

# DEALING WITH PLANNING AND LEGAL CHALLENGES WHEN USING UNDERGROUND SPACE

Han Admiraal

Enprodes BV  
Rotterdam (NL)

Antonia Cornaro

Amberg Engineering AG  
Zürich (CH)



SUSTAINABLE EXPLOITATION OF THE SUBSURFACE

The Geological Society – London, 20 May 2015



*It is necessary that the urban planner thinks deep and that underground development of cities is done not through random necessities, but according to a definite commitment, legislation and a predetermined plan.*

– Édouard Utudjian



# RE:PLAN

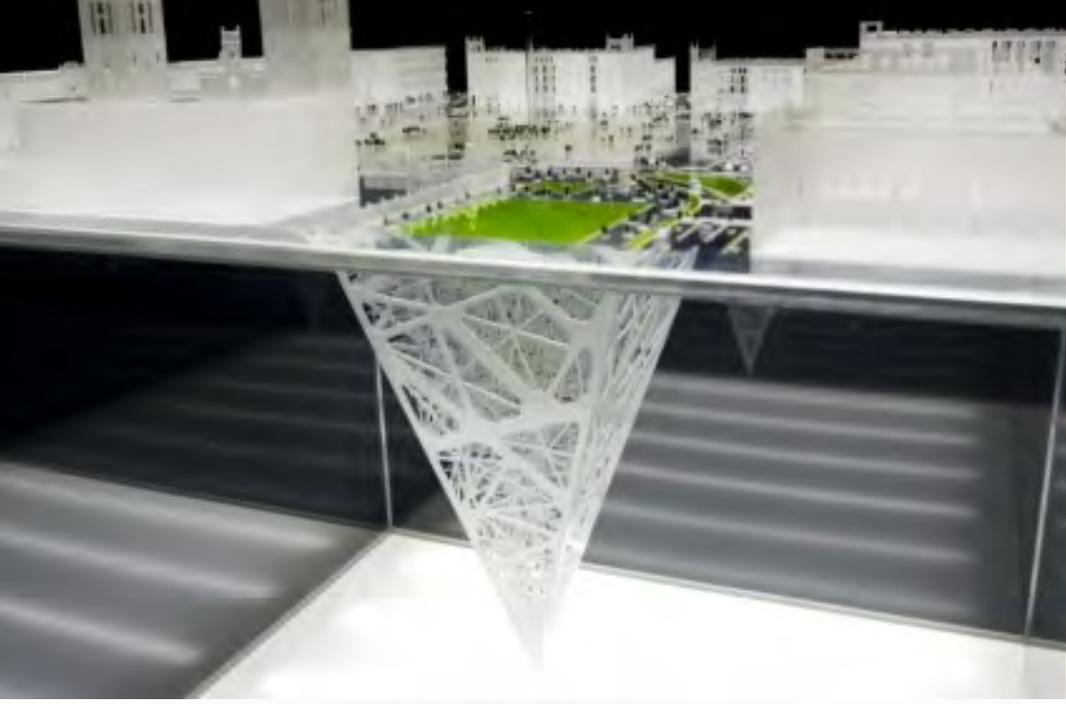
THINK  
DEEP  
PLANNING



The background of the slide is a complex, abstract graphic. It features a dense network of overlapping lines in various colors, including red, yellow, blue, green, cyan, purple, and white. Some lines are straight, while others are wavy or looped, creating a sense of movement and connectivity. Interspersed among the lines are several small, solid-colored dots in red, white, and green. The overall composition is dynamic and visually rich, set against a solid black background.

