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HOMBRE

“Holistic Management of Brownfield Regeneration”

D 7.1: Hombre Website, newsletter, brochure

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Disclaimer

Summary

HOMBRE W7 “Networking, Dissemination and Business Plan” used several dissemination tools such as a project website, newsletters and project flyers to inform the public and the related communities and networks on the activities and developments in HOMBRE.
At the same time e.g. the internal area of the HOMBRE website supported the exchange of information between the project partners.

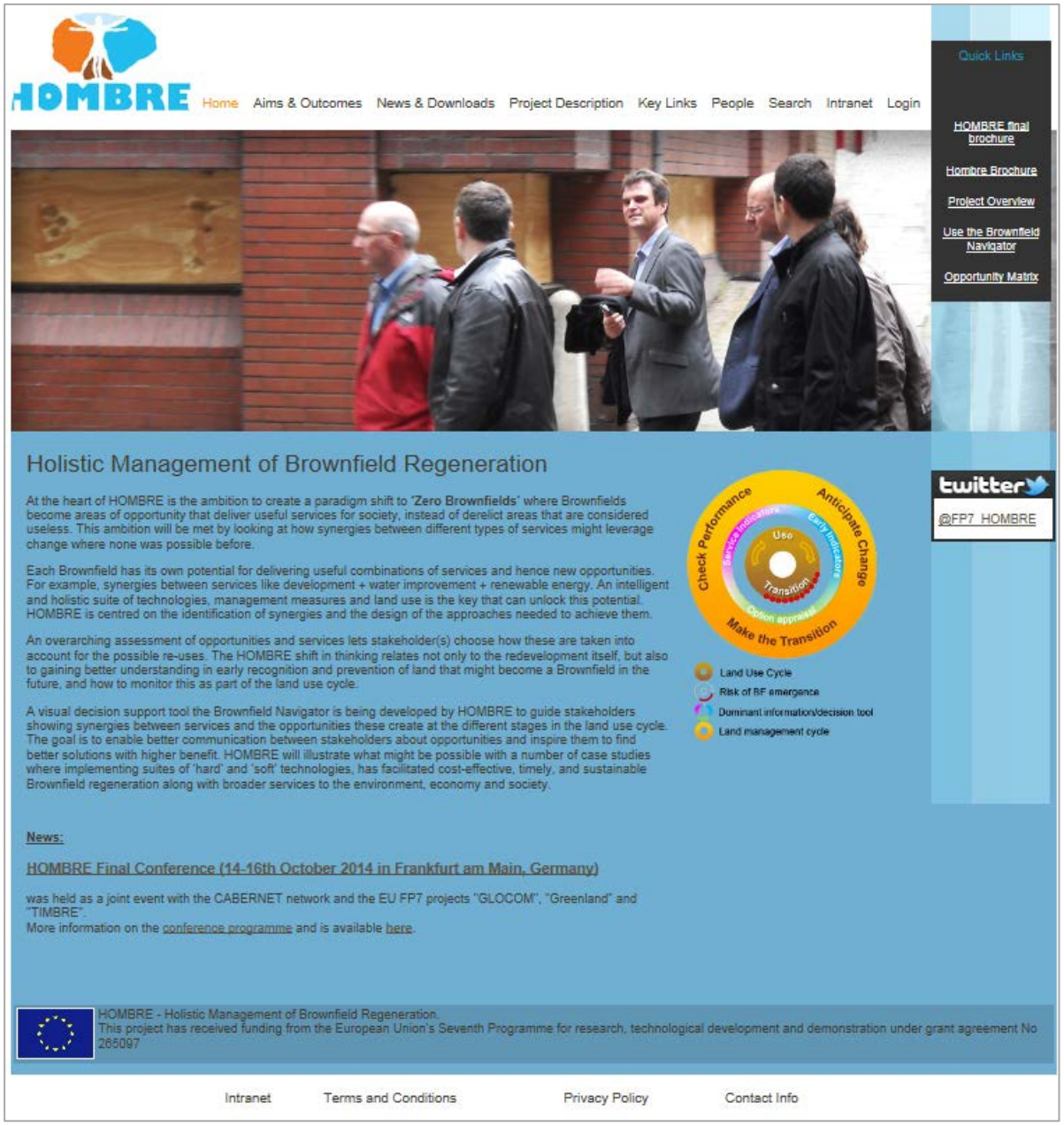
Contents

1 Scope and frame of the deliverable

The deliverable introduces to the HOMBRE project website, the HOMBRE newsletters and the 3 project brochures.

2 HOMBRE Website

Under the URL http://www.zerobrownfields.eu/ the HOMBRE internet platform was set up.



