Lillo Formation

Unit name: Lillo Formation

Hierarchical unit name: /

Type: Formation

Code: Li

Author(s):

- Compiled by: Deckers Jef, Louwye Stephen & Goolaerts Stijn
- Modification of: De Meuter & Laga (1976)

Alternative names: /

Origin of the name: former village, north of Antwerpen, disappeared with the digging of the Kanaaldok between the Churchilldok and the Zandvlietsluis.

Status: Formal

Date: 01/05/2022

How to refer: Deckers, J., Louwye, S. & Goolaerts, S., 2023. The Lillo Formation, 01/09/2023. National Commission for Stratigraphy Belgium. http://ncs.naturalsciences.be/lithostratigraphy/Lillo-Formation

Characterizing description

Shelly sand with a clayey admixture in the central part and with several distinct shell layers. The colour is grey, grey-brown to light grey-brown. A gradual decrease of the clay and shells occurs in the upper part of the formation. Locally, the uppermost part can be decalcified. Glauconite content is fairly constant and varies between 6 and 12% with locally some higher content up to 20% in the basal part (Luchtbal Member; Laga, 1972).

The formation was subdivided by De Meuter & Laga (1976), from base to top, into the Luchtbal Member, the Oorderen Member, the Kruisschans Member, the Merksem Member and the Zandvliet Member. Now, the Poederlee Member (former formation) and the Broechem Bed (new) are also included in the Lillo Formation.

De Meuter & Laga (1976) stressed the fact that whereas only the lower Luchtbal Member has distinct boundaries, a gradual change is observed between all other members.

Type section, type locality, type borehole, type CPT and/or type geophysical borehole

The type locality is to the north of the city of Antwerp in the Lillo district, where the former eponymous village disappeared during the construction works of two docks.

The type section was visible in a temporary outcrop during the digging of the Tunnel Kanaaldok, later called the Tijsmanstunnel (GSB 015W0304; DOV BGD015W0304), at between 3 m and 23.5 m depth (Fig. 1). This section can be correlated to the nearby type CPT (DOV GEO-20/034-S5) which shows high cone resistance (20-40 MPa) and low friction ratio (1%) at the sandy units and low cone resistance (10 MPa) and higher friction ratio (> 2%) at the clayey central unit of the Lillo Formation.

Type geophysical borehole is borehole Stabroek (GSB: 015W0216; DOV kb7d15w-B296) with the Lillo Formation between 4 to 36 m depth (modified after Laga, 1979; Fig. 2).

Description upper boundary

In its southernmost area, it is overlain by Quaternary strata, while further north, it is overlain by the Malle or Merksplas Formation. The contact with the Malle and Merksplas formations is characterized by the upwards decrease in glauconite, coarsening of the grain-size and discoloration (grey-green to grey). On gamma-ray logs, this boundary coincides with an upwards decrease in gamma-ray values and increase in resistivity values (Fig. 2). On Cone Penetration Tests, this boundary generally (excluding when the Zandvliet Member forms the top of the Lillo Formation) coincides with a sharp decrease in cone resistance values (Fig. 1).

Description lower boundary

It generally overlies either the Kattendijk Formation, and in the southeast also the Kasterlee Formation. The contact with the Kattendijk and Kasterlee formations coincides with a gravel layer. The transition from the Kattendijk Formation towards the Lillo Formation also coincides with a strong increase in shell content, decrease in glauconite content and related change in colour from dark green or grey green towards green grey. This contact is not obvious on Cone Penetration Tests, and coincides with an upwards decrease in gamma-ray values and increase in resistivity values on geophysical borehole logs (Fig. 2).

The transition from the Kasterlee Formation towards the Lillo Formation coincides with an increase in shells or shell-imprints and a decrease in glauconite content.

Thickness

Maximum around 30 m (Deckers et al., 2019).

Occurrence

From the Waasland area in the west, across the City of Antwerp and Port of Antwerp areas into the western Campine area. East of the city of Turnhout, it transitions into the time equivalent white sands of the Mol Formation.