**URBAN UNDERGROUND AS  
STANDARD COMPONENT  
FOR URBAN PLANNING**



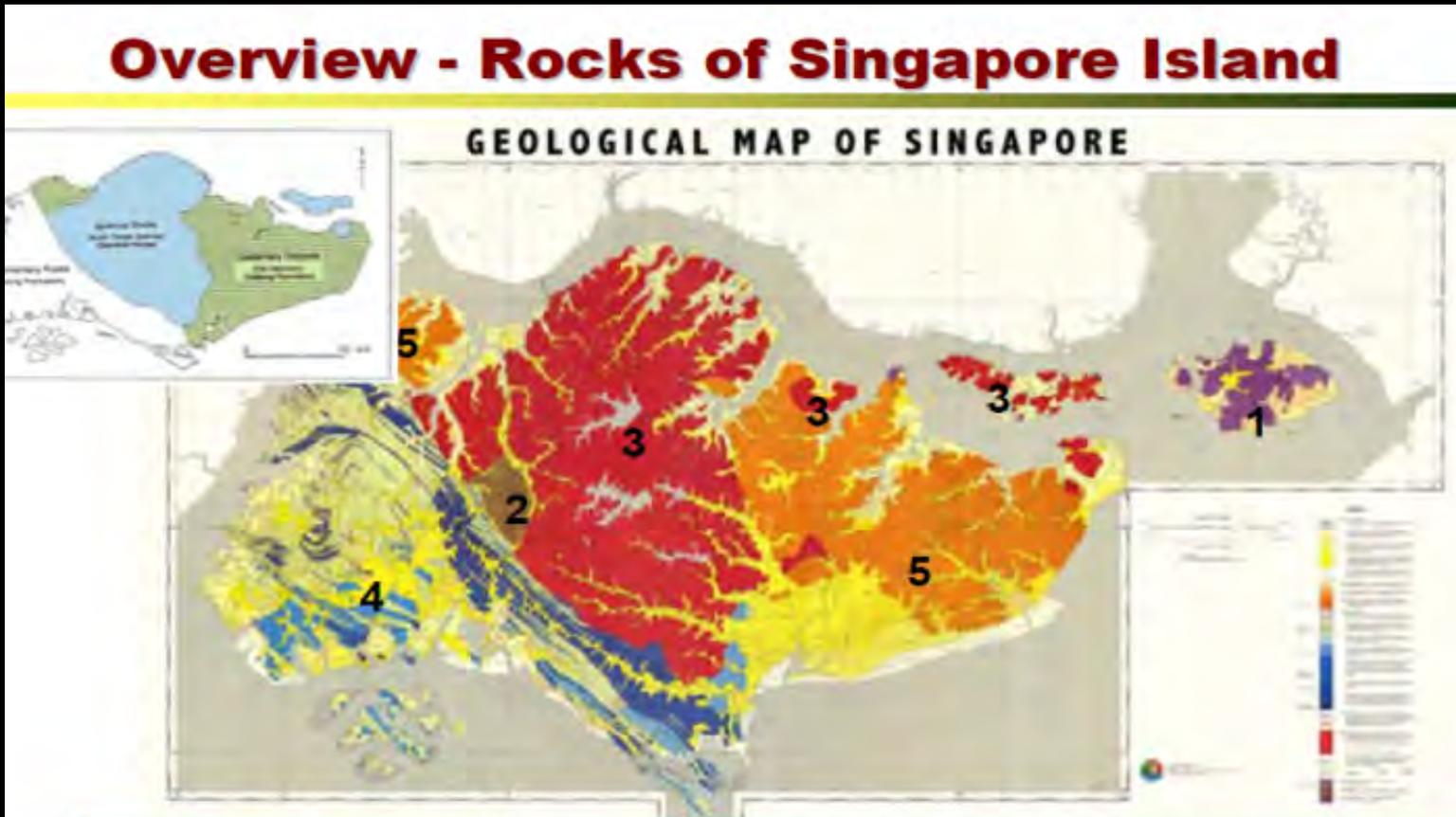


THE NEED FOR A DEEPER UNDERSTANDING:

