SNOWMAN NETWORK
Knowledge for sustainable soils

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BALANCE 4P

BALANCE 4P: Balancing decisions for urban brownfield regeneration – people, planet, profit and processes

Workpackage 5

Harmonizing subsoil management in spatial planning: the Netherlands, Sweden and Flanders.

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Harmonizing subsoil management in spatial planning: the Netherlands, Sweden and Flanders.

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Introduction Balance4p

A difficulty for brownfield redevelopments is that in urban projects the responsibilities, tools and knowledge of subsurface engineering and urban planning and design are not integrated, they work together but sectorial. In fact, they are two
quite different fields with their own characteristics, language and perspectives, their activities are not taking place at the same time and they don't have the habitat of exchanging ideas about the opportunities and challenges of subsoil systems in
urban renewal. The urban designer is usually dealing with the opportunities for socio-economic benefits and the subsoil engineer with the challenges. BALANCE 4P aims at delivering a holistic approach that supports sustainable urban renewal through the redevelopment of contaminated land and underused sites (brownfields). In order to reach the overall aim, the specific project objectives focus on the application and assessment of methods for design of urban renewal/land redevelopment strategies for brownfields that embrace the case-specific opportunities and challenges; on the development of a method for sustainability assessment of alternative land redevelopment strategies to evaluate and compare the ecological, economic and social impacts of land use change and remedial technologies; and on the development of a practice for redevelopment of contaminated land in rules and regulations to enable implementations.
The different parts will be integrated into a decision process framework to support urban renewal through the redevelopment of contaminated land and underused sites. The framework will have a strong focus on integrating urban planning and soil issues, such as remediation decisions and will facilitate proper accounting for the soil functions currently under-considered in land management.

The main deliverables of the project are:
• A method for designing alternative land redevelopment strategies and visions for the cases on their specific questions and redevelopment.
• A method for sustainability assessment of land redevelopment strategies by evaluation of ecological (including soil ESS), social and economic impacts as an effect of land use changes and remedial strategy.
• An analysis of the possible changes or challenges for integrating the subsurface engineering and urban planning sectors by formal institutions (regulations), informal institutions (how things are usually done) and technological entrepreneurship (process of cooperation between the professionals).
• A decision process framework in the form of a flow chart showing which steps to take, suggestions on existing tools and methods as well as important communication and participation tasks in the different phases of an urban renewal project, including guidelines on uncertainty management.

Introduction work package

Urban designers are not used to taking the subsurface into a holistic perspective on spatial development. Nevertheless, the subsurface accommodates numerous functions crucial to urban life, such as infrastructure, carry capacity, heat, water, etc.. Moreover, it also carries the natural system crucial for urban quality and health. In the light of the current climate change, energy transition and the financial crisis these issues are more important for different reasons. The subsurface stores water, plays a role in cooling the city, provides geothermal warmth as renewable energy, and smart use of the subsurface can save considerable money. Besides,

urban renewal (brownfield development) is the preferred option over taking new land (greenfield development). Brownfields do not have an unexplored soil system, it is already used in many ways. Therefore ‘Urban design with the subsurface’ should be considered a new frontier in urban planning and design.

The neglect of the subsurface in spatial planning is due to the fact that responsibilities, tools and knowledge of subsurface engineering and urban planning and design are not integrated, they work on the same locations but divided into sectors. The urban designer is usually dealing with the opportunities for socio-economic benefits whereas the subsoil engineer deals with the technical challenges. Both on a practical level of building the city, as well as at policy level, ‘subsurface’ and ‘surface’ are separate realms. The aim of this report is to discuss this segregation in three countries that are active in integrating subsurface in urban development: Sweden, Netherlands and Flanders (Belgium). The main research questions are: What characterises these planning systems? How is the subsurface framed in these countries? A comparison is performed as the first step in learning and proposing better ways of integrating subsurface in urban planning and design, and vice versa.

There are many ways of carrying out as well as theorizing spatial planning, and planning practice is continuously changing. This contribution tries to provide descriptions of a status quo (2014) that identify key moments where it could be useful to integrate subsoil knowledge, technology and procedures in planning. The first section defines the field and identifies the sources that provide the framework for the description of spatial planning for each country. The following sections describe the main features, such as guiding principles, main institutions, legal framework and planning documents in the Netherlands, Sweden and Flanders. For every feature both aboveground spatial planning as well as the management of subsoil aspects are highlighted. The conclusions provide an overview of the main differences and overlaps. They demonstrate that soil legislation and management have an increased importance to adapt to climate change and energy transition. Finally and foremost, integration of subsoil in urban planning allows to (re-)develop cities with lower costs. This forms the basis for potential strategies for integrating subsoil decision-making with spatial planning.

1. Planning system, planning practice, planning culture

1.1 Definitions of planning

There are numerous definitions of spatial planning. One of the earliest definitions is as follows:

> *"Regional/spatial planning gives geographical expression to the economic, social, cultural and ecological policies of society. It is at the same time a scientific discipline, an administrative technique and a policy developed as an interdisciplinary and comprehensive approach directed towards a balanced regional development and the physical organisation of space according to an overall strategy."* [1]

This comprehensive definition from the European Regional/Spatial Planning Charter, adopted in 1983 by the European Conference of Ministers responsible for Regional Planning (CEMAT), is not workable, but it illustrates the complexity of the discipline. Planning is at the same time policy and practice, and it needs to be concerned with all aspects of social, environmental and economic development in a coherent way. Moreover, the different developments each have their own rhythm, for example financial conditions change much faster than demographic profiles or eco-systems and planning decisions that involve large investments or infrastructure take a long time to realize while the needs of society change rapidly. To plan 'according to an overall strategy' at all scale levels is therefore an illusion. Nevertheless, policy-makers articulate priorities that steer planning decisions and need to be implemented. The term 'spatial planning' is often used at the same time for both these decisions (the substance of planning) and the governance system (the process of planning). For example the European project for planning and climate change adaptation ESPACE states:

> *"Spatial planning is a process that assimilates and interprets evidence-based knowledge to inform those activities that aim to ensure spatial development takes place in an appropriate, sustainable way, from a functional, social, economic and environmental point of view."*[2]

For Balance4P[3], the main interest lies in the processes of planning, and this is what is referred to when discussing 'planning systems' [Nadin & Stead, 2003]. Moreover, the professional structure of planning does not only consist of formal, written procedures and regulations. The unwritten assumptions and concepts, for example about the role of inhabitants, the reliability of government or the importance of nature, forms culture of planning. These influences, as far as they are important for subsoil engineering, are investigated in the project Balance4P. This is done in workshops where stakeholders are looking into the integration of subsurface and surface together.

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[1] From: European Regional/Spatial Planning Charter adopted in 1983 by the European Conference of Ministers responsible for Regional Planning (CEMAT) www.coe.int/t/e/cultural_cooperation/environment/cemat/list_of_conferences/071_resol1983.asp January 2014

[2] www.espace-project.org/part1/part1_intro.htm#what March 2014

[3] BALANCE 4P is a project with a consortium from the Netherlands, Belgium and Sweden about developing holistic approach that supports sustainable urban renewal through the redevelopment of contaminated land and underused sites (brownfields). www.chalmers.se/en/projects/Pages/Balance-4P.aspx

Several organizations have made compendia of spatial planning systems in Europe. To structure the investigation, use is made of the Isocarp International Manual which features all partner countries of Balance4P [Ryser & Franchini 2008]. Furthermore, a comparative table created by the COMMIN Interreg IIIB project provides a useful framework to structure the comparison.[4] To describe planning systems, COMMIN uses 5 categories:

1. Constitutional
2. National scale
3. Regional scale
4. Local scale
5. Participation

For understanding the planning context, in the following sections its main features are described for the respective countries.[5] First the guiding principles and the objectives defined for planning are analysed. Second, the principal planning institutions are identified. Then the Planning Acts and other legally binding contexts are investigated and finally a summary of types of planning documents that are commonly used and generally recognised is provided. To fit the framework better to the Balance 4P project some crucial questions were added. For each scale the question if and how soil management here is handled. In order to make the link to the building practice, as an important part of urban development, the following questions are added under the heading practice:

1. Who initiates urban development?
2. What steps are taken into the process, related products?
3. What role does the government play in the development?
4. How is knowledge integrated in the plan and design process?
5. How is subsoil inserted in the development process?

These questions are important in order to understand how the planning system is brought into the plan process of an urban development.
The COMMIN system is quite general for the descriptions of planning systems and works very well for a comparison. However, to get a better grip on the relation between subsurface and surface in each country, a more detailed description of these systems was necessary. Here, the same levels are used for planning as for the four categories in the subsurface water, soil, civil constructions, energy (Hooimeijer & Maring, 2013). For each category the institutions, laws, policy/instruments and regulations are gathered, resulting in the mainframe shown in Table 1.1.

[4] www.commin.org accessed 16 Dec 2013
[5] For details, see the Excel table that we completed between the project partners.

Table 1.1. The mainframe for understanding and comparing the planning systems with regard to subsurface, expanding the COMMIN system.

	Institutions	Law	Policy/instruments	Regulations
Planning Europe, National, Regional, Local scale				
Water Europe, National, Regional, Local scale				
Soil Europe, National, Regional, Local scale				
Civil constructions Europe, National, Regional, Local scale				
Energy Europe, National, Regional, Local scale				

The three tables, one for each country, were used for a more detailed understanding, and comparison of the three planning systems. [6]

source for criteria: COMMIN THE BALTIC SPATIAL CONCEPTSHARE			BALANCE4P DEC. 2013	(version copied from Commins, checked by Kaln)	
			NETHERLANDS	SWEDEN	FLANDERS
			Spatial Planning	Spatial Planning	Spatial Planning
CONSTITUTIONAL	1 Planning legislation	Which types of by-laws exist outside the central legislative council(s) of the state and by whom are they adopted?	Municipalities have the right to enhance the national building law with local regulations (gemeenteverordening)	As laws, by-laws can only be decided by the parliament in the field of planning.	grond- en pandendecreet (social housing); vernieuwingsdecreet (voorkomen leegstand); woningbouwwet (Housing Act)
	2 State-municipal division	Which constitutional principle(s) regulating state-municipal relations exist and what is it called?	Planning Act (Wet Ruimtelijke Ordening)	State-municipal relations are regulated by municipal self-government.	Before 1970s, the Belgian Federal Government was the planning authority; this are now the regional governments. Brussels, Flanders and Walloon
	3 what are main responsibilties of:	state	Main responsabilities of the state are: legilative; Structure vision infrastructure & space	Main responsibilities of the state: national interests, sectoral planning.	Flanders planning system operates on a subsidiarity principle. Competences are regulated in 1996 Spatial Planning Decree
		regional and	Main responsabilities of the Provinces are: regional vision (Streekplan); check land-use plans against Streekplan; management of infrastructure; assist municipalities. Grant permits considering the middle deep layers.	Main responsibilities of the regional planning agencies: Guiding and scrutinizing Municipal comprehensive plans concerning national	Provincial plans are checked by the regional department; Provinces checks the municipal plans.

Figure 1: Table illustrating the COMMIN system

1.2 Definition of subsoil

In the Balance4P project “subsoil” includes everything below (land-)surface. In a Dutch project entitled “Manual for planning with the subsurface" different qualities were defined that the subsoil offers to the surface[7] and were organised in the following categories: carrying, information, regulating and producing(Figure 2).

[6] For details, see the Excel table that we completed between the project partners.

[7] www.ruimtexmilieu.nl Handreiking plannen met de ondergrond on www.ruimtexmilieu.nl is a website that is built in commission by former Ministry of Transport, Spatial Planning and Environment by H2Ruimte, TNO, Dauvellier Planadvies, MoceaN and Alterra. jaartal project 2012? Kan ik nakijken

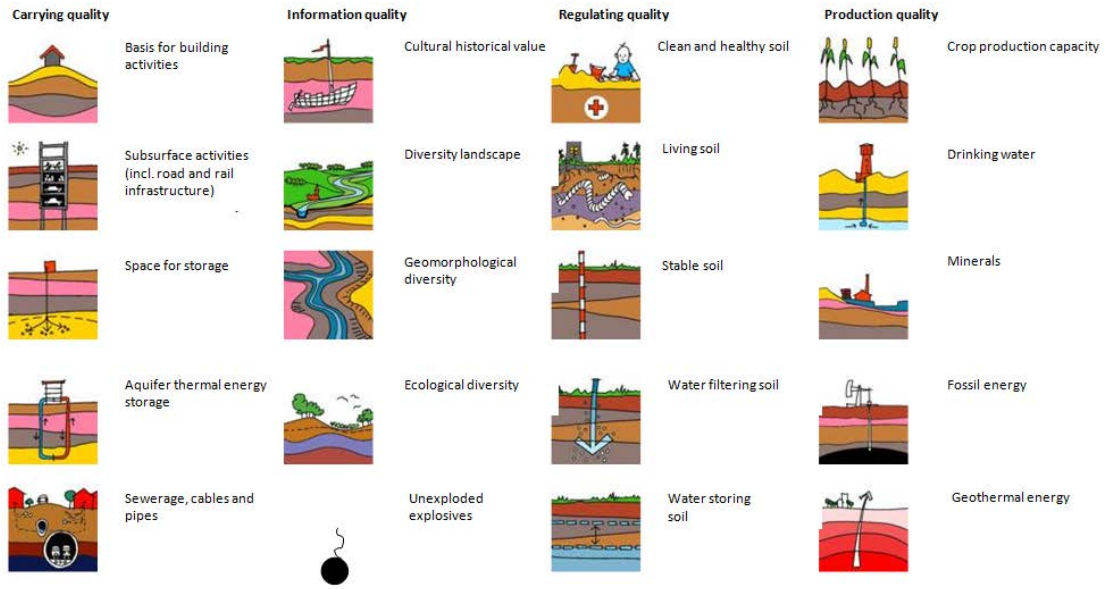

Figure 2: Subsurface qualities as defined in the “Manual for planning with the subsurface"

This ecosystem related view does not connect well with the perspective of spatial planning, and therefore another categorization was made in the project “Design with the subsoil” [Hooimeijer and Maring 2013] instead recognizing the categories:

- civil constructions (archaeology, explosives, underground building, cables and pipes, carrying capacity)
- water (infiltration, storage and drinking water resources)
- energy (aquifer and underground thermal energy storage, geothermal and fossil energy)
- soil (clean soil, soil life and ecology, crop capacity, diversity and geomorphology, mineral resources and underground storage)

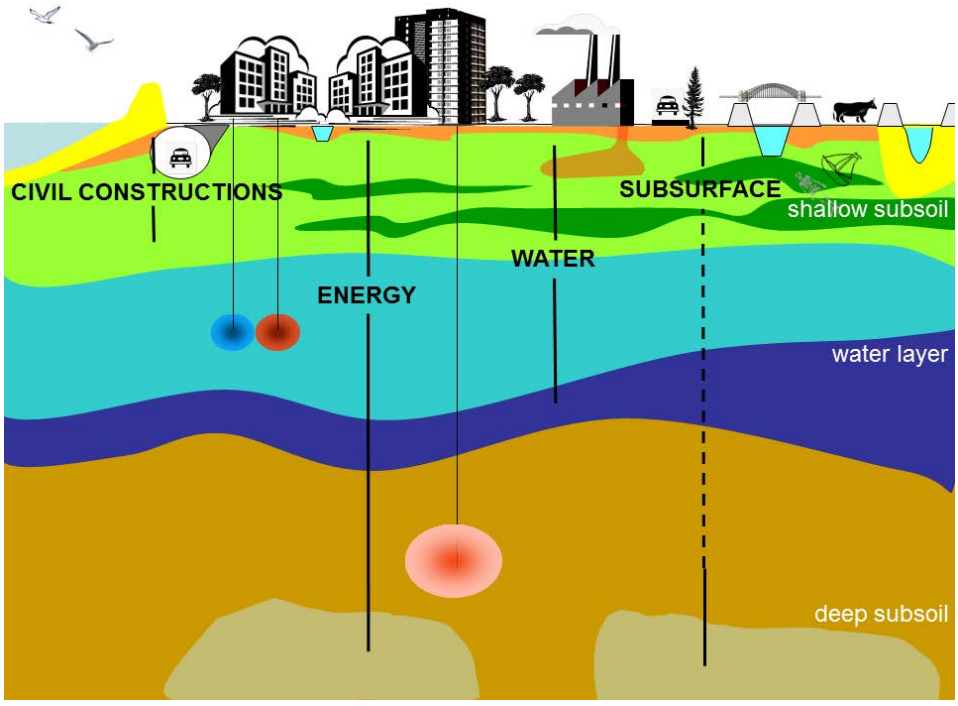

Figure 3: Location of subsoil themes in subsurface layers

These categories are used to connect the surface with the subsurface and are brought together in the model "System Exploration Environment and Subsoil" [Hooimeijer and Maring 2013]. The subsoil qualities that are in these categories are described in detail on the site [www.ruimtexmilieu.nl.](http://www.ruimtexmilieu.nl)

