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The Bryggen Monitoring Project, Part 5: report on the investigations at the rear of Nordre Bredsgården, 2006

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NIKU

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1. Introduction

In August 2006 it was decided to investigate the area behind Nordre Bredsgården, where drainage due to the sheet piling around the Radisson SAS Bryggen Hotel site has caused a lowering of the water-table by up to three metres, which is drastic. The investigation was therefore intended to concentrate on the deposits in the non-saturated zone, to see how they may have been – and are being – affected by the dewatering. It was designed as a two-pronged investigation, the plan being to carry out one drilling for installation of a dipwell (designated MB21), along with mechanical/manual excavation of a small test-pit.

MB21 was installed in late August 2006 with A. R. Dunlop (an archaeologist from the Bergen office of the Norwegian Institute for Cultural Heritage Research) and Arild Haukeland (a geotechnical/drilling specialist from the firm of Multiconsult AS) participating in the field. The excavation and investigation of the test-pit took place September-October 2006, with Dunlop, Henning Matthiesen (a geochemist/conservation specialist from Denmark's National Museum), and Arild Haukeland and Frank Dyrkolbotn (both from the firm of Multiconsult AS) participating in the field.

Much of the background has been presented in other reports. However, some mention should be made of the building behind which the test-pit and MB21 are located. Designated building 1f, it is the rear building in the northern row of the Bredsgården double-tenement, which is the northernmost of the complete tenements in the Bryggen complex. The details are somewhat unclear, but it would seem that the building's foundations were completely remade in ca. 1974-75, with the construction of footings of reinforced concrete supported by probably six driven piles of concrete, each pile with a diameter of 15-20 cm.

The investigation's NIKU project number is 156132907, and the Bryggen Foundation is to be thanked for assistance rendered.

2. Methods

As regards the test-pit, roughly the upper half was excavated by machine, with the lower half dug by hand.

For recording purposes, use was made of close-range photogrammetry, with Marcin Gładki responsible for the technical side of things. This was supplemented by a certain amount of ordinary digital photography. For drawing plans, a scale of 1:20 was used exclusively. Sections were generated from the orthophotos produced by the close-range photogrammetry. Documentation/recording adhered otherwise to the standard procedures employed by NIKU's Bergen office.

The various layers and constructions recorded in the course of the test-pit investigation were numbered sequentially as they were encountered, but using separate sequences (construction numbers have "K" as prefix). The layers and constructions have been assigned to successive phases, according to the stratigraphic analysis.

Quite a few soil samples were taken from the test-pit for geochemical analysis, combined with on-the-spot measurements of various parameters. All this work was carried out by geochemist Henning Matthiesen from the National Museum of Denmark (Matthiesen, 2007; see also Matthiesen, 2004).

A number of small finds (55 accession numbers in all) were recovered by Dunlop, and these have been registered under the reference number "BRM 651" in accordance with the principles laid down by Bryggens Museum.

Commentaries, and detailed information on constructions, finds and layers, are to be found in separate tables in an MS-Access database (filename *156132907dba.mdb*).

3. Fieldwork results

3.1 General remarks

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

3.2 Test-pit 2006

The recorded layers and constructions have been divided into successive phases, 10 in all, with phase 10 as the oldest (table 1). Description of the individual phases will commence with phase 10.

Table 1. Layers and constructions by phase.

Phase	Constructions	Layers	Phase character
1		1	Demolition/levelling
2	K1, K2	2	Occupation
3	K2	3	Rubbish deposition
4	K2	4	Occupation
5	K2, K3	5, 6	Occupation
6	K2, K4	7	Occupation
7		8	Rubbish deposition
8		9, 10	Mortar production
9		11, 12	Mortar production
10		13, 14	Occupation

3.2.1 Phase 10

Layers: 13, 14

This phase was only present in the small exploratory hole dug in the test-pit's eastern corner. It started with layer 14, which consisted of medium-brown, soft, sandy humus with some poorly preserved to well-preserved woodchips and some hazelnut shells; most of the woodchips seemed to be lying parallel to the plane of deposition. The layer appears to have built up in and around a timber foundation, which probably supported a building. Timbers were not found in the hole, but one was encountered at the appropriate elevation in the nearby borehole for dipwell MB21 (stratum MB21-12; see report section 3.3.2). Layer 14's surface was at 2.15 masl.

The phase ended with the deposition of an in situ firelayer, layer 13, whose surface was at 2.30 masl. In situ firelayers – where one finds red ash/sand above charcoal – are almost always associated with buildings/dwellings. We can therefore be fairly confident that this area was occupied by a tenement at this time.

