Thermal interaction of neighbourly shallow geothermal systems
-
challenges in planning and monitoring

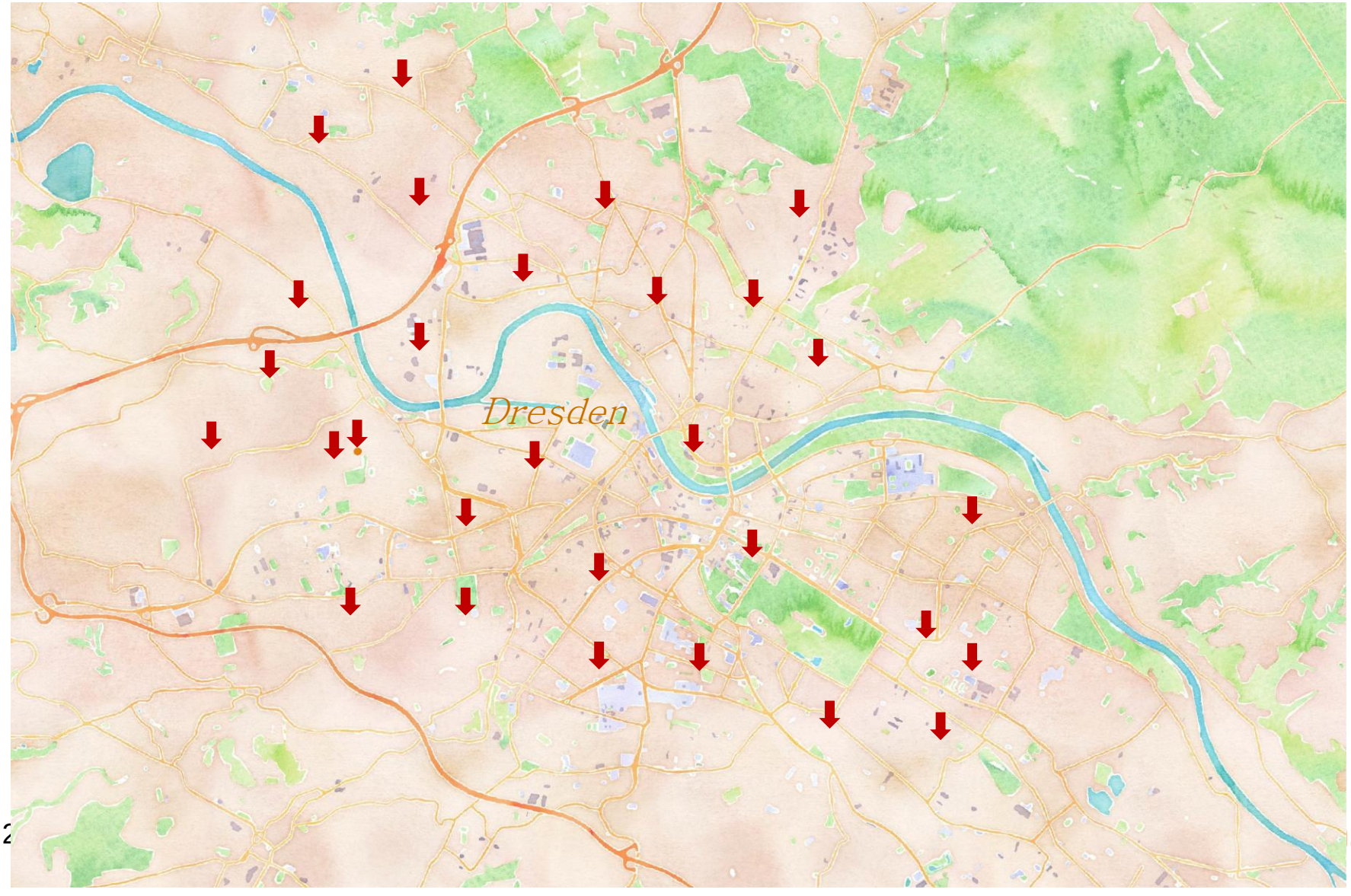
An example from Dresden, Germany

M.Sc. Tom Reinhardt

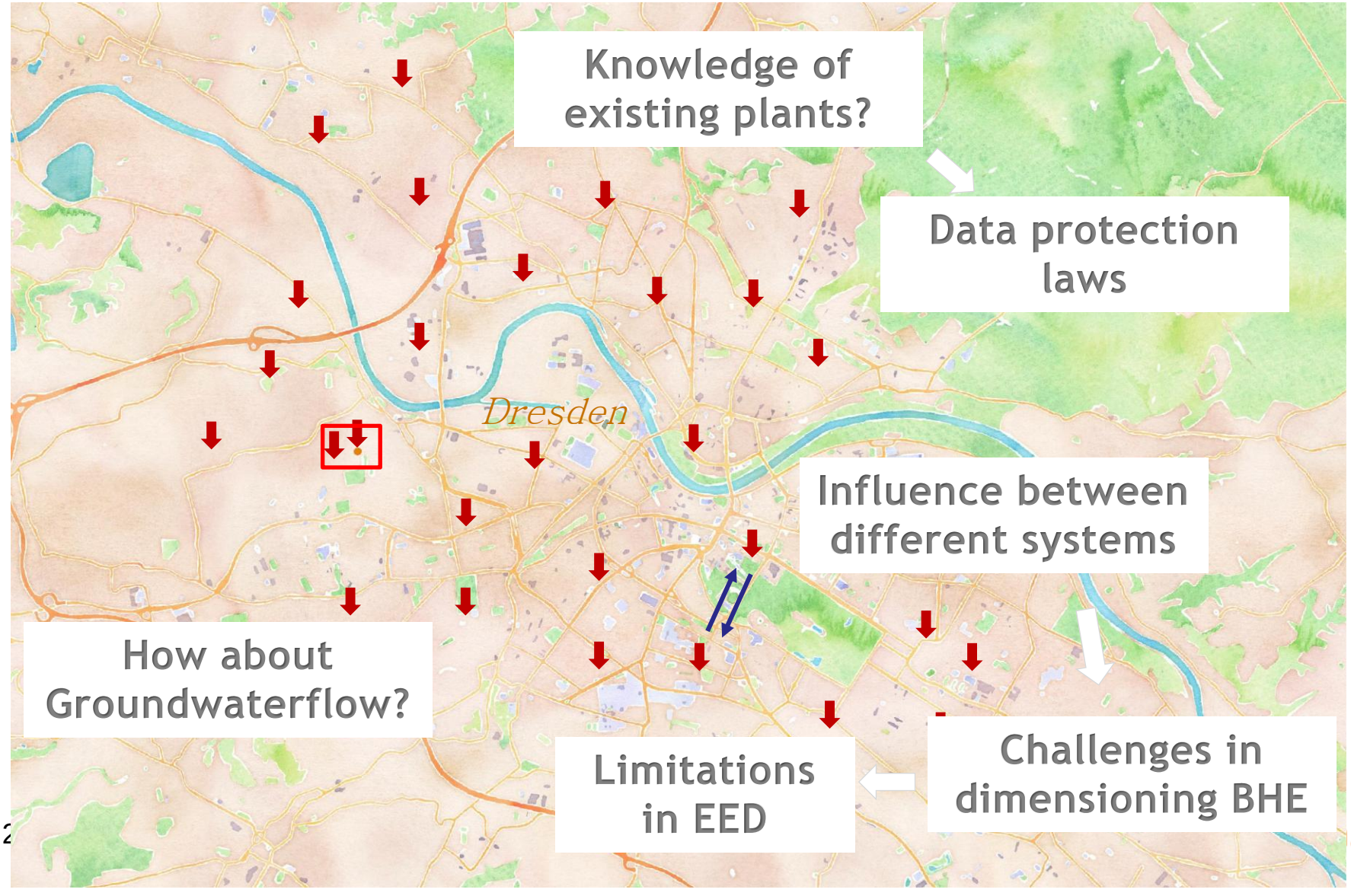
Project engineer geology

Erdwärme. Planen. Testen. Überwachen.

