Water treatment plant Prinses Juliana

Student tour – 27 June 2022

Prest, E.; Gude, J.; Rietveld, M.

PWNT
WATER TECHNOLOGY

PWN

Provinciale Waterleidingbedrijf Noord-Holland

- 600 employees
- annual turn-over € 180 million
- since 1990 private owned company
- 100% owned by the Province of North Holland
- Non-profit organization

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WATER TECHNOLOGY

PWN

Provinciale Waterleidingbedrijf Noord-Holland

- Drinking water production
  - annual drinking water production: 105 mln m^3
  - distribution to 780,000 connections
  - 1.7 million customers
  - about 130 L per day per person
  - 10.000 km distribution network

- Preservation of dune area
  - 7.400 hectares dune area
  - 7 million visitors per year
  - 3 camp sites

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PWN has three subsidiaries

- engaged in innovative purification techniques and makes these available to drinking water companies all over the world.
- provides support for numerous development projects by providing advice on drinking water supplies in countries where sufficient and clean drinking water is not so obvious.
- consist of three campsites in the PWN area: Camping Bakkum, Geversduin and De Lakens. All campsites have been awarded a golden Green Key.

https://youtu.be/hQIE1rdZ8hY

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Water source challenge

- most province below sea level
- salty groundwater

- IJssel Lake only available source
- dominantly fed by the river Rhine
- under the influence of industry, recreation, population, agriculture
- high contamination level (delta of Europe)

- 95% surface water
- 5% groundwater

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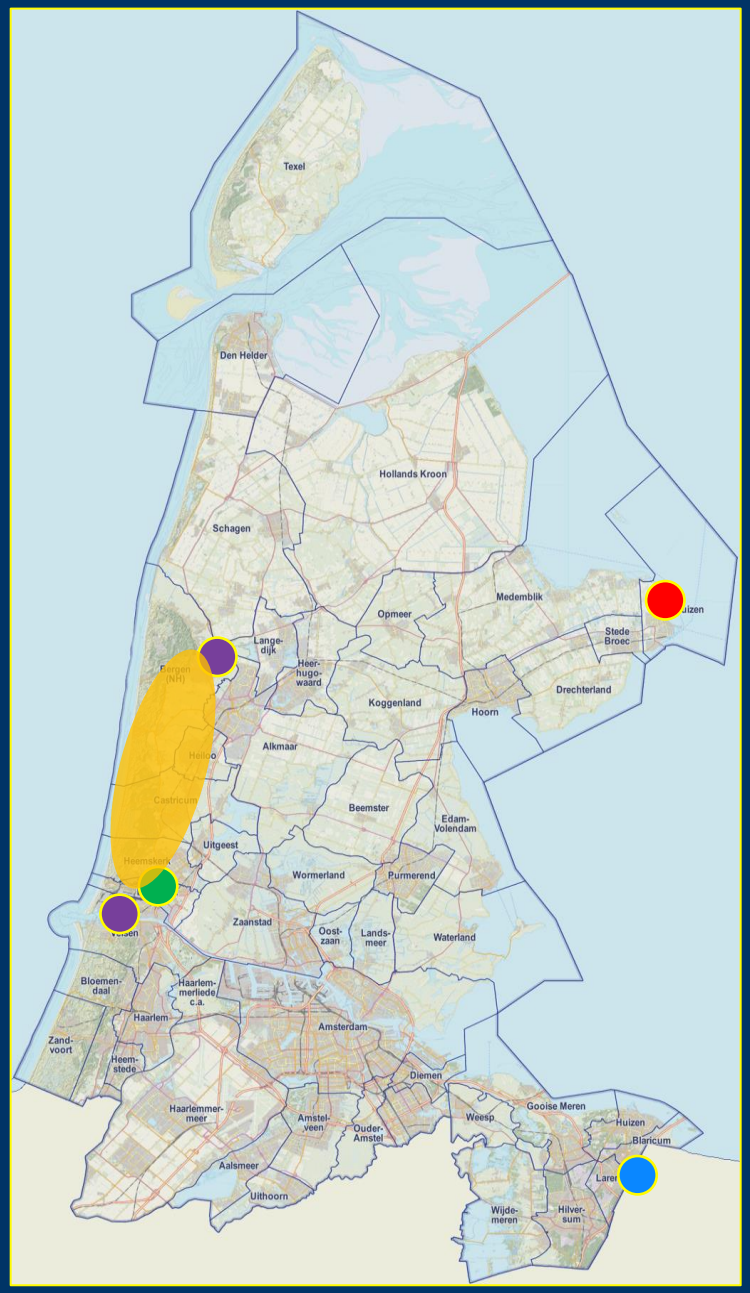
Drinking water production and transport



- WTP – Martien den Blanken
- WTP – Princess Juliana
- WTP – Jan Lagrand
- Dune infiltration area
- WTP – Wim Mensink
- WTP – Bergen
- WTP – Laren

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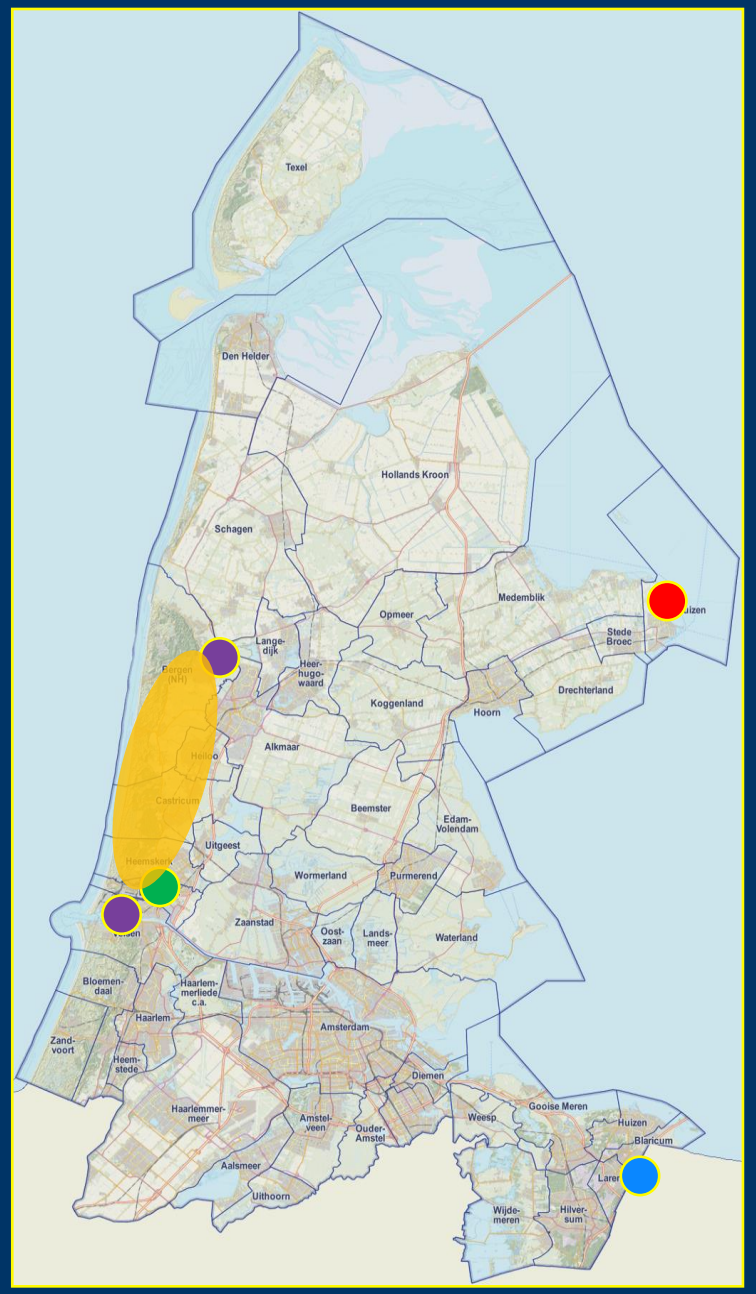