Website structure

To inform about the activities and to support the exchange of information among the project partners the HOMBRE internet platform was divided into a public and a restricted internal area with the following subpages:

- Aims & Outcomes
- News & Downloads
- Project Description
- Key Links
- People
- Search
- Intranet / Login

Aims & Outcomes

- Introduces to the general research objectives, the strategies and concept of the HOMBRE project
- Presents the outcomes of the project, especially the public reports on the results developed in HOMBRE
- Contains the presentations and the proceedings of the HOMBRE Final Conference (”CABERNET 2014”)

News & Downloads

- Announcement of meetings and events
- Information on related activities and initiatives
- Download of HOMBRE newsletters and brochures

Project Description

The subpage “project description” gives a first overview of the activities within the HOMBRE project and the “zero brownfield concept”.

It introduces to the products developed in HOMBRE as well to the case study sites that are located in different parts of Europe.

The section on the “Work package description” presents the contents of the HOMBRE work packages and contact persons that are responsible for the work package.

Key Links

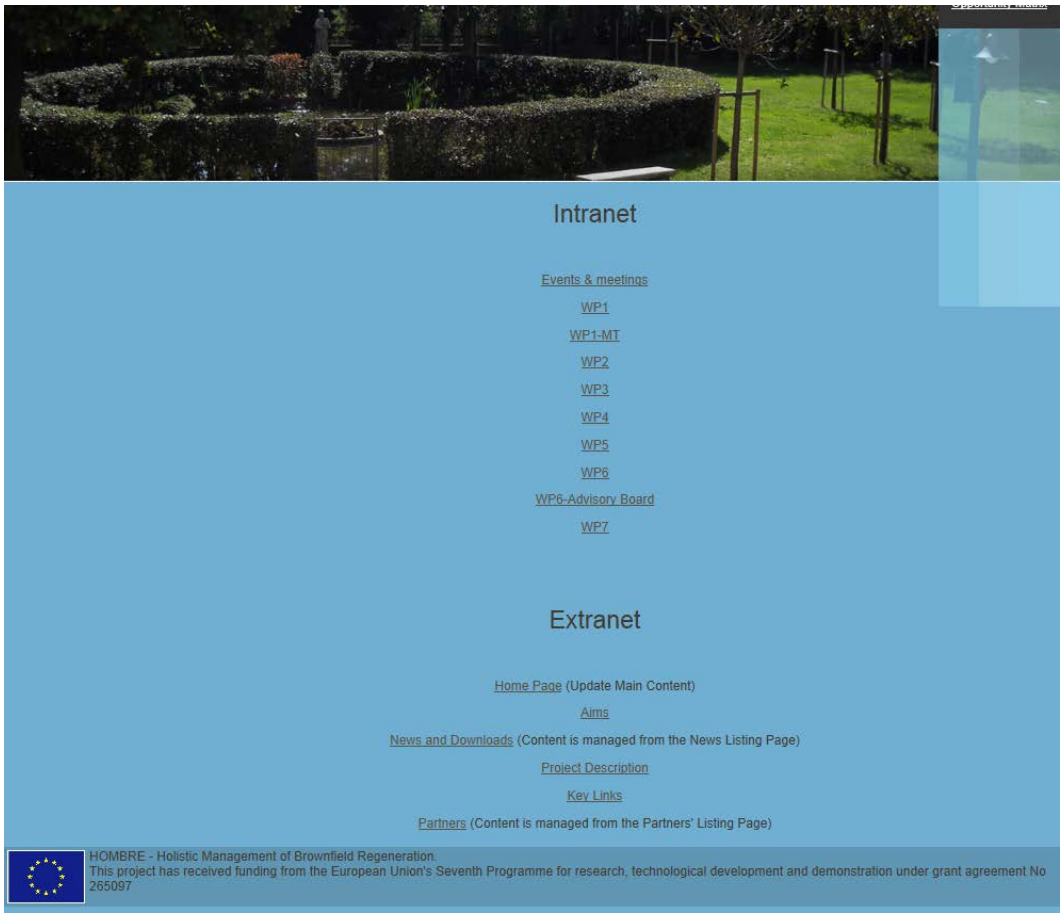
The section gives a short description of the related networks and EU projects such as TIMBRE and Greenland and provides links to their homepages for more detailed information.

People

This subpage gives an overview on the HOMBRE project partners and the Advisory Board members as well as links to the websites of the respective institutions.

Search
Possibility to search for certain terms via www.google.com either only in the HOMBRE website (www.zerobrownfields.eu) or in the whole internet.

Intranet / Login
The HOMBRE project partners were able to enter the intranet of www.zerobrownfields.eu with a certain password.



Here the partners are able to make changes or update the changes on pages of the extranet.