It‘s getting tight

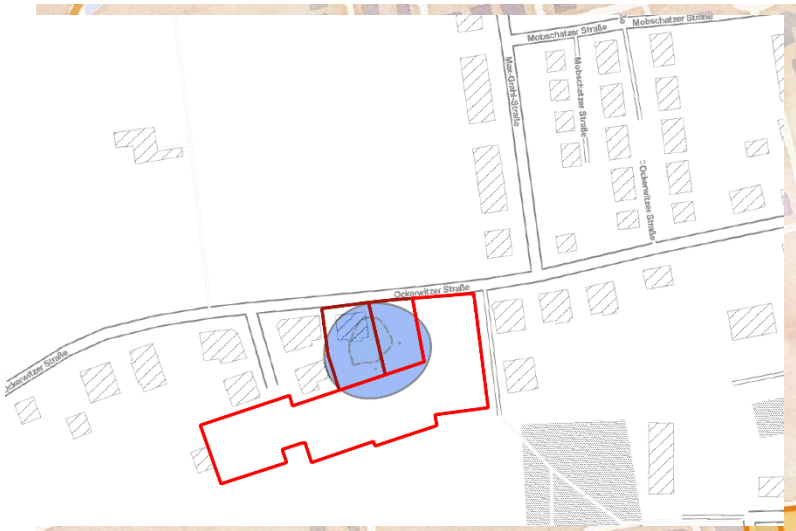


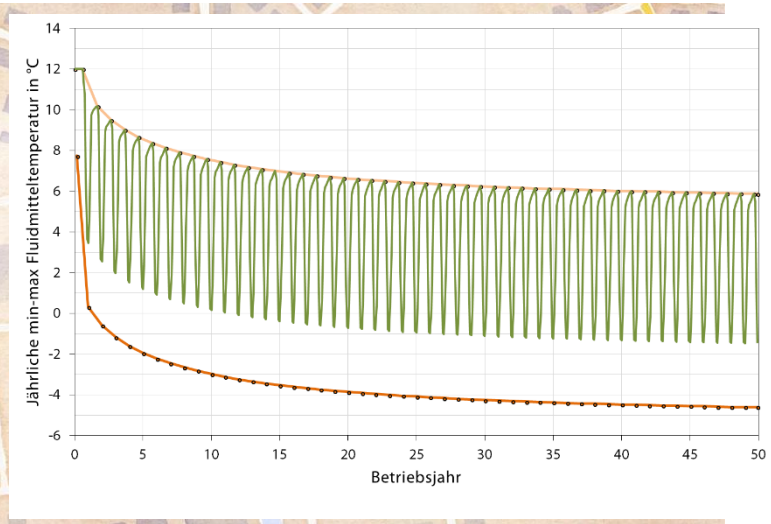
Changes/challenges in planning



Example from Dresden

Defining initial situation

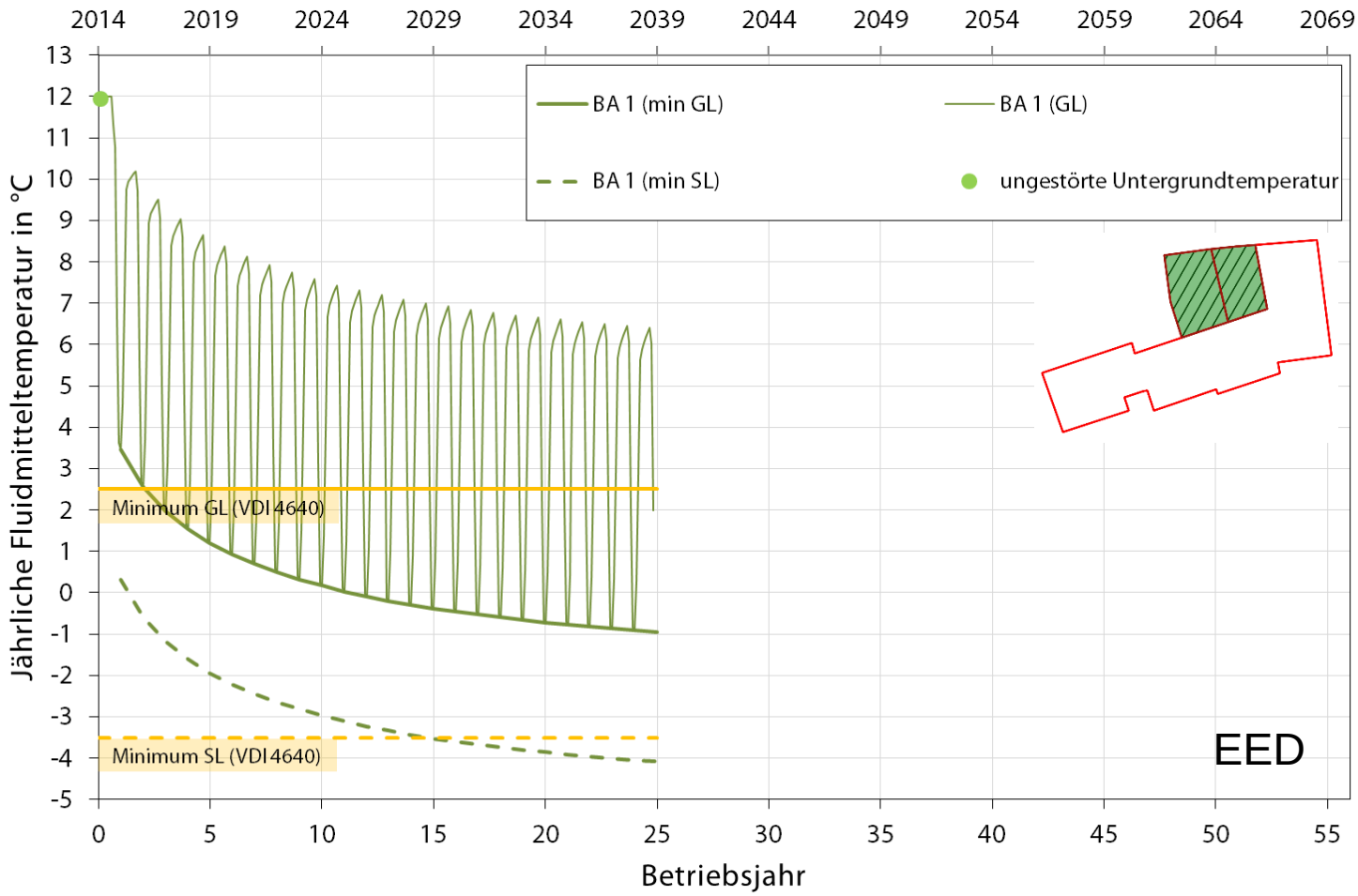




Thermal impact

Fluid temperatures

Planing


2014
2019
2024
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2059
