



# Why does the Bryggen Foundation recognize that the light-rail on the front area will have an overall negative impact on WHS Bryggen?

Bernt-Håvard Øyen

PhD, Managing director, Bryggen Foundation

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# Our main opposition



- ❑ It is beyond any doubt that a light-rail on the front-area is an extensive intervention in existing structures. The proposed measure decimates a number of unique structural, functional and morphological characters and affects the OUVs. These we are obliged to protect under the World Heritage Conventions.

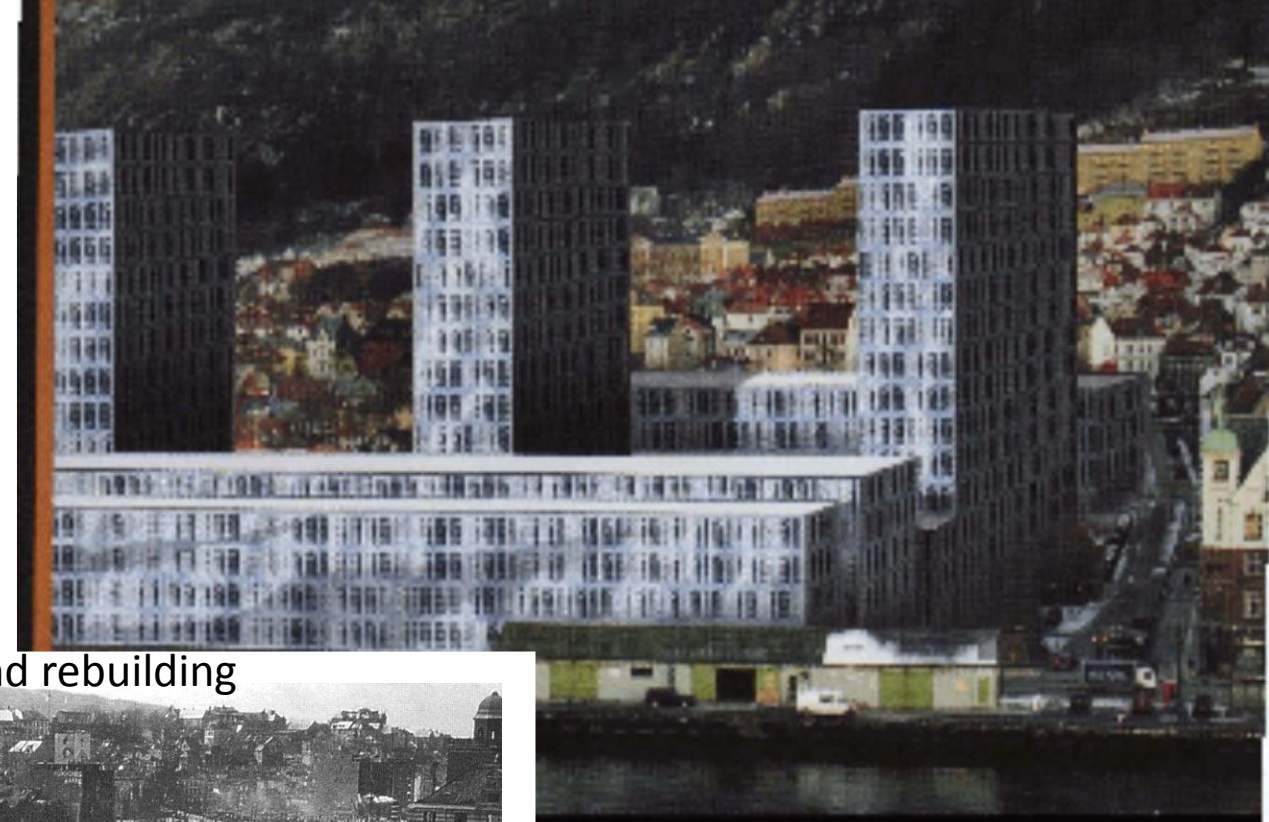


III: Scholeus c. 1580

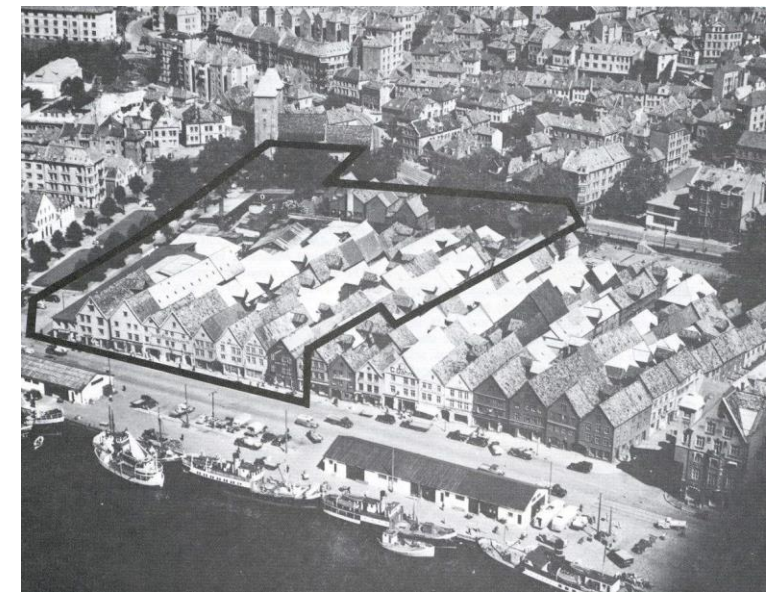
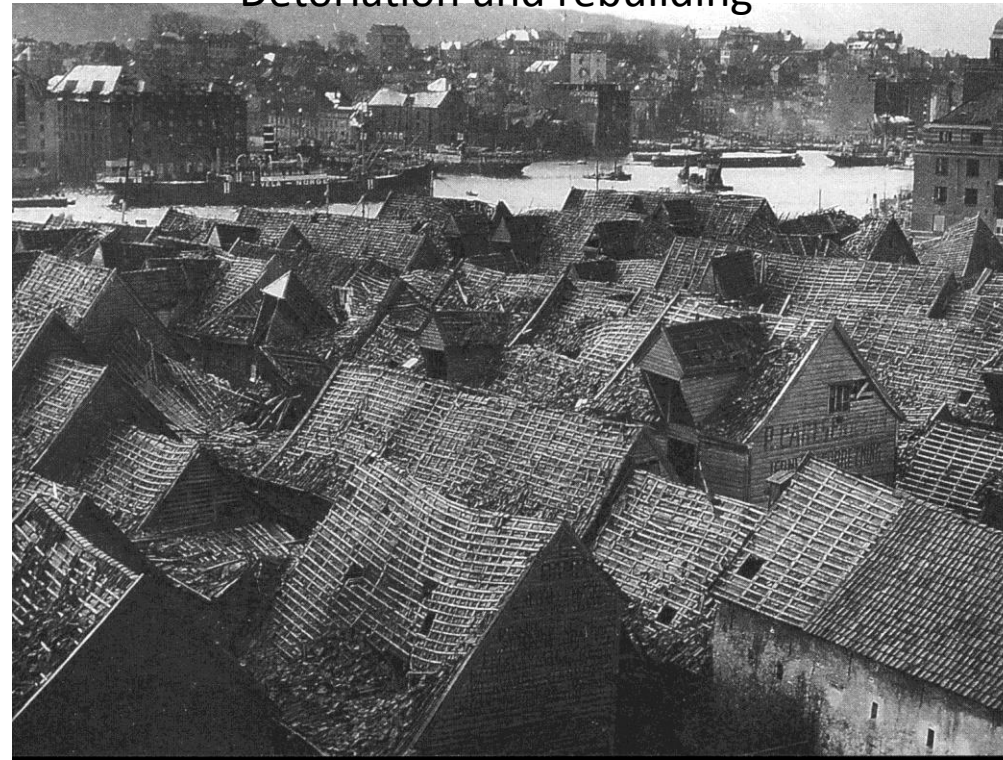


Photo: Ersland 2018





Detoriation and rebuilding







❑ A light-rail will cement a modern transport corridor (south-north direction), in contrast to and completely across the main direction of the historical functional use of Bryggen (west-east-direction). If the day option is chosen the front-area of Bryggen will appear more as a pure transport area than as an integrated part of the world's cultural heritage. We recognize that a light-rail on the front areas means that Bryggen as a harbour quarter is split up, where Bryggen's remaining building structures and the quay area come on opposite sides of a heavily trafficked railway and cycle-express road.





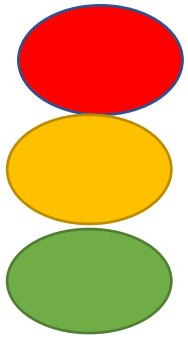