The intranet provides overarching contractual documents such as the "Annex I – Description of Work" and the presentations given at HOMBRE events such as the General Assemblies.

Each work package (WP) had a separate folder where the partner involved in this WP could exchange on:

- *Reports*
  - Deliverables (draft, final)
  - Milestones
  - Others
- *Presentations*
- *WP meetings* (physical meetings and phone/web conferences)

- *Publications*
    - Journal Papers
    - Conference papers
    - Others
- *Cases* (case study sites)
- *WP specific Issues* (e.g. WP3: Brownfield Navigator and WP7: Dissemination – newsletters, brochures, e-learning modules)

3 Newsletters & Brochures

During the lifetime of the project 3 newsletters, 2 brochures and 1 extended final brochure were produced.

They were made available on the HOMBRE website for download, they were sent to 1.280 addresses and they were distributed during related events such as the AquaConSoil in Barcelona/Spain in April 2013.

1st Newsletter - published 12.06.2012

HOMBRE NEWS ISSUE 01 / 2012

HOLISTIC MANAGEMENT OF BROWNFIELD REGENERATION

EDITORIAL

Welcome to the first issue of the HOMBRE newsletter. The HOMBRE newsletter will be a vehicle for spreading the activities of the project to the stakeholder community and gives a summary of the project, upcoming events and announcements. Our newsletters we will have a "series on the HOMBRE cases" where short descriptions of a HOMBRE case study sites are presented. This issue presents the Genoa case as our first example. In this issue we will also take the opportunity to present some of the work being done within the HOMBRE consortium in the Brownfield Roadmap and Framework for Zero Brownfields, integration of technologies and a practical decision making instrument "Brownfield Navigator".

Please visit the web site www.zerobrownfields.eu in order to learn more about HOMBRE in general, and to get detailed information on upcoming events, e.g. stakeholder workshops and conferences, related to Brownfield regeneration and how HOMBRE proceeds.

HOMBRE – HOlistic Management of Brownfield REgeneration
Urban redevelopment – Brownfield regeneration

Today most of us perceive brownfields (BF) as a legacy of the past. Yet our urban landscape expands at an ever increasing rate and we travel ever increasing distances across this landscape. Perhaps in our urban sprawl we are already busy creating the brownfields of tomorrow. These might be different from the post-industrial brownfields of today but will nonetheless be exploited and abandoned land. The concept of 'zero waste' has ushered in a paradigm shift in attitudes to resource use. The same paradigm shift is long overdue in attitudes to land use. HOMBRE has been launched project to bring about and enable a paradigm shift to 'zero brownfields'. It is a Collaborative Project carried out under the *Seventh Framework Programme THEME FP7 ENV.2010.3.1.5-2: Environmental technologies for Brownfield regeneration*, Grant Agreement Number 265097. It has been running since December 2010 and will end in November 2014. The consortium consists of 14 institutions from 8 countries across the EU. Our strategic goal is to stimulate a greater dividend from BF regeneration for environment, economy and society, to support more sustainable development. HOMBRE will provide:

- Better understanding *why, how, where* and *when* BF's are formed in order to avoid future BF's, for different areas in the EU and across three main domains: urban, industrial and mining areas,
- Better planning and more attractive communication technologies, that allow more holistic appraisal of BF regeneration options and early stakeholder involvement,
- Better operations, better implementation of state of the art technologies, and development of innovative technology combinations for more sustainable integrated BF regeneration,
- Better and more creative solutions for the long-term land use of current and potential future BF's.

Hence HOMBRE aims to HOlistic Management of Brownfield REgeneration, and will provide the scientific and technical backbone to support four very simple 'zero-brownfield' concepts:

Land-use life cycle: Land is the ultimate finite resource. It is also a resource that is in a cycle of use. Brownfield land can be a stage in this cycle, but for many economic, environmental and social reasons it is important that future brownfield generation is prevented, and where land is already brownfield its re-use is accelerated.

Intermediary land use: The best management solution is prevention, following that is remediation (where some processes are needed to bring land back into suitable re-use). Sometimes its helpful to find some form of intermediary land use for such abandoned land to support a recovery in land value. The land can there be gradually restored until it can be fully re-integrated into the land use cycle.

Added value by combining technologies: Integrated solutions offers a great opportunity to surmount the costs barrier by sharing the land management costs with other services and opportunities for society such as renewable energy and urban green space and climate control. The potential for revenue from diverse renewable energy / climate control technologies from ground source heating and cooling to bio-energy may provide revenue opportunities to enable remediation.

'Zero Brownfields': For any site come benefits and responsibilities for several stakeholders. A more intelligent design for brownfield management potentially brings important sustainability benefits and receives the duration of disuse and hence Brownfields generation. For the planet there may be benefits of better resource optimization and lower impacts from land management; for people there may be societal benefits from a better urban landscape and for profits there may be economic benefits from avoiding the 'over-design' of standalone remediation solutions.