2064
2069
13
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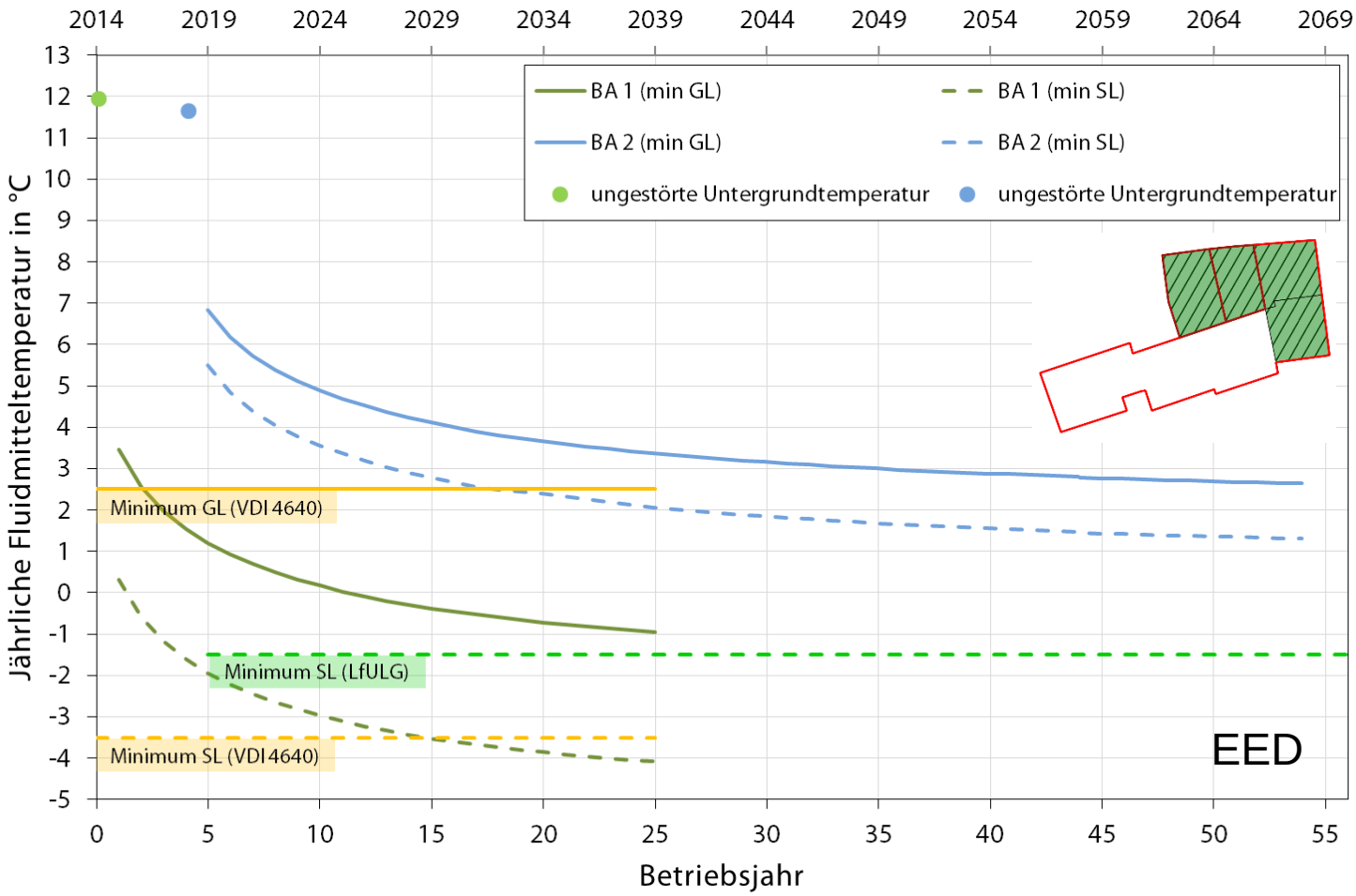
1
0
-1
-2
-3
-4
-5
Jährliche Fluidmitteltemperatur in °C
BA 1 (min GL)
BA 1 (GL)
BA 1 (min SL)
ungestörte Untergrundtemperatur
Minimum GL (VDI 4640)
Minimum SL (VDI 4640)
EED
0
5
10
15
20
25
30
35
40
45
50
55
Betriebsjahr

