark\_103114



Photos: MB42



niku\_ark\_103116



niku\_ark\_103117



niku\_ark\_103119



niku\_ark\_103120

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