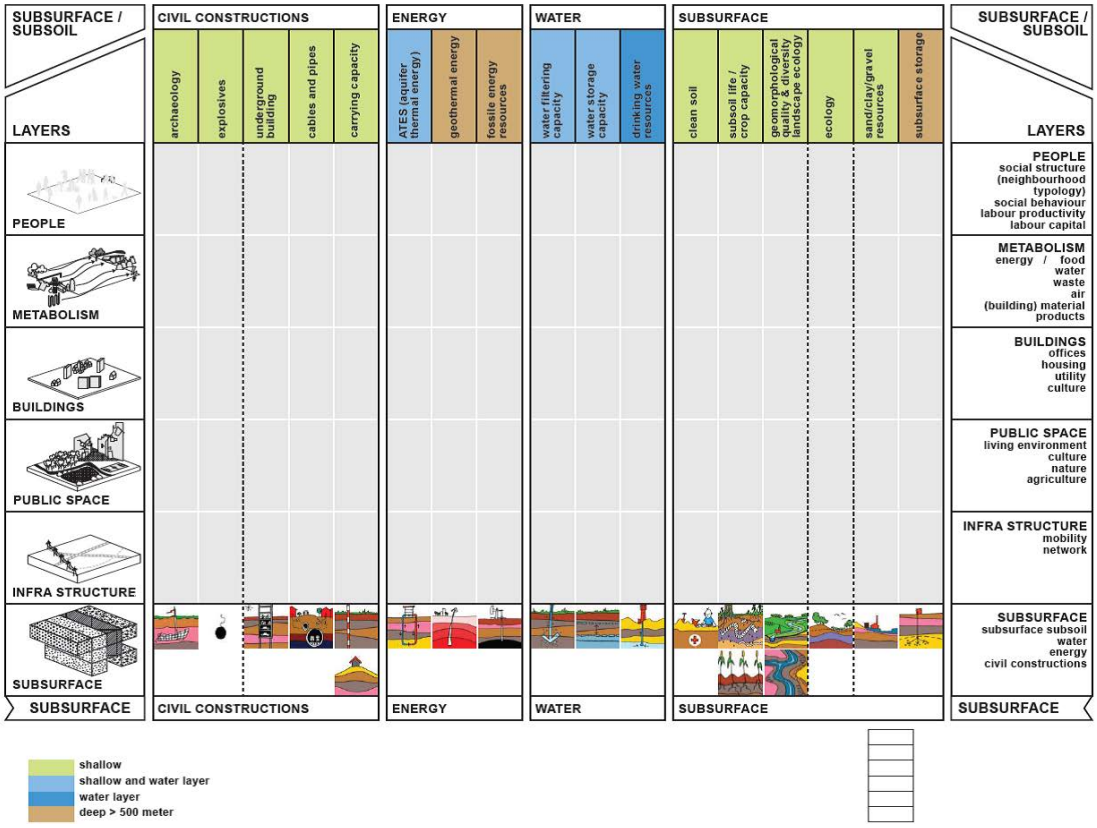

Figure 4: System Exploration Environment and Subsurface

2. Planning Systems: What are the guiding principles?

2.1 EU policies and regulations

Although the European commission has no formal authority for spatial planning, it has influence in member states like the Netherlands, Sweden and Belgium as a result of other sectorial policies and trans-border collaboration projects [Dühr et al 2010]. For example, the European nature conservation policy the NATURA 2000 network[8] and habitat[9] and birds[10] directives, have impact on planning both in surface and subsurface land use.

Moreover, there is a board of European Ministers of spatial planning, that published the first European Spatial Development Perspective (ESDP) in 1999. The ESDP (updated 2003) is not binding, but gives directions to achieve more territorial cohesion in Europe [Faludi 2006].

Civil constructions

For the subsoil management categories civil construction, water, energy, and soil, there are international agreements. One of the first specific subsoil related policies addressed a feature of civil construction: Archaeology. The Malta Convention was signed in 1992 by 47 European countries in order to protect archaeological sites buried in the soil or seabed. The Malta convention also provides for the incorporation of archaeological heritage into spatial planning and the funding of archaeological research on the principle 'the developer pays'. In the Netherlands, the convention is incorporated into the Monuments and Historic Buildings Act and the Archaeological Heritage Management Act.[11]

Water

The EU Water Framework Directive (WFD),[12] aiming at a "good status" for all waters, has quite a strong impact on the management of the river water system. Formerly water was managed in areas with administrative or political boundaries. The WFD uses a single system of water management: the river basin, the natural geographical and hydrological unit. The water basins can traverse national boundaries, which asks for close cooperation between authorities. There is also a daughter directive of the WFD: the Groundwater Directive introduces quality objectives, obliging Member States to monitor and assess groundwater quality on the basis of common criteria and to identify and reverse trends in groundwater pollution. (COM (2003) 550).[13]

Energy

The EU has agreed on Energy and Climate targets for 2020 and beyond to reduce greenhouse gas emissions, increase the share of renewable energies and improve energy efficiency the European Strategic Energy Plan (SET Plan) was agreed in 2007, and updated with a Communication on "Energy Technologies and Innovation" in May 2013 [EC 2013]. In

[8] http://bd.eionet.europa.eu/activities/Natura_2000/index_html
[9] Directive 92/43/EEC http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:31992L0043
[10] DIRECTIVE 2009/147/EC http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32009L0147
[11] www.cultureelerfgoed.nl/en/archaeological-monuments
[12] Directive 2000/60/EC http://ec.europa.eu/environment/water/water-framework/index_en.html
[13] Brussels, 19.9.2003 COM(2003) 550 final 2003/0210 (COD) Proposal for a DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on the protection of groundwater against pollution http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2003:0550:FIN:EN:PDF

Netherlands this is arranged by the Mining Act for fossil and geothermal and Adjusted Directive for ATES.[14]

Soil

There are directives considering waste (Directive 2008/98/EC on waste[15] and the European Directive on the Landfill of waste[16]). A proposal for a soil framework directive (Directive COM (2006) 232)[17] was rejected, but there is also a soil strategy (Communication COM (2006) 231)[18] set up by the European Commission (in which different threats for soil are described and measures are proposed, e.g. for soil sealing,[19] loss of organic matter, erosion, contamination. The directives have legal status and thus need to be taken into account by spatial plans in order to be approved.

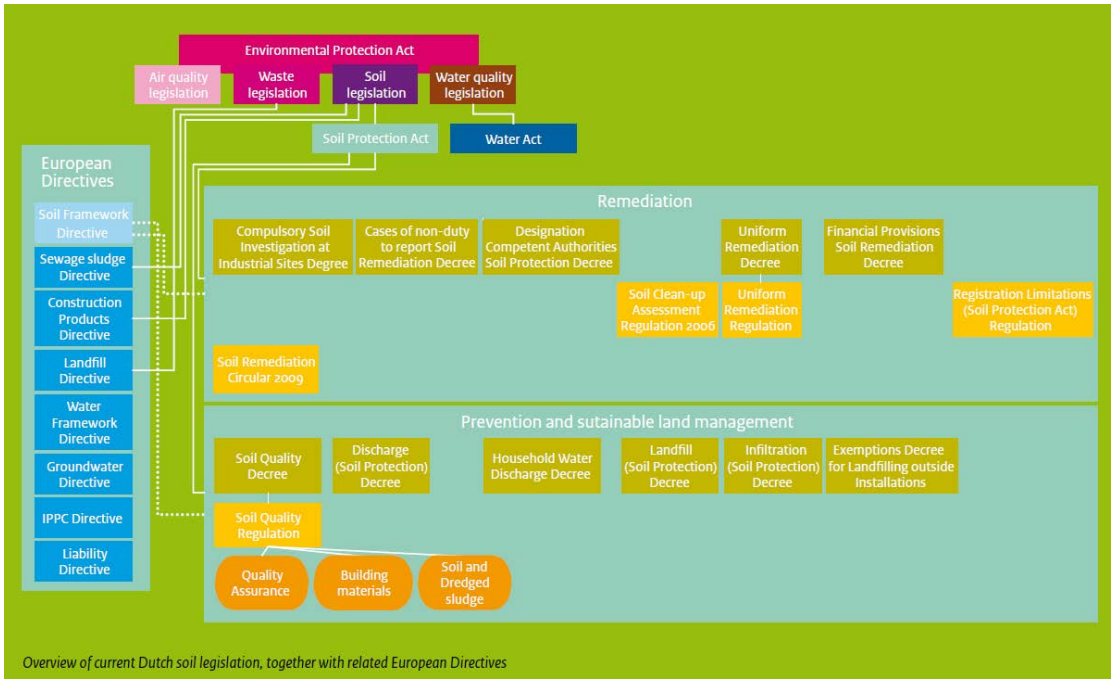

Figure 5: Soil "quality" regulation (source: Into Dutch Soils)[20]

2.2 Historical and cultural aspects

Netherlands

Because of its wet and soft territory The Netherlands has a strong tradition in governance from early days [Hooimeijer 2011, van der Cammen 2005]. Especially flood management, a main condition for spatial development, has been institutionalized and considered of national concern since the start of the Monarchy in 1814 [Van der Woud 1987]. It is said that the creation of polders brought with it the necessity for collaboration and the resulting 'polder

[14] http://www.rwsleefomgeving.nl/onderwerpen/bodem-ondergrond/bodemenergie/wet-regelgeving/
[15] http://ec.europa.eu/environment/waste/framework/
[16] http://ec.europa.eu/environment/waste/landfill_index.htm
[17] http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52006PC0232
[18] http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52006DC0231
[19] http://ec.europa.eu/environment/soil/sealing_guidelines.htm
[20] Ministry of Transport, Spatial Planning and Environment (2010) Into Dutch Soils. VROM 0164/april 2010 page 19

model' characterises the negotiation process of which 'poldering' is the verb [Lendering 2005].

Spatial planning in the Netherlands is seen as a public task for centuries and put into law in 1901 in the Housing Act. Traditionally, next to flood prevention a major issue concerns balanced territorial development. Since the 1970s planning had to respond to the new environmental policies and in the current neo-liberal era we see the government reconsidering their central role and diverting responsibilities to lower governments and the market. Presently a process of integrating sectorial domains is taking place in the Netherland. This is done at all governmental organizations, for example at national level by merging the ministries of water and spatial planning, at provincial level,where departments of soil and spatial planning are combined, and at municipal level where engineering and urban development departments have merged.

On the national level, in 2012, the Dutch Ministry of Infrastructure and the Environment (MinIE) issued the *Structuurvisie Infrastructuur en Ruimte* (Vision Infrastructure & Space; SVIR) to set priorities for the development of the territory until 2040.

Sweden

In 1810, land in Sweden became a tradable commodity through a law granting landownership rights to Swedes regardless of their social class. However, uncontrolled development of privately owned land led to urban sprawl, low hygiene standards, fire hazards, lack of space for public functions and speculations on the housing market (Blücher, 2013). The planning system was therefore established in the 1900s in order to ensure the balance between public and private interests with respect to land use through the control of the State. Public interests promoted and included in planning are health and safety, cultural and ecological values, environmental and climate aspects, social issues, aesthetics, resource efficiency and growth (Hedström and Lundström, 2013). The Environmental Quality Standards (*miljökvalitetsnormer*), which are mostly based on EU requirements, serve as an important instrument for achieving the national environmental objectives (*miljömål*) in planning. These objectives are e.g. "good built environment" (*god bebyggd miljö*) assuming consideration of the above-mentioned public interests in planning, and "non-toxic environment" (*giftfri miljö*) promoting an environment free of toxic substances[21]. Historically in Sweden, municipalities (*kommuner*) have a planning monopoly, i.e. spatial plans are formulated, approved and adopted at the local level. Planning and urban development is also connected to property formation (Kalbro and Mattsson, 1995). In the latest revision of the building and planning legislation (SFS 2010:900)[22], municipalities may define special regulations in the detailed plan (*detaljplanebestämmelser*) that specify property subdivisions (*fastighetsindelning*), land reserves (*markreservat*) for jointly owned facilities (*gemensamhetsanläggningar*), easements (*servitut*), utility easements (*ledningsrätter*) and similar. Until May 2011, these special regulations could be documented in a separate property subdivision plan (*fastighetsplan*) complementing the detailed plan.

[21] http://www.miljomal.se/Environmental-Objectives-Portal/
[22] http://rkrattsdb.gov.se/SFSdoc/10/100900.PDF

Belgium/Flanders

The planning system in Belgium is the responsibility of the Regions: Flanders, Brussels and Walloon. Since the state reform in 1980, the Federation has no constitutional powers regarding spatial planning, only some regarding environmental issues, and de facto, nowadays there exist three planning systems based upon regional autonomy. At the background of all three systems lies the (then national) Planning Act of 1962, and this inheritance is still present in legislation and district plans [IMPP 2008]. Until the 1970s, spatial planning in Belgium was a national issue. Guiding principle from that time was the functionalist approach of separating industrial, residential and leisure areas. Before the Urban Design Act (1962), Environmental Impact Assessment decrees belonged to the Municipal Law and there was no assessment procedure to see if they were carried out. Building and parcelling decrees made between 1962-2000 had to be checked by the King, and later the Flanders government. Since 2000, these urban design decrees are formalized by the provinces.[23] For changing parcels and changing function of a building a permit needs to be issued by the municipality.

In practice, the Flanders, Brussels, and Walloon regions can be considered as the national level. In the Balance4P project the comparison and cooperation is done with the Flanders Region, and the focus lies on spatial planning and soil management of that region. The basic principles for Flanders Spatial Policies Plan (2012) are the 'Productive Landscape', 'The Long Term, Uncertainty and Governance' and 'Welfare and Well-being'.[24]

[23] www.ruimtelijkeordening.be/NL/Beleid/Vergunning/Vergunningnodig

[24] www.beleidsplanruimte.be March 2014

3. What are the main institutions?

3.1 National

Netherlands-surface
In the Netherlands, legislation is made by central government and approved in the Senat (*Eerste Kamer*). Until 2010 there existed a Ministry of Transport, Spatial Planning and Environment (VROM) that issued National Spatial Strategies followed by so-called key-decisions with legal binding elements. After 2010, Spatial planning became the responsibility of the Ministry of Infrastructure and the Environment (MinIE) while housing was assigned to Internal Affairs.

Next to the ministries there are several research/planning offices such as The Netherlands Institute for Social Research SCP (*Sociaal Cultureel Planbureau)* and Netherlands Environmental Assessment Agency PBL *(Planbureau voor de leefomgeving)*, Environmental Impact Assessment Commission (*Milieu Effect Rapportage Commissie)* and *Staatsbosbeheer* (Forestry) for the stewardship and management of forests.

Netherlands-subsurface
Civil construction in the subsoil is represented in a variety of institutions: the Cultural Heritage Agency of the Netherlands (*Rijksdienst voor het Cultureel Erfgoed),* part of the Ministry of Education, Culture and Science, supervises Archaeology. The Municipal Platform of Cables and Pipes[25] as well as the Centre of Underground Building[26] support development of policy and technology considering cables and pipes. Water was for centuries the concern of the Ministry of Traffic and Water, which in 2010 has been combined with the Ministry of Spatial Planning into MinIE. The operational department of *Rijkswaterstaat* (Infrastructure) continues to be responsible for the development and management of infrastructure and water on the larger scale and setting the boundary conditions for urban development. Important knowledge institutions are *Deltares* (research institute for subsurface, infrastructure and water), RIVM (National Institute of Public Health and Environment), Alterra (research institute for our green living environment) and TNO-Geological Survey of the Netherlands. The MinIE is also responsible for soil protection. The Ministry of Economic Affairs is responsible for the mining activities. Fossil energy (oil, gas and minerals) as well as geothermal energy are both under the Mines Act about which The Ministry of Economic Affairs is the legal entity to address.

Sweden-surface
In Sweden the Parliament (*Riksdagen*) is the supreme political decision-making body appointing the Prime Minister who forms the Government (*Regeringen*). Similar to Belgium, the Government of Sweden has no planning competence. However, there are a number of governmental agencies which define national interests (*riksintresse*), directives (*föreskrifter*), and guidelines (*allmänna råd*) that must be considered in planning. National control over the implementation of such policies is executed by County Administrative Boards on the

[25] www.gpkl.nl/
[26] http://www.cob.nl/

county/regional level through supervision of decisions taken by municipalities at the local level.

The National Board of Housing, Building and Planning (*Boverket*) monitors the function of the legislative system related to planning, management of land and water resources, urban development, building and housing. The National Board of Health (*Socialstyrelsen*) issues recommendations regarding e.g. noise levels, ventilation and indoor air quality. Both these authorities are administered by the Ministry of Health and Social Affairs (*Socialdepartamentet*) and are supported by Advisory Boards consisting of delegates who are commissioned by the Government. The Swedish Environmental Protection Agency (*Naturvårdsverket*) administered by the Ministry of the Environment develops environmental policies and legislative initiatives, coordinates, monitors and evaluates efforts to meet national environmental objectives (see examples in Section 2.2), and provides guidance (*vägledning*) on e.g. environmental impact assessment (EIA, *miljökonsekvensbeskrivning*).[27] The Swedish Transport Administration (*Trafikverket*) develops long-term plans for the transport system on roads, railways and by sea and air and is administered by the Ministry of Enterprise, Energy and Communications (*Näringsdepartamentet*).

Despite the planning monopoly of municipalities, the State can interfere in municipal planning in order to protect structures of national interests, national resources and inter-municipal issues. This right has only been used once in the history, when a postal terminal was planned on the border between the municipalities of Stockholm and Solna against the will of the municipality of Solna in the 1970s (Blücher, 2013). Consensus in planning is instead typically reached through negotiations in the course of legally regulated procedures for participation and consultation which precede final binding planning decisions.