SKYSCRAPER VERSUS EARTHSCRAPER

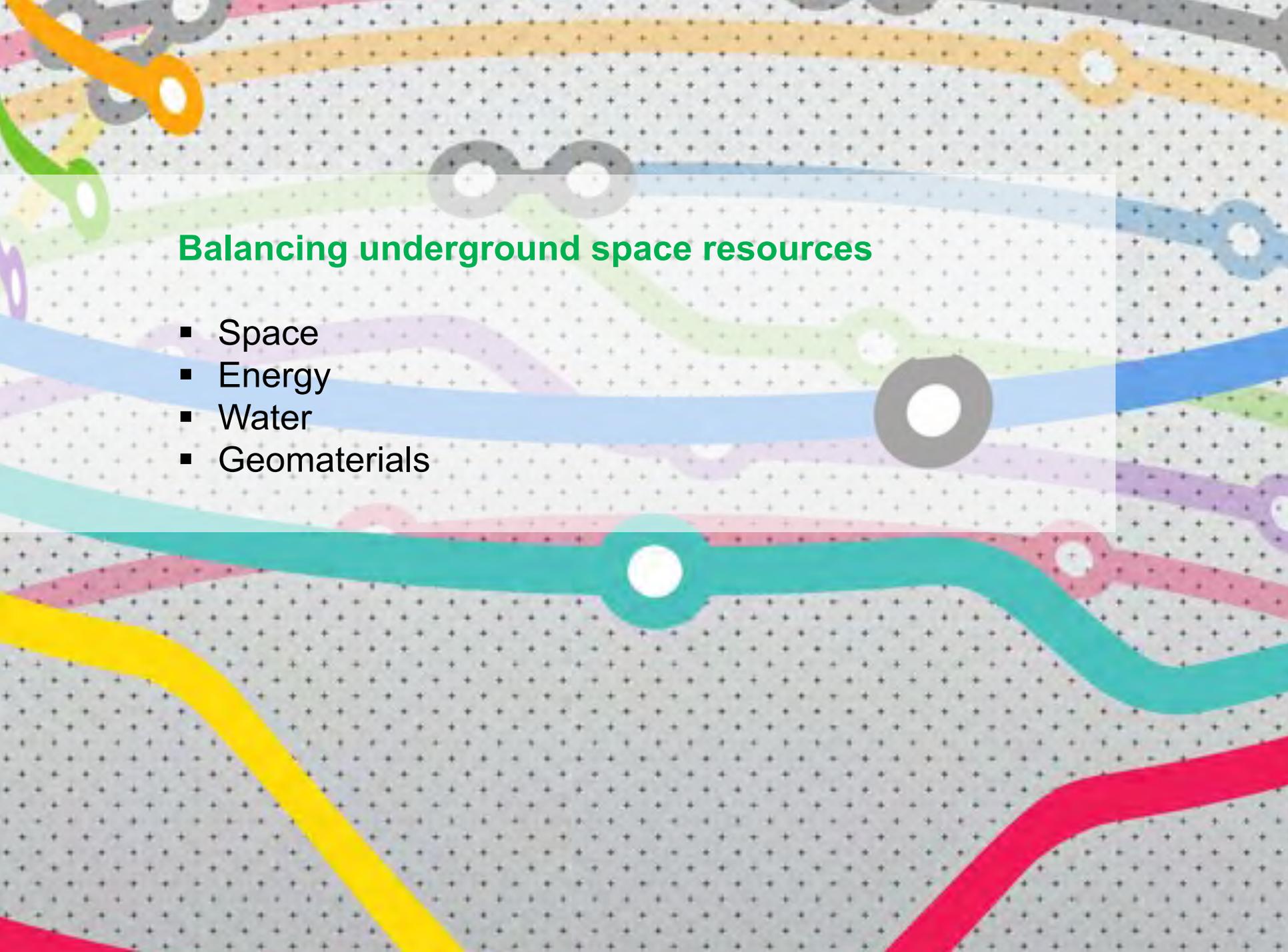


# GEOLOGY VERSUS URBAN NEEDS



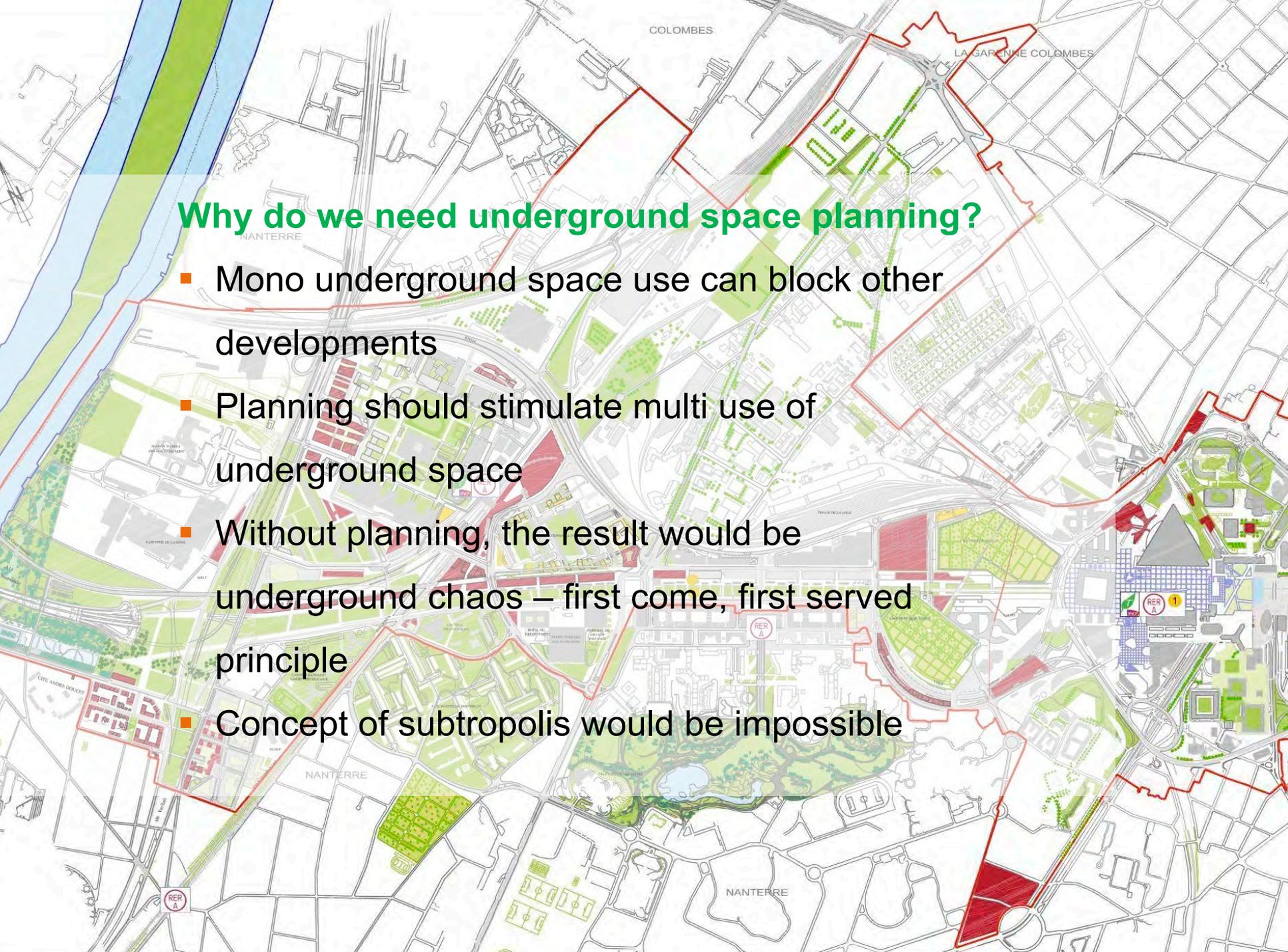
A geological map of Singapore



The background features a light gray grid of small plus signs. Overlaid on this are several thick, wavy, horizontal lines in various colors: orange, green, blue, purple, teal, yellow, and red. Some of these lines have circular cutouts or are connected by rings, creating a network-like appearance.