3.2.2 Phase 9

Layers: 11, 12

Phase 9 started with the deposition of layer 12, a levelling layer consisting of grey, coarse sand, gravel, pebbles, stones and only a small proportion of organic matter (some woodchips, charcoal, birch-bark, animal bone). Layer 12's surface was at 2.50-2.40 masl.

This was followed by the deposition of layer 11, which consisted of slaked lime/mortar production detritus and charcoal. The deposit almost separated into two distinct strata towards the test-pit's south-western side, with light-coloured slaked lime/mortar detritus uppermost, and charcoal/humus/stones in the lower part. Layer 11's surface was at 2.75-2.70 masl.

Layer 11 must derive from mortar production, though the actual production site must have been located somewhere outside the test-pit. Layer 11 represents the detritus that was dumped after the mortar production activity itself had taken place. What is clear is that in phase 11, the site of the test-pit had become part of the rearward, more "industrial" part of Bryggen, and no longer part of the dwelling area. This is a development that has been documented elsewhere in the Bryggen area, and it seems to occur around the start of the Late Middle Ages – from around 1300 or 1350.

3.2.3 Phase 8
Layers: 9, 10
Phase 8 was virtually identical to the preceding phase 9. Phase 8 started with the deposition of layer 10, a levelling layer consisting of grey, coarse sand, gravel, pebbles, stones and only a small proportion of organic matter (some woodchips, charcoal, birch-bark, animal bone). Layer 10's surface was at 2.85-2.75 masl.

This was followed by the deposition of layer 9, which consisted of slaked lime/mortar production detritus, charcoal, and some small patches of clay. Layer 9's surface was at 3.15-2.80 masl.

As with layer 11, layer 9 must derive from mortar production, though the actual production site must have been located somewhere outside the test-pit.

3.2.4 Phase 7
Layer: 8
Phase 7 comprised only a single layer, layer 8, which was a highly organic refuse layer of humus and woodchips. Most of the layer's components seemed to be lying parallel to the plane of deposition, and it was almost certainly the result of relatively slow accumulation – the woodchips had obviously had time to decay in situ during and after deposition. It has to be interpreted as an occupation layer, a primary deposit of household rubbish that was thrown out at the back of the dwelling area proper. Layer 8's surface was at 3.35-3.10 masl.

Layer 8 was subsequently "reused" – but probably not intentionally – to support K4, the very first floor of stone slabs in the stonecellar that was built in phase 6. The stonecellar was partly dug down into the contemporary ground (though stonecellars in Bergen were never really subterranean structures, despite the name), and it was thus fortuitous that layer 8 ended up directly under the stonecellar's original floor. We may assume that once layer 8 had been covered by younger deposits, the rate of decomposition of layer 8's organic content would have slowed.

3.2.5 Phase 6
Constructions: K2, K4
Layer: 7
Phase 6 saw the construction of K2, a structure of a type known as *steinkjeller* (stonecellar). Built predominantly of stone, the stonecellars' primary purpose was to provide fireproof storage for valuables, and they were mostly constructed along the back of the dwelling area.

Construction commenced with the excavation of a trench for the foundations. The trench was probably only a little wider than the foundations, and it was dug down to a depth of up to

about 70 centimetres below the contemporary ground surface (the bottom of the foundations was unearthed only along the test-pit's north-western side).

The foundations consisted of irregularly shaped stones of varying sizes. There were no courses – apart from at the very top of the foundations, where flat slabs were laid to provide a suitable support for the bottommost stones of the walls themselves – and there was very little earth/rubble fill (the voids between the stones were, however, subsequently filled by water percolation, resulting in a very sticky, silt/fine sand mixture). Once the foundations were in place, the gap between the stones and the wall of the trench was backfilled with a stony, sandy deposit, layer 7. Layer 7's surface reached up to 3.35 masl.

After that, the walls of the stonecellar were erected on top of the foundations. The walls were slightly narrower than the foundations and were built in a much more regular fashion – in a kind of Gothic style, with pinning-stones and mortar in the interstices. As excavated, the walls were preserved to a height of no more than 70 centimetres.

Finally, a floor of stone slabs – designated K4 – was laid in place. Some of the slabs were quite massive. The surface of K4 was at 3.35-3.10 masl. Originally, before subsidence, it would have been fairly level at an elevation of about 3.40-3.30 masl.