Planing


2014
2019
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Jährliche Fluidmitteltemperatur in °C
BA 1 (min GL)
BA 1 (min SL)
BA 2 (min GL)
BA 2 (min SL)
ungestörte Untergrundtemperatur
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Minimum GL (VDI 4640)
Minimum SL (LfULG)
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EED
0
5
10
15
20
25
30
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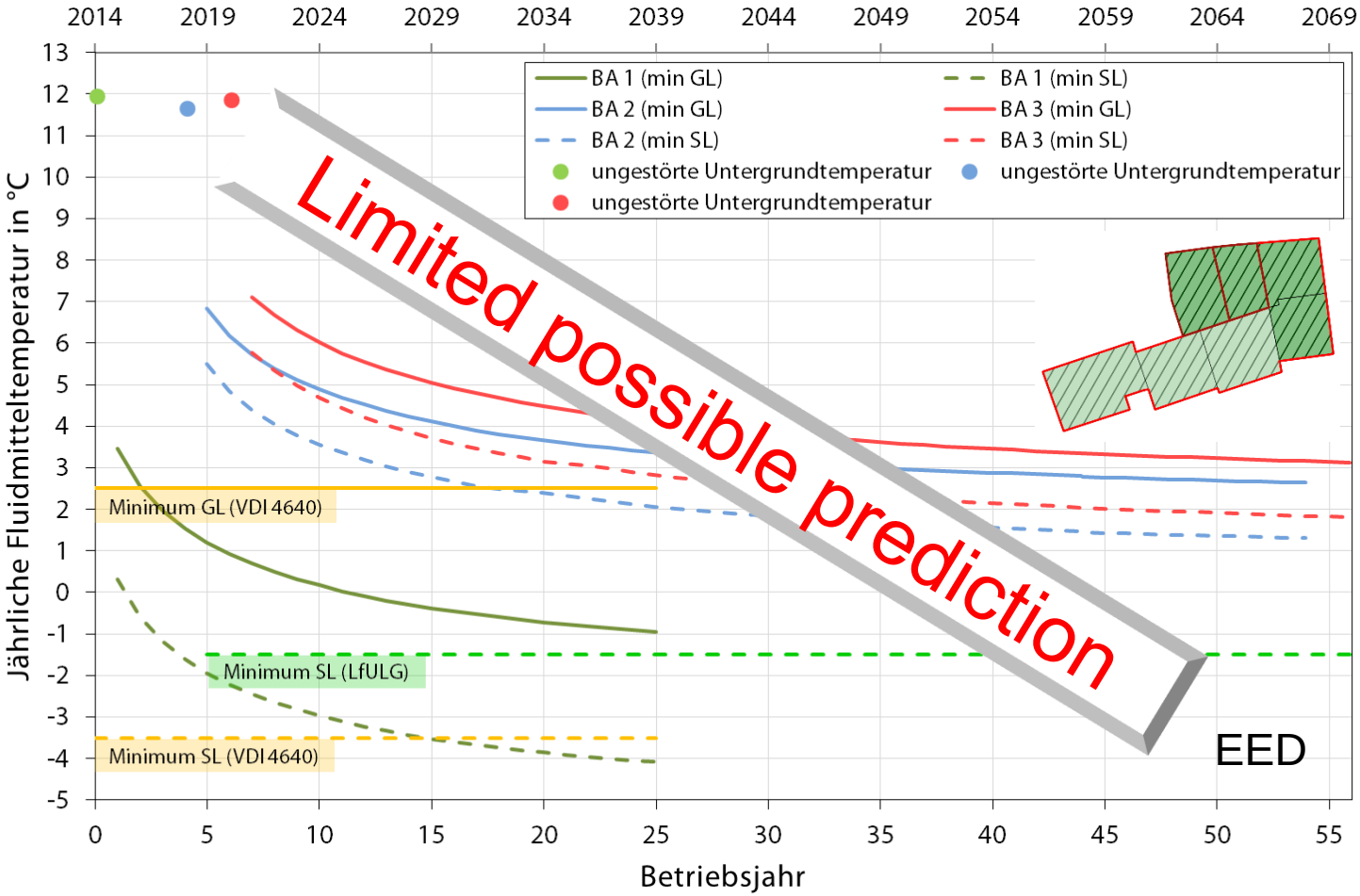
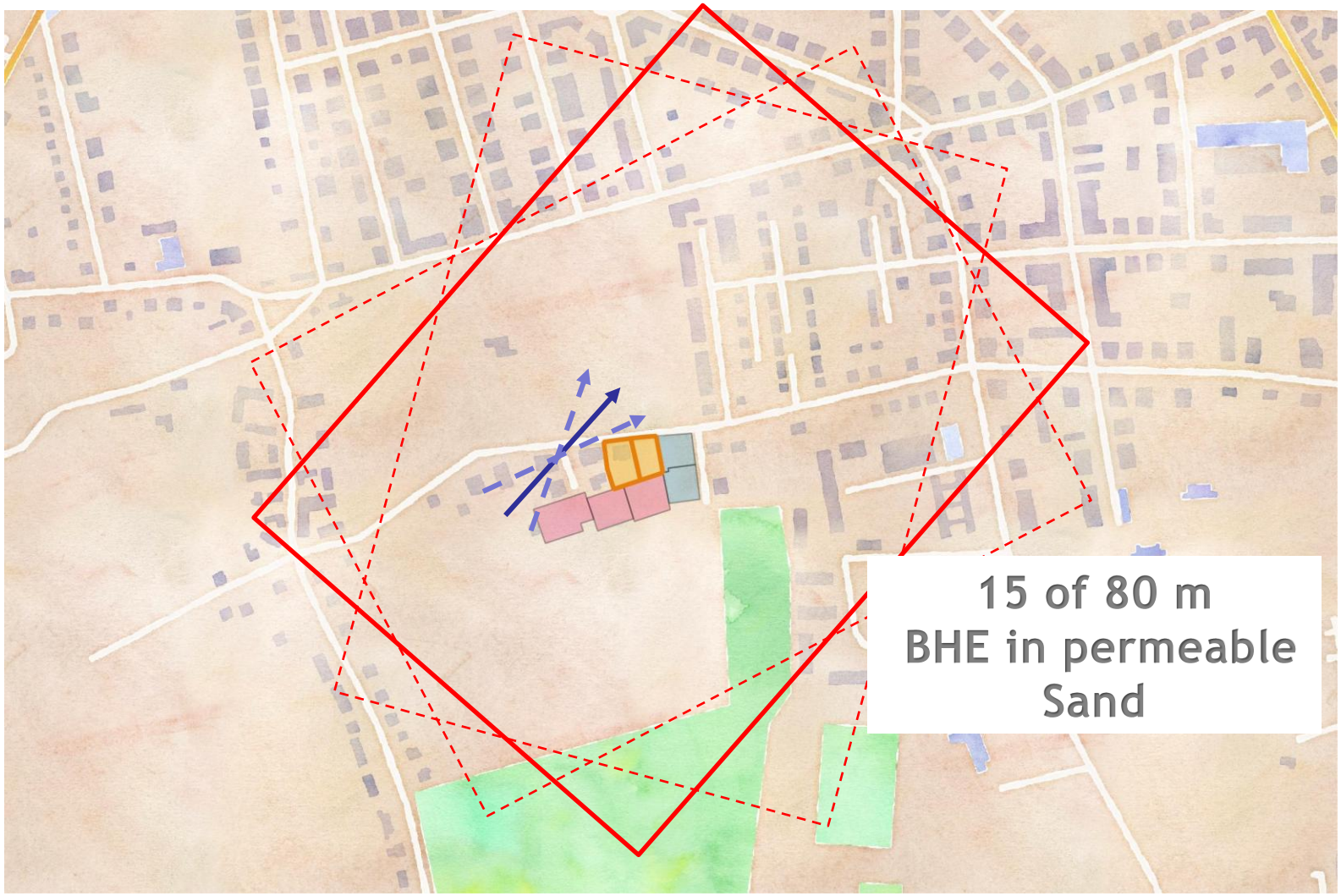
Betriebsjahr