HOMBRE will bring credible approaches that will help communities plan land use to reduce the creation of brownfields in the future, and a series of integrated technical solutions that enable the re-use of brownfield sites that already exist.

A spot on HOMBRE cases: Italy – Genoa- Polcevera site

What is the case about?

Polcevera Stream valley is an important link between the eastern and the western part of the city of Genoa, in Northwestern Italy. Genoa is part of an important transit for the north-south transport of goods, especially along the European corridor 24 Genoa-Rotterdam. Despite tumultuous recent history of urban and industrial development, the Polcevera valley still shows obvious signs of a not so distant past characterised by agricultural and light manufacturing activities. Last but not least, this corridor also represents one of the most used migratory routes followed by birds (but also insects and larvae) during their annual migrations from the African continent to the Great Plains of the Eurasian continent.

At the moment the Polcevera stream delta is a heavily urbanized area, inside the borough of Cornigliino, with a steel industry brownfield lying to the west of the stream for about 6 ha. An old 17th century historical building, Villa Bombrini, is sited adjacent to the area.

The Polcevera delta project seeks a complete restoration of the area and a connection between the stream and a garden/recreational area that is planned on the western bank in coming years.

How did the case become a Brownfield?

The area used to contain steel factories that ceased production in the 90's, caused by loss of a competitive position to 'low salary countries' (India, China) and also stricter environmental laws. A Pressure group 'the Cornigliano mothers' wanted to have furnaces closed due to the high problems with air quality. Partly the Italian government provided funds to close the factory and move the workers to another location.

In 1996 the production of iron stopped and the site become disused. In 1998 the region created a "green buffer zone" along the margins of the site, because this was the easiest and cheapest solution at that moment.

What are the most important issues?

Project drivers:

- **Political:** the Regione Liguria wants a new 700 bed hospital on the riverbank on the Brownfield sites. The Genoa Municipality made a Municipality Urban Plan (PUC) specifying commercial and multiple service areas along with green areas. Nowadays the PUC is still discussed by the stakeholders and final approval is expected in 2012.
- **Economic:** depending on the future of port activities and industries, the site may find new role, especially as link area between port and motorways. A new network of roads will cross the area, a two-lane street running along the river, a new railway and a new main road along the sea, crossing the delta to the south. Their aim is to reduce the traffic pressure on Cornigliano Borough and to connect quickly highways and port facilities. The new network of roads is planned to be completed by 2015.
- **Social:** the expectations of the local community are very high, in terms of urban requalification, with new spaces being devoted to commercial activities and green areas. A stakeholder and local community involvement project held by the municipality was scheduled to start in November 2011 and will give first feedback in 2012.

Benefits:

- A new gate for the city to the inland, a new perception of the entire Cornigliano Borough.
- A new engine for a sustainable remediation and a model for future projects.
- A stepping stone in the ecological network of the city and for the Rete Natura 2000 network.

This case is not a real brownfield (BF) is not abandoned. The regeneration project has already started and part of the area is still in use. However, since the problems and plans for this area are very diverse and still disputed, a tool like the Brownfield Navigator (BFN, could be very useful to clarify opportunities and implications of certain measurements for the area. Also, the problems found in this case are for other BF cases in Europe, so it might be able to serve as a good guidance case within the HOMBRE project.

Strategic management products

The Brownfield Roadmap and Framework for Zero Brownfields

HOMBRE is developing practical, science based guidance to deliver the concept of a land cycle as a working system for planners and land managers. The strategy will be based on indicators for early recognition of why, how, and when Brownfields come into existence, as well as on finding indicators that signal potential for sustainable, cost-effective and timely site renewal. By monitoring these indicators, timely intervention may avoid Brownfield formation or at least mitigate the negative effects. It will ensure that scarce resources are focused on solving genuine problems, e.g. by avoiding unnecessary remediation, and on creating long lasting opportunities. The final Framework will incorporate the experiences obtained from the HOMBRE case studies, market and stakeholder guidance on all methodologies and technologies developed, and a policy brief on Brownfield regeneration.

A practical decision making approach: Brownfield Navigator

HOMBRE is developing integrated stakeholder communication and decision support technology for the selection of optimal Brownfield regeneration options, approaches and technologies of decision making. This will apply a set of common principles but support their use at different geographical scales and different stages in land management decision-making. For example, during the planning phase there is a need for more elaborate and integrated decision making tools and processes that help stakeholders to 'navigate' holistically towards a successful Brownfield regeneration across an area. The Brownfield Navigator will enable to assess the key environmental, economic and social aspects of Brownfield regeneration scenarios in either local or regional contexts. It will integrate a set of rules and principles from HOMBRE's strategic guidance; GIS technologies using the 'design table' visualization approach to support interactive and cross sectoral decision-making.