Sweden-subsurface

The Swedish Energy Agency (*Energimyndigheten*) engages in the use of renewable energy, improved technologies, smarter end-use of energy, and mitigation of climate change. Also *Energimyndigheten* is administered by *Näringsdepartamentet*. The Swedish National Heritage Board (*Riksantikvarieämbetet*), under the auspices of the Ministry of Culture, monitors legislation and disseminates information related to archeology, protection and preservation of cultural heritage and the historic environment. In addition to the above, *Naturvårdsverket* also oversees subsurface environmental conditions, in particular regarding soil protection and inventory of contaminated sites.

Similar to the Netherlands and Belgium, the Government has also commissioned governmental expert bodies to support and advise the County Administrative Boards and municipalities on the relevant issues. The Swedish Geotechnical Institute (*Statens geotekniska institut*, SGI), administered by *Socialdepartamentet* is a geotechnical and geo-environmental research institute responsible for geotechnical issues, e.g. relating to landslides and coastal erosion. The know-how of SGI is available for many sectors of society and comprises land use planning, foundation engineering and the technique of soil reinforcement, slope stability, ground energy, polluted land and sediments, re-use of by-products, field and laboratory investigations. The Geological Survey of Sweden (*Sveriges geologiska undersökning* SGU),

[27] http://www.naturvardsverket.se/Stod-i-miljoarbetet/Vagledningar/Miljokonsekvensbeskrivning/Innehall/

administered by *Näringsdepartamentet* is the state agency for issues relating to geology and hydrogeology. SGU promotes the use of geological information in planning and issues the permits for mineral exploration and extraction under the Mineral Act (*minerallagen*) of 1991.

Flanders-surface
Flanders operates on a system of three planning levels: the region, provinces and municipalities that work together on principles of subsidiarity and framework control. The spatial planning department (Ruimte Vlaanderen) is responsible within Flanders for spatial development. The Flanders Department for the Environment, Nature and Energy (*Departement Leefomgeving Natuur & Energie*) is responsible for topics related to environment, nature and energy. Environmental Impact Assessments are also hosted by this administration. Important administrations for water are the *Vlaamse Milieumaatschappij* (VMM, Flanders Environment Agency for the larger non-navigable waterways)[28] and the institute of Mobility and Public Works (navigable waterways).

Flanders-subsurface
The Flanders Department for the Environment, Nature and Energy is also responsible within Flanders for soil protection. More specifically topics as soil compaction, soil erosion, soil compaction and soil biodiversity are dealt by this administration. The *Openbare Vlaamse Afvalstoffenmaatschappij* (OVAM, Public Waste Company) is responsible for the operationalization of soil contamination policy.[29] Archaeology and the protection of cultural heritage is the responsibility of the Cultural Heritage Agency which is part of the Spatial Planning Department.

3.2 The Regional scale

Netherlands-surface
In the Netherlands the role of the twelve provinces is strong in spatial management but they are mainly advisory in development planning. Dynamic regions form special planning agencies to create inter-municipal Structure Plans in a cooperative body of stakeholders. The mandates these Regional Agencies are given depend on the participating municipalities and is not regulated by law. Most regional agencies strive to involve the private sector and to present transparency in their goals and budgeting.

Netherlands-subsurface
The provinces, together with the some larger municipalities, are the competent authority for soil remediation in the soil protection act. Provinces are also responsible for granting permissions for Aquifer Thermal Energy Storage (ATES) and (larger) groundwater subtractions. The Water Boards are responsible for the regional water system of ground and open water. Water Boards (nowadays 24) are the oldest Dutch form of government already established in the 14th century when the forces to defend from the water were joined.

Sweden-surface

[28] www.vmm.be/
[29] www.lne.be/themas/beleid/mina4/leeswijzer/themas/bodemverontreiniging www.lne.be/organisatie/structuur/afdeling-land-en-bodembescherming-ondergrond-natuurlijke-rijkdommen 10 April 2014

There are 21 counties in Sweden that have two organisations with different obligations, the County Administrative Board [*Länsstyrelsen*] and the County Council [*Landstinget*].

It is often said that the County Administrative Board is the link between the local and the national/state level, as it represents national government locally and local interests nationally. The county administration has no planning competence but gives advice and provides background materials to the municipalities as well as ensures that the planning is suitable with regard to:
1) national interests [*Riksintressen*],
2) coordination issues between municipalities,
3) environmental quality standards,
4) protection of shorelines, and
5) human health and safety, risks for accidents, flooding or erosion.

The County Administrative Board addresses appeals linked to municipal planning, and is also, together with *Boverket*, responsible for following up on implementation of decisions and regulation. The results of EIA are examined on the regional level during examination phase (*utställning*) in the planning process. There is usually a separate department (the names differ) at County Administration Boards dealing with environmental issues.

The County Councils are regional political bodies but regional planning is only undertaken in two regions: for the Stockholm region by the Stockholm County Council (*Stockholms läns landsting*), and to some extent for the Region Västra Götaland through the Gothenburg Regional Association of Local Authorities (*Göteborgsregionens komunalförbund*) active in the Gothenburg metropolitan area. The former has planning competence and produces a regional plan, whereas the latter only develops regional development strategies (*regionala utvecklingsstrategier*). Neither of these planning documents have any legal status but serve as guides for the municipalities' own planning.

Sweden-subsurface
At County Administrative Boards, different departments (organization and names differ depending on counties) are responsible for issues associated with e.g. archaeology, cultural reserves and landscape preservation, as well as water management, contaminated soil and radon/radiation. The County Administration Boards perform inventory and registration of contaminated sites in the national information system for contaminated soil (*EBH-stödet*)[30] and are also engaged in coordination of interventions. Additonally, the County Administration Boards oversee hazardous activities, such as energy facilities, quarries and mines.

Flanders-surface
Flanders consists of five provinces that as described in the former paragraph play a role in the three step subsidiarity system of structure plans. In this way the interaction between national, provincial and municipal level is ensured. The provinces make the provincial *Ruimtelijke uitvoeringsplannen* (RUP, spatial implementation plans) and assess the municipal RUP's.

[30] http://www.lansstyrelsen.se/vastragotaland/SiteCollectionDocuments/Sv/publikationer/2011/2011-51.pdf

The provincial institute POM (provincial development agency) gives advice on economic development and spatial planning for industrial areas.

Flanders-subsurface
The provinces have no specific role related to the subsurface. Municipalities directly contact Flemish administrations as OVAM and LNE, who frequently have provincial departments.

3.3 Local

Netherlands-surface
There are at present 403 municipalities in the Netherlands,[31] whose City Councils approve major planning decisions such as zoning plans and urban (re-) development. Decisions are prepared in planning departments, for smaller municipalities with support from the provincial planning department. Consent for the modification of land-use or building permits are issued at municipal level.

Netherlands-subsurface
For the subsoil, several larger municipalities are competent authority for soil remediation in the soil protection act.[32] For small municipalities, this is transferred to the province. The use of the shallow subsurface is very much related to the zoning or land use plans (*bestemmingsplannen*) for spatial planning. The municipalities or regional environmental services grant permits for some activities in the subsurface with the before mentioned land-use or building permits.

Sweden-surface
There are 290 municipalities in Sweden of varying size with regard to surface area and number of inhabitants. The decentralized municipal monopoly on spatial planning is a distinctive feature of the Swedish planning system giving the municipality an ultimate authority to decide on its plans. Unless appealed, the County Administration Board (at the regional level) can only object on limited aspects of the plan proposals (see Section 3.2). The Planning and Building Committee (*byggnadsnämnd*) at the municipality is responsible for planning and approval of plans, and in large municipalities closely works with Property Management Committee (*fastighetsnämnden*) and Transport Committee (*trafiknämnden*). The former is responsible for housing policy and development of municipal land, as well as assessment of land demands for housing, industry and commerce[33]. The latter is responsible for the urban transport infrastructure. EIA is carried by the Planning and Building Committee in cooperation with the Environment Committee (*miljönämnden*) at the municipality and in consultation with the County Administration Board and neighboring municipalities.

Sweden-subsurface

[31] www.vng.nl/vereniging/leden accessed 23 January 2014
[32] http://www.bodemloket.nl/bevoegd_gezag_wbb
[33] http://goteborg.se/wps/wcm/connect/7ed6d68042185acfa8c5ab6f1cf2ff43/Bobyggprocessen_090513_webb.pdf?MOD=AJPERES&CACHEID=7ed6d68042185acfa8c5ab6f1cf2ff43 [assessed 7.11.14]

Various departments at the municipality have competences and responsibilities related to the subsurface, and their names and organization differ between municipalities. For example, in the City of Gothenburg (*Göteborgs stad*) it is the Environment Department (*miljöförvaltningen*) under the Environment and Climate Committee (*miljö och klimatnämd*) that works with issues related to contaminated soil. The Public Water and Waste Water Department (*kretslopp och vattenförvaltningen*) under Public Water and Waste Water Committee (*kretslopp och vattennämnden*) deals with sewerage and water supply systems[34]. The Property Management Department (*fastighetskontoret*) under Property Management Committee (*fastighetsnämnden*) has competence on geotechnical issues and public utilities, such as water and sewerage mains included in a public water and sewerage facilities, district heating mains, high-voltage power lines, public telephone lines and public low-voltage lines.

Note that contaminated soil related issues are handled on both municipal and regional levels, but since the division of responsibilities is not clear in the legislation the Swedish Environmental Protection Agency is currently inquiring into this issue.[35]

Flanders-surface
In Flanders the 308 municipalities are obliged to have a spatial structure plan, called RUP, however these are also drawn up at provincial level because a number of spatial issues are of a supra-local nature (but not necessarily of a Flemish/regional nature). Local councils approve municipal spatial implementation plans as elaboration of the municipal spatial structure plan.

Flanders-subsurface
Little activities related to subsurface are performed by municipalities. The Regional Soil Decree protects potential buyers of land at the local level for issues related to soil pollution. This is governed for the entire region by OVAM. Municipalities have no authority and can only provide advice on the steps land owners have to take. Soil investigations and remediation is performed by private companies, who are officially recognized by OVAM.

[34] http://goteborg.se/wps/wcm/connect/a071d2e4-5e80-42b2-8752-2ba97f66aa75/G%C3%B6teborgs+Stads+organisation_140508_detaljerad.pdf?MOD=AJPERES [assessed 7.11.14]
[35] http://www.naturvardsverket.se/Miljoarbete-i-samhallet/Miljoarbete-i-Sverige/Regeringsuppdrag/Redovisade-2014/Tillsynsansvar-over-fororenade-omraden/)

4. Which legal framework needs to be taken into account?

4.1 National / overall legal framework

Netherlands-surface
The first *Wet Ruimtelijke Ordening* (WRO, Spatial Planning Act) of the Netherlands dates from 1965 and its current version from 2008. Public authorities at all scale levels are obliged to publish new plans online, the digital version even prevails if there is a discrepancy with the paper edition.[36] In the Netherlands, the overarching environmental legislation is provided in the Environmental Protection Act that first came into effect in 1993. The act sets general regulations for water, air, soil and waste.[37] A number of sectorial laws also influence planning as they have a spatial component, for example *Wet Geluidshinder* (noise) that defines norms especially for residential areas, or *Transport Gevaarlijke Stoffen* (dangerous goods transport) that is related to road profiles.

Netherlands-subsurface
The main legislation concerning the subsurface that need to be taken into account by spatial planning are the Monuments and Historic Buildings Act and the Archaeological Heritage Management Act, the Water Act, Environmental Protection Act, the Mines Act, the Excavation Act, Soil Protection Act and Nature Protection Act.
The main water governance structure is described above, for water filtering and water storage there is no specific regulation but should comply with regulation as stated in the Water Act. Extraction of drinking water or (on smaller scale) process water has been regulated in the Water Act. Spatial protection zones for drinking water are designated: water winning areas and groundwater protection areas, the latter is taken up in the Environmental Protection Act that also obliges municipalities for taking care of their sewer system.
The Mines Act was established already in 1810 and replaced in 2002. This act concerns the mining of fossil fuels and minerals below 500 meter. The Soil Protection Act was established in 1987. The immediate cause was the discovery of some seriously contaminated sites such as *Volgermeerpolder* and the residential area *Lekkerkerk*. In those early years, remediation consisted of excavation of the whole area, an expensive operation. In the following years, the regulation contaminated sites developed to the current practice, a more cost-effective risk-based approach. Subsurface storage (>100m) is subject of the Mines Act and moving contaminated soil is regulated by the soil quality decree.[38]
The earlier mentioned sectorial integration process is also applied in the legal framework: all sectorial acts are brought together into one comprehensive Environmental Act (*omgevingswet*) in order to simplify procedures and permits. The new act is under construction and in 2014 the draft texts are presented.

Sweden-surface
National interests (*riksintressen*) in Sweden are regulated through thirteen different laws and examples are areas of particular environmental or cultural values of national importance, or of

[36] www.ruimtelijkeplannen.nl [accessed…..]
[37] Ministry of Transport, Spatial Planning and Environment (2010) Into Dutch Soils. VROM 0164/april 2010
[38] www.bodemrichtlijn.nl/Bibliotheek/beleid/beleid-van-centrale-overheid/landelijk-beleid/beleidsblad-besluit-bodemkwaliteit-grondstromen [accessed…..]

importance for infrastructural development, such as roads, railways, and energy supply, or for fisheries, and reindeer husbandry. The Swedish Planning and Building Act (2010:900) [PBL – *Plan och Bygglagen*] dates back to 1987 and its current version to 2011. It states that the purpose is to enhance a societal development with equitable and good social living conditions and a good long-term sustainable living environment for people today and for future generations, while taking the freedom of the individual human being into account. It regulates the planning of land and water resources, as well as buildings and also governs the distribution of responsibilities between municipalities and the national government. PBL refers to the Environmental Code (1998:808) (*miljöbalken*) in several places, e.g. regarding resource management, environmental quality standards, EIA, shorelines, and soil contamination. The Environmental Code aims at supporting a sustainable development that builds upon the principle that nature has a protection value and that the human right to change and use nature is strongly associated with a responsibility to manage nature in a good way. Other relevant regulations include the Housekeeping Ordinance (*hushållningsförordningen*), linking the Environmental Code and the Planning and Building Act regarding preservation of natural resources. Planning of highways and railways is a national issue under the Road Act (*väglagen*) of 1971, whereas planning of streets and local roads is the responsibility of municipalities.

Sweden-subsurface

Use of the subsurface is a subject to legal regulation, e.g. installation of pipelines for district heat, gas, and crude oil requires a concession from the Government (or authority appointed by the Government). Special regulations also apply to the extraction of natural resources, e.g. use of water, minerals, peat deposits and the continental shelf is regulated. Legislation related to the subsurface can be divided into four groups: (*i*) “soil and groundwater quality” regulated by the Environmental Code (*miljöbalken*); (*ii*) “archeology” regulated by the Heritage Conservation Act (*kulturmiljölagen*) of 1988; (*iii*) “use of natural resources” regulated by the Water Act (*vattenlag*) of 1983, the Mineral Act (*minerallagen*) of 1991, the Peat Deposits Act (*lagen om vissa torvfyndigheter*) of 1985, and the Continental Shelf Act (*lagen om kontinentalsockeln*) of 1966; and (*iv*) “underground installations” regulated by The Pipelines Act (*rörledningslagen*) of 1978, the Water and Sewerage Act (*lagen om allmänna vatten- och avloppsanläggningar*) of 1970, the Electrical Installations Act (*ellagen*) of 1985, the Telecommunication Ordinance (*teleförordningen*) of 1985 and the Public Heating System Act (*lagen om allmänna värmesystem*) of 1981. By starting the development of nuclear power and hydro power in the 1970s and bioenergy in the recent decades, Sweden minimized the dependency on imported fossil fuels. The heating sector, to a large extent district heating, is practically fossil fuel free as a result of the increased use of biomass and heat pumps. In the electricity sector the main sources of energy are also hydro power and nuclear power, as well as wind power. Through the Municipal Energy Planning Act (*lagen om kommunal energiplanering*) of 1977, the State has obliged municipalities to develop a separate plan for the supply, distribution and use of energy. Similar to the Netherlands, extraction of ground water is regulated by the Water Act. As well as in the Dutch case, Swedish sewerage systems are the responsibility of the municipalities but under the Public Water and Waste Water Plant Act (*lag om allmänna vattentjänster*) of 2006. In contrast to the Netherlands, the water protection zones are regulated by the Planning and Building Act.

Flanders-surface

Flanders approved its Spatial Planning Decree in 1996. Further legal framework consists of a

system of plan ‘costs and profits’ as well as ordinances, which are aimed for example at the construction-physical quality of buildings, the thermal and acoustic qualities, the maintenance of the road network, the construction of public utilities, disability access. These ordinances also can be issued at the three levels of Flanders, provinces and municipalities; the lower administrative levels have to align themselves with the higher levels.

Flanders-subsurface
The main legislation in Flemish soil policy is the Flemish soil remediation decree, drawn up in 1995 and updated in 2006. The headline of the Flemish soil policy is that all historical soil pollution has to be treated by 2036 and that all new pollution has to be prevented or be treated immediately. In Flanders, a lot of soils were contaminated by former uses (e.g. industrial activities). Because soil pollution poses a threat to both public health and ecosystems, the Flemish region has introduced in 1995 the soil remediation decree. The most essential topics in the decree are the land information register, the soil certificates and remediation. The land information register gives an overview of the contaminated sites in Flanders. Anyone looking to transfer land must have a soil certificate. The soil certificate informs and protects the buyer and gives an overview of all relevant information available on the land in the land information register (previous investigations performed on the site). A soil investigation is required for the transfer of ownership of a risk area, periodically or for the termination of a risk activity. Different phases are foreseen in the process: a preliminary soil investigation, a descriptive soil investigation, a soil remediation project and soil remediation works. If the preliminary soil investigation indicates a soil or groundwater contamination, OVAM orders a descriptive soil investigation.
The Brownfield decree (2007) stimulates the redevelopment of brownfields by setting up a brownfield covenant. In a brownfield covenant agreements are made between the Flemish Government, the project developer and/or land owner, investors and other authorities involved and this in such a way that at the start of the brownfield project there is clarity about certain temporal and procedural requirements and expectations. The brownfield covenant promotes the cooperation and synergy between the various project stakeholders and also provides some financial and tax benefits for redevelopers.
Other important legislation relates to Decrees on Environmental Protection (VLAREM – VlaamsReglement Milieuvergunning), Integrated Water Management, Materials, Environmental Impact Assessment, Environmental Liability, Cultural Heritage and other subsoil topics that are under investigation.