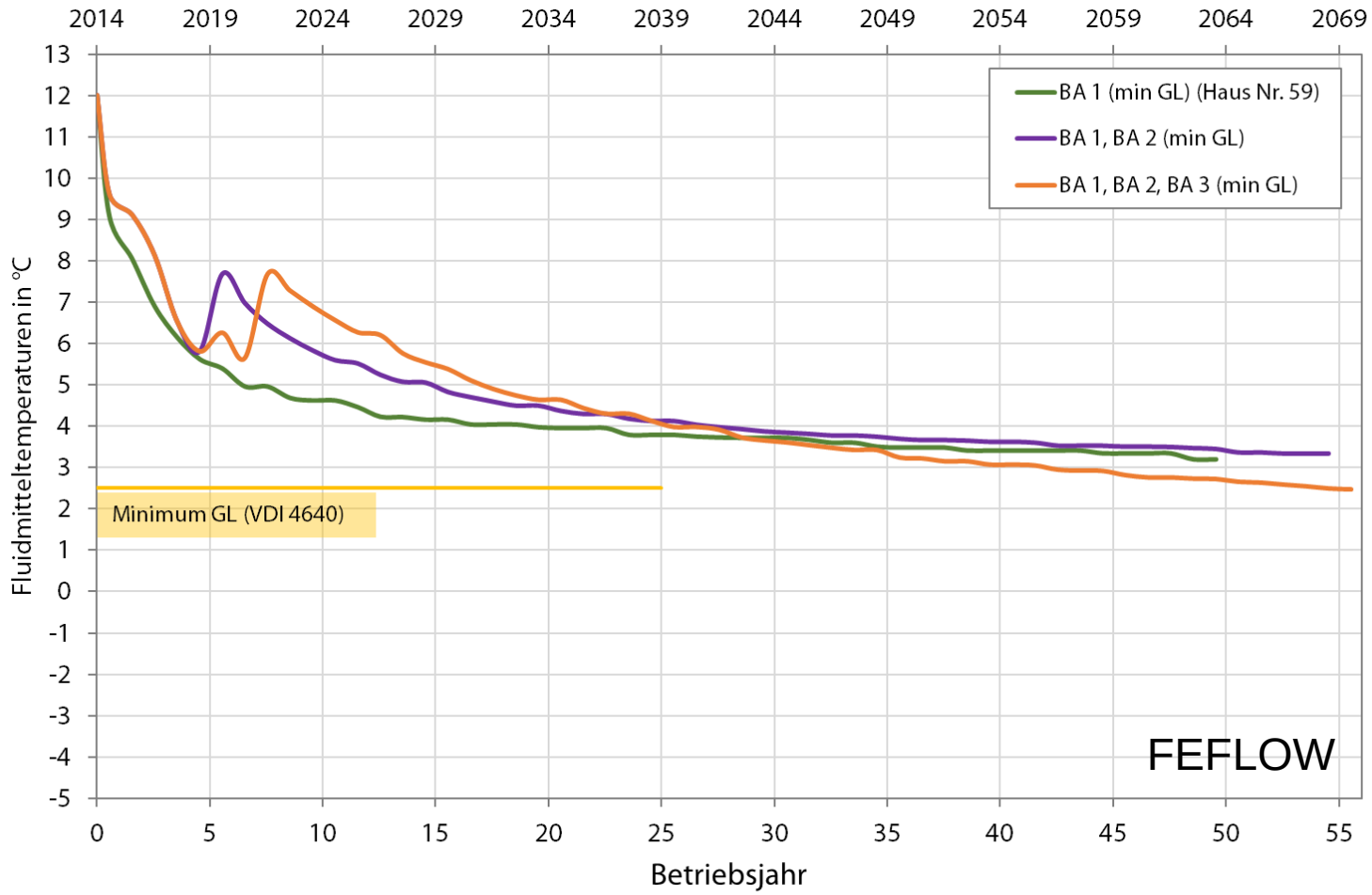
Planing


2014
2019
2024
2029
2034
2039
2044
2049
2054
2059
2064
2069
Jährliche Fluidmitteltemperatur in °C
Betriebsjahr
BA 1 (min GL)
BA 2 (min GL)
BA 2 (min SL)
ungestörte Untergrundtemperatur
ungestörte Untergrundtemperatur
BA 1 (min SL)
BA 3 (min GL)
BA 3 (min SL)
ungestörte Untergrundtemperatur
Limited possible prediction
Minimum GL (VDI 4640)
Minimum SL (LfULG)
Minimum SL (VDI 4640)
EED

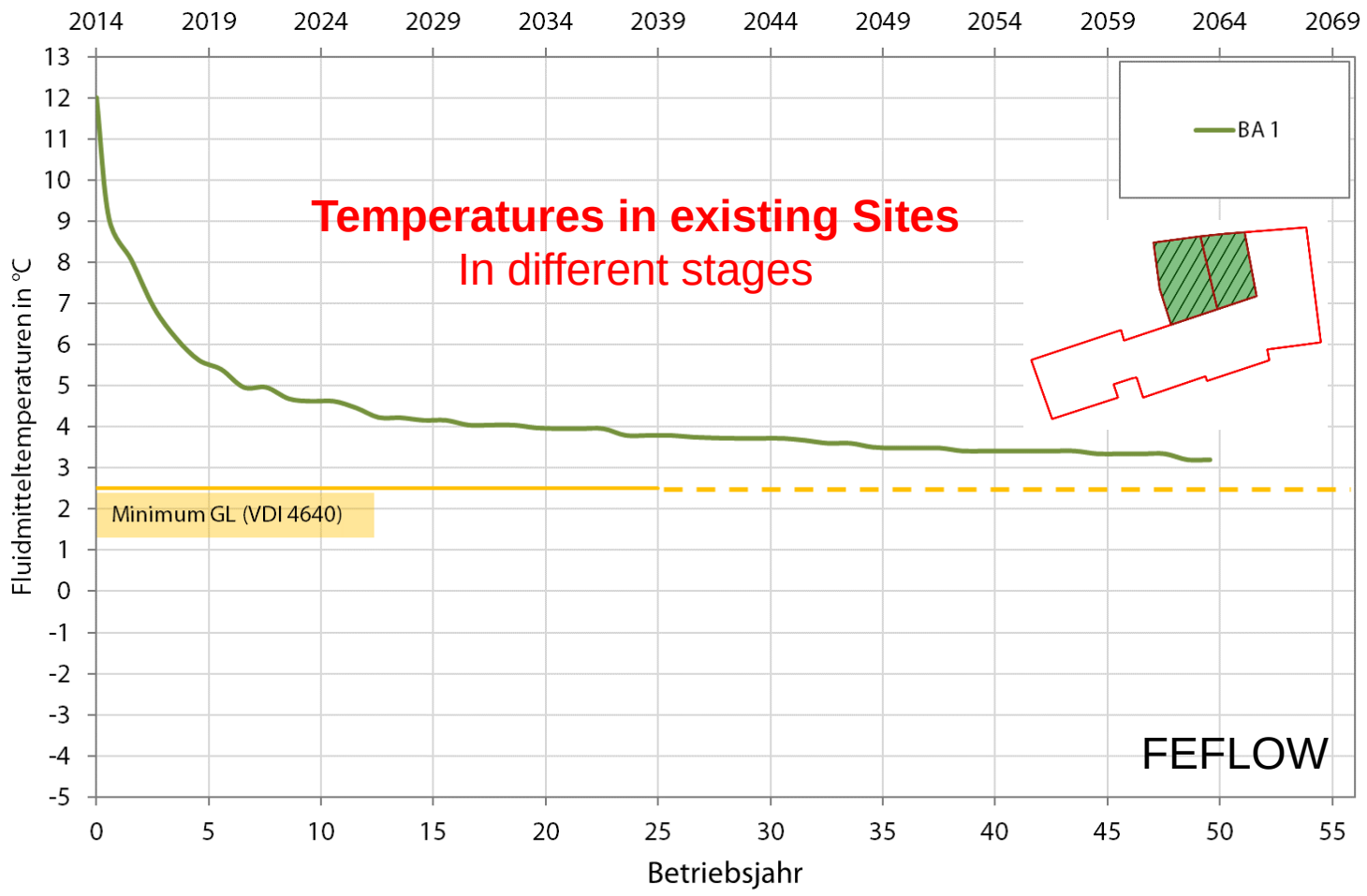
How about groundwater?