Regional correlations

It largely correlates with the Oosterhout Formation in the Netherlands.

Age

Early to Late Pliocene. See Louwye et al. (2020) and references therein.

Dataset

Data in the LIS are part of the DOV-Neogene data collection, including links to the GSB-collection data sheets:

Name	GSB name	DOV name	GSB Collections URL	DOV URL
Outcrop Tunnel Kanaaldok	015W0304	BGD015W0304	http://collections.naturalsciences.be/ssh-geology-archives/arch/015w/015w0304.txt	https://www.dov.vlaanderen.be/data/boring/1999-161693

Extra data:

Name	GSB name	DOV name	GSB Collections URL	DOV URL
CPT Tunnel Kanaaldok		GEO-20/034-S5		https://www.dov.vlaanderen.be/data/sondering/2020-079300
Borehole Stabroek	015W0216	kb7d15w-B296	http://collections.naturalsciences.be/ssh-geology-archives/arch/015w/015w0216.txt	https://www.dov.vlaanderen.be/data/boring/2016-147541

References

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De Meuter, F. & Laga, P., 1976. Lithostratigraphy and biostratigraphy based on benthonic Foraminifera of the Neogene deposits of northern Belgium. Bulletin van de Belgische Vereniging voor Geologie, 85/3-4, 133–152.

Laga, P., 1972. Stratigrafie van de mariene Plio-Pleistocene afzettingen uit de omgeving van Antwerpen met een bijzondere studie van de foraminiferen. Unpublished Ph.D. Thesis. Katholieke Universiteit Leuven - Faculteit Wetenschappen, Leuven. 3 vol., 252 p.

Laga, P., 1979. Borehole description Stabroek GSB 015W0216. http://collections.naturalsciences.be/ssh-geology-archives/arch/015w/015w0216.txt, accessed 01/12/2021.

Louwye, S., Deckers, J. & Vandenberghe, N., 2020. The Pliocene Lillo, Poederlee, Merksplas, Mol and Kieseloolite Formations in northern Belgium: a synthesis. Geologica Belgica, 23/3-4, 297-313. https://doi.org/10.20341/gb.2020.016