The excavation of the test-pit revealed only the western corner of the stonecellar. We therefore do not know its length or width, though one can presume that its width would have corresponded fairly closely to the normal width of the wooden tenement buildings.

There was no trace of any use/occupation layer associated with K4. It is very likely that any such layer would have removed by subsequent building/repair work, such as that carried out in the succeeding phase 5.

3.2.6 Phase 5
Constructions: K2, K3
Layers: 5, 6
Phase 5 basically involved no more than the repair of the western corner of the stonecellar's original floor. It was found that some of the stone slabs in the western corner had subsided to a point where the floor in this area had become unusable; the westernmost slab, for example, was slanting steeply downwards towards the east, creating quite a cavity in the floor's surface.

To repair the floor, a fairly thick layer of quite pure, light-yellow fine sand – layer 6, which was probably redeposited "Dutch ballast sand" – was spread out on top of K4 in the western corner. After that, a number of new stone slabs – designated K3 – were put in place. Layer 6's surface was at 3.40-3.35 masl, while K3's surface was at ca. 3.45-3.35 masl.

Unlike in the preceding phase 6, this time there were traces of a very thin occupation layer – layer 5, consisting of humus and thin plank-like wood pieces – in association with K3. Like layer 8 in phase 7, the organic components in layer 5 must have had time to decay in situ during and after accumulation – in other words, the observed poor state of preservation was the result of a contemporary process, not a modern one. Layer 5's surface was at 3.45-3.35 masl.

The big question is: what caused the original stone slabs in the stonecellar's western corner to subside? The author contends that it was not the result of accelerated local decomposition of the underlying organic deposits – one may recall that layer 8, the deposit immediately underneath floor K4, had already undergone a good deal of decomposition during its accumulation. Nor is it likely that the subsidence was the result of use.

Rather, the explanation has to do with the movement of water. Shortly before excavation of the test-pit had been completed, water started flowing into the hole at a quite considerable rate from a weak point in the earth baulk that had been left unexcavated along the stonecellar's south-western foundation (the point was about halfway down from the top of the foundation). What must have happened is that, during excavation of the foundation trench, the stonecellar's builders inadvertently tapped into a source of flowing water at the stonecellar's northern corner – and since the foundation trench constituted the line of least resistance, this water would then have been channelled down to the stonecellar's western corner. Here, its continued flow south-westwards towards the harbour would have been blocked by deposits outside the stonecellar, so that at least part of the water would have been turned into the deposits underneath the western corner of floor K4. Over time, this must have been enough to cause the observed subsidence

3.2.7 Phase 4
Constructions: K2
Layer: 4
Phase 4 comprised layer 4, a layer of quite pure, light-yellow fine sand, which – like layer 6 in phase 5 – was probably redeposited "Dutch ballast sand". Given that layer 6 was used to support a stone floor, it is very likely that layer 4 would have had the same function – though the floor that it supported must have been totally removed (along with any associated occupation layer) at the end of phase 4. Layer 4's surface was at 3.60-3.45 masl.

3.2.8 Phase 3
Constructions: K2
Layer: 3
It would seem that after phase 4 had ended the stonecellar remained unused for some time. That is to say, unused for actual occupation purposes, but it appears to have been used as a dumping-ground for household refuse. This resulted in the accumulation of layer 3, an organic-rich refuse layer that resembled layer 8 in many ways. It contained, among other things, quite a lot of oyster-shell fragments. Many of the layer's components seemed to be lying parallel to the plane of deposition. All in all, layer 3 exhibited signs of having accumulated slowly and of having been left exposed to the elements for a relatively lengthy period, and the organic components appeared to have had the opportunity to decay to a considerable extent in situ during the accumulation process. Layer 3's surface was at 3.80-3.65 masl.

3.2.9 Phase 2
Constructions: K1, K2
Layer: 2
Phase 2 represents the final phase in the use of the stonecellar K2. A fairly thick layer of light-grey coarse sand, gravel, pebbles and stones – layer 2 – was spread out on top of layer 3. Layer 2 in turn supported K1, a somewhat irregular and partly damaged flooring of stone slabs. K1's surface was at 3.90-3.70 masl.

3.2.10 Phase 1
Layer 1
The stratigraphic sequence in the test-pit ends with phase 1, which consists of only one layer: layer 1. Originally a demolition/levelling deposit, most likely deriving from the destruction of the stonecellar, it turned out to have been heavily disturbed by post-depositional activities and mixed with the overlying gravel/crushed stone. Layer 1's surface was at 4.00-3.85 masl.