- We postulate that a light-rail will reduce the legibility and understanding of the area and thus contribute to weakening the experience of the WHS Bryggen, inscribed to the list in 1979 by criteria number III «bear a unique or at least exceptional testimony to a cultural tradition or to a civilization which is living or has disappeared».





- Bryggen Foundation has demonstrated that the proposed measure with a light-rail introduces a wide range of risk factors both for cultural layers in the ground, for the protected vulnerable buildings and for the visitors. Several of these risk factors have neither been properly investigated nor have they been the subject of professional assessments and considerations. In our view, several of the plans presented are immature, and partly based on incorrect premises.



We don't see any signs and convincing argument that WHS Bryggen will benefit from a Light-rail over the front area.



- The light-rail will change the sight lines, and will bring in barrier effects that will be negative for the experience, also well addressed in the HIA part 1 (2020) and 2(2021)
- The light-rail including cycle track and installations will steal land from the harbor quarter. Bryggen Foundation underline that all zone planes since the 1980s says that the area must be reserved for pedestrians, a living harbor and all those visiting the WHS (cf. current zoning plan VBK 2006).
- Bryggen as an arena for larger cultural city-events will in future be excluded or at best strongly hindered (cf. “Whitebook 2018). Light-rail will disrupt 12 to 20 festivals or events at the front area.