Lake IJssel

drum screens

mixing

flocculation

sedimentation

RSF

GAC

UV/H_2O_2

UF

GAC

RO

Dune infiltration

pellet softening

aeration

RSF

ClO_2

Distribution network

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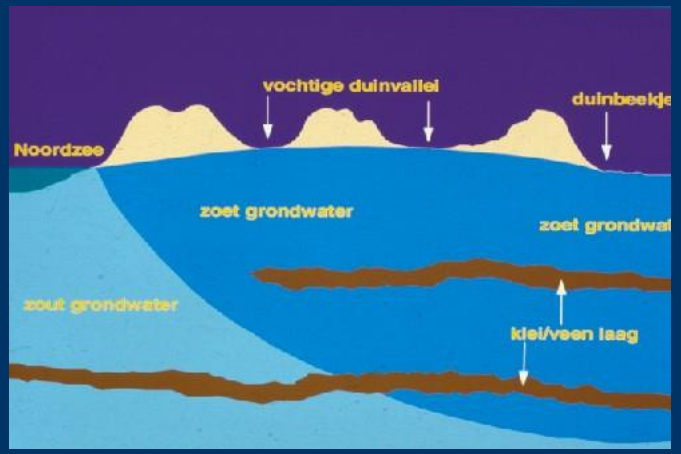
Dune water treatment

1920 – 1950 circa



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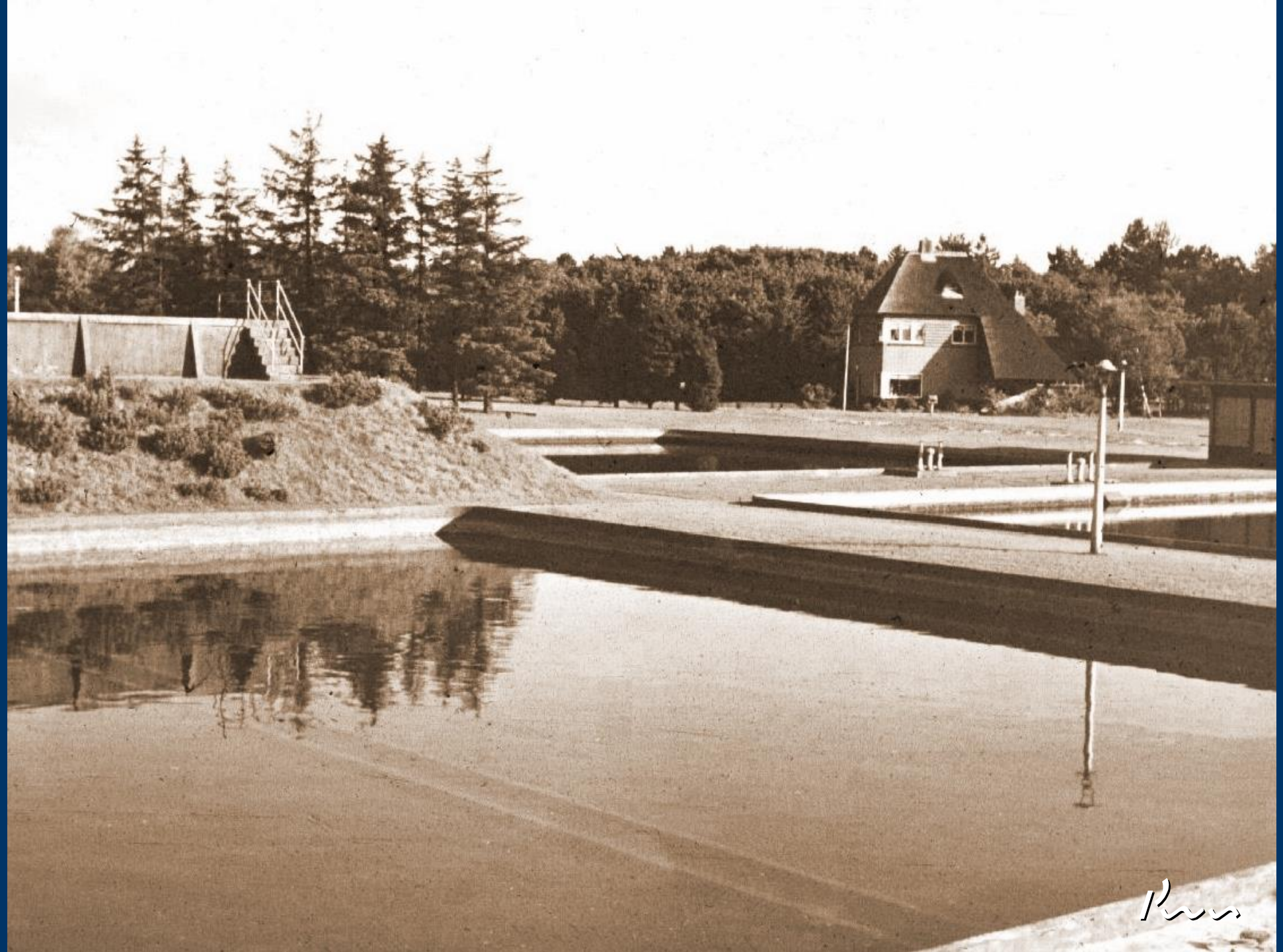