3.3 Rotary drilling for dipwell MB21: stratigraphic sequence (visual inspection)

3.3.1 General remarks

The stratigraphic sequence in the 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 drilling have been numbered in the following way. First comes "MB21" (MB stands for *miljøbrønn*, the Norwegian for "dipwell"), followed by sequential numbering of the individual stratum (from top to bottom).

3.3.2 Sediment sequence (visual inspection)

This hole was right behind Nordre Bredsgården and just to the south-east of the test-pit. Multiconsult determined the borehole's coordinates as X6701375.14/Y297502.87 (UTM 84 EUREF 32N), and the modern cobbled surface was at an elevation of ca. 4.15 masl.

Masl		Stratum number	Same as stratum no.	Finds	Accession number	Period	PC	Description
From	To							
4.15	3.85	MB21-01				Mod	E0	Cobbles in sand
3.85	3.60	MB21-02	Layer 1 in test-pit			Post med	-	Demolition layer: a lot of clay (from ceiling space?), much crushed red brick, a number of stones, some sandy grey(/brown) humus with some badly preserved pieces of wood, some charcoal Earthy smell Preservation indefinable
3.60	3.45	MB21-03	Layers 2, 3 and 4 in test-pit				-	Light-grey(/brown) fine to coarse sand with quite a lot of gravel and some pebbles; possibly a few small pieces of red brick
3.45	3.30	MB21-04	Layer 5 in test-pit	Samples: MB21-A pose 1 MB21-C pose 1		Post med	A1	Very patchy grey/dark-brown mixture of fine/medium-fine sand and humus with a few very rotted wood-chips Slight sponge reaction, but no odour and no colour change Not much soil for sampling remained on the drill Very poor preservation
3.30	3.00	MB21-05	Layer 6 in test-pit			Post med	-	"Dutch ballast sand", like the sand found under the rough cobblestone floor in Svensgården 4e Presumed to be under a stone floor, but no such floor actually detected by drill
3.00	2.85	MB21-06	Layer 8 in test-pit			Med	A1	Medium-grey sticky, silty, sandy humus with a few badly rotted pieces of wood, and one pebble of soapstone No odour, no colour change

Masl		Stratum number	Same as stratum no.	Finds	Accession number	Period	PC	Description
From	To							
2.85	2.70	MB21-07	Layer 9 in test-pit			Med	-	Probably mixture of detritus from mortar production: some slaked lime, some charcoal, some patches of clay, some sand, gravel and stones
2.70	2.60	MB21-08	Layer 10 in test-pit	Samples: MB21-A pose 2 MB21-C pose 2		Med	A2	Possibly more in the way of domestic rubbish with some rotted woodchips, some pieces of burnt bone, a few hazelnut shells and other organic matter, but also with a lot of charcoal, so perhaps still connected with mortar production Granular Many of the components seemed to be lying parallel to plane of deposition Poor preservation
2.60	2.20	MB21-09	Layers 11 & 12 in test-pit			Med	-	For the most part mineral: coarse sand, gravel, pebbles and a few larger stones (some burnt) Some charcoal, so possibly also connected with mortar production A few fish-bones, sporadic At 2.50 masl was a single patch of soil resembling MB21-08 The stratum looked to be pretty “chaotic”, and did not lend itself to soil sampling Very granular
2.20	1.95	MB21-10	Layer 13 in test-pit			Med	-	Charcoal (but not much soil adhered to the drill)
1.95	1.85	MB21-11	Layer 14 in test-pit	Samples: MB21-A pose 3 MB21-C pose 3		Med	A2	Medium-brown, soft, sandy humus with some poorly preserved woodchips and hazelnut shells Poor preservation
1.85	1.65	MB21-12		Sample: MB21-B pose 1		Med	A3	Timber, relatively well-preserved for the most part, but gave off rather sour odour

Masl		Stratum number	Same as stratum no.	Finds	Accession number	Period	PC	Description
From	To							
1.65	1.35	MB21-13		Samples: MB21-A pose 4: 1.55-1.45 masl MB21-C pose 4: 1.65-1.55 masl		Med	A3	As stratum MB21-11, but perhaps with dung uppermost and with the woodchips varying a deal more as regards state of preservation, and most woodchips seemed to be lying parallel to plane of deposition Soil was relatively dry Noticeable H_2S odour, and slow colour change Stratum became much more mineral in the basal 10 cm, especially gravel and pebbles, and greyer in colour
1.35	1.05	MB21-14				Med	-	Mineral: sand and gravel, but some larger stones present Some sea shell fragments from ca. 1.25 masl Quite sharp transition to overlying stratum
1.05	0.90	MB21-15		Samples: MB21-A pose 5: 1.00-0.90 masl MB21-C pose 5: 1.00-0.90 masl		Med	A3	As MB21-13, but with greater quantity of better-preserved woodchips; some gravel Medium preservation
0.90	0.35	MB21-16		Sample: MB21-B pose 2: 0.75-0.70 masl		Med	A3	Probably several courses of timber, relatively well-preserved, with some humus around the logs (but not enough for sampling) More noticeable odour of freshly cut wood Medium preservation
								Rotary drilling abandoned at 0.35 masl