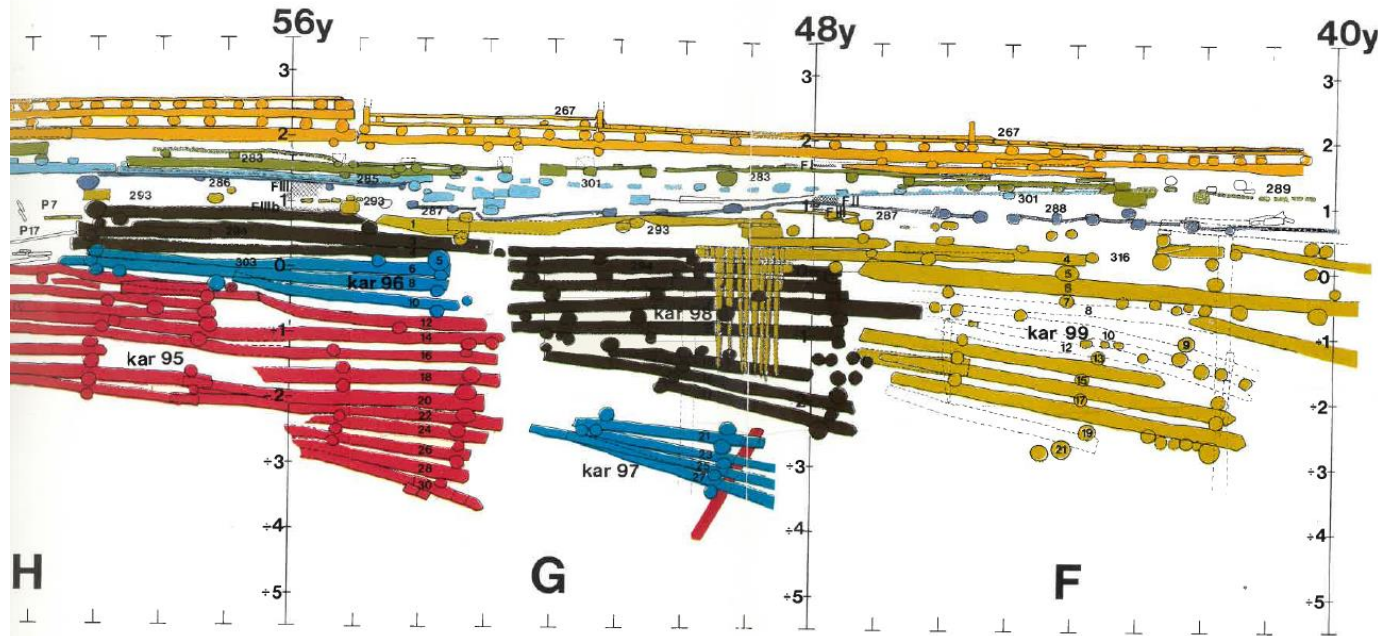
- Several of the proposed measures related to the light-rail development aim to anonymize and remove the historical traces and storytelling elements that we perceive to be important for Bryggen's constitution as a cultural monument and for the experience of Bryggen
- The cultural preservation, symbolic and socio-economic significance of the Bryggen and the future use of the Bryggen is little discussed or has not been included in the planning process. There is currently no Bryggen Visitor Plan, no Use Plan, no Buffer Zone Plan and no Dissemination Plan for Bryggen. A draft Traffic Plan for the city center has recently been presented - here the Bryggen is cemented as a pure transport artery! Presently there are more than 2 mill visitors per year to the site.





- The process has over a period of more than 10 years led to a divided local population, where the light-rail over the front-area in Bryggen has become a matter of political “trading” for power
- A number of measures and plans that have been proposed in the Bryggen's buffer zone will affect traffic patterns, visitor behaviour, uses and experiences. Several of the measures implemented will be irreversible
- Bryggen Foundation has experienced that owner rights have in several cases been overrun or ignored.
- Bryggen Foundation believes that far too little work has been investigated by independent "third-person voices", researchers and research environments to assess and investigate important questions and themes
- Bergen city centre, Torget and Bryggen will be a construction area for +6 years, probably more. In our opinion, the consequences of this for the WHS have not been sufficiently investigated!

## Subsidence at Bryggen – not a new question!



1476 quay. Waterfront challenges

Position changes (Z) frontarea Bugården  
1600 mm in 470 year  
3,4 mm/year

Subsidence; 3 mm/år (?)  
Accumulated material; 0,4 mm/år (?)

Source: Herteig (1986)





Presently: remove deteriorated  
bolwork logs (1703-10).  
Heavy subsidence

Establish a dry zone ( $> 0,9$  m)  
divided from a wet zone ( $< 0,6$   
m). New salt-impregnated  
bolwork.