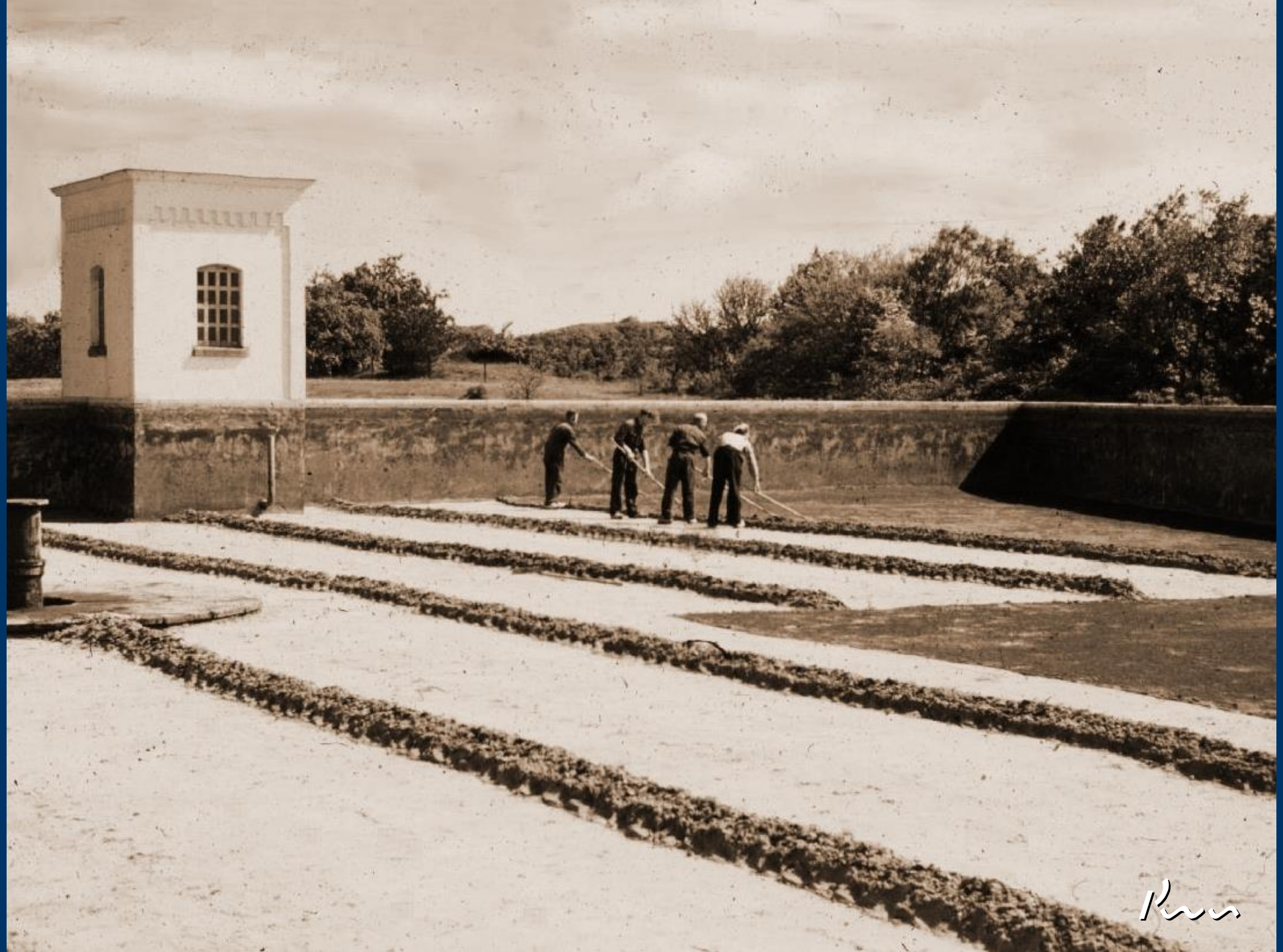

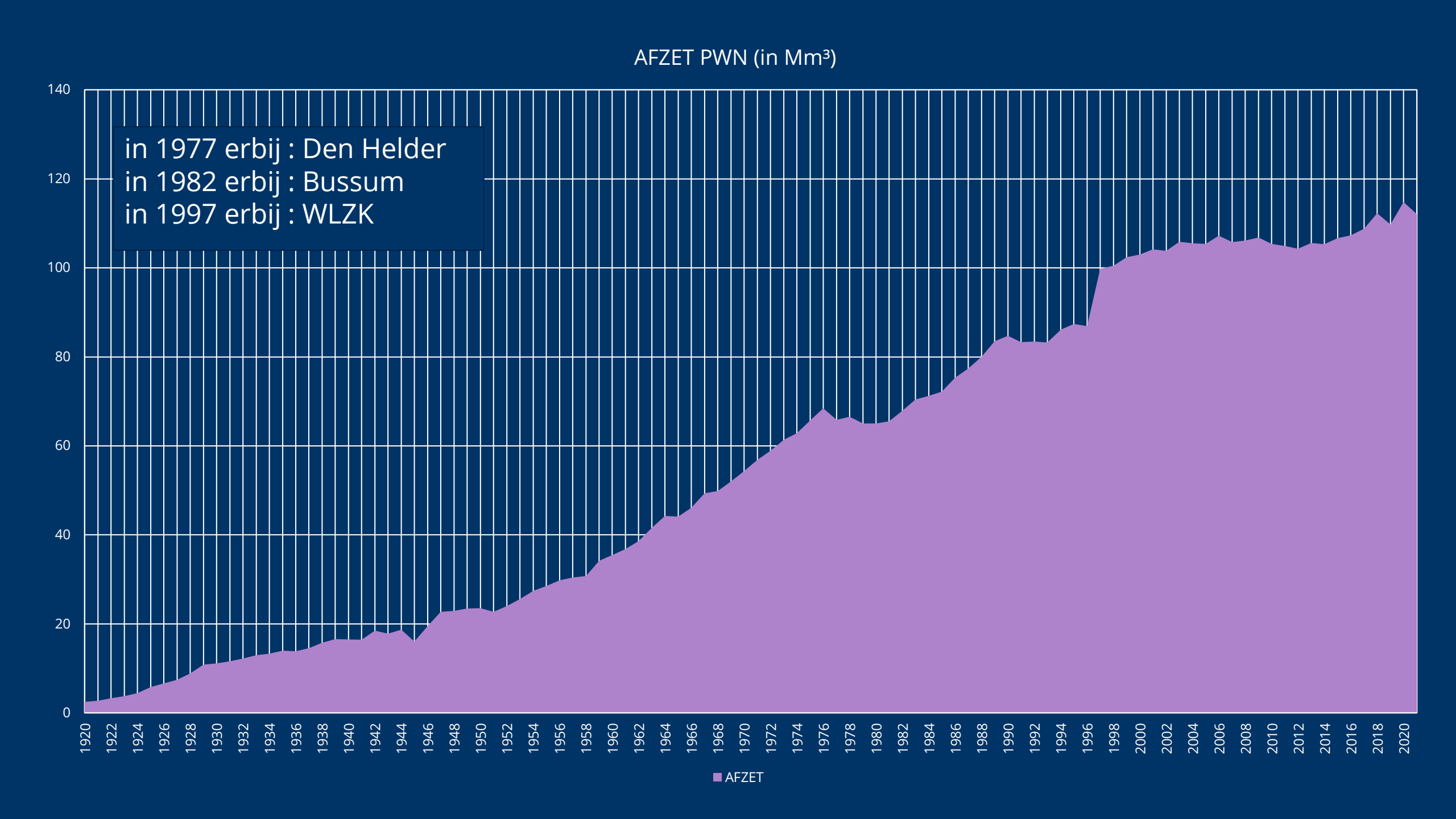
AFZET PWN (in Mm³)
in 1977 erbij : Den Helder
in 1982 erbij : Bussum
in 1997 erbij : WLZK
140
120
100
80
60
40
20
0
1920
1922
1924
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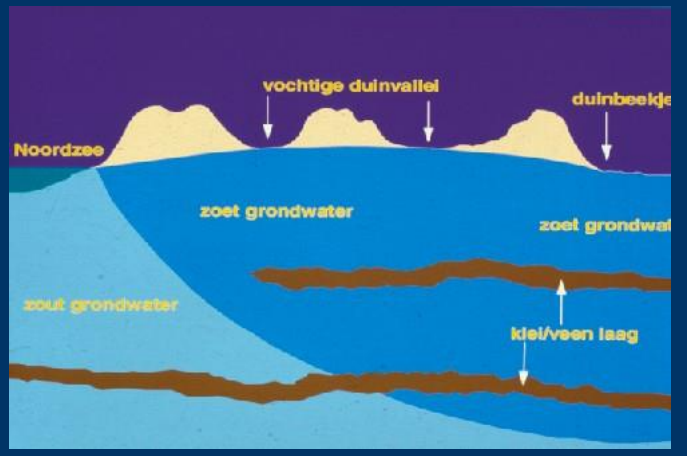
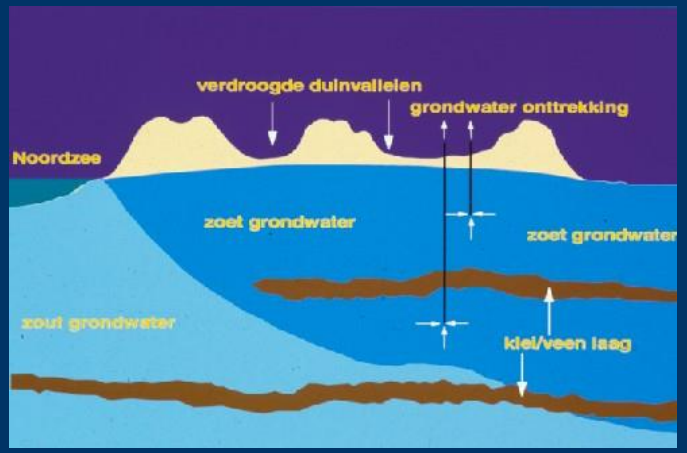
AFZET