4.2 Binding land-use and other functional regulators

Netherlands-surface
The association of Dutch Municipalities (VNG) publishes *modelverordeningen*: models that set the terms and standard for regulations, which municipalities use as such or adapt to local situation. *Bestemmingsplannen* (Land Use or Zoning Plans) are the key-documents for spatial planning, and in Dutch spatial planning the only document that is legally binding. These plans are rather dominant since the zoning of an urban district then is the base for the building codes that are connected to these zones. These regulations are quite strict preventing for example flexible and mixed use of areas. Each municipality also has a *Welstand* (commission of aesthetics) that assesses the architectural quality of building plans.

Structure Plans of the Provinces are not legally binding but are setting the larger scale conditions that are usually incorporated in *Streekplannen* (regional plans). Provinces are obliged to have regional plans and zoning plans, urban development plans and building applications are checked to fit the intentions of the *Streekplan*.
The Dutch *Bestemmingsplannen* contain at least a map, showing the area concerned; a set of rules and requirements and an explanation. The earlier mentioned *Structuurvisie* (structural vision) can be made at any of the three governance levels and is a common type of document that unites the results of a number of research reports and maps. Statistics and surface-analyses schemes generally inform development plans. Urban and landscape planners and designers frequently make use of drawings and artist impressions to explore scenarios of spatial development.

The *Structuurvisie* and Zoning Plans need to go through the Environmental Impact Assessment (EIA) procedure. The main purpose of the EIA is to ensure that decision makers have all necessary information. Even though the advice of this national advisory institute is not binding, a negative advice is usually a strong base for preventing these plans through a court order. However, when a plan is assessed to have negative effects on the environment, it may still be build, depending on the decision makers.[39]

Netherlands-subsurface
For subsurface, different "planning instruments"[40] are available related to the specific use functions of subsurface that are ordered in the categories civil construction, water, energy and soil. In (re)developments and building activities for civil constructions, as well as for unexploded ordnance (UXO), the Archaeological Heritage Management Act has to be taken into account. For UXO there are methods available such as risk maps and methods for detection. Until now, subsurface constructions are treated similarly to above ground and need to meet criteria of Zoning or Land Use Plans and the Building Act.

Cables and pipes have to be registered in the KLIC system by law.[41] Next to that (non-legal) sources with soil data exist, such as *bodemloket* [42] with information on soil quality and www.aardkunde.nl with geomorphological information. In the "Information Exchange Subsurface Network Act" (WION), all mechanical interventions in the soil (including the application of cables and pipes) have to be reported. Next to that there is a vision for major pipes.[43] Finally, some larger municipalities (Rotterdam) and *Rijkswaterstaat* have their own regulation for the (diversion of) cables and pipes.

The categories of water and energy are controlled by respectively the Water Boards and Provinces. Water protection areas are taken up in the provincial spatial plans, environmental and/or water regulation plans. ATES systems need some spatial planning because of possible interference between systems. Application of ATES is regulated in the soil energy systems

[39] www.mer.nl
[40] www.ruimtexmilieu.nl/wiki/ondergrondlaag/wiki/ondergrondlaag/ondergrondkwaliteiten-2
[41] www.kadaster.nl/web/Themas/Registraties/KLIC.htm
[42] www.bodemloket.nl
[43] www.ruimtelijkeordening.be/NL/Beleid/Planning/Verordeningen

decree.[44] All provinces have soil regulation. After broadening the scope from soil protection to soil management (soil policy letter of 2003), the provinces prepared "soil visions" that outline their soil management policy.[45] In many occasions (Drenthe, Groningen, Utrecht, Overijssel, Brabant and Zuid-Holland), the provinces also prepared a structure vision for the subsurface that is only binding for the province itself. Most provinces facilitate the local authorities with soil information or guidelines for soil management.[46] In Utrecht the Framework subsurface was just adopted in April 2014 to have more control over the intensive use of the subsurface and organise better the new forms for energy, drinking water and remediation and mining activities in deeper layers (geothermal and shale gas).[47]

In the category soil for soil life / crop capacity there are no "planning instruments". However, there is regulation on the application of fertilizer and nitrate and phosphate, related with soil quality. Geomorphological quality and diversity and landscape ecology have no planning instruments. In some cases geomorphological values can be part of cultural historical landscapes that can have a protected status (Nature protection act). Provinces can appoint "geomorphological monuments", however these have no legal status. Excavation of sand, clay, gravel resources is arranged by multiple actors: in most cases provinces and *Rijkswaterstaat* are responsible according to the Excavation Act (*Ontgrondingenwet*) and the Environmental Protection Act (*Wet Milieubeheer*). Municipalities are responsible when Zoning Plans have to be changed for excavation on land (Spatial Planning Act).

New in the Netherlands are the *structuurvisies* for subsurface (National: STRONG and on province level). Shallow subsurface is arranged in close cooperation with the aboveground in the *Bestemmingsplannen* (zoning plans).

Sweden-surface

All municipalities are required to have a municipal comprehensive plan (*översiktsplan*) where comprehensive issues and public interests are addressed. The comprehensive plan shows how national interests and environmental norms are secured and serves as visionary and/or strategic document for the long term development of the municipality. It is usually revised every 5-6 years. Parts of a comprehensive plan may also be developed with more local specificity and detail (f*ördjupad översiktsplan*). Comprehensive plans are not legally binding but need to be translated into the legally binding detailed plan (*detaljplan*) in urban areas or legally binding special area regulations (*områdesbestämmelser*) mostly outside urban areas. Such plans are used to reserve space for recreational amenities and communication routes, to delimit restricted areas and safety zones and to impose restrictions on land and water use. The detailed plan (*i*) governs how smaller areas in the municipality can be developed with regard to buildings, and the use of land and water, and (*ii*) forms the basis for granting the building permit (*bygglov*) for erection of new buildings and the demolition permit (*rivningslov*) for complete or partial demolition of the old ones, for tree felling and establishing of timber stands. The detailed plans should comply with the comprehensive plan which in turn should

[44] www.infomil.nl/onderwerpen/klimaat-lucht/handboek water/activiteiten/oppervalktewater/bodemenergiesystemen/
[45] www.platformbodembeheer.nl/upload/documents/Platform%20Bodembeheer/archief/overzicht_posters_visies.pdf
[46] www.zeeuwsbodemvenster.nl/bodemgebruik/zeeuwse_bodem and www.drenthe.info/kaarten/website/geoportaal/.
[47] www.ikcro.nl/php/redirect.php?url=www.provincie-utrecht.nl/actueel/nieuwsberichten/@281589/ps-stellen-kadernota/#backlink

comply with the regional plan (if any). Development of both the comprehensive and the detailed plan includes series of consultations (*samråd*) of the municipality with the County Administration Board, neighbouring municipalities, the public and other stakeholders. When developing the comprehensive plan, the consultation phase includes an EIA, which is a compulsory procedure under the Environmental Code. However, in the detailed planning process, an EIA is only performed if the municipality judges (*behovsbedömning*) that the proposed development may cause "substantial environmental impact" (*betydande miljöpåverkan*).

Sweden-subsurface

The use of the subsurface is usually planned on the local level in consultation with the County Administration Boards and national governmental bodies but is formally coordinated separately. The detailed plan (*detaljplan*) governs the site improvement permission (*marklov*) for excavation/landfill that considerably alters the height of the ground. A concession from the Government is needed for extraction of minerals under the Mineral Act (*minerallag*) of 1991. The permits for mineral extraction are granted on the national level by SGU (see above). However, archeological and soil remediation procedures are coordinated on the regional level. Similar to the Netherlands, under the Utility Easement Act (*ledningsrättslagen*) of 1973, cables and pipes are registered as utility easements (*ledningsrätt*) in the Land Registration System (*fastighetsregister*) by the Land Surveying Authority (*Lantmäteriet*)[48].

Flanders-surface

Like in the Netherlands in Flanders the structural plan is the planning instrument on all three levels and are valid for ten years. They need to consist of three parts: informative, guiding and binding. The structure plans are the framework for Implementation Plans (*Plan van Aanleg*) that also are issued at all three governance levels, depending on the theme. Implementation Plans can define building areas, parks and leisure, densities, typologies and management rules, and may provide layout for certain zones. They have the decreeing power because all types of permits (building, parcelling, etc.) are checked against them. Implementation Plans are approved by the next supra local level; thus municipal levels will be assessed at provincial level, while the provincial plan will be assessed at the level of Flanders. Like in the Netherlands, spatial plans are subject to Environmental Impact Assessment procedures, however, in Flanders, only certified agencies can perform EIA's. Unlike the Netherlands, a *Watertoets* (Water Impact Assessment) is needed not only for governmental pre-plans but also for private developments that apply for building permission [ESPACE project; Dreyfus 2012].

Flanders-subsurface

For subsurface some comparable instruments with the Netherlands in how Flanders deals with water, soil pollution and for example cables and pipes can be found. Since 2009 by Decree the Flanders region is protecting the cables and pipes in the subsurface. For excavation a plan proposal must be put in at the KLIP (*Kabels en Leidingen Informatie Platform*), the platform of cables and pipes that has over 300 members in cable and pipe owners.[49] The land

[48] http://www.lantmateriet.se/sv/Fastigheter/Andra-fastighet/Tillgang-till-annans-mark/Ledningsratt/
[49] www.agiv.be/producten/klip

information register gives an overview of the contaminated sites in Flanders. For the transfer of land must a soil certificate is necessary. The soil certificate informs and protects the buyer and gives an overview of all relevant information available on the land in the land information register (previous investigations performed on the site). Other information on surface and subsurface can be found on geopunt (www.geopunt.be) or the database subsoil Flanders (databank ondergrond vlaanderen dov.vlaanderen.be). So far, there are no examples of integrated surface-subsurface planning systems and initiatives. Recently, a territorial development program for the region North of Brussels was set up to come to more integrated short and long term visions on the redevelopment of this area taking into account both surface and subsurface issues (www.topnoordrand.be).

4.3 Planning process and participation

In the Netherlands, as well as in Flanders, public consultancy on the plan needs to take place before the formal approval. The different levels of government in both countries have a top down method of assessing and influencing spatial plans. Next to that the spatial structure plans are revised/updated through an EIA procedure and an extensive process of stakeholder meetings and public consultation. Participation procedures are regulated at all scale-levels by law. If contesters are not satisfied with the decision at local level, they can re-apply at provincial level and finally in court. For the subsurface procedures are not much different from the above ground. Spatial planning in the subsurface is not arranged separately. The owner of the above ground is also owner of the subsurface. In the Netherlands only use functions in groundwater and deep subsurface need a permit (from province respectively Ministry of Economic Affairs). “Normal” procedures (possibility to object etc..) apply on these permits. In Flanders this is similar. The soil certificate and the water check (*watertoets*) are required documents to provide in case of ownership transfer, which provides new owners/redevelopers some information on the subsoil.

Similar to the Netherlands and Flanders, in Sweden, public consultancy on the plan takes place before approval. Reformation of the planning system in 1987 has led to a more “communicative” land use planning processes allowing citizens certain possibilities to participate in decision-making and appeal the municipal decisions. The municipality is responsible for communication of planning intents, proposals, revised drafts and final plans to the public. In contrast to detailed planning, the comprehensive planning process includes a minimum level of citizen participation.

During the consultation phase of detailed planning, the planning proposals are usually presented on screens in the town hall or equivalent. Further, the municipality presents the results of the examination phase on the municipal billboards and in local newspapers (Hedström and Lundström, 2013). During both the consultation and the examination phases, all interested parties can comment on planning proposals. The comments are documented in reports (available to the public) providing the reasoning if the raised issues were not addressed.

The content of the adopted legally binding detailed plan can be contested by appeal to the County Administration Board, whose decisions in turn can be contested to the Land and Environmental Higher Court (*Mark- och miljööverdomstolen*), and ultimately to the Supreme

Court (*Högsta domstolen*). Since the comprehensive plan is not legally binding, it cannot be appealed but the residents can express dissatisfaction with the planning process initiating the local appeal procedure (*kommunalbesvär*) under the Local Government Act (*kommunallag*) of 1991.

The detailed planning process in Sweden includes the following main steps:
1) initiation on request by someone intending to take action that may require e.g. that a detailed plan is adopted, changed or suspended;
2) a detailed plan program is established, if needed;
3) the potential environmental impact is evaluated to decide whether or not to carry out an EIA;
4) consultation (*samråd*)] with all relevant actors, such as the Land Surveying Authority (*lantmäterimyndigheten*), County Adminstration Board, other affected municipalities, known stakeholders and others that may be affected by the decision;
5) examination and exhibition (*utställning*) of the final proposed plan; and
6) final approval and legal validation of the plan.

During the consultation (*samråd*) and exhibition (*utställning*) phases, everyone that has an interest or concern is allowed to leave comments in writing. In contrast to The Netherlands and Belgium, there are no strict rules about the EIA, since an EIA is only compulsory for comprehensive planning. The municipality decides whether it is a necessity to carry out an EIA for a detailed plan. The results of the EIA are then filed and presented together with the consultation report and the plan proposal during the exhibition phase giving the opportunity to interested parties to leave their comments.

5. The integration of Spatial Planning and Subsoil in practice

5.1 The Netherlands

Development of Netherlands subsoil policies

The National Environmental Policy Plan of 1997 stated that all sites with soil pollution should be known before 2005 and that all sites with serious risks shall be controlled prior to 2030. The MinIE is responsible for the organization of the soil remediation operation. In the fourth National Environmental Policy Plan, published in 2001, the Dutch government reconfirmed its intention to end the transfer of environmental costs to future generations. In 2003, the scope of soil regulation was also widened from quality to soil management with the "soil policy letter" (*beleidsbrief bodem*).[50]

The categories energy and soil are covered in the national vision on spatial planning of the subsurface (STRONG), currently in preparation under the auspices of the MinIE and the Ministry of Economic Affairs. STRONG covers both deep and shallower subsurface[51] and is instigated by the fact that in the Netherlands the subsurface is being used more and more for different functions and the aspect of spatial relevance related to the subsurface is becoming of importance. Shale gas is a "new" form of subsurface energy-source and presently a shale gas vision (*structuurvisie schaliegas*) is being prepared.

May 2007 the INSPIRE EU-Directive entered in force, establishing an infrastructure for spatial information in Europe (among which: soil) to support Community environmental policies and policies or activities which may have an impact on the environment.[52] Following INSPIRE, soil information (not soil quality) are centrally being administered and enclosed in the Dutch *Basis Registratie Ondergrond* (in progress).[53] DINO and BIS give data and information (maps, services) for respectively deeper and shallow subsurface.[54]
At 10 July 2009, the "*convenant bodem ontwikkelings-beleid en aanpak spoedlocaties*" [soil convent] was signed by central and regional authorities. The convent involves wrapping up of the soil remediation operation, as well as the decentralizing of the soil regulation to regional and local authorities.

Provincie Zuid Holland

The first soil vision by the Provence Zuid-Holland was part of a policy plan about ecology, water and environment (2006). It took another seven years to make the official Soil Vision (2013) that introduces a new approach towards soil, more based on spatial planning. One of the main conditions in order to do that was also by merging the departments of soil and spatial planning in the organization of the Provence. Only a year after this Soil Vision came out a new Structural Vision is presented in 2014, this new

[50] www.bodemrichtlijn.nl/Bibliotheek/beleid/beleid-van-centrale-overheid/landelijk-beleid/beleidsbla
[51] www.rijksoverheid.nl/onderwerpen/bodem-en-ondergrond/ruimtelijke-ordening-ondergrond 23 Jan
[52] inspire.ec.europa.eu/
[53] www.broinfo.nl/
[54] www.dinoloket.nl/ and www.wageningenur.nl/nl/Expertises-Dienstverlening/Onderzoeksinstituten/
Producten/Bodemkundig-Informatie-Systeem-BIS-Nederland.htm

policy document integrates completely the former soil vision in its attitude towards soil and integrating it into spatial planning. One major instrument that supports better weighing of soil value and better decision making is the *Bodemladder* (see image). Two main strategies of action are part of this way of working: first that soil use is renewable, and if not that soil can be redeveloped and at last it should be manageable. Second main strategy of action is that all uses should be acceptable.