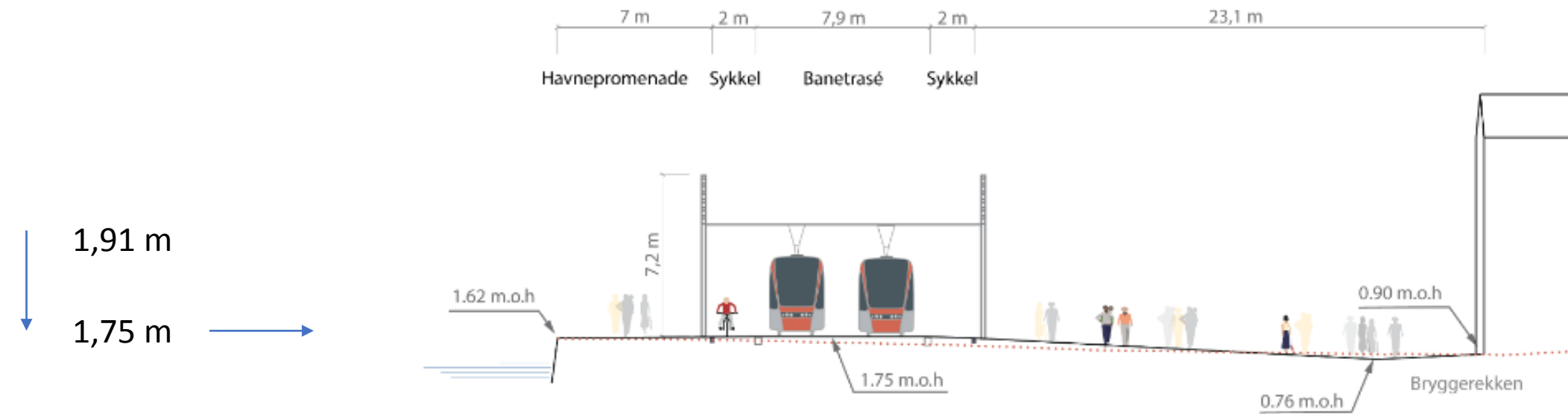


Source: K.Knudsen, Marcus, UiB, c. 1890





## Planned light-rail 2035



Figur 2-7: Tverrsnitt av byrommet foran Bryggen ved dagalternativet

Upper part bolwark: 1,46 m (NN2000)

Illustration: Bergen kommune (2021)

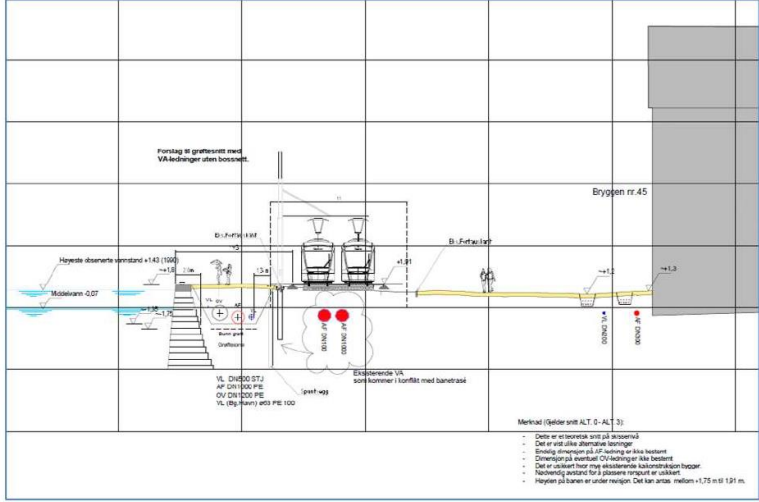




Several solutions for infrastructure have been considered, f.ex a culvert/tunnel.

The proposed solution is resembling the original solution, but the pipes are removed to the outer part om the modern quay.

To ensure later access and avoid damaging the track, the ditch will be secured with a piling wall



- The light-rail planners have applied in-correct information about the cultural layers and the quay structures in front
- No hydrological models regarding the effects of the pile wall has been presented.
- The light rail planners postulate that a closed pile wall will benefit groundwater management and the archeological layers, however a raised water table brings in increased risk for the bolwark in WHS buildings. Wood scientists have expressed«red light» about these matters.