Integration of technologies:

A 'treatment train' is a term to describe how different technical approaches can be combined to offer an enhanced benefit. HOMBRE is exploring treatment trains in two contexts: the 'hard' built environment context, and a 'soft' re-use context linked to urban greening and/or bio-energy production:

- Train1 Energy and water, where energy re-use and contaminated water restoration are combined.
- Train 2 Building materials and soil, where resource efficiency and contaminated soil management are combined.
- Train 3 Soil and water, where remediation and sustainable urban drainage and soil capacity building are combined.
- Train 4 Urban greening and restoration, where the benefits of remediation and urban green space are combined.
- Train 5 Bio-energy and remediation, where combining organic matter recycling and bio-energy production provides a solution and revenue for abandoned land.

HOMBRE HOLISTIC MANAGEMENT OF BROWNFIELD REGENERATION

HOMBRE – First Stakeholder Workshop – 02 - 03 November 2011

HOMBRE held its most recent , the General Assemble (GA) in the beginning of November 2011, combined with its First Stakeholder Workshop of HOMBRE in Brussels, Belgium. More than 30 participants attended this meeting, including associates from municipalities, members from the advisory board, coordination team of the TIMBRE project and researchers from the HOMBRE project.

The main purpose of the General Assembly was to inform participants about work to date, discus progress and results being reached in 2011 and plan activities for 2012 with the work package leaders. A "speed dating" session was held to link members of the Advisory Board and the different work package teams. Opportunities for collaboration were identified and advisory board members indicated which work package they want to champion.

Stakeholder involvement was a principal aim of the workshop. Stakeholders are of major importance for the HOMBRE project, for example to discuss the various HOMBRE pilot cases. Their experience, knowledge and demands also provide essential inputs to the project as a whole and to steer the development of functional outputs for Brownfield regeneration. Three subjects were discussed during the 1.5-day workshop. The first part of the workshop was about indicators that enable early recognition and better understanding of brownfields. This gave insight on the types of indicators that are used or helpful for three HOMBRE cases.

The second subject was about identifying opportunities, services and benefits for development of green re-use technologies (e.g. biomass-energy, open space), and defining generic target groups. This considered in particular soft reuse technologies, and gave the researchers of the project a better understanding about bottlenecks and benefits. The last subject – Brownfield Navigator (BFN) was presented and its further developments have been discussed.

The developing collaboration between TIMBRE and HOMBRE was cemented by the signing of a joint Memorandum of Understanding by both coordinators.

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2nd Newsletter - published 11.12.2012

HOMBRE NEWS ISSUE 02 / 2012

HOLISTIC MANAGEMENT OF BROWNFIELD REGENERATION

EDITORIAL

Soils provide a wide range of vital ecosystem functions, such as water filtration, storage, and food production. Soil sealing and associated land take lead to the loss of important soil functions. Soil sealing is getting higher on the policy agenda in Europe as a result of the conflict of interest between urban sprawl on one hand and increasing demand for agricultural land on the other hand.
The "Roadmap to a Resource Efficient Europe", adopted in 2011, sets an aim to achieve zero net land take by 2050. A measure for reaching this is the regeneration of brownfields instead of greenfield development. A challenge in brownfield regeneration is the number and diversity of stakeholders (public and private) which also need to be closer involved at an early stage of the redevelopment.

This newsletter presents a part of the tools and mechanisms that will be developed in HOMBRE to bring different stakeholders together (at an early stage) to eventually reach effective brownfield regeneration. The Brownfield Navigator, developed by HOMBRE, will be a web based tool to facilitate the process of bringing together different stakeholders. In this issue the status quo and further planning of the tool is given. HOMBRE will elaborate on a CEN Workshop Agreement, to bring different stakeholders together, by setting up a common glossary of terms related to brownfield regeneration. It will be further explained and you are cordially invited to participate. Finally, a short introduction of the second HOMBRE case Papigno (Terni, Italy) is given.

HOMBRE General Assembly and 2nd Stakeholder Workshop

On 19th September 2012 the HOMBRE consortium and members of the HOMBRE Advisory Board met for the General Assembly (GA) in Ferrara/Italy. The GA was followed by the 2nd HOMBRE Stakeholder Workshop on 20th September 2012 and a special session on HOMBRE at the 6th REMTECH ("Remediation Technologies & Requalification of Territory") Exhibition on 21st September 2012.

The main activities of the GA were to report on the progress in 2012 and plan activities for 2013 across the HOMBRE project. We were delighted to have input and feedback for both activities from the HOMBRE Advisory Board.