Especially interesting concerning the introduction of this vision is the Environmental Impact Assessment that had to be done. Whilst the vision is introducing a new approach to soil management, the assessment is done with the more traditional view on soil, only focussing on the remediation aspect. The assessment was not shedding light onto all the positive effects of the new Structure Vision. One positive effect for the soil system that was unfortunately missed was the decision only to develop existing urban areas and no new "greenfield" expansions. This means that brownfields also will be redeveloped and thus problems of contamination will be tackled. A more controversial aspect of the Structure Vision is the need for cities to densify and become more 'green and blue'. An almost impossible assignment for cities, especially Rotterdam, where the soil system is overcrowded and most surface is sealed.[55] The Municipality of Rotterdam has taken the initiative to deal with this and is working on a Master Plan for the subsoil. They realise that the subsoil is not another domain, but should be just as much part of the spatial planning as the surface of the city. In order to make a connection they use an instrument that belongs to the surface, the master plan, in order to test this on the subsurface.

Future

At the moment the Dutch environmental regulation and legislation is being transformed with the objective to facilitate spatial development by simplifying and combining many existing acts and decrees. As a consequence most of the Environmental Management Act (in total 15 existing laws) will be integrated in the Environment and Planning Act. Expectations are that the Environment and Planning Act will be empowered in 2018.

Currently, the major responsibility for soil is being decentralised. With a covenant (2010-2015) between the state government, provinces, municipalities and water authorities ambitions were formulated concerning remediation and sustainable use of the subsurface. Arrangements were made to reach these goals together. With the covenant, the major responsibility for soil is decentralised. A succeeding covenant is now being prepared and will be effective in 2016. One of the ambitions of the new covenant is to involve the private sector in the new arrangements.
The transition in soil regulation can be divided in two main streams:

1. Taking charge of the remediation operation
In the first covenant period, many sites are investigated and remediated, including most of the urgent sites. The next step is the management phase, aimed at contaminations that cannot be excavated, and that have a risk to spread.

[55] www.zuid-holland.nl/structuurvisie

This phase focuses on innovative management of these sites, e.g. on the application of different in-situ techniques and area based management of contaminated groundwater.
The link with spatial development is vital to the future of soil remediation in the Netherlands, as new ways of soil usage will initiate additional funding for remediation activities, especially if these can be combined with another land use, e.g. aquifer thermal energy storage (ATES). Soil remediation unrelated to spatial development is becoming redundant and is replaced by area based sustainable soil management.

2. Using the possibilities of the subsurface
Objective of the amendments is to focus on the sustainable use of the subsurface. This means that the use of the subsurface cannot be seen separated from spatial developments and societal challenges such as climate, energy, (ground)water and economic developments. The covenant addresses different functions of the subsurface. Themes such as sustainable use of resources (eg. strategic groundwater resources) and energy (shale gas, effects of gas winning, soil energy) are topics of interest.

Because not all aspects can be arranged on the local or regional level, strategies are being prepared on the spatial planning of the subsurface. In 2012 this was done for subsurface pipes. In 2013 the national government started, in cooperation with local and regional governments, the preparation of a national strategy for the subsurface "STRONG". In STRONG decisions will be made with respect to spatial planning with a national interest. It also should help local or regional governments to make decisions on spatial planning, both in urban and rural areas. The STRONG is planned to be ready in 2015. A strategy for shale gas (also expected 2015) will be an integral part of STRONG.

The envisaged transitions will involve different governmental organisations as well as private parties and research organisations. This collaboration aims to come to agreement on the use of the subsurface, the generation of knowledge and the necessary financial arrangements. Final objective is the implementation of sustainable use and management of the subsurface in daily practice.

5.2 Sweden

Policy
Swedish soil policy is narrowed to deployment of "non-toxic environment" (*giftfri miljö*) strategy promoted in one of environmental objectives (*miljömål*) [56]. The "non-toxic environment" objective advocates no man-made or extracted substances in the environment aiming to damp negative effects of non-naturally occurring substances on human health and biological diversity. In Sweden, soil quality standards are developed to handle three types of risks posed by contaminants in the soil: (1) human health risks, (2) risks to the soil environment, and (3) risks with regard to contaminant spreading to surface water and groundwater. The lowest contaminant concentration value among acceptable levels for the three risk types is used as a guideline value in a remediation project. Being typically the lowest, values for protection of the soil environment are often used, although the sites after

[56] http://www.miljomal.se/sv/Environmental-Objectives-Portal/Undre-meny/About-the-Environmental-Objectives/4-A-Non-Toxic-Environment/

soil treatment are planned to be utilised for construction purposes (Lundgren, 2006). Risks posed to the soil environment are usually assessed by screening contaminant concentration in the soil and comparing them to guideline values derived from Species Sensitivity Distribution (SSD) models (Swartjes, 2012), which are statistical dose-response models.
In Sweden, there is no special law related to soil. The Environmental Code (*miljöbalken*) applies to the issues related to soil contamination. However, there is no clear link between the Environmental Code and the Planning and Building Act with regard to development of contaminated sites (Swedish National Board of Housing and SEPA, 2006). Furthermore, different authorities are responsible for planning and soil remediation, which complicates redevelopment of brownfields.

5.3 Flanders

Soil remediation and protection decree (1995, adapted in 2006)
The main legislation in Flemish soil policy is the Flemish **soil remediation decree**, drawn up in 1995 and updated in 2006. The headline of the Flemish soil policy is that all historical soil pollution has to be treated by 2036 and that all new pollution has to be prevented or be treated immediately. In Flanders, a lot of soils were contaminated by former uses (e.g. industrial activities). Because soil pollution poses a threat to both public health and ecosystems, the Flemish region has introduced in 1995 the soil remediation decree. The most essential topics in the decree are the land information register, the soil certificates and remediation. The land information register gives an overview of the contaminated sites in Flanders. Anyone looking to transfer land must have a soil certificate. The soil certificate informs and protects the buyer and gives an overview of all relevant information available on the land in the land information register (previous investigations performed on the site). A soil investigation is required for the transfer of ownership of a risk area, periodically or for the termination of a risk activity. Different phases are foreseen in the process: a preliminary soil investigation, a descriptive soil investigation, a soil remediation project and soil remediation works. If the preliminary soil investigation indicates a soil or groundwater contamination, OVAM orders a descriptive soil investigation. A distinction is made between historical (before 28 Oct 1995) and new contamination (after 28 Oct 1995). For historical contamination clean-up is required if a serious risk can be expected and clean-up will be scheduled according to priority. For new contamination, immediate clean-up is required if standards are exceeded. The investigations and the remediation are conducted by an authorized soil remediation expert. OVAM can decide ex-officio to conduct a descriptive soil examination, land remediation or other measures if the operator, user and owner of the land is not bound or not able to conduct a descriptive soil examination or remediation. Priority will be given to projects with a societal added value and high-risk contaminated sites. The rules governing the use of excavated soil has the objective to control the spread of enriched or contaminated soil and is also part of the soil remediation decree.

The **new soil remediation and protection decree** together with the adapted VLAREBO (Order of the Flemish Government establishing the Flemish regulation on soil remediation and soil protection) entered into force on 1 June 2008 and focusses not only on soil remediation but also on soil protection (preventive measures). The curative part (soil remediation) builds on the principles of the previous decree. A proactive and project based

approach is central to the approach of potentially contaminated soils (mainly former landfills or industrial sites) which is currently in a residential zone.
In the search of alternative financing instruments for soil remediation, priority was given to the creation of sector funds. The preventive part on soil protection constitutes a framework with tools for a good protection policy based on the environmental permit conditions, adjustments of the infrastructure to protect the soil against new soil pollution and other measures already taken or yet to be taken measures to prevent new soil pollution. It aims to protect the soil against pollution and disruption, and to safeguard the valuable soils. The protection of soil against pollution aims as much as possible to preserve the target values for soil quality. These target values are laid down by the Flemish Government and meet the levels of pollutants or organisms on or in the soil, that are found as normal background values in not polluted soils with similar soil characteristics.

Recent updates
For mixed soil contaminations for which various players have a clean-up duty, a joint approach is stimulated. In case of a so-called 'complex contamination', the pollution is created in different periods and/or on different grounds, after which the pollutants are mixed. Multiple parties are responsible for the remediation, but it is technically not possible to determine exactly who is responsible for which part of the pollution. If these parties do not come to an agreement or solution, OVAM can formally qualify a site as a 'mixed soil contamination' and the financing is done on the basis of a distribution key determined by OVAM.

Brownfield decree (2007)
The redevelopment of brownfields is stimulated through an accelerated implementation of the ex-officio approach and this within the means of the brownfield Decree. More active involvement of the municipalities in the redevelopment of brownfields is provided by the financial support in the framework of the environmental cooperation agreement.

The Flemish Government stimulates and facilitates the redevelopment of brownfields by a brownfield covenant. In a brownfield covenant agreements are made between the Flemish Government, the project developer and/or land owner, investors and other authorities involved and this in such a way that at the start of the brownfield project there is clarity about certain temporal and procedural requirements and expectations. The brownfield covenant promotes the cooperation and synergy between the various project stakeholders and also provides some financial and tax benefits for redevelopers. The Flemish Government regularly publishes calls in the Belgian Official Journal which allows parties to apply for a brownfield convenant for a specific site. The Brownfield decree is very small and can only work because its reliance on other existing and adopted legislation for soil and spatial planning etc. In line with the provisions of the brownfield Decree of 30 March 2007, the Flemish Government of 21 March 2008 has established a ‘brownfieldcel’ (i.e. board advising Flemish Government about the admitted projects, the negotiations, closing of the covenants and the follow up of some projects). This ‘brownfieldcel’ consist of representatives of the various Flemish administrations which are involved in brownfield projects: leading officials responsible for department of economy, soil and waste agency and spatial planning department; 2 experts, 3 negotiators and Enterprise Flanders (process manager, administrative support and secretary).

6 Comparison of the three countries

6.1 Planning systems

In comparing the Netherlands, Sweden and Flanders with Belgium, the first conclusion is that they are incomparable as entities. There is basically no Belgium with a national planning culture, tradition, laws etc. Moreover, the Flanders citizens consider Flanders as their national government. Therefore, within the project Balance 4P the comparison is made between the Netherlands, Sweden and Flanders.

Planning is culture! Even though in the structure of institutions, law, policy, instruments and regulations the three countries do not differ that much, there are quite different cultures in them that organizes the planning system and is determent of the outcome, see Table 3.2. The culture has to do with historical developments, the geography of the territory and population density. Netherlands and Flanders are comparable in historical developments and geography. This is for example shown in the fact that water is an important spatial component in these countries, this is much different in Sweden. That size matters is recognizable in the level on which spatial planning control is manifested. Sweden is such a large country that it is also sensible to have municipalities in control. The Netherlands is such a small country that it has been sensible to have strong spatial planning on a national scale to make maximal use of the land. In Flanders this has been the same, with the distinction that even though the planning is top-down the urban development has for the dominant part been in the hands of private developers supported by local policy. This also influences the scale of development, and the final output. The main conclusion is that the Netherlands is moving to a more governmental bottom-up system that is executed in Sweden and also a more bottom up development practice as it is executed in Flanders.

Table 6.1 Overview of approaches to planning and building in the three countries.

	Planning system	**Building practice**
The Netherlands	Top Down > Bottom up	Top Down > Bottom up
Sweden	Bottom Up	Top Down
Flanders	Bottom up > Top Down	Bottom up

Comparing the building practices in the three countries it shows that due to larger housing programmes in the Netherlands and Sweden more large scale organized projects take place. In the Netherlands the municipality and later project developers were expecting these building projects (top-down). This is still the case in Sweden (like the case Fixfabriken shows) but in the Netherlands, due to the financial crisis the building practice changed towards a more botoom up approach of redevelopment of existing neighbourhoods. In Belgium there was always a much larger tradition in people building their own houses and this ‘bottom up’ approach is still there.

6.2 Subsoil management

For the management of the subsurface, several planning instruments have been developed in the Netherlands, but none in Sweden and Flanders. Dutch national interests in the subsurface will be arranged in the National Spatial Planning Strategy for the subsurface STRONG. For other subsurface functions the provinces or municipalities will be responsible. However, the

national government will facilitate the regional-local authorities by the development of decision frameworks, and making data and information available.
National Spatial Planning Strategy for the subsurface STRONG
The National Environmental Policy Plan of 1997 stated that all sites with soil pollution should be known before 2005 and that all sites with serious risks shall be controlled prior to 2030. The Ministry of Infrastructure and the Environment (MinIE) is responsible for the organization of the soil remediation operation. In the fourth National Environmental Policy Plan, published in 2001, the Dutch government reconfirmed its intention to end the transfer of environmental costs to future generations. In 2003, the scope of soil regulation was also widened from quality to soil management with the "soil policy letter" (*beleidsbrief bodem*).[57] In May 2007 the INSPIRE EU-Directive entered in force, establishing an infrastructure for spatial information in Europe (among which: soil) to support Community environmental policies and policies or activities which may have an impact on the environment.[58] Following INSPIRE, soil information (not soil quality) are centrally being administered and enclosed in the Dutch *Basis Registratie Ondergrond* (BRO, in progress).[59] DINO and BIS give data and information (maps, services) for respectively deeper and shallow subsurface and will be integrated in BRO.[60]
Adding the developments in subsoil management to the comparison of movements in the planning culture of the three countries, in figure 14, the dynamics become visible. All three planning systems are changing and especially the Netherlands is ahead in integrating this into the planning culture.

Figure 14 Comparison of the planning systems and the subsoil management systems in the three countries that's shows how the three countries move in different directions.

7 The holistic approach

Unifying the subsurface and surface in a holistic approach according to Balance 4P is based in a strategy for action. The leading strategy of action in the project itself has been finding balance and synergy between the three P's of the Triple Bottom Line (UN, 2002 (Johannesburg)); People, Planet and Profit/Prosperity, that are at the base of an urban project. This complex process requires innovative and strategic action, with in-depth knowledge of

[57] www.bodemrichtlijn.nl/Bibliotheek/beleid/beleid-van-centrale-overheid/landelijk-beleid/beleidsblad-beleidsbrief-bodem
[58] inspire.ec.europa.eu/
[59] www.broinfo.nl/
[60] www.dinoloket.nl/ and www.wageningenur.nl/nl/Expertises-Dienstverlening/Onderzoeksinstituten/Alterra/Faciliteiten-Producten/Bodemkundig-Informatie-Systeem-BIS-Nederland.htm

aspects and new conceptual ideas on their integration in a given situation. This crucial strategic activity, that we consider at the base of sustainable urban development, is captured by Van Dorst and Duijvestein (2004) by introducing the fourth P of Project and/or Process to the triple bottom line, representing the strategy of action (Figure 15).

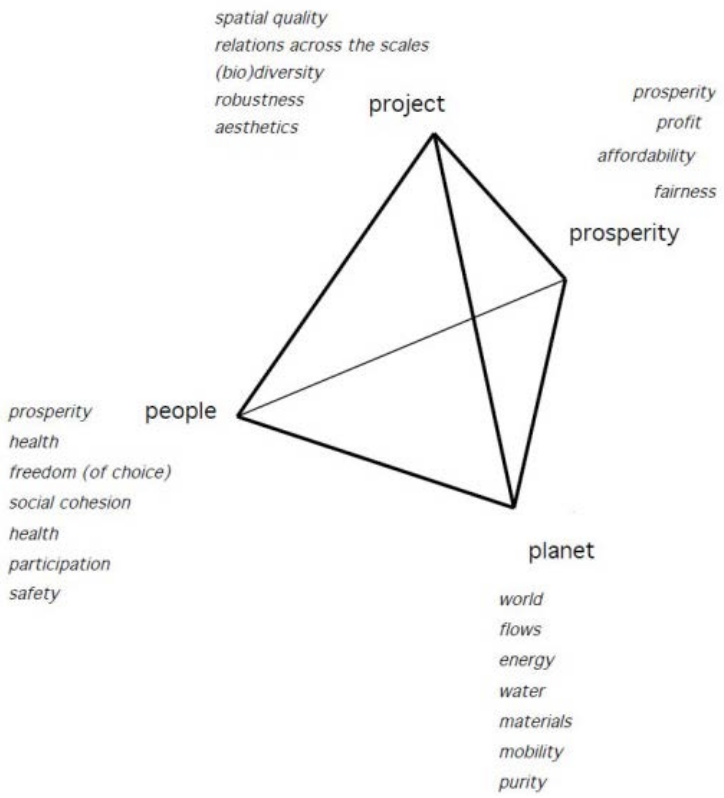

Figure 15. The tetrahedron of sustainable construction based on the sustainability triangle, after UN 2002 Johannesburg: People, Planet, Prosperity and associated themes. (Van Dorst & Duijvestein, 2004)

The fourth P represents Project in which the skill is represented that integrates sustainability aspects in a balanced design that warrants spatial quality. The skills that are referred to with Process are about the interaction between stakeholders and their institutional context to realize this design (Van Dorst & Duijvestein, 2004). Important part of the Balance 4P research is therefore the analysis of the possible chances or challenges for integrating the subsurface engineering and urban planning sectors by formal institutions (regulations), informal institutions (how things are usually done) and technological entrepreneurship (process of cooperation between the professionals). The planning systems and building practices in the three participating countries, the Netherlands, Sweden and Belgium (Flanders), are studied resulting in the contribution to the holistic approach.
The holistic approach according to Balance 4P is a conscious act/activity of integrating subsurface aspects in the redevelopment process for the purpose of more sustainable land management. This approach should be applied to all aspects of the urban planning system. Figure 16 shows how the planning system is a process in which the radars of law, regulation, policy, and institutions which work together on different scales, influence each other and set the planning conditions for urban (re)development. The urban (re)development consist of four phases that are interrelating. The initiate and plan phases are part of the plan process, the realization and maintenance phases relate to the implementation process. The plan phase has

been made more specific in dividing it into a definition, design and preparation step. The design process is carried out during this phase. This mainframe is applicable to the three countries in the study.