Dune water treatment

1920 – 1950 circa





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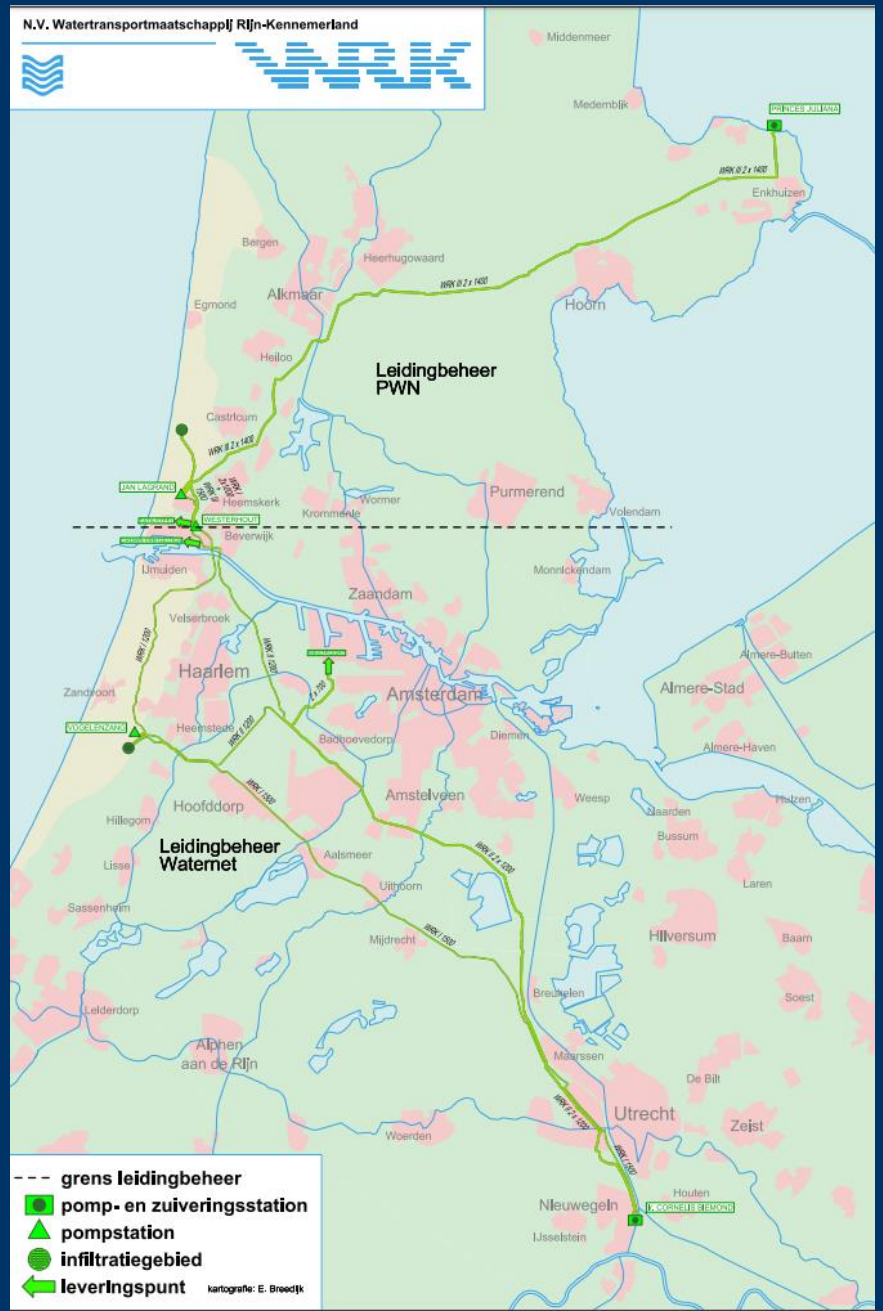
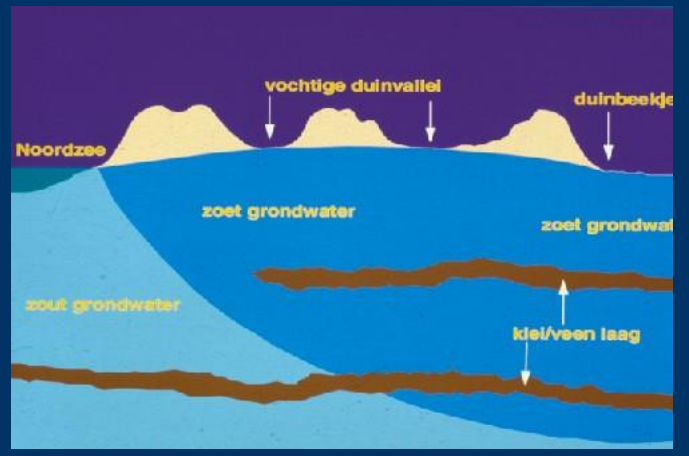
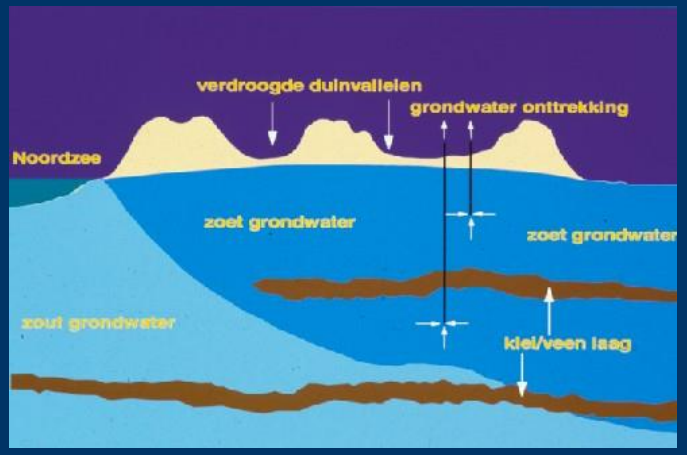
Dune water treatment