The Stakeholder Workshop focused on the stakeholders involved in the interaction of the HOMBRE work packages and some of the project's cases studies, namely:

- Terni (Italy)
- Genoa (Italy)
- Jui (Romania)
- Solec (Poland)
- Gelsenkirchen (Germany)

Updates for each case study were followed by intensive group discussions between HOMBRE partners and the representatives of the cases on each case study. The outcomes of this discussion will be used to develop the project's action plan for 2013.

The workshop included a session on the "Brownfield Navigator" (See also page 5), the interactive IT decision making tool that is being developed in HOMBRE. The Brownfield Navigator (BFN) aims to support decision makers in each phase of the land use, land use

Figure 1: Discussions during the HOMBRE Stakeholder Workshop in Ferrara

1

planning and brownfield regeneration process by providing a tool that helps to visualize the situation and collect and connect data to a geographical map for the brownfield location. The workshop demonstrated the latest version of the BFN and its tools and the participants were asked for recommendations on the further development of the BFN.

The Stakeholder Workshop also debated the impact of the Euro crisis on brownfield creation and reuse in Europe. The participants were asked to give feedback on the impact of the Euro crisis on the construction sector, manufacturing, skilled employment and the housing market in their home country and to think about possible solutions to the problems of new brownfields and slowed return to beneficial use of brownfield sites.

Here – amongst others – the following ideas came up:

- Use a different basis for measurement (from monetary valuation to holistic valuation).
- A surcharge on the price for building/ buying a building could be put into a fund for the eventual decommissioning of the building.
- Tax break for private investment in Research & Development.
- Bring together relevant parties (public institutes etc.) to solve the problem in a concentrated period of time – regulation by consensus workshops.
- Use brownfield sites as transport infrastructures nodes to increase connectivity – e.g. bus interchange; cycle pick up points.

HOMBRE includes running a CEN Workshop Agreement to support consensus building for brownfield regeneration concepts. This is a tool provided by the European Committee for Standardization (CEN) to elaborate a consensus document with agreed positions concerning a certain defined issue. The stakeholder workshop debated how HOMBRE would use a CEN Workshop Agreement. Participants lively exchanged on the possible scope and rationale for such a process. This debate carried on to subsequent Internet meetings. As a result of these discussions HOMBRE has decided to run a CEN Workshop on the elaboration of a glossary of terms for the holistic management of brownfield regeneration. The HOMBRE CEN Workshop will start in March 2013 and have a duration of approximately 18 months (see page 7).

The HOMBRE special session at the 6th REMTECH Exhibition on 21st September 2012 focused on "The approach of the European project Holistic Management of Brownfields Regeneration (HOMBRE) and the Italian experience". The current structure of the BFN and the benefits of its use in the process of brownfield regeneration were introduced. Furthermore HOMBRE presented examples that illustrated the advantages of applying technology trains for brownfield regeneration. The session was closed by a presentation of the two Italian HOMBRE case studies (Genoa – see Page 2, HOMBRE newsletter 01/2012 and Terni – see Page 3).

HOMBRE at the CABERNET Conference

The approach and strategic goals of HOMBRE were presented at the 3rd CABERNET Conference on Urban Land Management which was held on 2nd – 4th October 2012 in Ustron, Poland. A special focus was given to the benefits that could be gained from the use of the "technology trains" (developed in HOMBRE work package 4). Different examples for soft re-use of brownfields (from HOMBRE work package 5) were also presented.

The conference included 140 participants (mainly from EU). It successfully highlighted many current problems of urban land management in Europe. The conference succeeded in bringing together multi-disciplinary experts, as well as public and private stakeholders, by combining the 6th Conference on Innovative Solutions for Revitalization of Degraded Areas and the 3rd CABERNET Conference on Urban Land Management.

The conference provided a multi-disciplinary overview across a broad range of tasks associated with the revitalization of degraded areas. Over 60 conference contributions were shared with the participants on a range of topics, such as: good practices, problem solving knowledge and expertise on the application of land management policies, new techniques and tools. The conference also featured a presentation on the principle of Circular Flow Land Use Management (see also Figure 9) as a solution for multi-stakeholder governance and interdisciplinary co-operation and highlighted the possibilities to include land management and brownfield regeneration in ERDF (European Regional Development Fund) regional programmes 2014 – 2020.

Case studies in HOMBRE: The Papigno site near Terni/Italy

What is the case about and how did it become a brownfield?

Papigno is located close to Terni along the River Nera, which is one of the most important rivers in central Italy and a tributary of the Tiber River. Terni was - as part of Valnerina Route – once a centre-piece of the 1800s Grand Tours of Romantics and as a city with important industries such as steelwork it was largely exploited during the pre-industrial and industrial era up to the Second World War.