## Balancing underground space resources

- Space
- Energy
- Water
- Geomaterials



## Why do we need underground space planning?

- Mono underground space use can block other developments
- Planning should stimulate multi use of underground space
- Without planning, the result would be underground chaos – first come, first served principle
- Concept of subropolis would be impossible

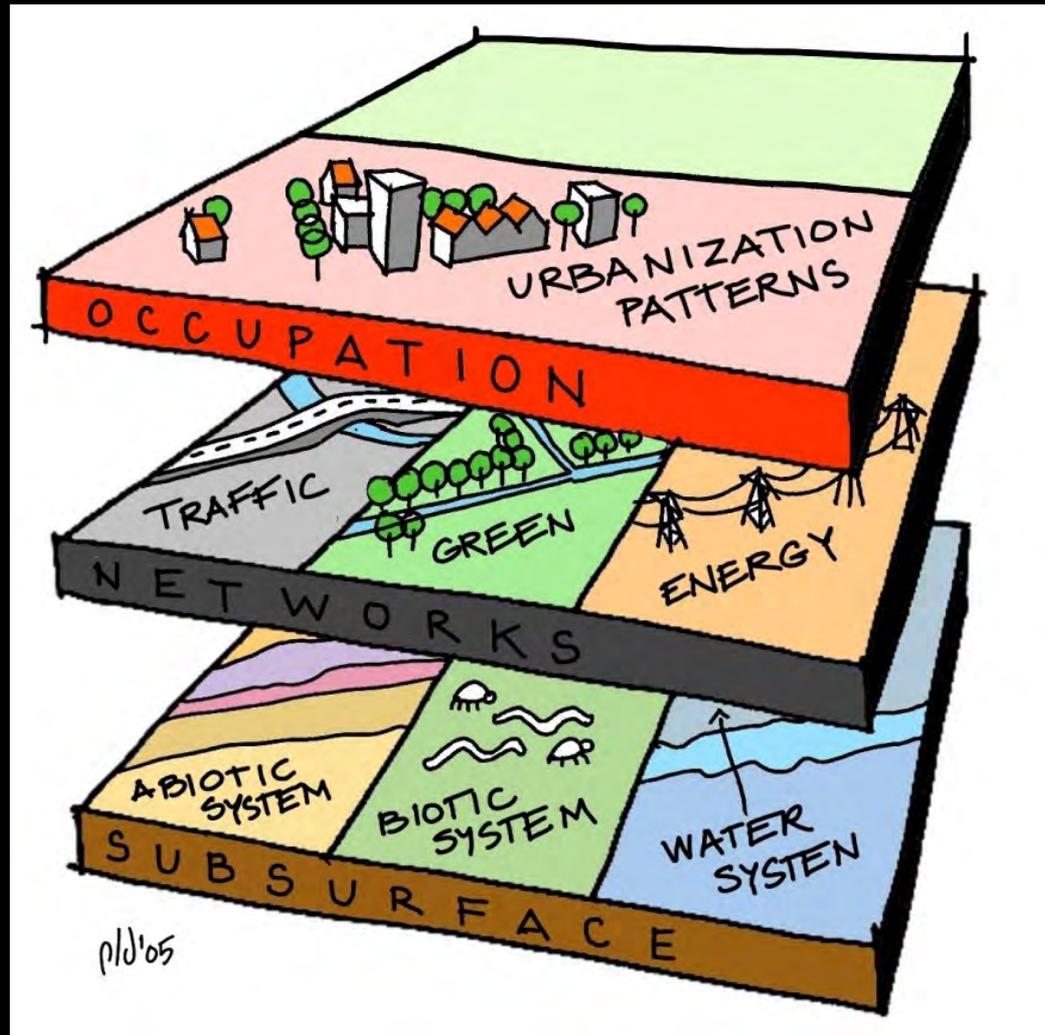


## Planning Challenges

- Gaining in-depth knowledge of the existing underground space
- Development is often limited by geological aspects
- Multi use across policy silos is a must for sustainable underground space development