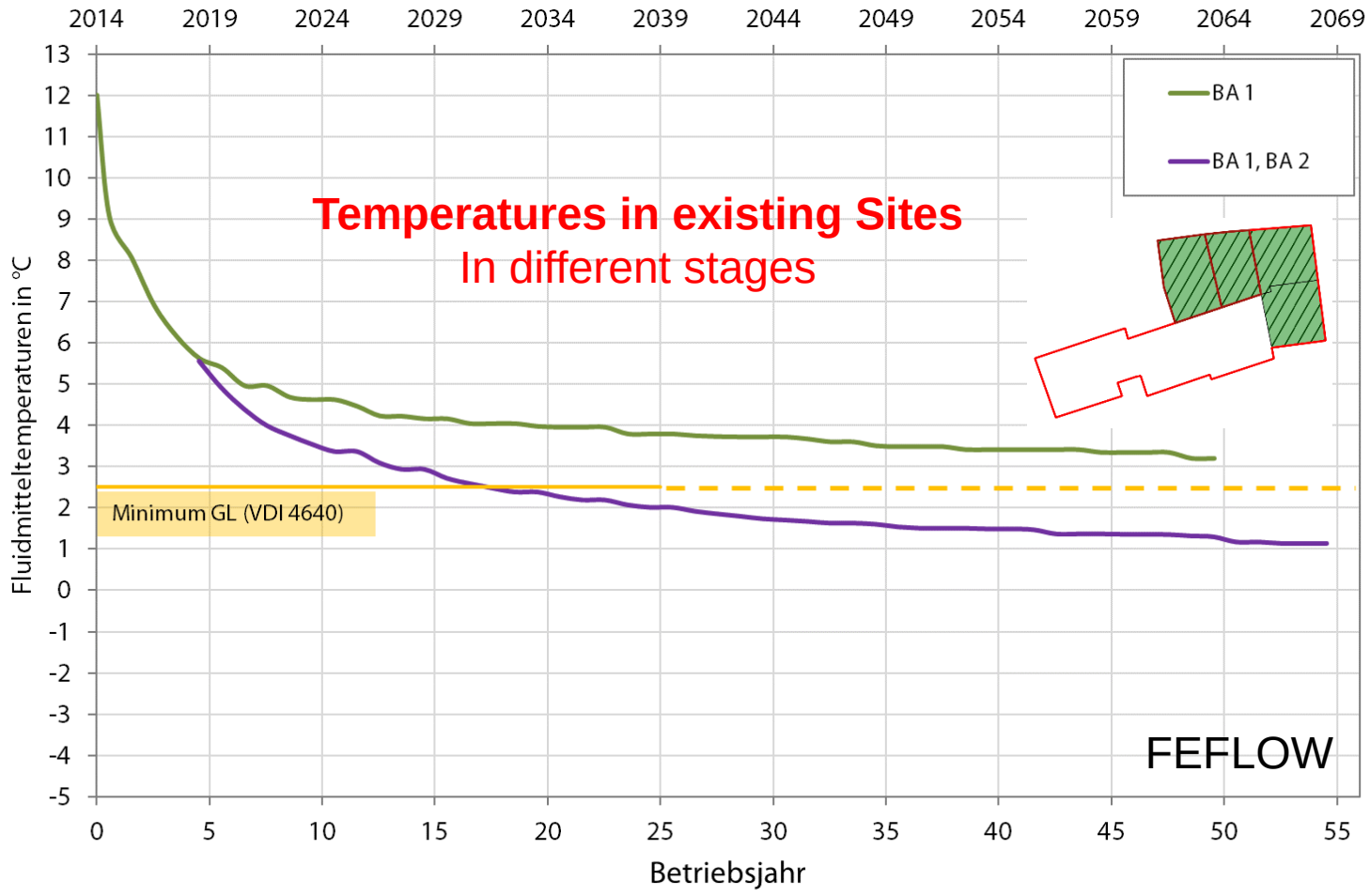
Calculation results - what next?



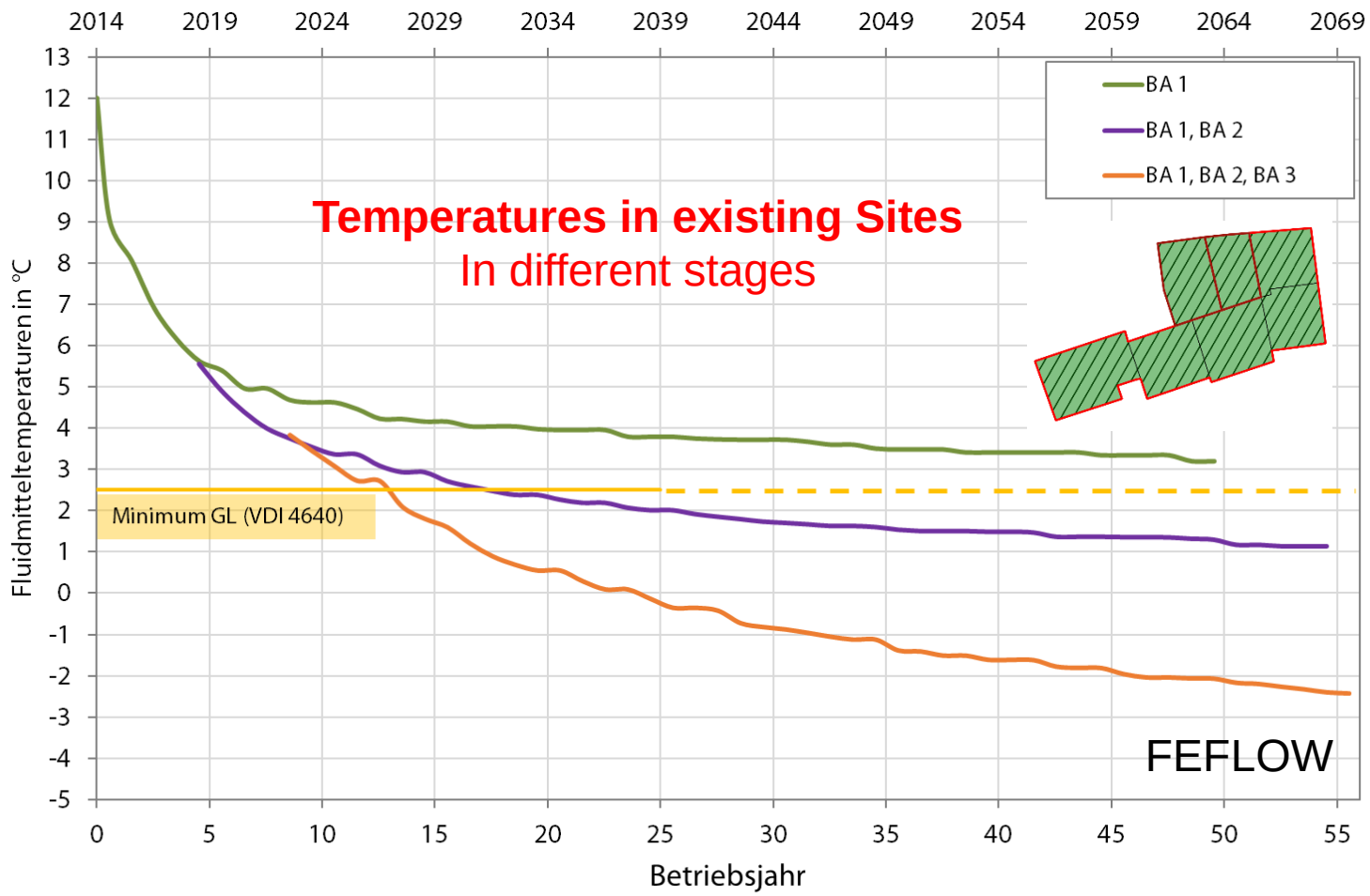
Calculation results - what next?