Two digital photos were taken of the length from 4.15 to 3.15 masl, two digital photos of the length from 3.15 to 2.15 masl, two digital photos of the length from 2.15 to 1.15 masl, and three digital photos of the length from 1.15 to 0.35 masl (one close-up of the lower part).

4. Finds & Dating

4.1 General remarks

The archaeological finds were examined by Dunlop. No radiocarbon datings have been carried out.

4.2 Test-pit

4.2.1 Phase 3

From layer 3 were recovered 9 sherds of post-medieval Siegburg stoneware.

4.2.2 Phase 4
From layer 4 were recovered 20 sherds of post-medieval Siegburg stoneware.

4.2.3 Phase 5
From layer 6 were recovered 2 sherds of post-medieval Siegburg stoneware, and 1 sherd of possibly late-medieval earthenware.

4.2.4 Phase 7
From layer 8 were recovered 1 sherd of Svartgods (dark, low-fired earthenware), 1 sherd of South Scandinavian glazed ware, 2 sherds of possible Humber ware, 2 sherds of Grimston ware, 1 sherd of Pingsdorf-like earthenware, and 1 rim-sherd of a soapstone vessel.

4.2.5 Phase 9
From layer 12 were recovered 1 sherd of medieval cooking-pot, 1 sherd of Grimston ware, 1 medieval glazed redware (provenance uncertain), 3 sherds of Scarborough type II ware, 1 sherd of possible Humber ware, and 1 sherd of Andenne ware.

4.2.6 Phase 10
From layer 13 were recovered 1 sherd of Humber ware, 1 sherd of Scarborough ware (probably type II), and 1 piece of flint. From layer 14 were recovered 1 sherd of Svartgods, and 1 sherd of Grimston ware.

Table 2. Finds by phase and layer.

	Phase→	**3**	**4**	**5**	**7**	**9**	**10**	
	Layers→	**3**	**4**	**6**	**8**	**12**	**13**	**14**
TYPE	**Siegburg**	9	20	2				
	Earthenware (medieval?)			1				
	Svartgods				1			1
	South Scandinavian earthen.				1			
	Grimston				2	1		1
	Humber				2?	1?	1	
	Scarborough type II					3		
	Scarborough, type uncertain						1	
	Medieval glazed redware					1		
	Cooking-pot type					1		
	Pingsdorf-type				1			
	Andenne					1		

4.3 MB21
No archaeological artefacts were recovered from MB21.

4.4 Dating: conclusions
- phases 7, 8, 9 and 10 can definitely be placed in the medieval period, and are possibly earlier than ca. 1300 (based, among other things, on the apparent absence of stoneware types)
- phase 6 – which saw the construction of the stonecellar – may be late medieval in date
- phases 1, 2, 3, 4 and 5 are post-medieval, and phase 1 may have ended with the fire in 1702.

5. State of preservation assessment

It was stipulated that the report should contain archaeological assessments of the "health" – i.e. state of preservation – of the organic deposits in the test-pit and in the borehole for MB21.

For assessment of the deposits in the test-pit, the newly developed State of Preservation Scale was applied. Only four layers were rich enough in organic matter to allow meaningful assessment, which turned out as follows:
layer 3 – A2
layer 5 – A2
layer 8 – A2
layer 14 – A3

As regards the state of preservation of these organic deposits, the following interpretations can be made:

- in the case of layers 3, 5 and 8 there is evidence of historical decomposition – but this is NOT to be taken to mean that these layers are NOT undergoing decomposition at the present time

In addition, we have also found evidence of some historical subsidence, as displayed by K4, the original flooring in K2. This, however, seems to have been caused by subterranean water-flow, not so much as by contemporary decomposition (it must be recalled that layer 8 – the deposit underlying K4 – had already had the opportunity to decompose considerably **before** K4 was laid in place).