Annexes

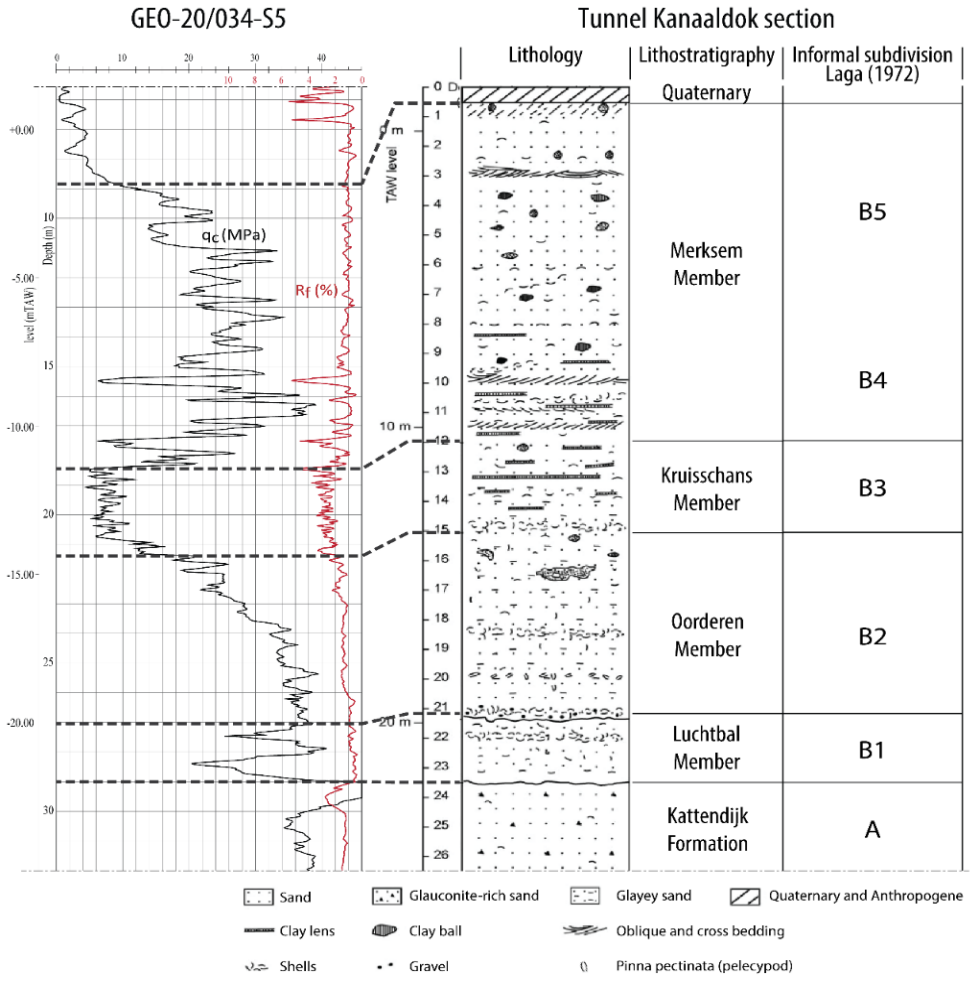

Figure 0-1: The Lillo Formation at the Tunnel Kanaaldok section as described and interpreted by Laga (1972) and correlation with a nearby CPT by this study.

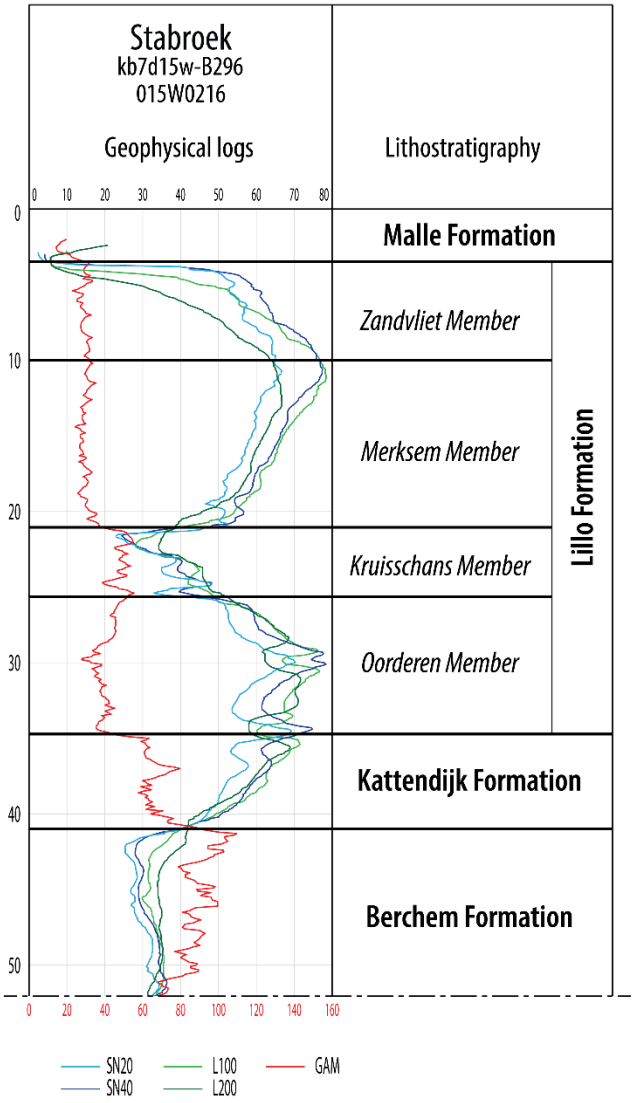

Figure 0-2: Log-expression of the Lillo Formation in borehole Stabroek. Modified after Laga (1979).