# Multi layered approach

Planning practice NL



# Underground Space Planning Tianjin City – China

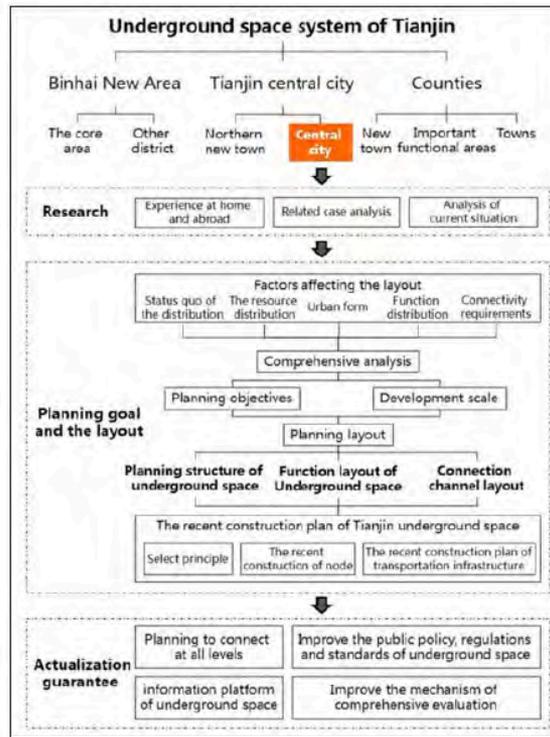
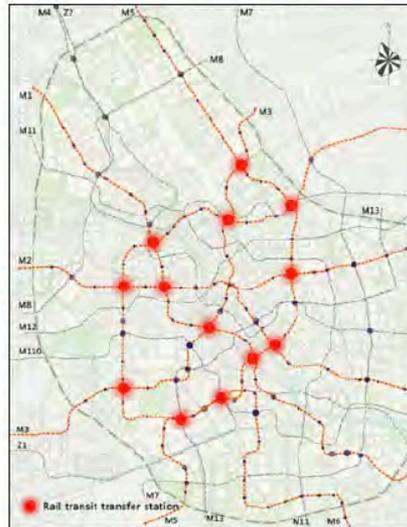
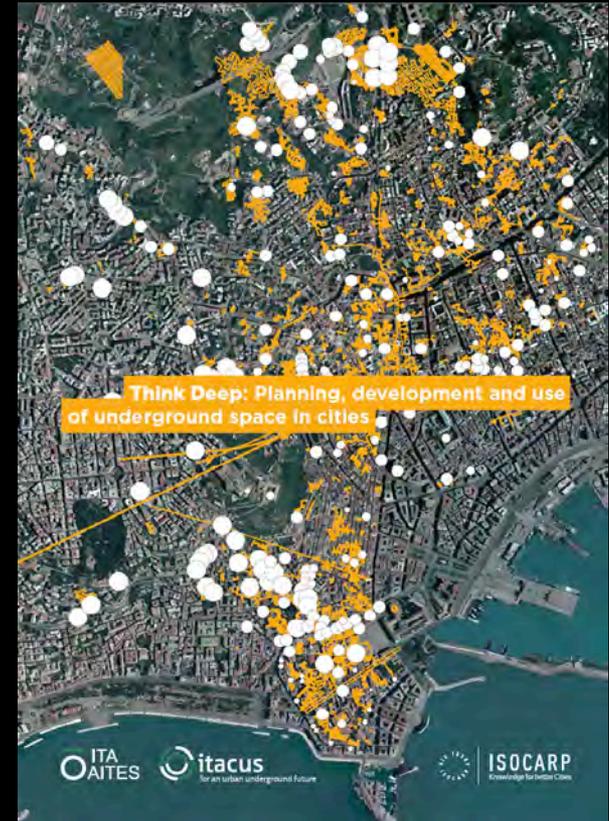
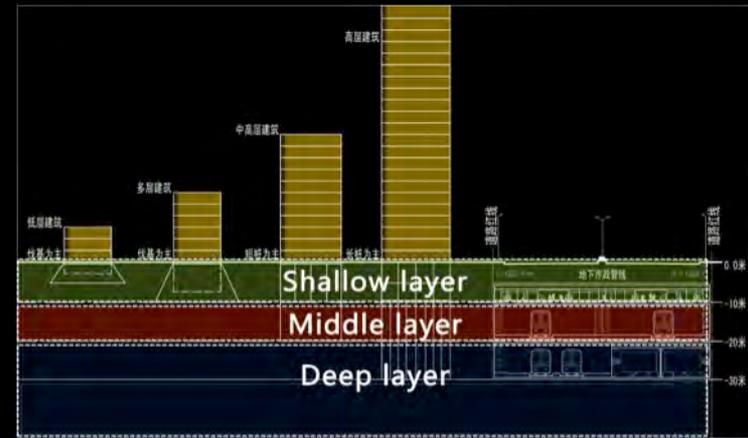
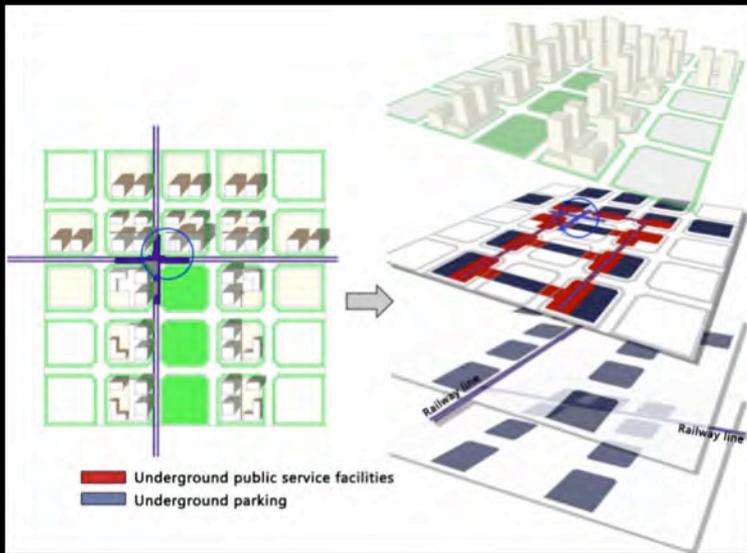


Figure 2: Technical route of The Utilization of Underground Space Planning in Tianjin central city (2011-2020)

Figure 3: The ground public center in Tianjin central city

Figure 4: Rail transit transfer station in Tianjin central city





## Underground Space Planning Tianjin City – China



External

Does the use of underground space lead to reuse of excavated material in a sustainable way? Does it contribute in any other way, e.g. less traffic noise and emissions?

Is the created underground space reusable for other functions in the future?

Internal

Is the development itself sustainable i.e. it uses less energy, has a lower carbon footprint, etc.?

Does the use of underground space still allow future development of underground spaces?