As regards assessments of the "health" of the archaeological sequence in MB21, table 3 below seeks to provide an easy-to-grasp picture of the situation in MB21, with the nearby MB7 (investigated in 2003: see Dunlop 2003) alongside for comparison.

Table 3. Schematic comparative presentation of state of preservation (archaeological assessment) of the deposits in MB21 and MB7. Each individual symbol represents a length of about 20 centimetres, and depth from the surface increases from left to right.

MB21 (2006)	MB7 (2003)	Masl	SYMBOLS
?	?	5.0 – 4.0	X - VERY POOR
???X?	XXXXX	4.0 – 3.0	X – POOR
XX???	?X?XX	3.0 – 2.0	X - MEDIUM
XXX??	XXXXX	2.0 – 1.0	X - GOOD
XXXA	X?XXX	1.0 – 0.0	X - VERY GOOD
	X????	0.0 – -1.0	? - INDEFINABLE
	XXXXN	-1.0 – -2.0	N - NATURAL
		-2.0 – -3.0	A - DRILLING ABANDONED

6. Conclusions

In September 2006 a test-pit was dug by machine and by hand just to the rear of the northern Bredsgården tenement at Bryggen, Bergen. The pit was investigated by an archaeologist from NIKU (the Norwegian Institute for Cultural Heritage Research) and a conservation specialist from the National Museum of Denmark.

The investigation's main goal was to examine the deposits in the non-saturated zone, i.e. deposits lying above the water-table. This should not be taken to mean that the deposits were dry – they were definitely moist, just not waterlogged. There **is** water present, despite

the fact that the water-table has been lowered drastically. The investigated site lies in what is – for Bryggen – an (artificially) atypical area. It is perhaps more analogous to the general situation in Trondheim, though most of the deposits in the unsaturated zone in the area of Nordre Bredsgården are probably better preserved than their counterparts in Trondheim, since the Nordre Bredsgården area would have had a high water-table until 1979.

Immediately prior to the excavation of the test-pit, a new rotary drilling was carried out in more or less the same area on the unexcavated side of the sheet piling in order to install a short dipwell (MB21). The archaeological sequence was recorded in detail, with particular view to state of preservation, and numerous samples were taken from various layers, not only of the soil itself but also bone, wood and leather.

It was thought that it might be possible to extract some useful information on preservation states from a comparison between MB21 and the neighbouring dipwell MB7, which was installed in 2003, and which moreover is situated some metres closer to the sheet piling surrounding the SAS-hotel site. One might therefore have assumed a priori that the strata encountered in MB7 would exhibit generally worse preservation than those in MB21. A quick look at table 1 reveals that this is by no means the case – in MB7, the strata from 3.0 to 1.0 masl display states of preservation primarily ranging from medium to good, while those in MB21 are poor to medium. However, we now know that the explanation for this is that a number of the organic strata in MB21 – which is situated ***inside*** the stonecellar – were exposed to decomposition at the time of their deposition.

Be that as it may, because we cannot identify any strata in MB21 that correspond directly to strata in MB7, it is impossible to compare state of preservation stratum by stratum in the two dipwells.

As a final comment, what we seem to have in MB7 – at least as far as the strata above the watertable are concerned – is a case of medium to good preservation combined with poor preservation conditions. This can be represented – with reference to the State of Preservation Scale – by the following tag:

A3/4-2

[“A” denoting above the watertable, “3” and “4” being medium and good state of preservation respectively, and “2” meaning poor preservation conditions (employing a scale from 1 as very poor to 5 as very good for preservation conditions, just like the scale for state of preservation)].

And this can only lead to the overall conclusion that the well-preserved organic deposits in the area between the stonecellar and the sheet piling are seriously at risk of accelerated decomposition.

7. References

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Matthiesen, H., 2004. State of preservation and possible settling of cultural layers below Bredsgården and Bugården tenements, Bryggen, Bergen. – Copenhagen: National Museum of Denmark, Department of Conservation. Report no. 10832-0004-3.

Matthiesen, H., 2007. Preservation conditions above the groundwater level at Bugården, Bryggen in Bergen. Results from MB21 and a testpit from September 2006. – Copenhagen: National Museum of Denmark, Department of Conservation. Report no. 10832-0011-1.

8. Documentation (NIKU)

MB21

- Soil sequences noted down in *Boreprøvebok* (drilling logbook) 5
- 9 digital photos

Test-pit

- 14 digital photos (Stiftelsen Bryggen has many more), orthophotographic documentation by Marcin Gładki
- 4 section drawings (based on orthophotos)
- 3 plan drawings