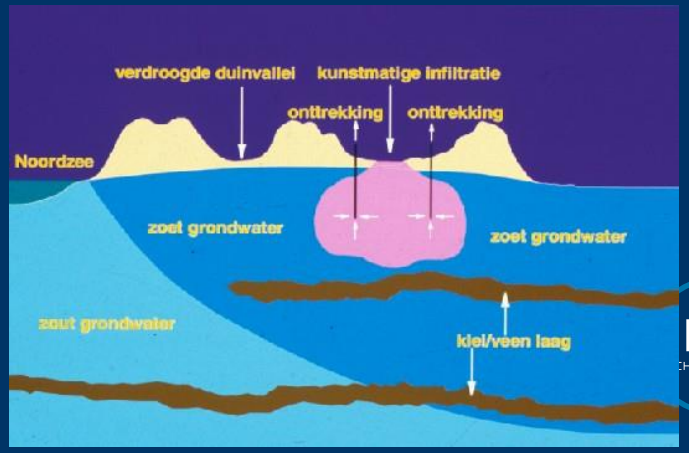
1950 – 1981 circa

- Rhine river
- RSF
- Dune water
- Aeration
- Sand filtration









Dune water treatment

1981 – 2001 circa

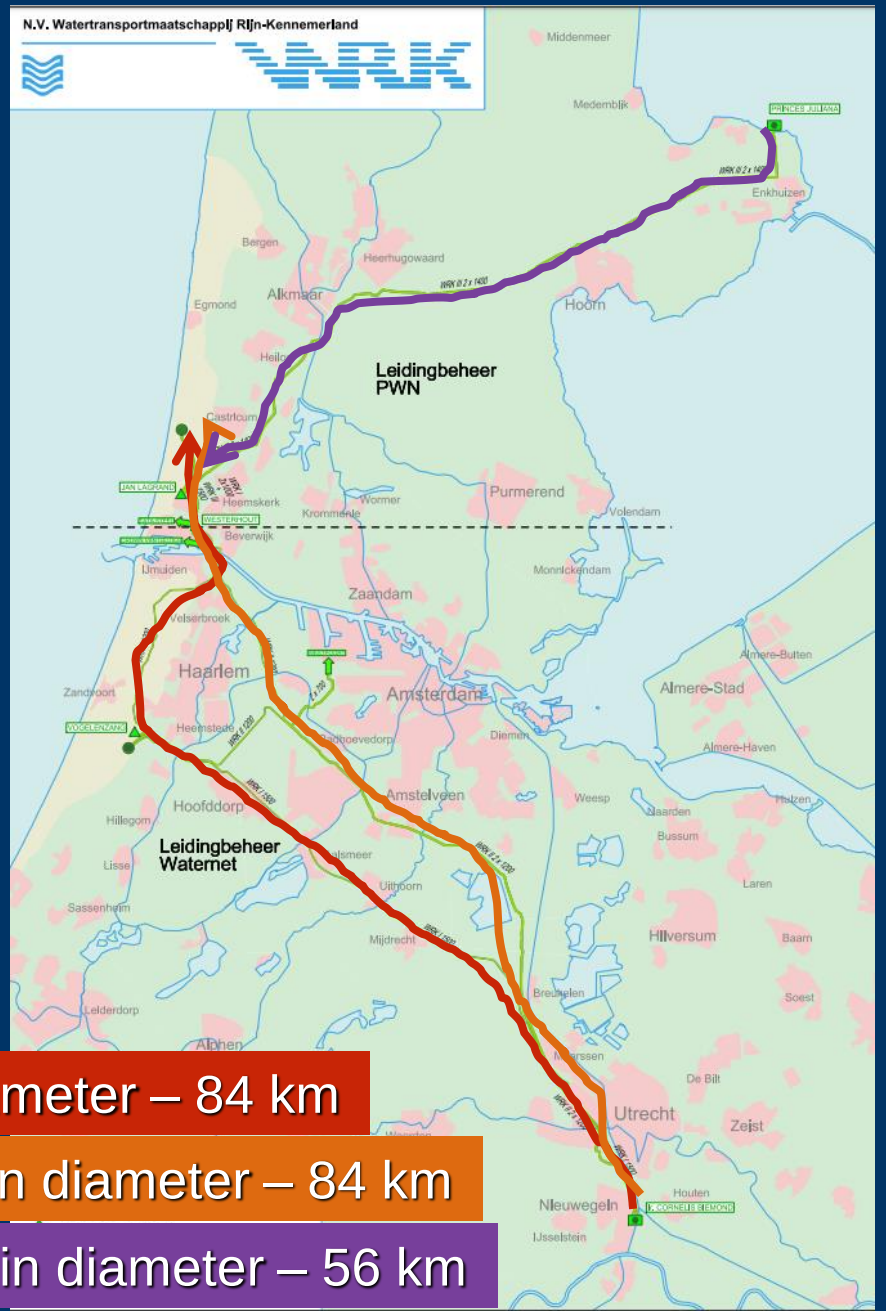
Rhine river

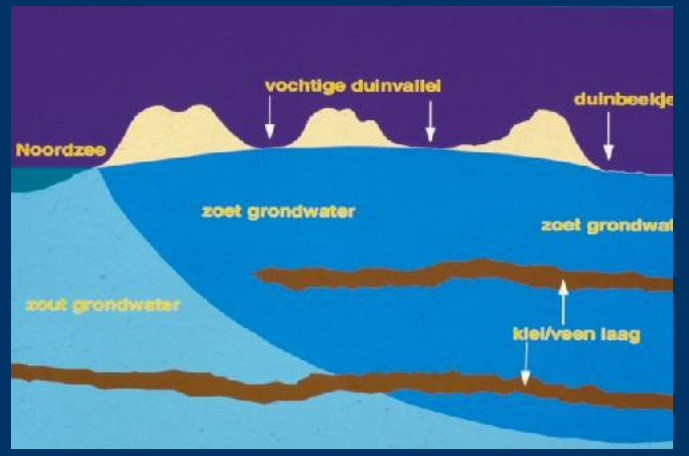
RSF

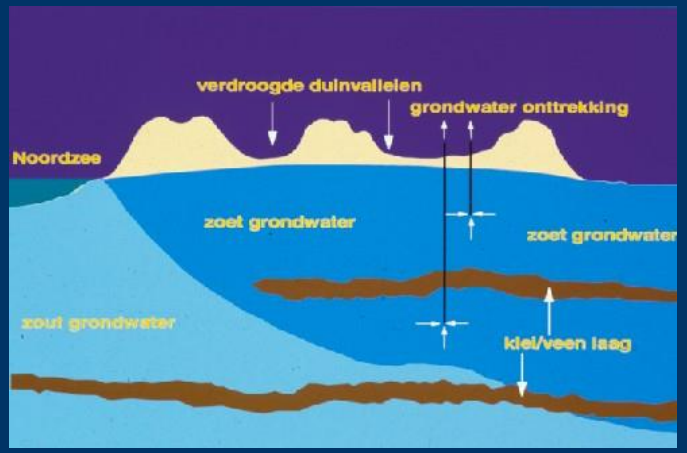
Dune water

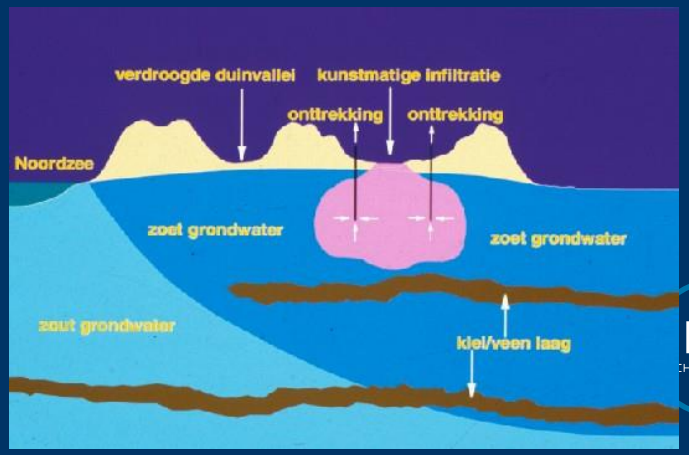
Aeration

Sand filtration





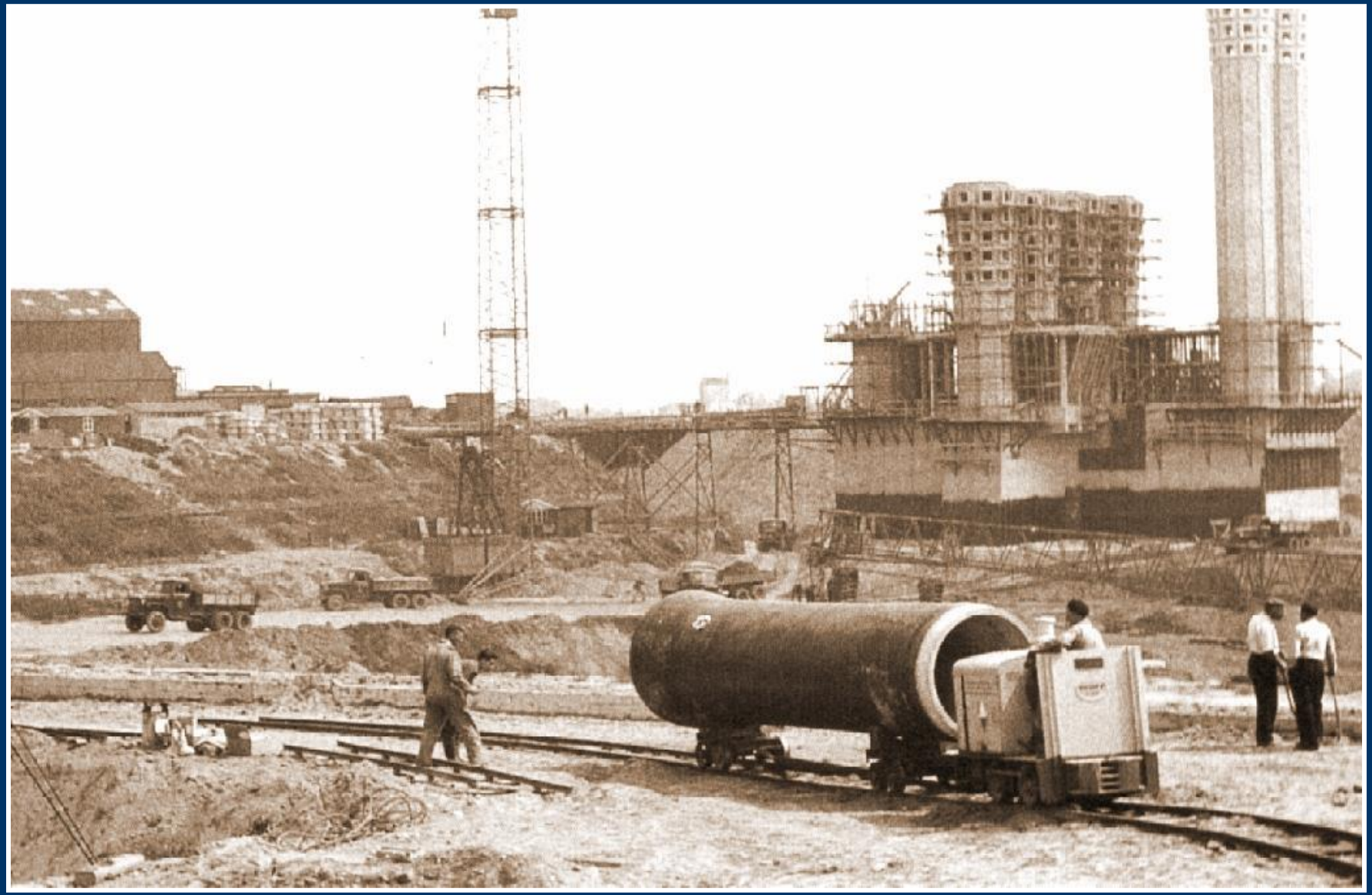




1957 - WRK I - 1.5 meter in diameter – 84 km

1967 - WRK II – 2 x 1.2 meter in diameter – 84 km