Now

Future

RE:LEGISLATE

THINK  
DEEP  
LEGISLATION





## LAND OWNERSHIP

## LIABILITY



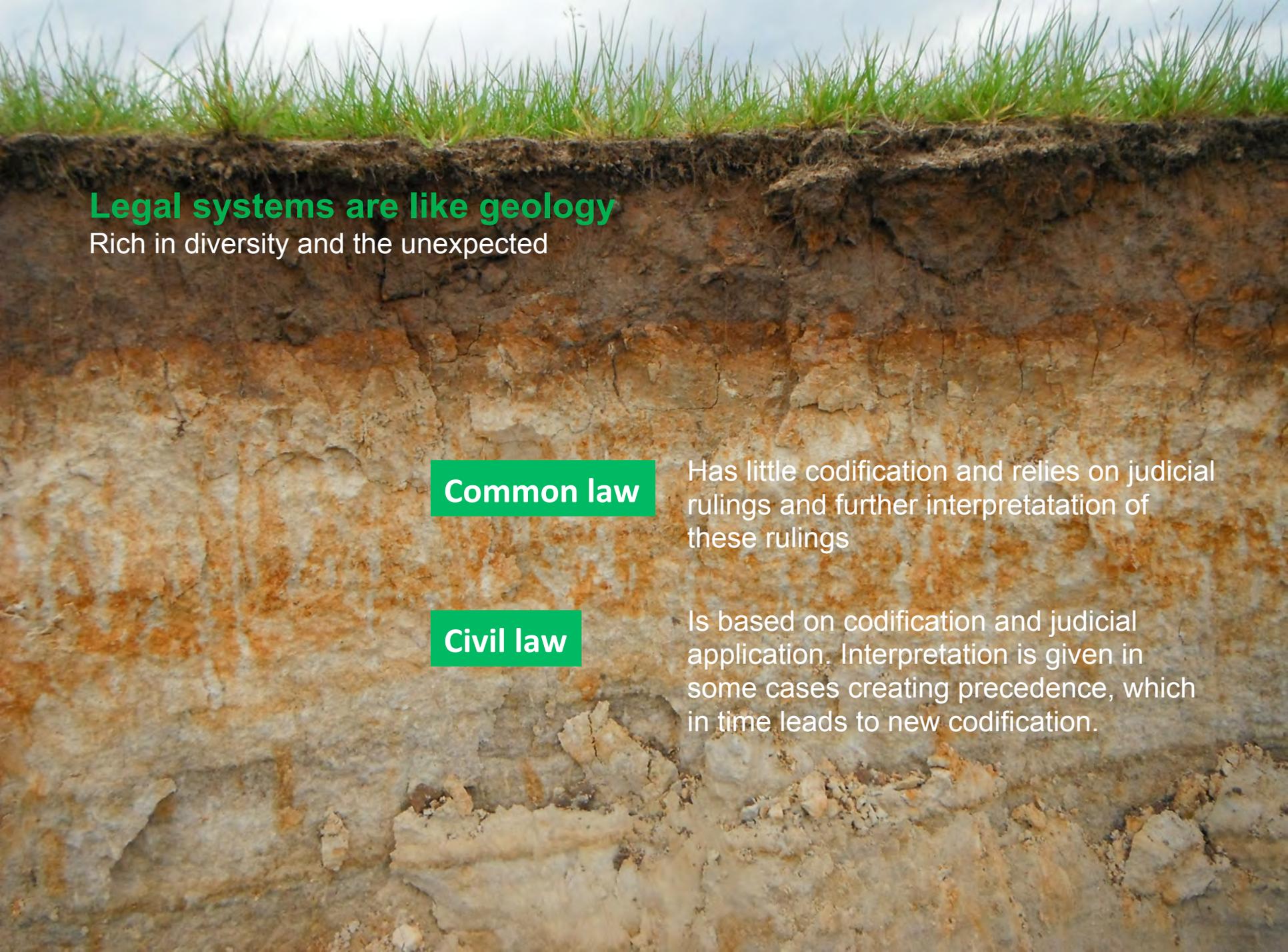
### **DISTRICT COUNCIL OF COOPER PEDY**

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### **Guidelines for the Construction of underground buildings in Coober Pedy**

## BUILDING CODES





## Legal systems are like geology

Rich in diversity and the unexpected

### Common law

Has little codification and relies on judicial rulings and further interpretation of these rulings

### Civil law

Is based on codification and judicial application. Interpretation is given in some cases creating precedence, which in time leads to new codification.

## Principle of accession

### **Superficies solo cedit**

*"... the surface yields to the ground*  
– Roman principle of law

## Principle of tenure

### **Cuius est solum, eius est usque ad coelum et ad inferos**

*"... whoever owns the soil, holds title all the way up to the heavens and down to the depths of the earth*  
– Medieval principle of law



## How have these principles evolved over time?

Tendency for limiting the exclusive air rights and subsurface rights

### Supreme Court case *United States v. Causby* in 1946

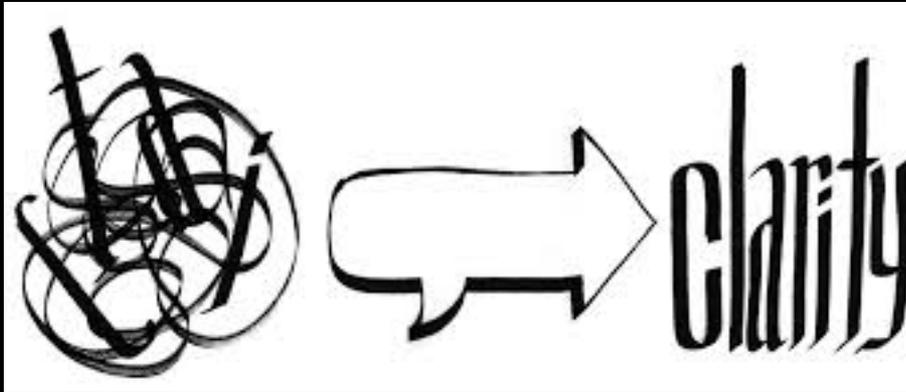
– Justice William O. Douglas

*"... if the landowner is to have full enjoyment of the land, he must have exclusive control of the immediate reaches of the enveloping atmosphere. Otherwise buildings could not be erected, trees could not be planted, and even fences could not be run"*

Thus a landowner "owns at least as much of the space above the ground as he can occupy or use in connection with the land," and invasions of that airspace "are in the same category as invasions of the surface."