The Papigno site is a large industrial brownfield area located on the outskirts of the Terni's administrative boundaries, approximately 5 km from the city centre. The site was occupied by nationally strategic hydro-plants and chemical industries that were built around 1900. The chemical plant on the Papigno site produced calcium carbide (CaC_2) and calcium cyanamide ($CaCN_2$). In front of the chemical plant is an area that was used as landfill for the industrial waste from the process. Industrial production stopped in the 1970s without any closure and reconversion programme. From that time on the site was abandoned. It was acquired by the municipality of Terni in 1994. Their wish was to keep and preserve the site as part of the city's heritage and industrial archaeology.

In 2002 the area was designated as requiring reclamation and of national importance (SIN[1] Terni Papigno). Remediation planning began in 2002, according to standards and procedures established by National Decree n. 471/1999 and Legislative Decree152/2006. Works were then carried out by the Council of Terni.

The Papigno site can be divided in two main areas (see Figure 2):

a) The main production buildings (former plant area);
b) The former landfill area

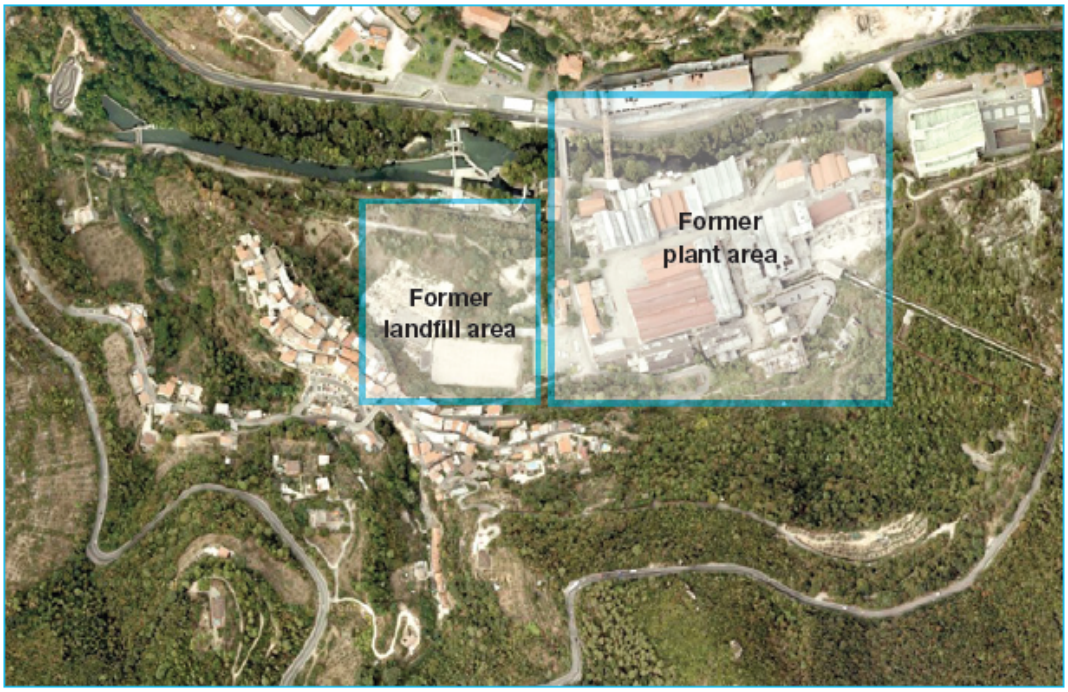

Figure 2: Satellite view of the Papigno site

a) Former plant area

The area also includes various industrial warehouses (see Figure 3). Some of these warehouses have been renovated and house a famous Italian filming company (Cinecittà Umbria film studios) and its main facilities. However, some still contain liquid and solid industrial waste, including mineral oils within large tanks. Residual asbestos is also present in parts of the buildings, while one building has major structural problems due to severe deterioration of its reinforced concrete and will have to be demolished. At the current state an initial characterization has been carried out assessing contamination of the soil with hydrocarbon, heavy metals and PCB.

1 SIN: Sito di Bonifica d'Interesse Nationale

b) Former landfill area

The landfill contains a mixture of industrial wastes produced by the nearby industrial plant, soil and rocks from nearby excavation areas and, other wastes probably occasionally disposed in an uncontrolled way. The soil contaminations mainly consist of C>12, PCB, and some heavy metals, whereas most of the wastes currently present in the site are basically inert material, without any major evidence of contamination.