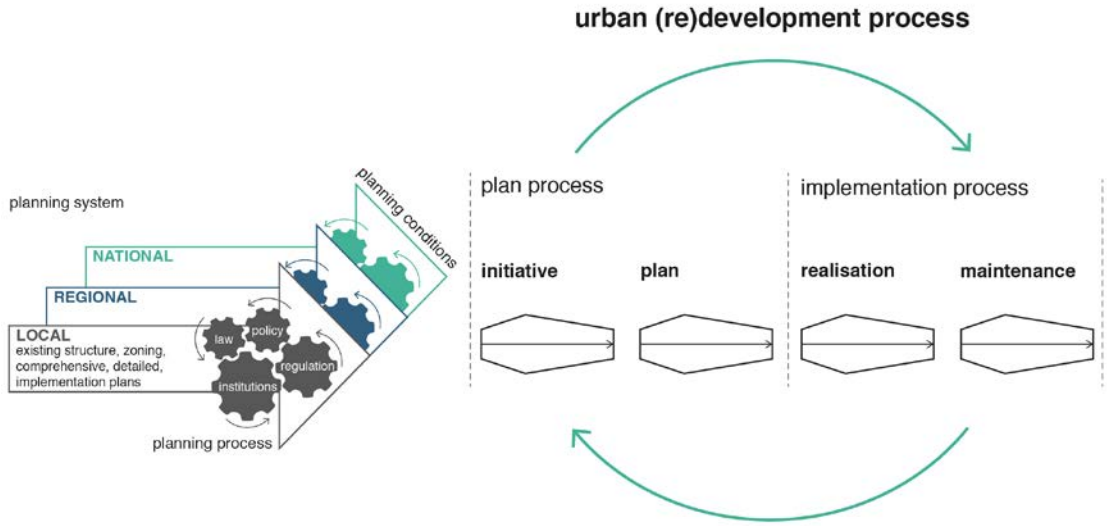

Figure 16. The holistic approach is operating within planning conditions that are the result of all levels in the planning system (local, regional, national) and their respective laws and regulations, policy and institutions. The urban (re)development process has a regulatory context (the planning conditions) and includes a plan process and an implementation process, each with different phases.

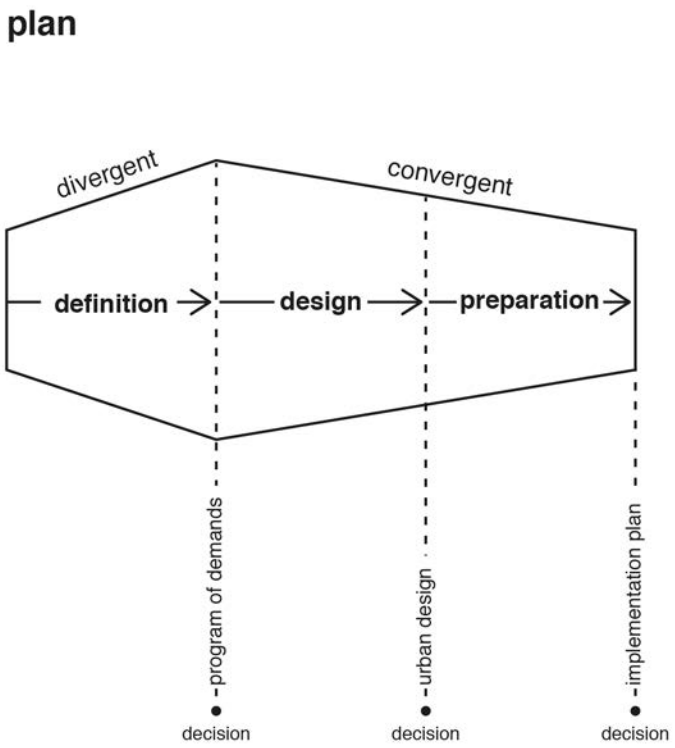

Figure 17. The characteristics of the plan phase. The plan phase itself has three steps: definition of the program of demands, the urban design and the preparation of the implementation plan.

The holistic approach that Balance 4P proposes integrates the subsurface in day-today-planning and urban development practices. There are four spatial planning subjects, which are in common in the three planning systems (NL, BE, SE) and which can be expanded to subsurface: heritage, environment, nature and water. For these four urban planning subjects, the integration of above- and underground aspects can be enhanced in different ways: 1) in law and regulation, 2) in policy and vision, 3) by structured knowledge exchange, and 4) in the design/construct process), see the summary in Table 2.1 and Section 3 for details. For each regular planning theme different aspects of the subsurface can be integrated; here the four categories of subsoil qualities (Hooimeijer & Maring, 2012) are used to give an indication of the possibilities. The categories are:

1. civil Constructions (archaeology, underground building, cables and pipes, foundations);
2. water (storage and filtering capacity, drinking water);
3. energy (Aquifer Thermal Energy Storage (ATES), geothermal and fossil energy); and
4. soil ecology (clean soil, morphology, ecology, landscape diversity, minerals).

Table 7.2. Summary of chances for enhancing subsurface into the current planning systems with regard to four spatial planning subjects: Heritage, Environment, Nature and Water, relating to four subsoil qualities: Civil constructions, Water, Energy, and Soil.

TOPICS IN SURFACE PLANNING →		heritage	environment	nature	water
CHANCES FOR ENHANCING THE SUBSURFACE BY	law and regulation	*chances for* - including the subsurface in planning regulations about heritage, environment, nature and water - including the subsurface in Environmental Impact Assessment and Water Assessment Test - subsurface in zoning plans through paragraphs about heritage, environment, nature and water			
	policy and vision	*chances for:* - visions on the subsurface in local and regional plans, local policies, as well as in individual projects			
	knowledge exchange	*chances for:* - interdisciplinary cooperation - developing new knowledge by cooperative learning			
	design / construction	*subsurface in plan and design process needs:* - better frame of reference - better instruments (subsurface potential map)			
CATEGORIES OF SUBSURFACE QUALITIES →		civil constructions soil	civil constructions soil water energy	water soil energy	water soil energy

For a truly holistic approach to be able to operate, subsurface is ideally enhanced by all the four ways suggested in Table 7.1. Law and regulation can enforce subsurface aspects and this would be demanded of the people in charge of the planning process if included in policies and visions.

7.1 Law and regulation

In law and regulation there are chances for including the subsurface in planning about heritage, environment, nature and water. Especially heritage in current redevelopment of cities is considered a chance for reuse, which is considered more sustainable, and a chance for using meaning and context (identity) in new developments. The heritage protection is set by law and made a self-evident part of the planning and plan process. Usually there are specific paragraphs dedicated to heritage in structure and zoning plans. Expanding this practice to archaeology and other human structures in the subsoil could be a chance. In Sweden, law and regulation is already strong with regard to protection of archaeological remains.

Taking the environment into account is secured in all three countries with the Environmental Impact Assessment (EIA). It is also applicable to plans of different scale in which also the subsurface is relevant. Through EIA, synergies between the natural system, the (civil constructed) conditions of the site, and the development plans can be brought together thus promoting integrated planning.

Nature protection is well organized starting on the European level with Natura 2000 and then for each country on all scales. Considering the subsurface as part of this natural system is quite evident and there is a chance to make a logical connection when making these laws and regulations.

In the Netherlands and Flanders there is the Water Assessment Test, also this current regulations could be expanded with the subsoil considering that groundwater is part of the water system as a whole.

7.2 Policy and vision

As the Dutch case shows, there is a great chance for visions on the subsurface in structure plans, but also taking the subsurface into policy in order to stimulate early consideration in the planning and plan processes. On different scales, these visions could emphasize other qualities of the subsurface, and together they could offer a sound base for structure plans. The connection to the planning themes of heritage, environment, nature and water could be made here as well.

By including the subsurface in policies and visions, practitioners on the municipalities will be “forced” to consider the subsurface explicitly in plans. A parallel example is from Göteborg where in 2011 social aspects in planning were included in the visions of the City and also in the budget. This has today developed into a new practice, where social aspects are considered in the planning process explicitly (see further Appendix G).

7.3 Knowledge exchange

Especially knowledge exchange is a key for a better integration of the subsurface into surface urban development. Since it enhances interdisciplinary cooperation, it could lead to new knowledge and knowledge management it is possible to handle uncertainties in qualitative manner. Direct and conscious knowledge exchange between surface and subsurface sectors in early phases will promote integrated plans. In traditional planning practice, knowledge exchange is often practiced by means of documents, reports and formal meetings. Here, there are chances to improve the current practices on knowledge exchange on subsurface and surface by existing instruments.

7.4 Design/construct

The subsurface in plan process and design process needs:

- Better frame of reference;
- Better instruments (subsurface potential map);
- Cultural change from how it is done now.

Taking the subsoil conditions into account in the plan and the urban design process of urban designers is a rather new concept. Especially for the plan process there should be better knowledge management of what and how data from the subsurface could be transferred into information that is relevant for the state of affairs in the process.
Even though the process of designing is ambiguous, personal and somewhat intangible, Van Dooren, Boshuizen, Van Merriënboer, Asselbergs and Van Dorst unravel it into a framework (2013), see Figure 21. This framework is not a step by step guide for a successful design process, but an overview of five generic elements involved in designing, making the design process explicit in a more clear and structured way. The five elements are:

6. Experimenting
7. Guiding theme or qualities
8. A frame of reference or library
9. Sketching/modelling
10. Domains

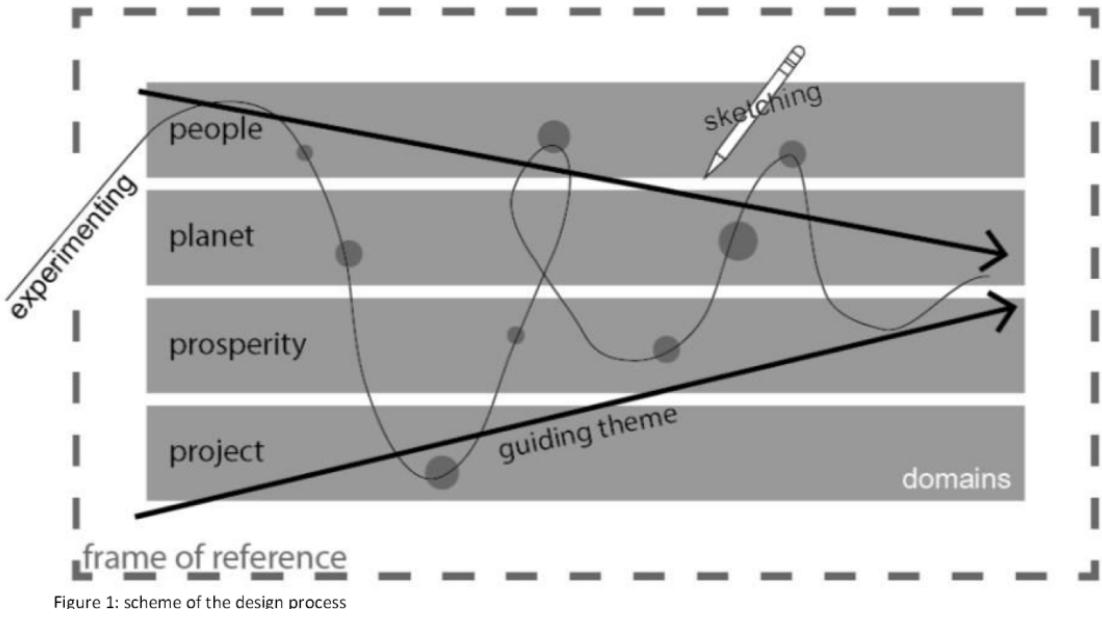

Figure 1: scheme of the design process

Figure 18. A conceptual framework for the design process (original Van Dooren et al., 2013; altered by P. van der Graaf 2014).

It can take some time before urban designers are used to deal with subsoil conditions, but the benefits are great. To take advantage of the potential qualities of the subsoil, its aspects should be investigated at the beginning of (1) experimenting in the design process. Although subsoil aspects derive from a wide variety of expertise, it is not to the urban designer to investigate all of them himself. By collaborating with the different experts, the urban designer can get an understanding of the context. It is up to the designer to investigate the spatial effect

on surface level and create a coherent design, which relates to the subsoil characteristics of a site. The urban designer can get a better understanding of subsoil condition by translating the data into his own language of (4) sketches and models. This could be a subsoil potential map in which the main characteristics of the subsoil and their spatial effect on surface level are made clear. This way, the urban designer can start experimenting and make relations between different solutions, which can strengthen each other and contribute to a coherent end result. Urban designers should start experimenting with the unknown aspects of the subsoil, so they expand their knowledge and experience. If the urban designers becomes familiar with modelling the data, know how subsoil aspects effect their spatial design on surface level and can pick generic solutions from a (3) frame of reference, then taking into account subsoil conditions becomes as common as relating urban designs to the spatial context of the built environment. Subsoil conditions should not be seen as an obstruction in the urban design process, but needs to be dealt with as part of the (5) domains and then has the potential to enrich the final design.

Thus
Crucial for efficient knowledge exchange is to deliver *the right information in the right format, at the right time and at the right place.*[61] The information should be delivered in a format that is understandable to the receiver ("show the maps but be the legend yourself", Postma, 2011). As the format of the knowledge exchange is typically not regulated, there is also a need for someone to orchestrate this knowledge exchange, i.e. there must be someone consciously including this activity within the planning process. Thus, the holistic approach is depending on the people involved in the planning process.

8. Conclusions

The main conclusion of this investigation is that it is almost impossible to grasp something as dynamic and fluid as planning systems and second that the difference between the three countries is based in the cultural and not the planning system differences. The comparison of cultures alike results into conclusions about differences, formal systems can be the same but informally work out very differently. However, the research did focus on finding a holistic approach to be about similarities. In all three countries the subsurface is the new frontier for urban designers, it is a question about nature and heritage, it is about tension between urban structure and public space design, expressed or should be the conclusion un-expressed in the dealing with the subsurface. Especially in urban renewal the question of what is nature considering the subsurface should be asked.
There is not only a gap between the worlds of surface and subsurface, also the difference between the nature of the planning processes and the uphold procedures that come from it is large. It is the difference between a common view or comply with strict guideline value.
The holistic approach therefor not a rigid manual, is an attitude that should be reflected in the domains of planning and urban development, in the formal and the informal institutions.
There is a need for more examples that show how the two domains can be joined. How the subsurface make a meaningful contribution to the design of urban structures and public space like it has been in the past.

[61] This conclusion was derived from the BIELLS project, 'Bodem Informatie Essentieel voor Landelijke en Lokale Sturing' (The Netherlands) eg Busink & Schouten, 2006