This constitutes a clear limitation of the principle of landownership to the space required for **occupation or use.**





## Resolved ... or not?

- US case was cited in the High Court of England & Wales in 1976
- Although principle is sound, it has no universal application

Local legal system, ruling and legislation

Local geology

Layer of subsurface to be used and for what purpose

## Question of subsurface landownership

**1931:** US court rules that a sewer 150ft deep was not on land belonging to the home owner above.

**1946:** US Supreme court rules that transcontinental flights do not trespass on land below.

**1978:** High Court of England and Wales says aerial photography plane was not trespassing.

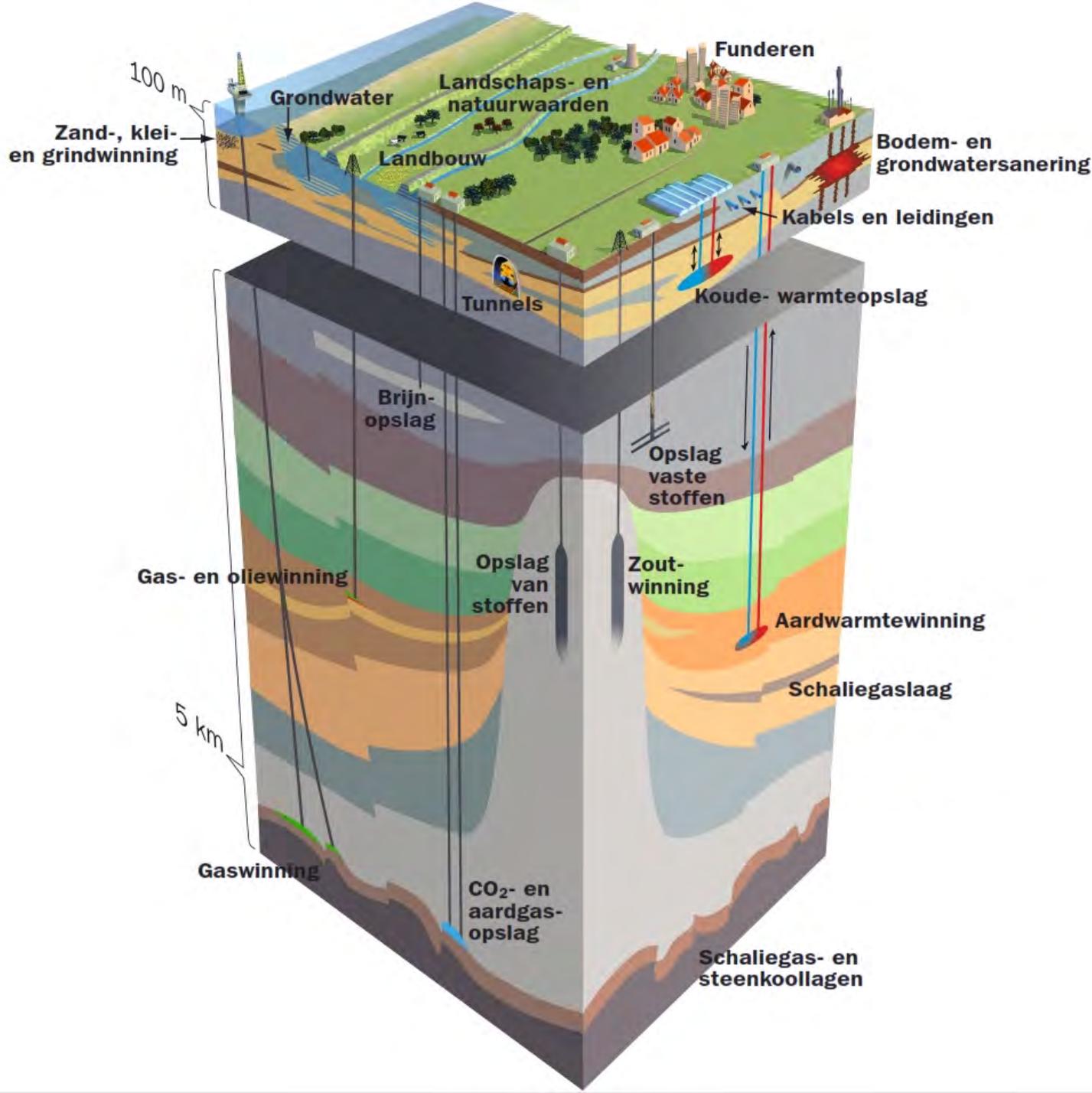
**2010:** UK Supreme Court rules that diagonal drilling down to 2,800ft from an adjacent plot of land is still trespassing under the surface.

Location, salvation, damnation  
<http://www.bbc.com/news/uk-politics-25742871>



# National master plan underground space

The Netherlands





## Placing a pipeline beneath land owned by party A

- if no settlement is made, the principle of accession leads to ownership by party A
- any settlement would need to consider restrictions on further surface use of the land owned by party A
- it would also need to consider liability of both parties in case of incidents



Legal instrument requiring codification  
and of use by **Government**

## The act of acquiring land by **Government** based on a legal mandate

- Eminent domain
- Compulsory purchase
- Resumption
- Resumption/compulsory acquisition
- Expropriation



Legal instrument requiring **private**  
**agreement** between parties

## Easement

- Party A as landowner allows party B certain rights
- In doing so party A is entitled to compensation
- Sometimes easement is by necessity





## Land acquisition

Specific legislation

### Crossrail Hybrid Act 2008

- The Secretary of State may acquire any land mentioned in the Act after the passage of the Crossrail Act 2008.
- Although there is a five-year limit on land acquisition, the Secretary of State may extend this power for up to another five years.
- In addition, private rights of way may be extinguished upon the passing of the Crossrail Act 2008 and the loss of these rights must be compensated.