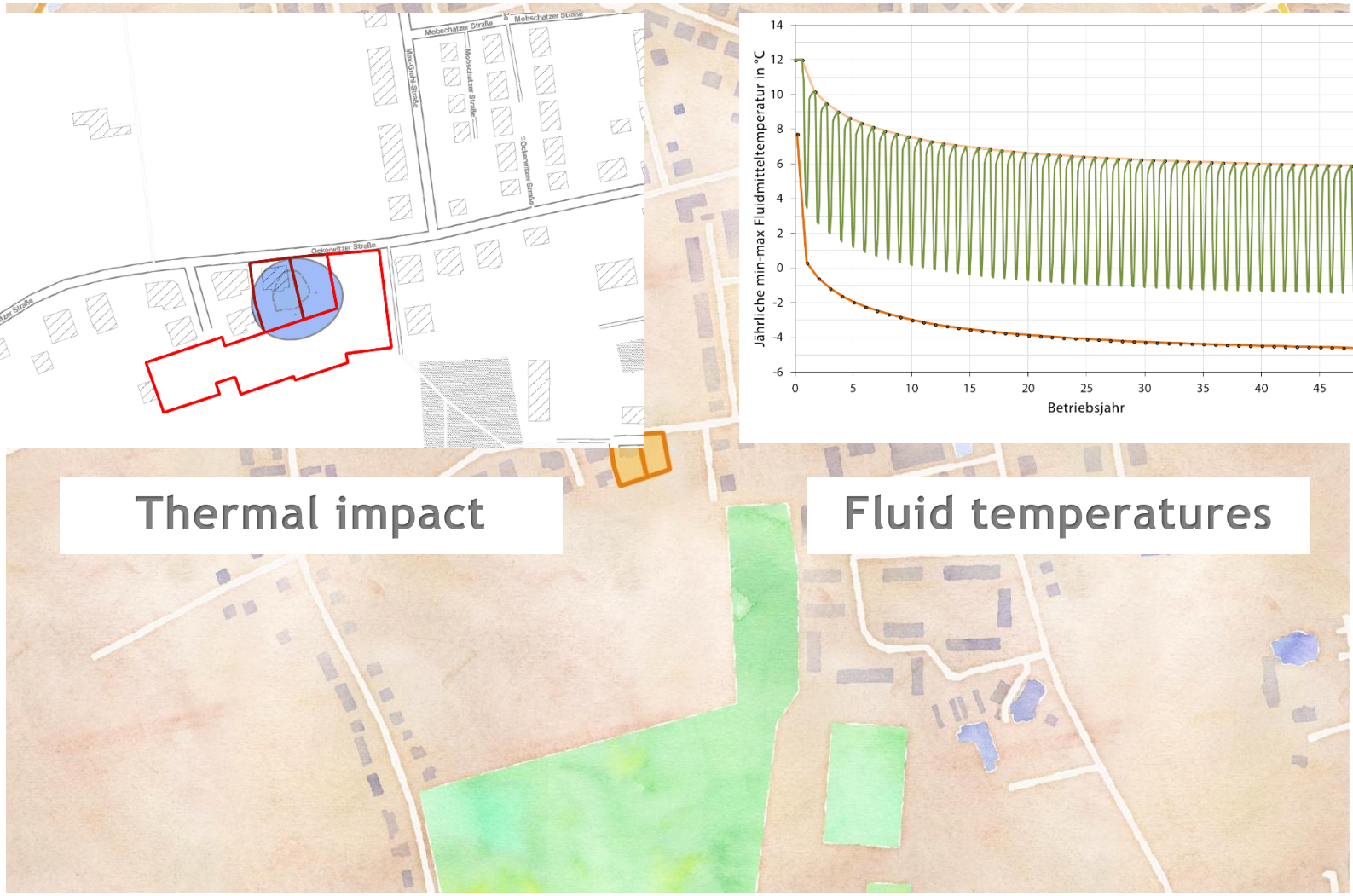


Calculation results - what next?



Calculation results - what next?




Mobschatzer Straße
Mobschatzer Straße
Mobschatzer Straße
Oderwitzer Straße
Oderwitzer Straße
Oderwitzer Straße
Jährliche min-max Fluidmitteltemperatur in °C
14
12
10
8
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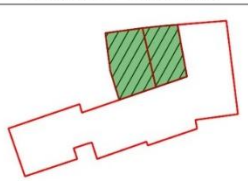
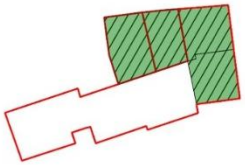
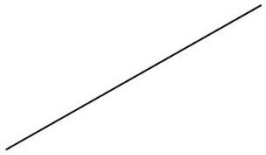
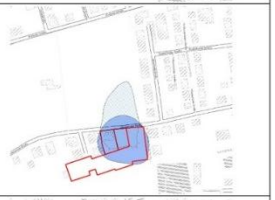
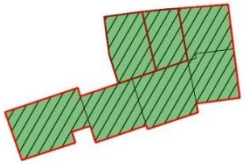
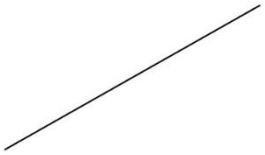
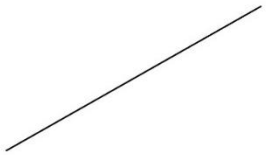
4
2
0
-2
-4
-6
0
5
10
15
20
25
30
35
40
45
50
Betriebsjahr
Thermal impact
Fluid temperatures

Amount of interference

Variante	Betrachtete Grundstücke	Nach 5 Jahren	Nach 7 Jahren	Nach 25 Jahren	Nach 56 Jahren
1 Bestand					
2 Bestand + BA2					
3 Gesamt-feld					