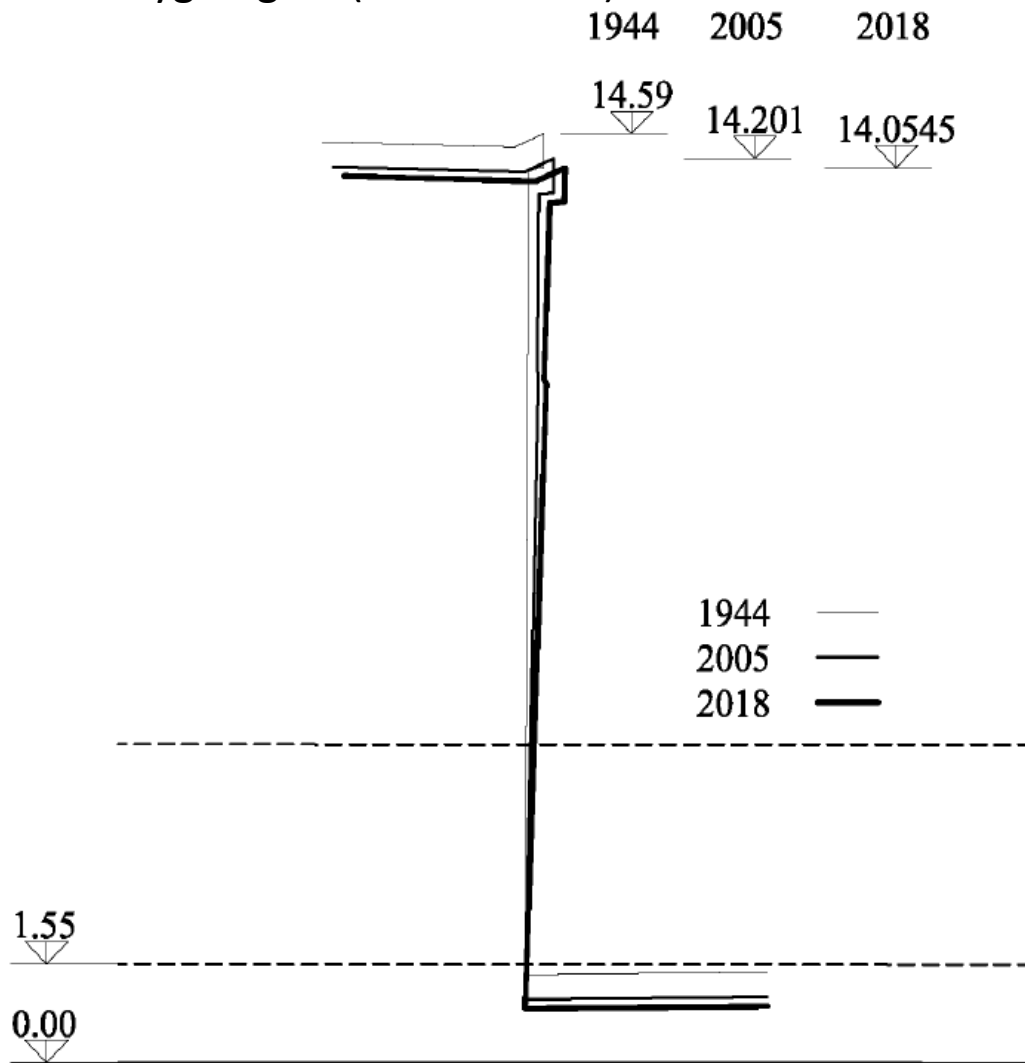
Figur 4-9: Visualiseringer av dag- og tunnelalternativet ved Bryggen. Sikt mot sør med ryggen mot Bryggegårdene.

- Visual impact in the HIA is done without considering varying subsidence (1,7 – 7 mm per year)

- Source: Bergen kommune 2021



Gabel height and angle development (NN 1954), Nordre  
Svensgård frontbygning 4a (seen from N)