1981 - WRK III – 2 x 1.4 meter in diameter – 56 km



1980

WRKIII

WPJ

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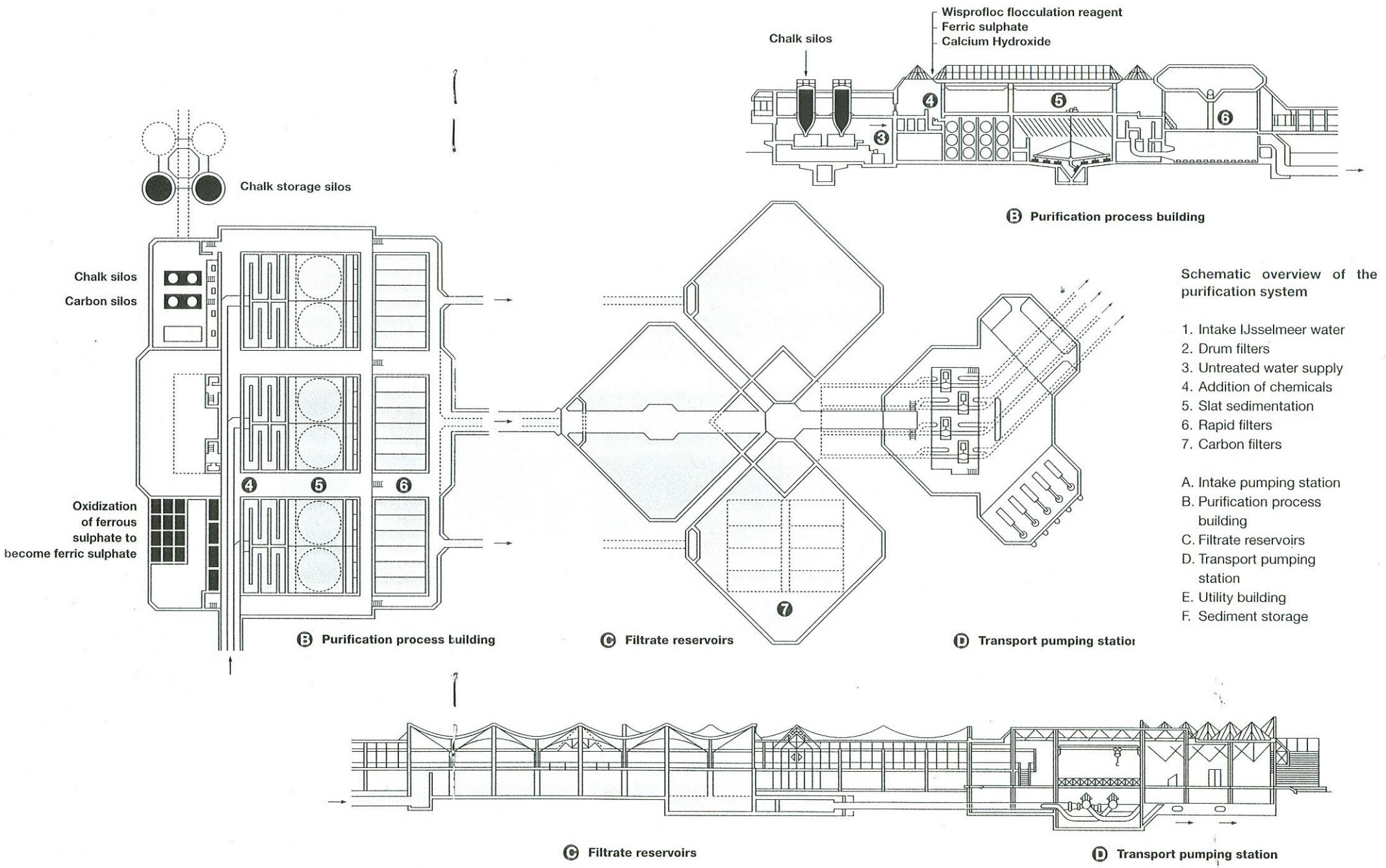

Schematic overview of the purification system

1. Intake IJsselmeer water
2. Drum filters
3. Untreated water supply
4. Addition of chemicals
5. Slat sedimentation
6. Rapid filters
7. Carbon filters

A. Intake pumping station
B. Purification process building
C. Filtrate reservoirs
D. Transport pumping station
E. Utility building
F. Sediment storage