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Source for criteria: COMMIN THE BALTIC SPATIAL CONCEPTSHARE reference to the original document http://commin.org/en/planning-systems/comparison-of-planning-systems/			*information filled by BALANCE4P* **NETHERLANDS** **Spatial Planning**	*information filled by BALANCE 4P is highlighted with light blue, the text in dark blue is based on COMMIN* **SWEDEN** **Spatial Planning**	*information filled by BALANCE4P* **FLANDERS** **Spatial Planning**
CONSTITUTIONAL	1 Planning legislation	Which types of by-laws exist outside the central legislative council(s) of the state and by whom are they adopted?	Municipalities have the right to enhance the national building law with local regulations (gemeenteverordening) Planning Act (Wet Ruimtelijke Ordening)	Only the parliment (Riksdagen) can develop new and improve old laws in the field of planning.	Land and building Decree(to regulate social housing); rDecree for renewal (to prevent empty stock); Housing Act
	2 State-municipal division	Which constitutional principle(s) regulating state-municipal relations exist and what is it called?		State-municipal relations are regulated by municipal self-government.	Before 1970s, the Belgian Federal Government was the planning authority; this are now the regional governments. Brussels, Flanders and Walloon Flanders planning system operates on a subsidiarity principle. Competences are regulated in 1996 Spatial Planning Decree
	3 What are main responsibilties of:	state	Main responsabilities of the state are: legilative; Structure vision infrastructure & space	Protection of national interests and sectoral planning are main responsibilities of the state.	
		regional and	Main responsabilities of the Provinces are: regional vision (Streekplan); check land-use plans against Streekplan; management of infrastructure; assist municipalities. Grant permits considering the middle deep layers. Water Boards are there for organising and maintaing the water system.	The County Administration Board (the main regional authority) is responsible for guiding and scrutinizing municipal comprehensive plans with regard to national interests and for adressing appeals to municipal detailed plans.	Provincial plans are checked by the regional department; Provinces checks the municipal plans.
		municipal planning agencies	Municipal planning departments make development plans and land-use plans (bestemmingsplan; issue local ordinances and grant building permission. also involved by subsurface user functions related to land use planning (bestemmingsplan)	The municipality is responsible for comprehensive planning and legally binding detailed planning.	Main responsibilities of the municipal planning agencies is making Spatial Structure Plans and Implementations plans.
	4 Access to public authority matters	The people's right to be informed and their right to give their voice: Are they defined as constitutional rights and what is the name for that principle?	Yes, Wet Openbaarheid Bestuur New plans need to be published online.	Yes. The free access to official documents (offentlighetsprincipen) and citizens' participation in planning are the constitutional rights of citizens.	Yes, Flanders has a Decree Publicity of Governance. Plans need to be published.
	5 Property rights	Does the constitution protect property rights against public intervention and what is the constitutional principle in case of public taking?	Yes, the constitution protects property rights against public intervention. In case of public taking the principle of expropriation for public needs against compensation is applied.	Yes, property rights are protected against public intervention by the constitution. Under the Expropriation Act, the privately owned land can be expropiated for public needs (e.g. using the compulsary purchase procedure); the market value of the expropriated parcel is compensated to the landowner.	Yes, the constitution protects property rights against public intervention. In case of public taking the principle of expropriation for public needs against compensation is applied.
	6 Public rights to the use of land	Is there a general access to land and water and is there a specific right for it?	general access to land and water is not regulated. so-called 'recht van overpad' is private and historically present or not in contracts	According to "everyman's right" (allemansrätt) everyone has the right to cross and stay temporarily on another's land and water areas provided his behaviour is not disruptive and he does not cause any damage. The right is guaranteed in the Constitution (Chapter 2, article 18, [Sveriges grundlagar]). It is allowed to pick mushrooms, wild berries, pinecones, wild flowers and suchlike on another person's land (regulated in Chapter 12, Section 2, Penal Code [brottsbalk 1962:700]).	The freedom to roam, or everyman's right is the general public's right to access certain public or privately owned land for recreation and exercise. The right is sometimes called the right of public access to the wilderness or the right to roam.
	8 Groups to be prioritized in planning	Is planning meant to give favour to particular groups of the population and if so, which groups are favoured?	Planning is meant to balance acces to urban resources for all citizens	All groups of the population ara eqaly treated in planning.	Planning is meant to balance acces to urban resources for all citizens
NATIONAL	1 Planning organization	A) Are the legal responsibilities for planning and management at national level within one ministry?	Legal responsibilities for planning and management at national level lie with the Ministry of Infrastructure and Environment (housing = Min. Internal Affairs). and Minsitry of Economic Affairs	No, different ministries have different legal responsibilities for planning and management at national level. E.g. the Swedish National Board of Housing, Building and Planning [Boverket] is a central government authority administered by the Ministry of Health and Social Affairs responsible for planning legestation. The Environmental Protection Agency [Naturvårdsverket], the Ministry of the Environment, responsible for legislation with regard to natural resource management in planning projects.	Legal responsibilities for planning and management at national level lie with the Ministry of the Environment, Nature and Energy
		B) What is the name of the planning law at national level?	Wet Ruimtelijke Ordening (Territorial Planning Act). Soon Environmental Act	The Planning and Building Act is the name of the law at national level.	The name of the law at Flanders level is Planning Decree
	2 Laws of particular importance in planning	Which laws have a particular importance in planning at national level?	A number of Laws have impact on planning such as: Environmental Code, Noise pollution Act; Roads & dangerous transport Act, Railway Act (etc), Mining Law, WBB?	Environmental Code, The Roads Act, The Railways Act are laws having a particular importance in planning at national level.	Structural plans give guidelines. Decreeing power lies in implementation plans
	3 Regulations and instruments in central government policies and planning	A) Which policy guidelines exist in central government policies and planning?	The National Territorial Structure Vison (SVIR) is informed by international competetiveness, flood protection and	The central government policy that governs a planning process includes environmantal quality objectives summarized e.g. in The Swedish environmental objectives system 2013 (http://www.miljomal.se/Global/24_las_mer/broschyrer/the-swedish-environmental-objectives-system-M201301.pdf).	SVIR 2012: Productive landscape; long term uncertainty & governance; welfare & wellbeing
		B) Which legally binding regulations exist in central government policies and planning?	A legally binding regulation in central government policies and planning is the Territorial Planning Act.	The Planning and Building Act and Environmental Code are legally binding regulations in central government policies and planning.	A legally binding regulation in central government policies and planning is the Planning Decree and a number of ordinances.
	4 EU regulations	Which EU regulations are adopted/ applied?	Natura 2000, Soil Protection Act; Malta Treaty, Water Framwork Directive, Environmental Impact Assesment	Natura 2000, Water Framework Directive, Waste Directive, Environmental Impact Assessment	Natura 2000, Soil Protection Act; Malta Treaty, Water Framwork Directive, Environmental Impact Assesment

	5 Subsoil management (*Included by BALANCE 4P*)	**Which instruments / regulations considering soil management are applied?**	There is a Nation Structure Vision Subsoil (STRONG) in preparation; soil convenant and SV shalegas (both in preparation), Basis registration subsoil (EU INSPIRE) National rspronsibility is >500m mostly considering oil and gas winning. For Cables and Pipes there is KLIK info-system and also archaeology is steered on national level.	Legislation related to the subsurface can be divided into four groups: (i) "soil and groundwater quality" regulated by the Environmental Code; (ii) "archeology" regulated by the Heritage Conservation Act (kulturmiljölagen) of 1988; (iii) "use of natural resources" regulated by the Water Act (vettenlag) of 1983, the Mineral Act	
	6 Nature conservation and cultural heritage	Which nature conservation instruments, and which instruments relating to cultural heritage are applied?	Nature conservation instruments applied are: Flora & Fauna Act Heritage is protected by Monuments Act.	Environmental Code and The Heritage Conservation Act are nature conservation instrument and cultural heritage instrument respectively.	Nature, Forrest, Bird, Protecten Flora & Fauna and Habitat Decrees; Protection of Monuments and Town and City Scapes (1976), Decree Protection of Landscape (2010) and Decree Protection of Archaeology (1993)
	7 Integration of sectoral aspects	A) Are there certain bodies/ instruments for integration of sectoral aspects?	Structure visios, Regional Plans & zoning plans integrate sectoral aspects	Legally binding land and water use restrictions through special area regulations (områdesbestämmelser) in comprehensive plans, e.g. recreational amenities, communication routes, restricted areas and safety zones.	The Spatial Structure Plans are the integration of sectoral aspects.
		B) Which formal duty for integration of sectoral aspects exists?	Environmental Impact Assesment	Integration of sectoral aspects is a formal duty of the County Administrative Boards.	
	8 Environmental Protection *(Included by BALANCE 4P)*	**Is there an independent Environmental Impact Assesment Committee?**	Yes, it requires structure plans and zoning plans to consider all relevant data of environmental assesment in order to make a sound decision, advice is not binding but in case of a law suit it's advice is ussually adopted by the court	No, Environmental Impact Assessment (EIA) is done on the municipal level only for (not legally binding) comprehensive plans in consultation with the County Administration Board and sometimes neighbouring municipalities. EIA for the legally binding detailed plans is performed only if the municipality judges (behovsbedömning) that the proposed development may cause "substantial environmental impact" (betydande miljöpåverkan).	The project needs to hire an certified EIA expert to lead the team of experts that make the report. This certification is to ensure quality of the report and takes a procedure leaded by th Environmental Licences department and supported by different other departments. The report is assesed by the Department of EIA.
REGIONAL	1 Territorial organization	A) Are decentralized state agencies, regional and municipal entities acting authorities in planning?	Yes, decentralized state agencies, regional and municipal entities are acting authorities in planning.	Yes, decentralized state agencies, regional and municipal entities are acting authorities in planning. However, the municipality has a planning monopoly. Regional bodies only consult to ensure national and public interests in a planning process.	Yes, decentralized state agencies, regional and municipal entities are acting authorities in planning.
		B) What is the territorial unit of the regional level, what is the decentralized state authority and what is the regional planning authority? (*Included by BALANCE 4P*)	The territorial unit at regional level is the Province, for regional planning and inter-municipal coordination. The decentralized state authority is the Province administrative board. The regional planning authority is the Regional planning body.	Regional planning is only undertaken for the Stockholm and the Gothenburg regions. The Stockholm County Council (Stockholms län landsting) and the Gothenburg Regional Association of Local Authorities (Göteborgsregionens komunalförbund) are governmental bodies responsible for regional planning in the respective region. Regional plan is adopted only for the Stockholm County. In the Gothenburg Region, regional planning is carried out without formal regional plans. In orther cases the County Administration Boards are regional bodies which does not have planning competence but consult and coordinate the municipalities in the planning process to secure national and public interests in the plans.	The territorial unit at regional level is the Province, for regional planning and inter-municipal coordination. The decentralized state authority is the Province administrative board. There are also Arrondissements.
	2 Forms of planning at regional levels (planning process)	Which forms of planning/ planning processes exist at regional level?	superimposed or self-organized regional (planning) associations	The forms of planning/ planning processes at regional level are regional development programming, regional planning for Stockholm County and Gothenburg region.	The Provences and Arrondissements are part of the three step planning system of Flanders, regional and municipal scale.
	3 Statutory categories of plans (planning products)	Which statutory categories of plans/ planning products exist at regional level?	Statutory categories of plans ar regional level are development program and structure vision by the Provencies, the water Boards make Water Plans	The regional development programme and the regional plan (voluntary) are plans/ planning products at regional level carried out for Gothenburg and Stockholm respectively.	The Provincial Development Agency makes a Spatial Structure Plan. This is translated to a Spatial Implementation Plan.
	4 Body mandated for initiating and approval of plans	Which body is mandated for the initiation and the approval of plans at regional level?	The Provincial council are mandated for the initiation and approval of regional development programmes	The Stockholm County Council (Stockholms län landsting) and the Gothenburg Regional Association of Local Authorities (Göteborgsregionens komunalförbund) are governmental bodies mandated to initiate and aprove regional plans and programmes respectively in the respective region. Any County Concil can initiate regional planning.	The Flanders government.
	5 Binding force of regional plan	A) Is the regional plan binding on subordinate planning?	Yes, municipalities must check building applications to provincial stuctural plans. The water boards do the water assesment of plans.	No, the regional plan does not have a binding force on subordinate planning.	Yes, municipalities much check building applications to structure and implementation plans
	6 Subsoil management (*Included by BALANCE 4P*)		A numer of provinces made a Soil Vision that is aiming at integrating the subsoil in planning. Methods to integrate subsoil in spatial planning like the Soil Ladder Provinces and water boards are responsible for watermanagement, the province for layer inbetween (aquifers) in relation to extraction permits, they also deal with contamination. The water boards maintain the regional water system, dikes, pumps and open water. The Province is also framing	The concession from the Government is needed for extraction of minerals, The permits for mineral extraction are granted on the national level. The archeological and soil remediation procedures are coordinated on the regional level by the County Administration Boards. The County Administration Boards also oversee hazardous activities, such as energy facilities, quarries and mines.	Waterboards and *wateringen* for water management. For contaminated soil there are Brownfield decrees and convernants.
LOCAL	1 Territorial organization	a) Which local territorial unit(s) exist(s)? b) Is the local planning authority also the local building authority?	rural *buitengebied,* village *dorpskern,* town *stad, area* wijk Planning and Building are 2 departments of the same authority	The municipality is a territorial unit at municipal/ local level. No, the local planning authority and the local building authority are different entities by law.	Municipality *Planning and Building are 2 departments of the same authority?*

2 Local planning authority bodies	A) Which are the local committees and/ or the local supreme authority for initialization and adoption/ endorsement of plans?	The local committee for initialization and adoption/ endorsement of plans is the Standing committee for planning matters (various names, depends on the municipality) and the local supreme authority for initialization and adoption of plans is the Municipal council.	The Standing committee for planning matters (various names, specific name depends on the organisation of the municipality) is the local committee for initialization and adoption/ endorsement of plans. The Municipal Council is the local supreme authority for initialization and adoption of plans.	*The local committee for initialization and adoption/ endorsement of plans is the Standing committee for planning matters (various names, depends on the municipality) and the local supreme authority for initialization and adoption of plans is the Municipal council.?*
	B) Do legally notified instruments exist to cooperate between municipalities and which are the instruments?	Legally regional collaboration may be superimposed by national government, sometimes it is a voluntary initiative of municipalities (non legally notified)	Yes, the regional plan is a legally notified instrument to cooperate between municipalities (used only for Stockholm County). Otherwise, despite the planning monopoly of municipalities, the State has right to interfere in municipal planning in order to protect structures of national interests, national resources and inter-municipal issues.	Yes, on the provincial lever the Structure Vision and the Implementation Plan are putting links between smaller units.
3 Forms of planning	A) Which forms of planning for the territorial unit exist at local level?	Vison for municpal level, Masterplan for distict level (both no binding status) and then on the lowest level the Land use plans (bestemmingsplan) are the legal instrument for planning at local level. These are under development towards and Environmental Plan	The municipal comprehensive plan is the form of planning for the territorial unit at local level.	Spatial Implementation Plans are the legal instrument for planning at local level
	B) Are there plans for various levels and how are they called?	City Vision, Master Plan, Urban Design Plan (Zoning Plan), Public Space Plan	Yes, there are two levels: (i) municipal comprehensive plan (översiktsplan), and (ii) municipal detailed plan (detaljplan), and special area regulations (områdesbestämmelser). In some cases the detailed plan can be deepened (fördjupad	Yes, there are plans on two levels the Municpal Structure Plan and the Municipal Implementation Plan
4 Regulation instruments of local plans	*A) Are land use zoning categories required in local plans?*	Yes, land use zoning categories are required in 'bestemmingsplan'	Yes, there is a separate legally binding planning product called special area regulations (områdesbestämmelser) with land and water use restrictions, e.g. restricted areas and safety zones, land reservations for communication routes. The municipality can reserve land (markreservat) for public purposes in the datailed plan, e.g. streets, electrical communication network, other communications for public purposes.	Yes, land use zoning categories are required in Municipal Structure and Impementation Plan
	B) Which formulations are applied for giving future directions in local plans?	Master plans contain guidelines; Zoning plans provide legally binding regulations concerning land-use and building envelope.	Comprehensive plans contain not legally binding guidelines. Detailed plans provide legally binding regulations concerning building and land use.	Structure Plans (sometimes called Master Plans) contain guidelines; Implementation Plans provide legally binding regulations concerning land-use and building envelope but also
5 Overall local plan	A) What is the name of the overall local plan(s), and is it legally binding?	The overall local plan is usually the Municipal Development Vision. It is not legally binding	The overall local plan is the municipal comprehensive plan, which covers the entire municipality. It is not legally binding.	The overall local plan is the Municipal Structure Plan. It is legally binding
	B) What are the main components of the overall local plan(s)?	The main components of the overall local plan are diagnoses, vision, maps and indicative timetable	The plan (översiktsplan) that covers the municipality, consulatation report (samrådsredogörelse) and revision statement (granskningsyttrande) are the main components of the overall local plan.	The main components of the RUP are diagnoses (situation physical, jurisdictional, spatial option), urban guidelines in maps, drawings and texts.
	C) Which statutory zoning and land use categories are shown on the plan map?	Identification of districts and their future development, thematic in housing area or centre district.	The comprehensive plan containes specifications on the intended use of land and water areas within the boundaries of the municipality; descriptions on how national interests and environmental quality standards are ensured; how the municipality is intended to develop and protect the built environment; how the comprehensive plan complies with regional and national objectives, plans and programmes with regard to sustainable development; how the municipality ensures housing provision in a long run.	The following should be clear from the plan: the vision of and intended use of land in the area,
	D) Is the time horizon of the overall plan(s) positively limited and for how long?	It differs per city but it usually is about 30-50 years.	The comprehensive plan should be revised at least every 5-6th year. No any legally binding time horizon limitations for the comprehensive plan.	There are no horizon limits.
6 Detailed plans	A) Is there a free right to initiate a detailed development plan, what categories of these plan(s) exist and are they legally binding?	Yes, there is a free right to initiate a detailed development plan, the municipality need to check the plan before implementation against formal existing plans & regulations	Yes, a detailed plan there can be initiated by private landowners but the municipality can refuse the initiative without a right of appeal (municipal planning monopoly). The detailed plan is legally binding.	The municipality makes the Municipal Spatial Implementation Plans.
	B) Are time limits set for the public handling of detailed development plans and is the time horizon/ validity of these plan(s) positively limited?	Zoning Plan needs to be updated within max 10 years	There are no time limits set by law for the public handling of detailed plans. The time horizon of the detailed plan is positively limited: the not used development rights are protected up to 5 - 15 years.	There is no time limit.
	C) Which statutory land use zoning categories exist in detailed development plans?	Type of plan, type of usage (housing, water, traffic, garden, sports, recreation, nature, societal, trade, green, mixed, service, industry, trade, culture, centre, forrest, agriculture and office), double zoning, type of hindrance contour, type of plan, type of juristicial level.	Land use zoning categories in the detailed plan are (i) districts (kvartermark) with different types of use, e.g. industrial, commercial, residential, mixed; (ii) public spaces (allmänna platser), e.g. recreational amenities, communication routes; (iii) water areas (vattenområden) with different types of water use; and (iv) land reservations (markreservat) for public purposes, e.g. streets, electrical networks, other communications for public purposes.	Boarder, Usage: housing four types), centre (two types), shops, leisure, industry, green, public space, trade and right of sale.
7 Development control	A) Which statutory density measures are implemented in addition to land use zoning categories?	In addition to land use zoning categories different means are used to regulate building within blocks, height of structures, number of storeys, floor space etc.	Different means are also used to regulate building within districts, i.e. height of structures, number of storeys, floor space etc.	In addition to land use zoning categories different means are used to regulate building within blocks, height of structures, number of storeys, floor space etc.