### First period

389 mm/61 yr = 6.4 mm/yr

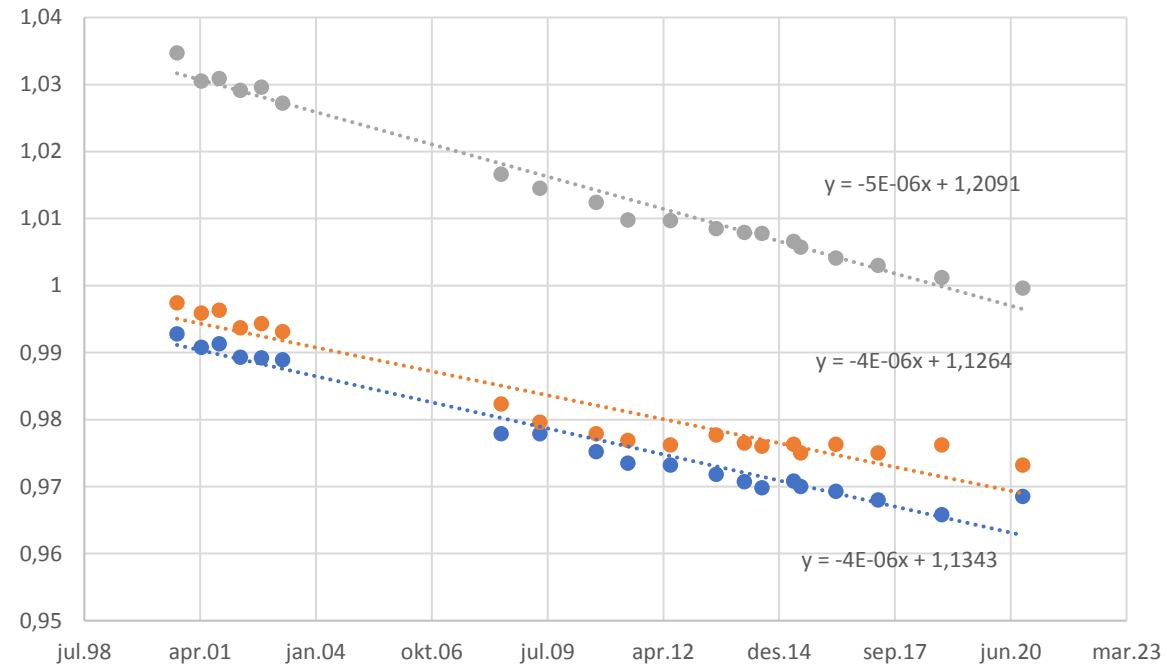
### Second period

146 mm/13 yr = 11.2 mm/yr

### Over the measurement-period

540 mm/74 yr = 7.3 mm/yr

Changes pavement surface Bryggen, 1999-2020  
(on the former Fylkesvei)