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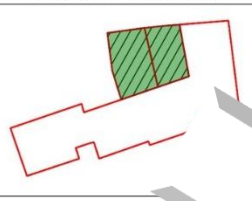
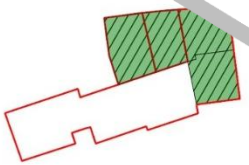
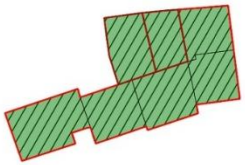
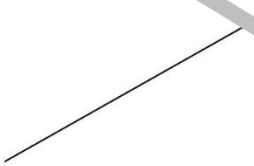
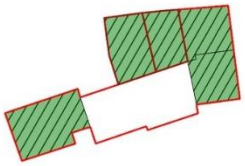
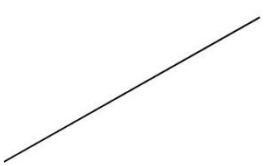
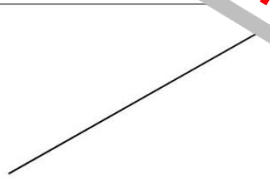
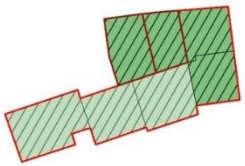
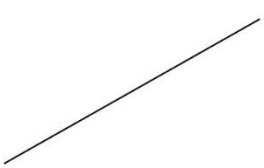
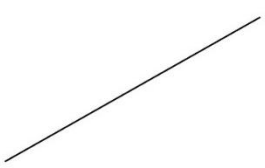
1 Bestand					 50 Jahre
2 Bestand + BA2					
3 Gesamt-feld					
4.1 Bestand + BA2 + Teil des BA3					
4.2 Bestand + BA2 + BA3 (halber Bedarf)					

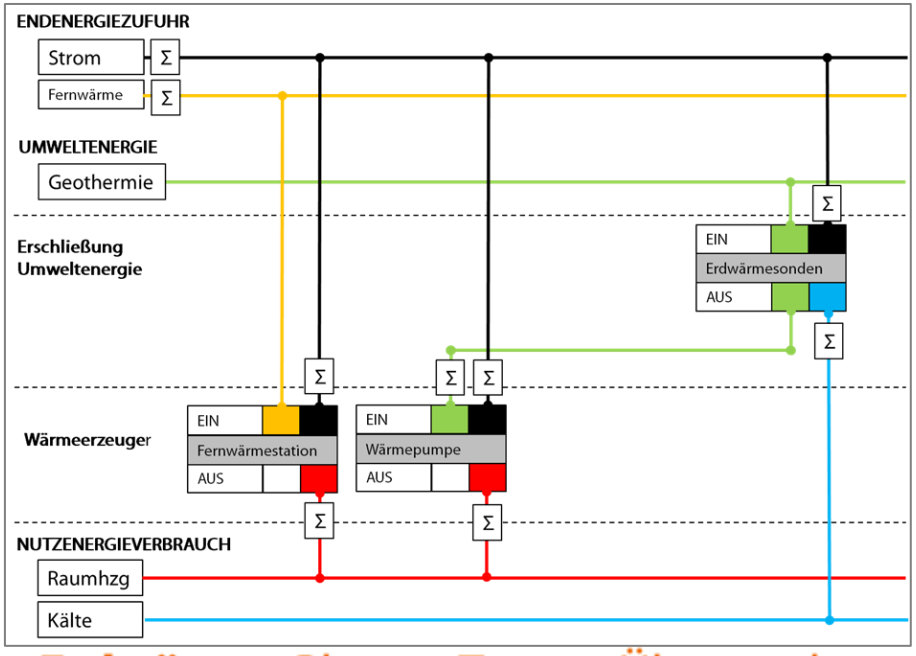
time-consuming

Monitoring concepts

- Drilling temperature measurement points
  - In upstream and downstream position
  - Drilling to depth of BHE not strictly necessary because of uniform geology from 15 m downwards (claystone)

- Monitoring of actual energy use in existing and new buildings essential

- **model = approximation**
  → monitoring creats facts

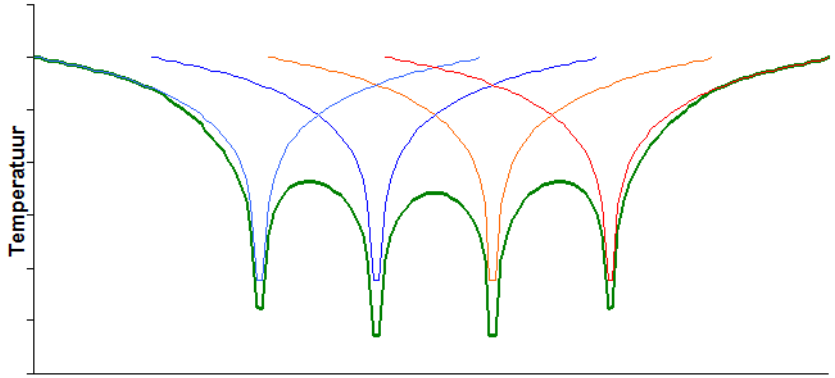


results

- Dimensioning of existing site undersized
- Underground already cooled down before CP2 and CP3
- Different legal requirements lead to:
  - First come – first serve
  - Oversized dimensioning of the new sites
- Current solution:
  - Temperature limits

Solution from the Netherlands

- Groenholland BV, Amsterdam
  - Since 1996 in shallow geothermal energy
  - Especially working in research and development



ADVIESBUREAU VOOR MILIEUTECHNIEK
GROENHOLLAND

BUM HUM Methode

Possible Solutions


Thank you for
your attention

Bundesverband Geothermie

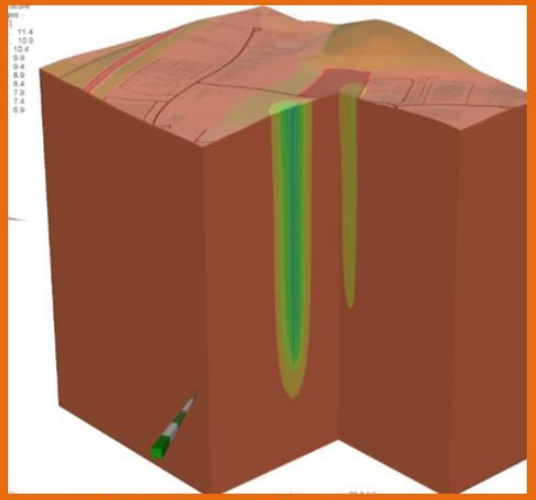
geoENERGIE Konzept

Erdwärme. Planen. Testen. Überwachen.

WORKSHOP

Nachbarschaftliche Beeinflussung von Erdwärmeanlagen in dicht besiedelten Gebieten

Zielgruppen:
Behörden, Kommunen,
Planer, Wissenschaft



22.05.2019

13:00-17:00 Uhr

GIZEF Freiberg

Im Vorfeld des
geoENERGIE Tags