		B) What are the statutory categories of building permit matters?	Statutory categories of building permit matters are: Building permit, Demolition permit, *woonruimteontrekking* permit.	These are (a) building permit (bygglov), (b) demolition permit (rivningslov), and (c) site improvement permit (marklov).	Statutory categories of building permit matters are: Building permit, Demolition permit, divide permit, change of groundfloor permit. Urban development permits: plot permit, function change permit and care permit.
		C) What are the categories of permits for projects requiring building application and are there time limits for the permit`s validity?	Buildingactivities may require a 'light' of 'full' building permit and need to start within a year.	The permits' validity is limited to a two year time period.	The permits' validity is limited to a two year time period.
		D) What relation has the Zoning plan to the building permits? (*Included by BALANCE 4P*)	The zoning plan is checked to see if the building application is meeting the requirements in that zone. There is a very strong connection.	There is a very strong connection between building permits and the leaglly binding detailed plan. The latter is checked to see if the building application meets the requirements in the detailed plan.	The RUP plan is checked to see if the building application is meeting the function requirements in that zone. There is a very strong connection. Private people can ask for a change of of RUP.
	8 Subsoil management (*Included by BALANCE 4P*)		Through the Zoning Plan some categories of the subsoil are touched on a munipal level. But next to water, remediation, archaeology and cables and pipes there is no active management or vision. Some municipalities are working on a Master Plan for the subsoil.	Only archeological procedures integrated into a detailed planning process (early stage). The soil remediation procedures are usually carried out in the late stage of detailed planning or after approval of the detailed plan. Contaminated soil related issues are handled on both municipal and regional levels, but since the division of responsibilities is not clear in the legislation the Swedish Environmental Protection Agency is currently inquiring into this issue. There are special regulations in the detailed plan defining land reserves (markreservat) for jointly owned facilities (gemensamhetsanläggningar), easements (servitut), and utility easements	Through the RUP some categories of the subsoil are touched on a munipal level: level and relief of the ground floor, pavement of the lots.
PARTICIPATION	1 The entitlement to inform and the right to get access to information (answers sorted by levels)	Are there statutory requirements for informing the public and public access to information?	Zoning Plans need to be available online	Yes. Firstly, the constitution principle of free access to official documents (offentlighetsprincipen) garantees public access to information. Secondly, the rules for regional planning in the Planning and Building Act ensures that the public is informed and has access to information.	All RUP's are availeble online.
	2 Particular participatory instruments beyond information in the planning process	Are there statutory instruments for public participation during the preparation of plans like number of hearings, meetings, etc.?	Yes, plans need to be made public and a period of time that citizens can appeal to the plans.	There are no statutory instruments for public participation at regional level during the preparation of regional development programmes but regional plans require public reviews, public exhibition and comments on public opinions. The public has possibility to leave comennts on the municipal comprehencive plan during the exhibitaion phase (utst'llning). The public is involved during preparation and exhibition of the detaied	Yes, plans need to be made public and a period of time that citizens can appeal to the plans.
	3 The public opportunity to challenge the plan after the plan is formally adopted	Is there an option for an appeal in order to challenge the plan after it is formally adopted?	No	Nobody can appeal in order to challenge the comprehensive plan after it is formally adopted, because it is not legally binding. But the residents can express dissatisfaction with the planning process initiating the local appeal procedure (kommunalbesvär) under the Local Government Act (kommunallag) of 1991. The content of the adopted legally binding detailed plan can be contested by appeal to the County Administrative Board, whose decisions in turn can be contested to the Land and Environmental Higher Court (Mark- och miljööverdomstolen), and ultimately to the Supreme Court (Högsta domstolen). The detailed plans can be appealed to the County Administration Board on the reginal level.	No

The Netherlands				
Spatial development:	**institutions**	**laws**	**policy/instruments**	**regulation**
EU	Board of European Ministers of Spatial Planning		European Spatial Planning Charter (1983); European Spatial Development Perspective (2003)	
		Waste Directives Natura 2000		
				EU Guidelines energy performance for buildings (EPBD)
			INSPIRE Directive (2007): information gathering	
National	Ministry of Infrastructure and Environment (Institute for Social Research, Environmental Assesment Agency)	Spatial Planning Act (2008) > Environmental Act	Structure Vision Infrastructure and environment 2040 (2012);	
		Nature Protection Act Noise Polution Act Transport Dangerous Substances Act		
	Ministery of Internal Affairs Environmental Impact Assesment Commission	Building Act (2012) Environmental Protection Management Act		Building Codes Environmental Impact Assesment (for structure and zoning plans)
			Ministerial guidelines (no law) for gas and inflamable liquid transport: distance around networks. External Safety ordonance: obligation to register risk with dangerous material.	
		Public Health Act	National Waste Magement Plan (LAP) National Environment and Health Plan 2008-2012 Noise and Fine dust zoning	
	Ministry of Education, Culture and Science (Cultural Heritage Agency) Forestry (staatsbosbeheer)	Monuments and Historic Buildings Act		
Regional	Regions Provences		Regional Plan Structure Plan Area Profiles Spatial Qualities Provincial Environmental Ordonnance	
Local	VNG			Model Ordonannces (modelverordeningen)
	Municipalites		Vision, Master Plan Architectural Quality Assesment	Zoning Plan Building Permits
Water	**institutions**	**laws**	**policy/instruments**	**regulation**
EU		Water Framework Directive Urban Wastewater Directive Ground Water Directive		
National	Ministry of Infrastructure and Environment (Deltares)	Water Act	National Water Plan	
		Environmental Management Act		
	National Water State Department		Safety Qualification Primary Defence (veiligheids kwalificatie keringen)	
Regional	Provence			Province regulates infiltration and extraction of water (new Waterwet/Water Act in preparation)
	Water Authority		Regional Water Plan Water Plan	Water Assesment Test
		Water Level Decree	waterschapslegger	
Local	Municpality		Water Plan local waste-water plan	
Subsoil	**institutions**	**laws**	**policy/instruments**	**regulation**
EU		Directive on Waste Directive on Landfill of Waste	European Soil Strategy	
National	Ministry of Economic Affairs Ministry of Infrastructure and the Environment (TNO)	Mines Act Soil Protection Act (1987)	STRONG (National Spatial Planning Strategy for the subsurface) (expected 2015)	
		Excavation Act Evironmental Management Act	Information System Soil Soil Polici Letter (2003) Soil Convent	
		Nature Protection Act		
Regional	Provences		Soil Vision/Soil Ladder	soil remediation
Local				soil remediation
Civil constructions	**institutions**	**laws**	**policy/instruments**	**regulation**
EU			European Convention on the Protection of the Archaeological Heritage (1992)	
National	Ministry of Economic Affairs (Municipal Platform of Cables and Pipes, Cultural Heritage Agency, Centre of Underground Building)	Information Exchange on Underground Infrastructure Act (WION)	KLIC	
	Ministry of Education, Culture and Science (Cultural Heritage Agency)	Excavation Act Archaeological Heritage Management Act		
		Monuments and Historic Buildings Act		
			External Safety ordonance: obligation to register risk with dangerous material.	

Regional	Provences		Structure scheme pipelines (SBUI): national main network for provinces to incorporate in structure plans. Provincial Research Agenda Archaeoly Policy Culturel Heritage; Programme Heritage	
Local	Municipality	Environmental Management Act		sewer regulations Local regulations considering cables and pipes in general.
Energy	**institutions**	**laws**	**policy/instruments**	**regulation**
EU		European Energy Strategy Plan (2013)	Energy Technologies and Innovtion (2013)	
National	Ministry of Economic Affairs, Ministry of Infrastructure and the Environment and Ministry of Social Affairs and Employment	Nuclear Energy Law: regulates ministerial competences for storage of radio-active waste; Strategy on Shale Gas (expected 2015)	SER energy agreement (2013)	Energy Prestation Certificate
Regional **Local**	Provinces		IPO agreement geothermal	license issued under the General Provisions Environmental Law (Wabo) (open systems) reporting closed bottom energy ATES (recorded in amending soil energ , no separate Amvb)

Sweden				
Spatial development:	**institutions**	**laws**	**policy/instruments**	**regulation**
EU	Board of European Ministers of Spatial Planning		European Spatial Planning Charter (1983); European Spatial Development Perspective	
		Waste Directives Natura 2000		
				EU Guidelines energy performance for buildings (EPBD)
			INSPIRE Directive (2007): information gathering	
National	Ministry of Health and Social Affairs (National Board of Housing, Building and Planning [*Boverket*], Swedish Environmental Protection Agency, National Board of Health [*Socialstyrelsen*])	*riksintresse has 13 laws*		
		Planning and Building Act (*Plan- och Bygglagen - PBL (2010:900*)		Planning and Building Ordinace (plan- och byggförordningen 2011:338) Houskeeping Ordinance [Hushållningsförordningen 1998:896]
		Environmental Code (Miljöbalken (1998:808)		Regulation on implementation of the Environmental Code (Lag om införande av miljöbalken 1998:811)
	Ministry of Health and Social Affairs (National Property Board of Sweden [*Statensfastighetsverk*]) Ministry of Culture (Swedish National Heritage Board [*Riksantikvarieämbetet*])	Cultural Heritage Act (kulturminneslagen 1988:950)		
	Ministry of Health and Social Affairs (National Land Survey *Lantmäteriet*)	Property Subdivision Act (fastighetsbildninglagen 1970:988) Utility Easement Act (ledningsrättslagen 1973:1144) Joint Installation Act (anläggningslagen 1973:1149)		Registration of jointly owned facilities (gemensamhetsanläggningar), easements (servitut), and utility easements (ledningsrätter) in Land Registration System (fastighetsregister)
	Ministry of Environment - Miljödepartamentet (*Swedish Environmental Protection Agency - Naturvårdsverket)*	Environmental Code (Miljöbalken 1998:808) Lag om införande av miljöbalken (SFS 1998:811) Förordningen om avgifter för prövning och tillsyn enligt miljöbalken (SFS 1998:940)		Förordningen om miljökonsekvensbeskrivningar (SFS 1998:905)
		Expropriation Act (expropriationslagen 1972:719) Pre-emption Act (förköpslagen 1967:868) Joint Land Development Act (lagen om exploateringssamverkan 1987:11)	These property rights-related laws serve as important instruments for plan implementation and land development	
	Ministry of Enterprise, Energy and Communications (Transport Administration [*Trafikverket*])	Road Act (väglagen1971:948) Railway Act (järnvägslagen 2004:526)		
Regional	County Counsil *(Landstinget)* is the link between national and municipality		Environmental quality standards, shorelines and human health, safety, risks, flooding, erosion. Regional Plans (*Regionplan)* and Regional Development Strategies (*Regionala utvecklingsstrategier)*	
Local	Municipality (Urban Planning Departments *(Stadsbyggnadskontoret),* Urban Planning Committees *(Stadsbyggnadsnämnden)*		Municipal Comprehensive Plan (*Översiktsplan) and Parts of a Comprehensive Plan (* Fördjupad översiktsplan*)*	Detail Plan *(detaljplan)*
			building permit (bygglov) demolition permit (rivningslov) site improvement permit (marklov)	Area Regulations (*Områdesbestämmelser)*
Water	**institutions**	**laws**	**policy/instruments**	**regulation**
EU		Water Framework Directive Urban Wastewater Directive Ground Water Directive		
National	Ministry of Health and Social Affairs (National Board of Housing, Building and Planning *(Boverket))* Ministry of Environment - Miljödepartamentet (Swedish Environmental Protection Agency - Naturvårdsverket)	Planning and Building Act (*Plan- och Bygglagen - PBL (2010:900*) Environmental Code (Miljöbalken (1998:808) Water Act Public Water and Waste Water Plant Act (lag om anmälla vattentjänser) 2006		
Regional				
Local				Area Regulations (*Områdesbestämmelser)*
Subsoil	**institutions**	**laws**	**policy/instruments**	**regulation**
EU		Directive on Waste Directive on Landfill of Waste		

National	Ministry of Health and Social Affairs (*Swedish Environmental Protection Agency, Swedish Geotechnical Institute)* Ministry of Enterprise, Energy and Communications (Geotechnical Survey of Sweden)	Environmental Code (Miljöbalken 1998:808) Peat Deposits Act (lagen om vissa torvfyndigheter 1985) Mineral Act (minerallagen 1991) Continental Shelf Act (lagen om kontinentalsockeln 1966)		
Regional				
Local				*Special regulations in the Detail Plan (detaljplanebestämmelser), i.e. land reserves (markreservat) for jointly owned facilities (gemensamhetsanläggningar), easements (servitut), utility easements (ledningsrätter)*
Civil constructions	**institutions**	**laws**	**policy/instruments**	**regulation**
EU			European Convention on the Protection of the Archaeological Heritage (1992)	
National	Ministry of Culture (Swedish National Heritage Board [*Riksantikvarieämbetet*])	Heritage Conservation Act (kulturmiljölagen 1988)		
	Ministry of Enterprise, Energy and Communications (Swedish Energy Agency [*Energimyndigheten*])	Electrical Installations Act (ellagen 1985) Public Heating System Act (lagen om allmänna värmesystem 1981) Pipelines Act (rörledningslagen1978) Water and Sewerage Act (lagen om allmänna vatten- och avlopsanläggningar 1970)		Telecommunication Ordinance (teleförordningen 1985)
	Ministry of Health and Social Affairs (National Land Survey Lantmäteriet)	Joint Installation Act (anläggninglagen 1973:1149) applies to facilities common to two or more properties e.g. parking C12 play C14 water and sewarege facilities constructed and maintained by property owners Utility Easements Act (ledningsrättslagen 1973:1144) applies to e.g. water and sewrege facilities constructed and managed by municipalities (legal bodies), telephone lines		Registration of jointly owned facilities (gemensamhetsanläggningar), easements (servitut), and utility easements (ledningsrätter) in Land Registration System (fastighetsregister) by National Land Survey (lantmäteriet)
Regional				
Local				
Energy	**institutions**	**laws**	**policy/instruments**	**regulation**
EU		European Energy Strategy Plan (2013)	Energy Technologies and Innovtion (2013)	
National	Ministry of Enterprise, Energy and Communications (Swedish Energy Agency [*Energimyndigheten*]) Ministry of Health and Social Affairs (Lantmäteriet)	Municipal Energy Planning Act (lagen om kommunal energiplanering 1977:439) Utility Easements Act (ledningsrättslagen 1973:1144) applies to heating main, high- and low-voltage power lines		
Regional				
Local			Energy plan (energiplan)	Special regulations in the detailed plan, i.e. land reserves (markreservat) for jointly owned facilities (gemensamhetsanläggningar) and utility easements (ledningsrätter)

Flanders (Belgium)				
Spatial development:	**institutions**	**laws**	**policy/instruments**	**regulation**
EU	Board of European Ministers of Spatial Planning		European Spatial Planning Charter (1983); European Spatial Development Perspective (2003)	
		Waste Directives		
		Natura 2000		
				EU Guidelines energy performance for buildings (EPBD)
			INSPIRE Directive (2007): information gathering	
National		Planning Act (1962)		
national/Flanders	Flanders Department for the Environment, Nature and Energy (Department Space and Monuments)		Regional Zoning Plan *(gewestplan);* gradually replaced by Spatial Structure Plans (RUP)	Planning Planning Decree 1996
			Spatial Structure Plan Flanders SVIR 2012	
				Decree Protection of Monuments and Town and City Scapes (1976)
				Decree Protection of Landscape (2010)
	Flanders Department for the Environment, Nature and Energy (Flanders Environment Administration)			Nature, Forrest, Bird, Protecten Flora & Fauna and Habitat Decrees
				EIA decree (Milieueffectenrapport)
				Spatial Safety Report (ruimtelijke veiligheidsrapport; RVR)
	Flanders Department of Mobility and Public Works			Mobility Impact Assessment (mobiliteitseffectenrapport; MOBER)
Regional	Provences and Arrondissements (Provincial Development Agency)		Regional Spatial Structure Plan	Regional Spatial Implementation Plan
			Provincial Spatial Structure Plan	Provincial Spatial Implementation Plan
			Strategic Plan Tourism and Recreation and Scheldeland	
Local	Municipality	Local Government Act 1991	Municipal Spatial Structure Plan	Municipal Spatial Implementation Plans
Water	**institutions**	**laws**	**policy/instruments**	**regulation**
EU		Water Framework Directive		
		Urban Wastewater Directive		
		Ground Water Directive		
National	Flanders Environment Agency	Surface Water Act		
			Sigmaplan (flood protection)	
Regional	Provinces			Decreet Integraal Waterbeleid
	Water Boards			
Local	*Watering*			Water Assesment Test
Subsoil	**institutions**	**laws**	**policy/instruments**	**regulation**
EU		European Strategy & Soil directive: protection and remediation. Covering, pollution, erosion, loss organic material, saltification, densification, biodiversity, landslides);	European Soil Strategy	
		Directive on Waste		
		Directive on Landfill of Waste		
National	Ministry of Economic Affairs (Belgium Geological Department)	Mining of Minerals Act		
National /Flanders	Flanders Department for the Environment, Nature and Energy (Public Waste Compagny)		Subsoil Information System	Soil Protection and Contamination Decree (2006) > Brownfield decree
	Brownfield Cel		Brownfield Decree	Brownfield Covernant
Regional				
Local				
Civil constructions	**institutions**	**laws**	**policy/instruments**	**regulation**
EU			European Convention on the Protection of the Archaeological Heritage (1992)	
National /Flemish	Flanders Department for the Environment, Nature and Energy (Department Space and Monuments, Flemisch Insitute for Heritage)			Decree Protection of Archaeology (1993)
	Platform of Cables and Pipes			KLIP information system cables-
Regional				
Local				
Energy	**institutions**	**laws**	**policy/instruments**	**regulation**
EU		European Energy Strategy Plan (2013)	Energy Technologies and Innovtion (2013)	

National	Energy Prestation Certificate	
Regional		
Local		