### European Convention on Human Rights

Any deprivation of the rights of the owner of a property must be:

- in accordance with the law
- necessary in a democratic society
- proportionate

Generic legislation

### Japan: Deep Underground Space Act

- Depth greater than 40 meters or
- Depth 10 meters greater than the layer on which deep foundations rest
- In the case of public use, no compensation to the land owner is required.



## Easement



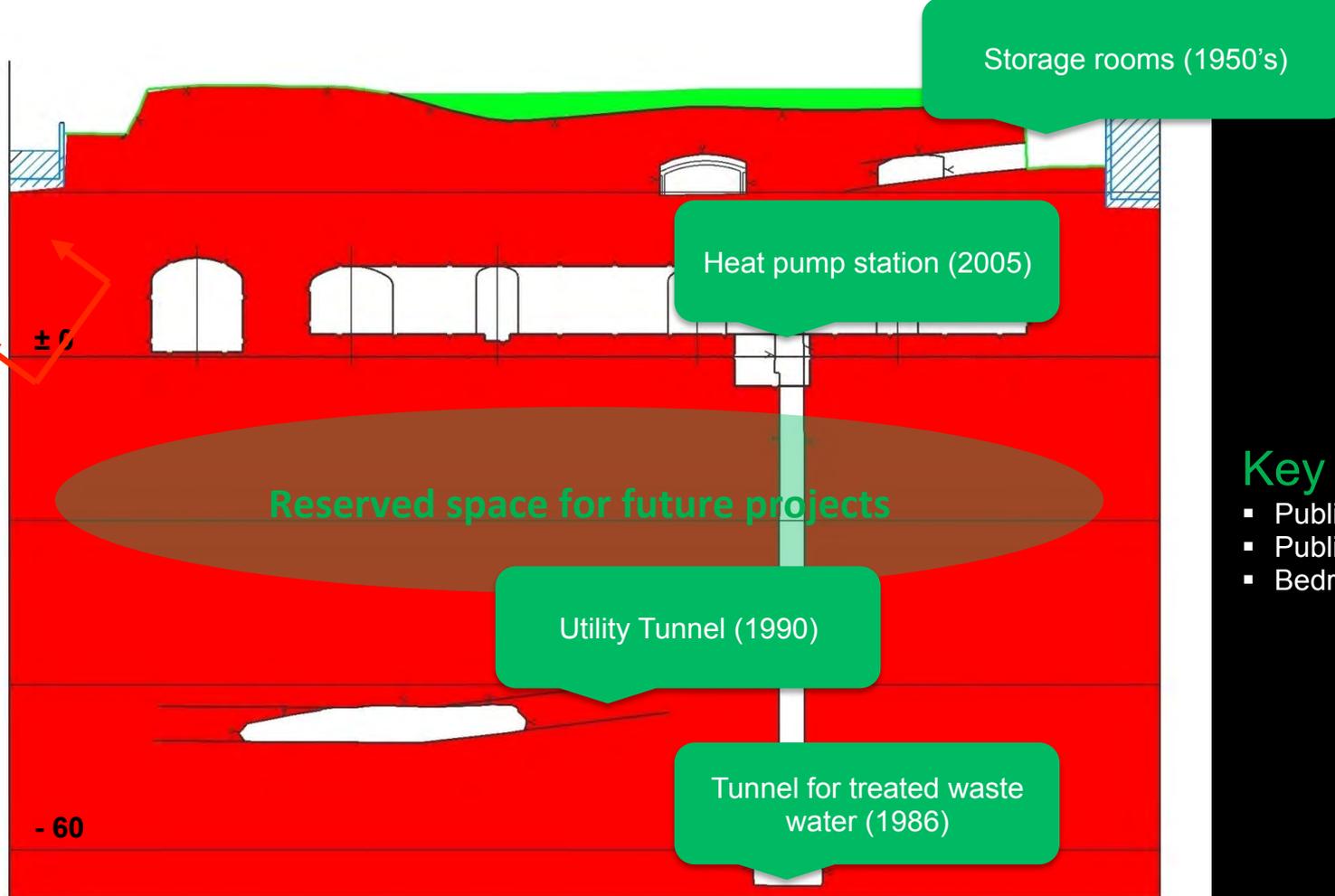
“At the time we bought it I didn’t know what an ‘easement’ was!”

## Case: LA metro

### Aspects considered in terms of determining compensation

- Impact on existing buildings (damages during construction or after construction)
- Impact on potential future development:
  - is construction above the tunnels legally or physically possible?
  - do the tunnels and their easements limit the potential density or scale of future development?
  - will construction costs be measurably increased as a result of the presence of the tunnels?
  - will limitations on subterranean parking negatively affect construction costs or building appeal and construction?





## Key Success Factors

- Publicly owned land
- Public utilities
- Bedrock geology

Change any one of the key success factors and its a totally different ball game



# CONCLUDING REMARKS

Urban underground space can and must play a vital role in our future cities

The planning of underground space requires a new planning approach

The subsurface is not an unknown quantity in legal terms.

Legal issues are situational and determined by the local legal system, past rulings and applicable legislation.

**The local geology is a determining factor in solving both planning and legal challenges**





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# THANK YOU!

Better Being  
Underground



han.admiraal@enprodes.nl  
acornaro@amberg.ch



**itacus**

for an urban underground future