WPJ – Process flow

d_m = 200 µm

Q_{max} = 14.000 m^3/h

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WPJ – Process flow

Lake IJssel

drum screens

mixing

flocculation

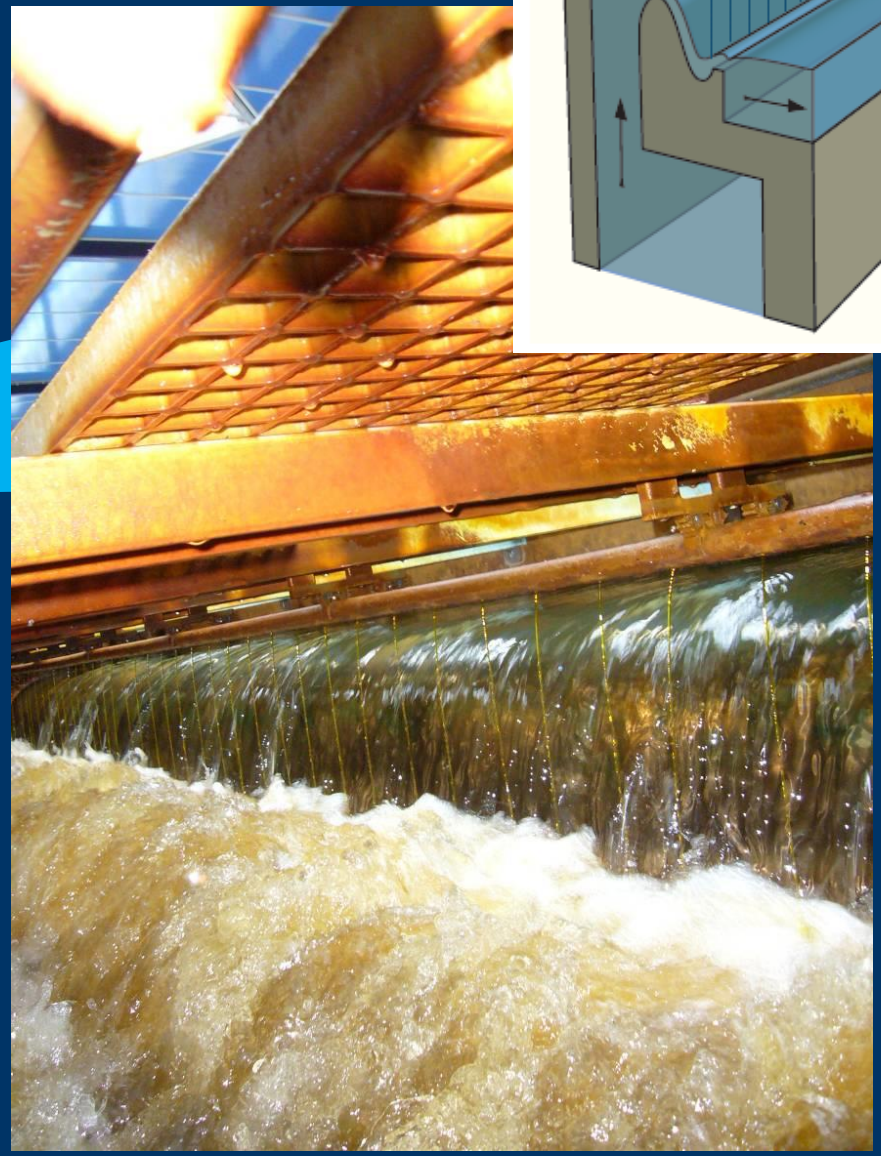
sedimentation

RSF

GAC

~ 20 mg/l as Fe^{3+}

@ pH 8 w NaOH



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WPJ – Process flow

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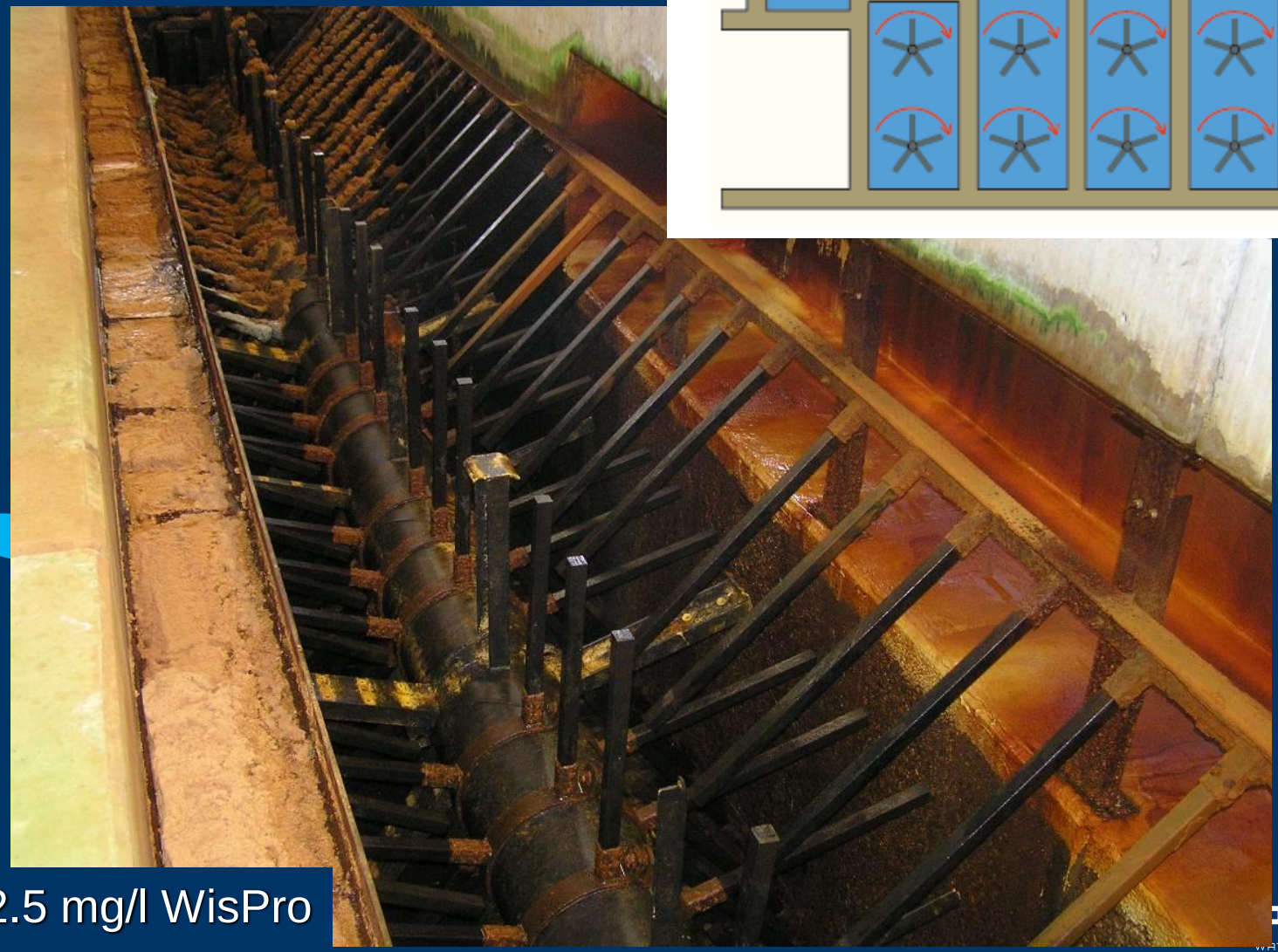
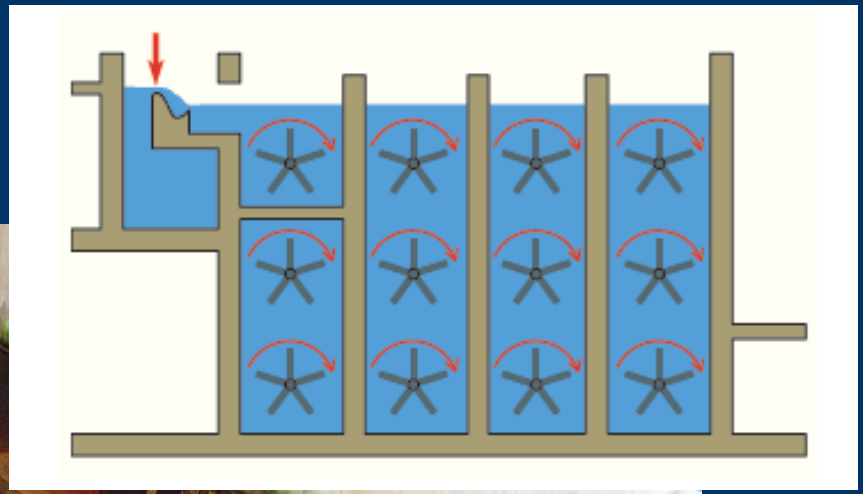