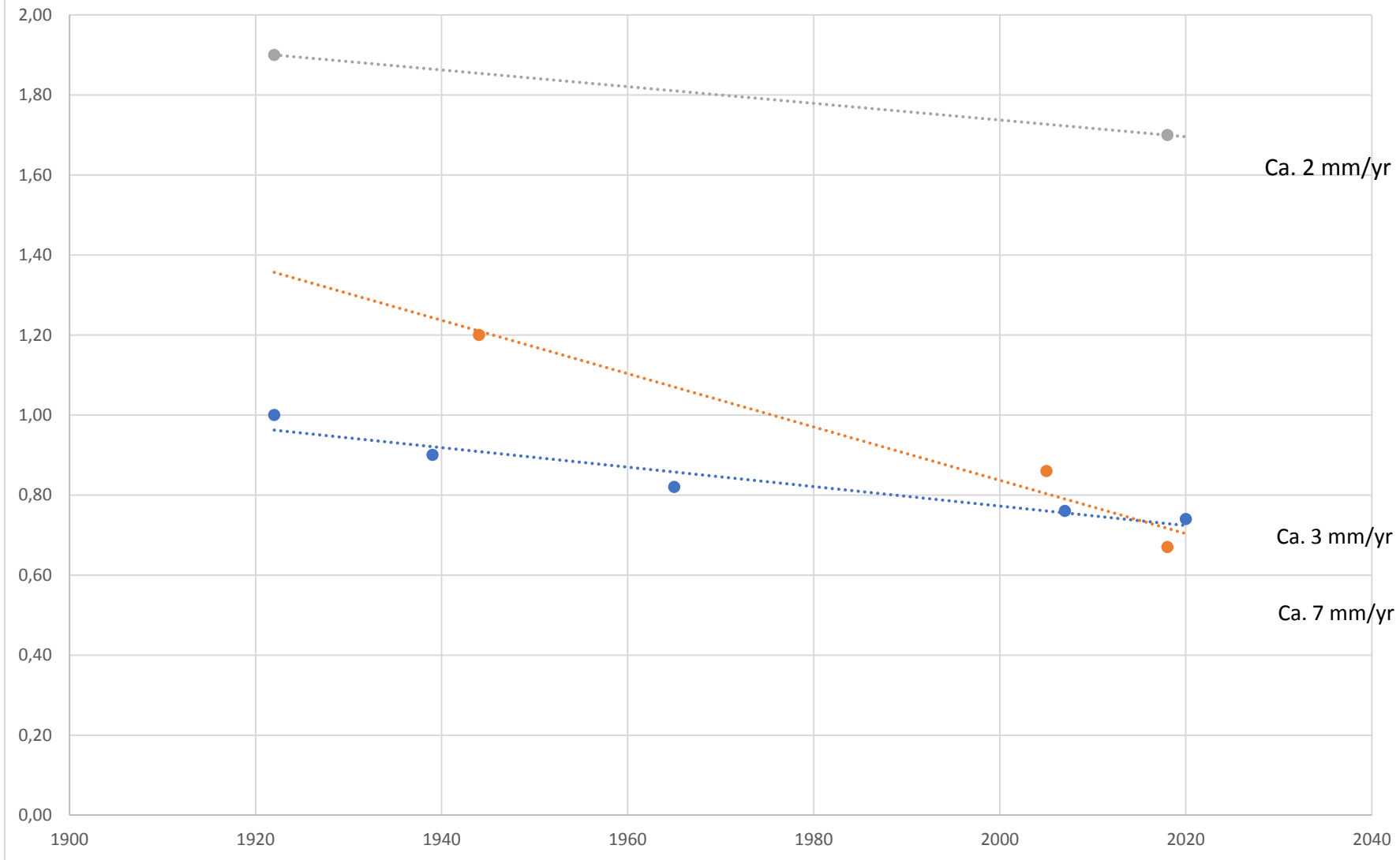


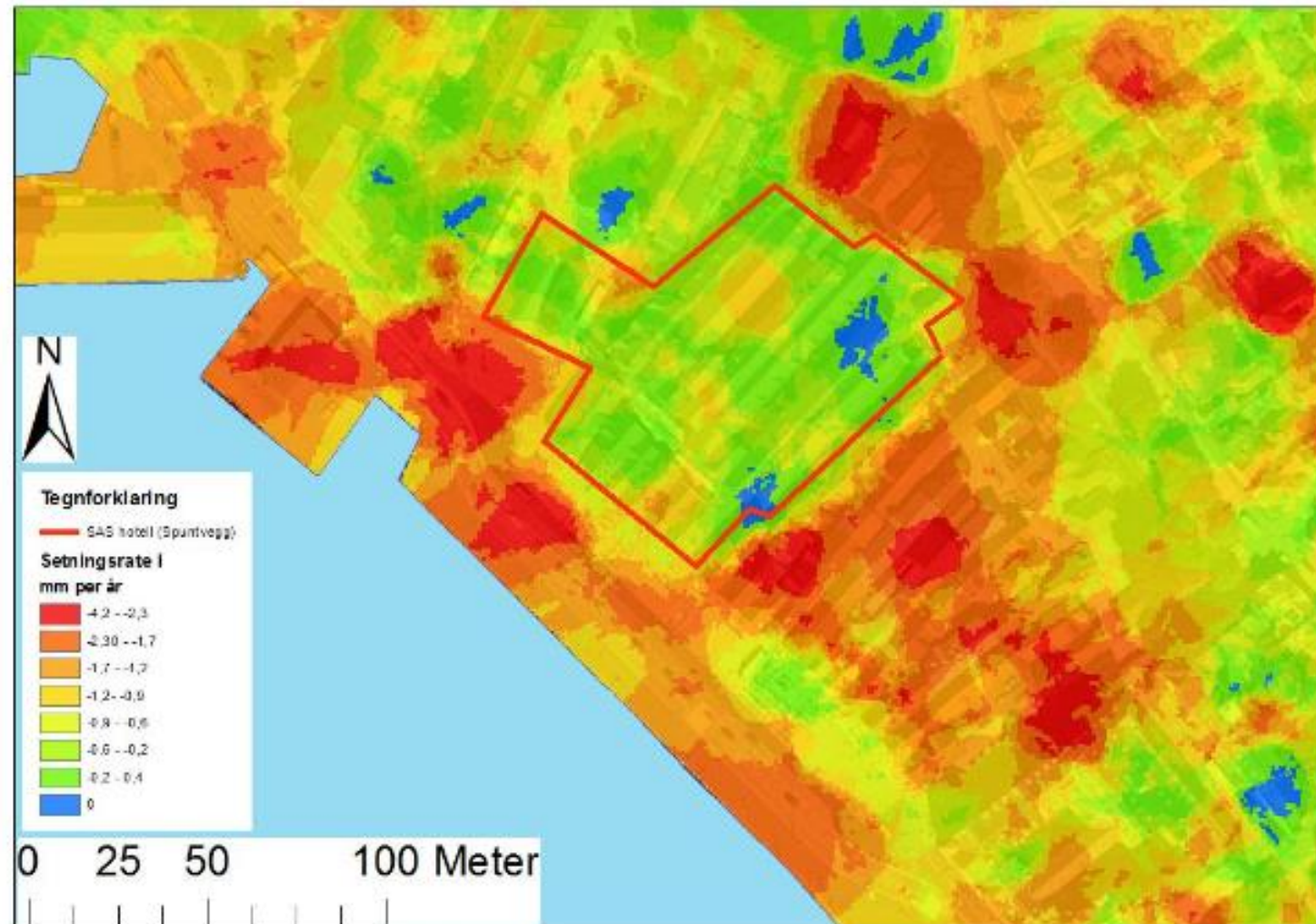
Speed:  
2-2,5 mm per år

Grey = Bugården, Blue = Bellgården, Orange = Bredsgården



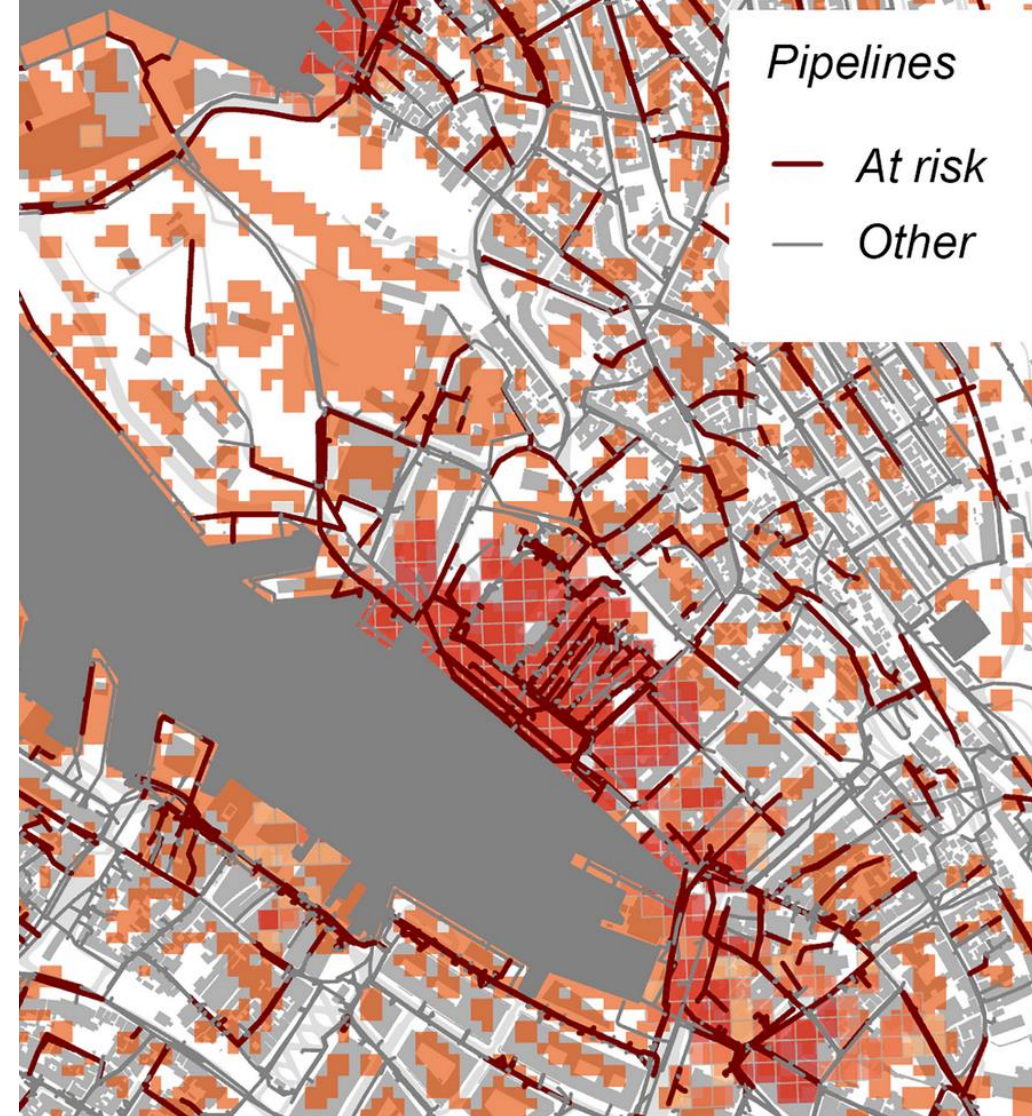
Subsidence over year  
Front building floor 9 buildings (yellow), 3 surface water tanks (blue) and stone quay top  
(grey) Bryggen in Bergen





*Figur 5-5: Utsnitt fra setningskartet som viser Bryggen og Schøtstuene. Spuntveggen rundt SAS hotellet er markert med rødt. Det er en markert forskjell i setningsutviklingen mellom Bryggen og Schøtstuene og det nye hotellområdet.*





Source: Venvik et al. 2020. Risk assessment for areas prone to flooding and subsidence: a case study from Bergen, W. Norway  
Hydrology Research 51(2), 322-338.

HIA-rapport 2 (Kloos 2021)

*-The day option will have a moderate positive impact on risk preparedness for sea water rise and flooding due to the planned pile wall and higher quay level at Dreggekaaien.*

*In Bryggen Foundations opinion, without including expected subsidence and surface percolation, the impact effect on Bryggen buildings could be the opposite*

*-The day option might cause large risks for built heritage foundations and groundwater changes during construction works on Bryggen Quay.*

*In Bryggen Foundations opinion; this is a crucial point – therefore all risks factors must be elaborated carefully*





Foto: Stiftelsen Bryggens arkiv (Postkort Mittet 1962(?))

## Summary

- Large subsidence is measured in Bryggen over the last 100 years (and in former periods)
- The main picture is a speed of 1,7 mm/yr (stone quay) up to 7 mm/yr (frontal buildings).
- If average speed is 3-4 mm/yr, a light rail laid on height 1,75m in 2035 will be lowered to 1,49-1,56 m in 2100.
- There is presently no signs that subsidence has stopped in the frontal zone
- Varying subsidence will cause challenges for all measures on the front area
- Bryggen Foundation can't see that subsidence has properly been looked into in risk calculations, sea level rise validations, regularity issues, barrier-effects, construction period challenges and other important questions regarding forming and use of the frontal area