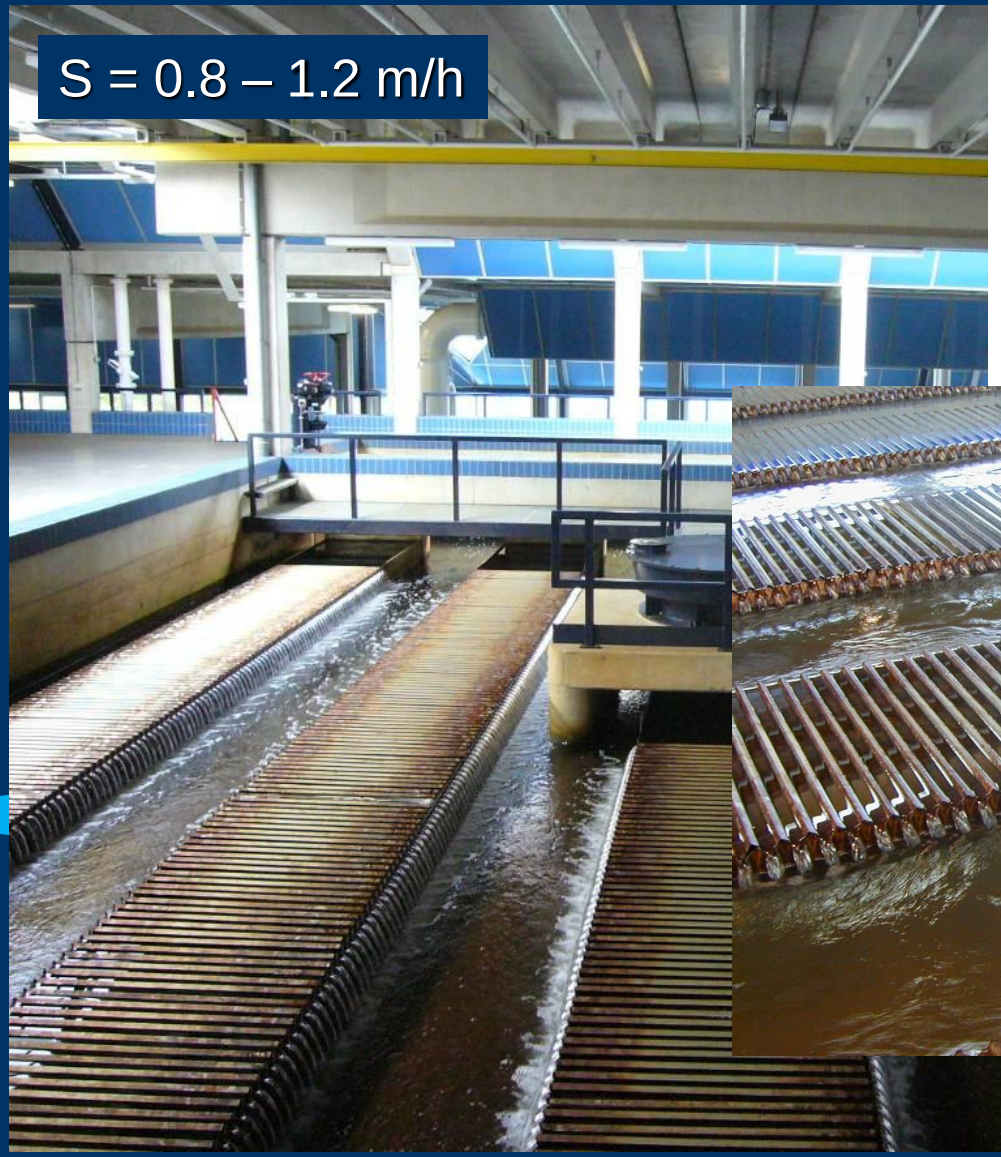


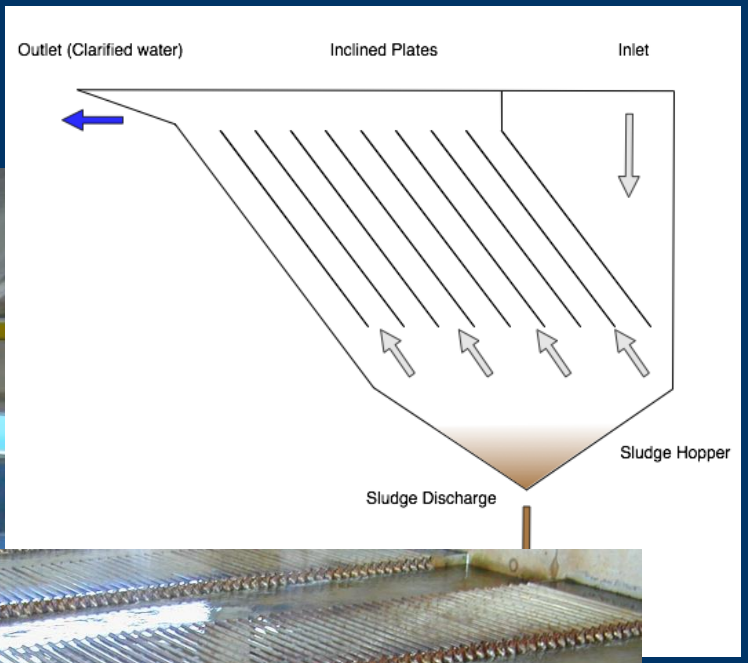
0.1 – 2.5 mg/l WisPro

G_T ~ 22.000

WPJ – Process flow

- Lake IJssel
- drum screens
- mixing
- flocculation
- sedimentation
- RSF
- GAC





WPJ – Process flow

- Lake IJssel
- drum screens
- mixing
- flocculation
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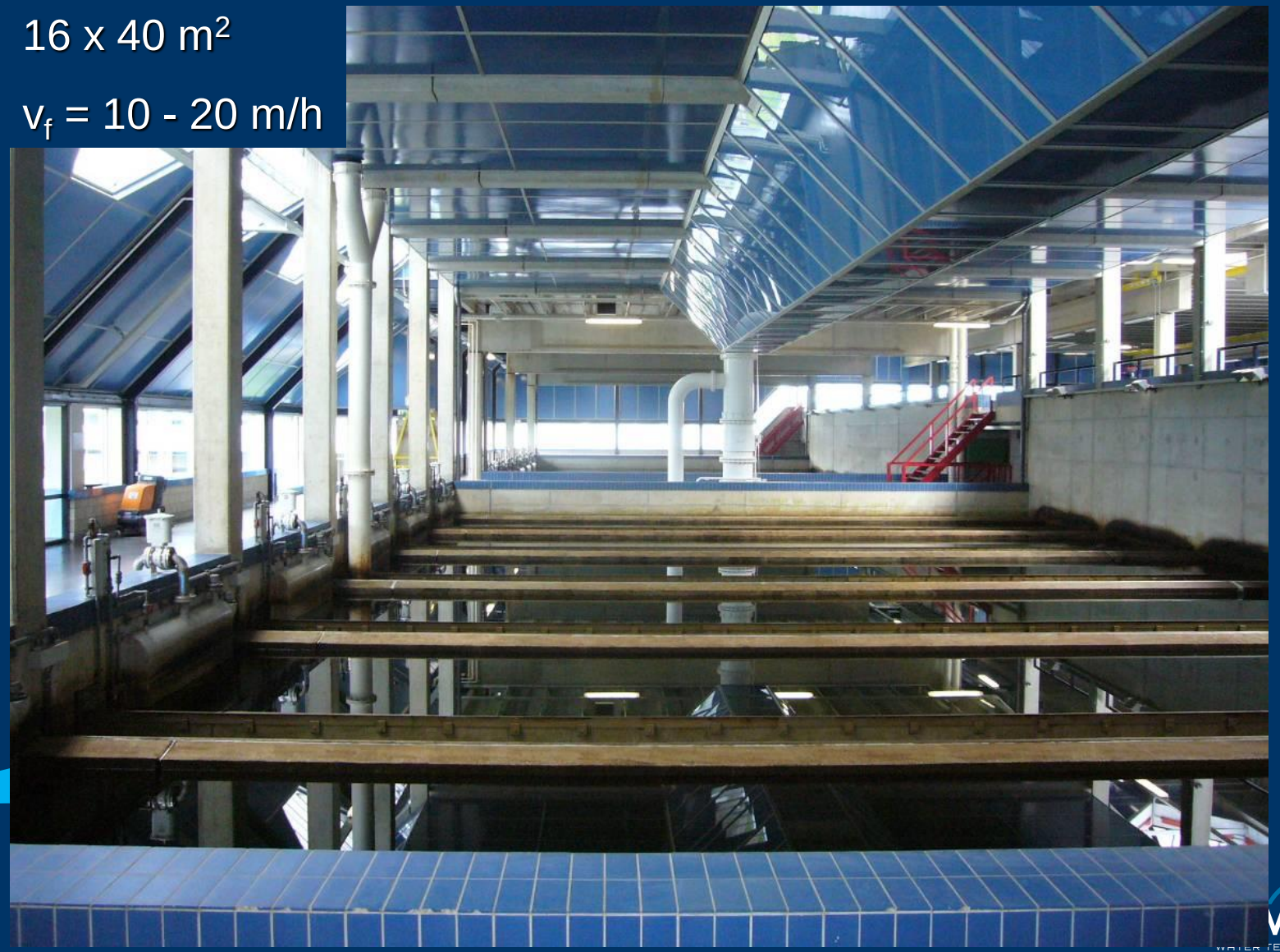
- GAC

16 x 40 m^2

v_f = 10 - 20 m/h



WPJ – Process flow

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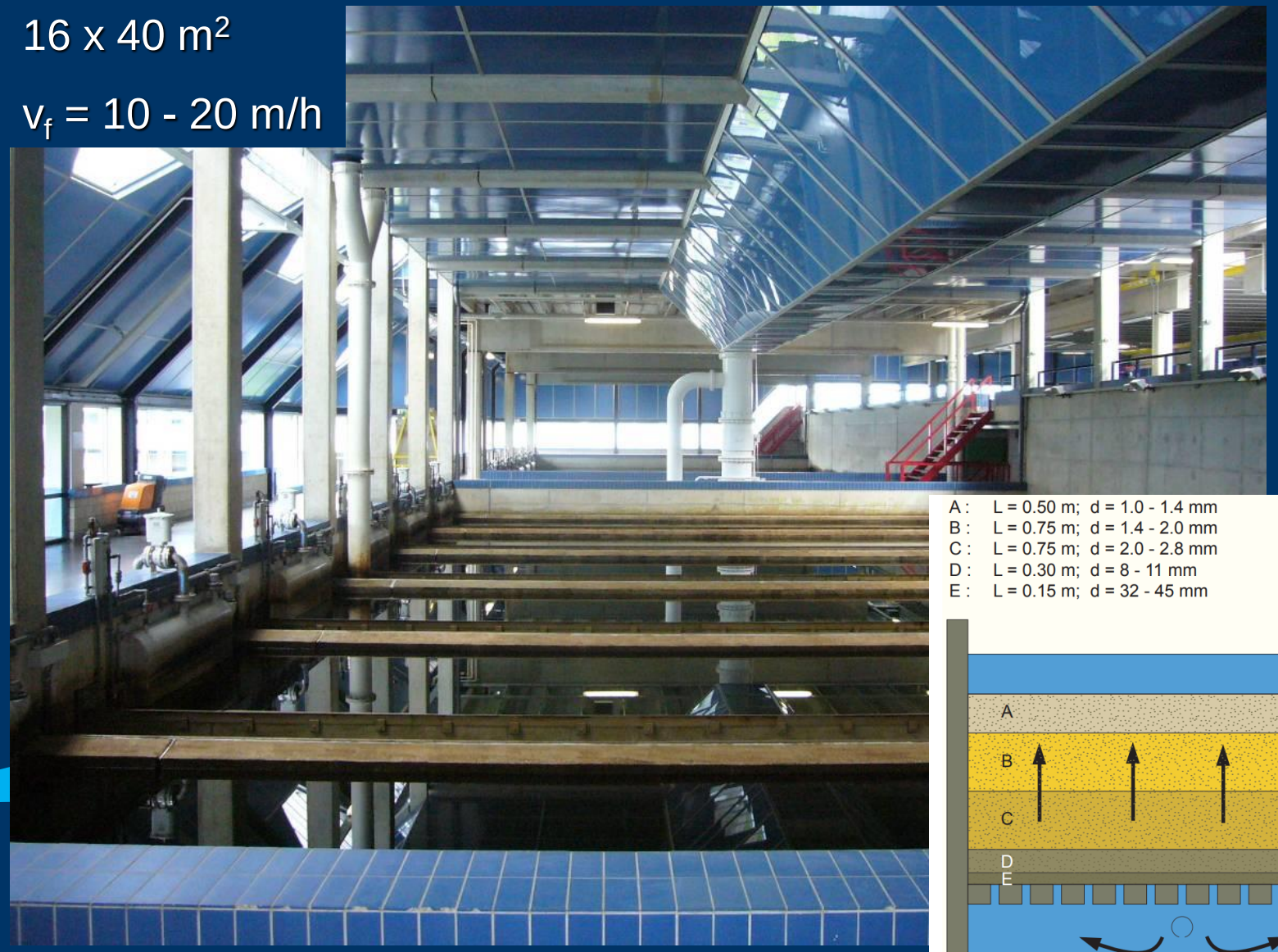

WPJ – Process flow

WPJ – Pumps building

infiltration

Questions

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- jink.gude@pwn.nl