Redevelopment of the site so far

The Municipality of Terni has assigned to the "REMIDA[2] consortium" composed by the Regional Environmental Agency (ARPA Umbria), the Tuscia University and the National Research Council (CNR) the design of the remediation, reclamation and requalification of the portion of the site corresponding to the former landfill area. Remediation will be based on the application of phytoremediation techniques. The project goals are shown in Figure 4. The intention is to partition the site into two areas:

1. A sports area and parkland which will be given back to the citizens of Papigno for recreational end use after a combined use of risk analysis and removal of contaminated soil.

2. An area which will be used either for hydrological control of water percolation by plants (area of extensive treatment) or for the intensive treatment of more contaminated soils, using again phytoremediation techniques.

The phytoremediation will use poplar trees as they grow under variable climatic conditions and in soil with different composition.

Poplar trees support the decontamination of the site as they work as a natural water pump extracting and can treat soil up to 2-4 metres under the soil surface. Besides, it will be also possible to assess the possibility of using the produced biomass for energy production, possibly allowing to reduce or compensate the costs of cleaning up by selling biomass or selling energy produced by thermo-valorization of the biomass.

Data from the area will be collected and monitored in order to verify and to optimize the cleaning process. The use of the former landfill area will be restricted until the remediation work has been completed.

The partial redevelopment of the former plant area obtained so far has been the reuse of some of the buildings as location for the Cinecittà Umbria film studios (Figure 5) and for hosting a rafting center (Figure 6) owing to its close vicinity of the river Nera. However, most of the industrial buildings are not used and still have open environmental and safety issues.

What are the most important benefits

The main benefits for former landfill area from the implementation of the proposed remediation project are: the restitution of the area to public use, the reduction of environmental costs for clean-up of the site (by selling biomass or energy produced by thermo-valorization of the biomass, integration of the regeneration with renewable energy production and consequent cut of the carbon emissions (reuse of biomass produced in the site).

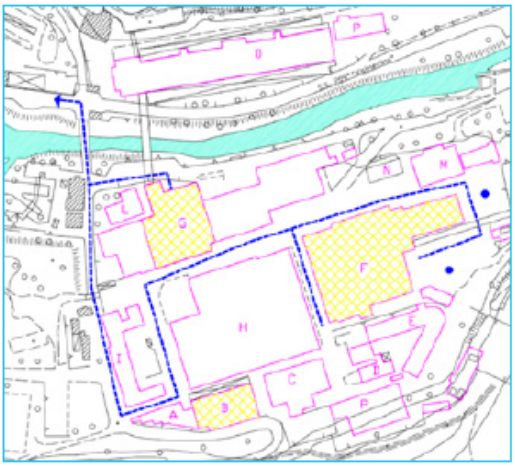

Figure 3: Layout of the former plant area

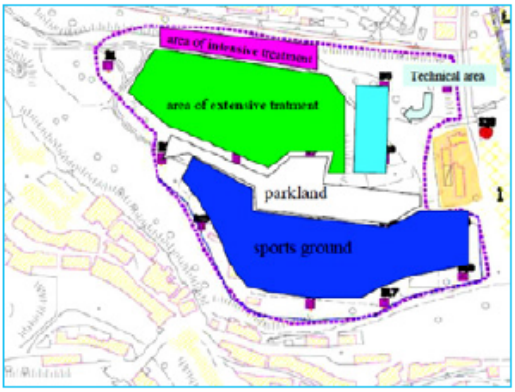

Figure 4: Layout of the REMIDA intervention on the former landfill area

Figure 5: Pictures of "Life is beautiful" filming in Papigno

2 REMIDA: **R**emediation & **E**nergy production in soil **M**anagement – **I**.**B**.**A**.**F** **D**.**I**.**S**.**A**.**F**.**R** **I**. **A**rpa U.

The main driver for the re-use of the former plant area is linked to its high potential for tourism use, primarily because of its vicinity to the Valnerina route and the Marmore's waterfall (Figure 6). Touristic interest is a strong influence on the municipality's desire to use part of the existing buildings as an industrial archaeology museum.

Figure 6: Marmore waterfall and rafting on the Nera River

The Brownfield Navigator – development of an interactive decision support tool

The Brownfield Navigator (BFN) will be one of the results of the HOMBRE project. It is a map-based online instrument that will help stakeholders to navigate towards a successful BF regeneration. With the BFN key aspects (economic, social and environmental) for BF regeneration can be logged and assessed by the user. It can be used for different scales (regional, portfolio, site/project): to determine if any locations are at stake of becoming a brownfield (BF), and site level: to assist the regeneration of the BF. The BFN combines decision support frameworks used with a geographical information system (GIS). It will be possible to use the BFN on a design table (Figure 8) or via a normal desktop or laptop. The BFN will be available online (web-based instrument).

Figure 7: View of the welcome page of the Brownfield Navigator

Current state of the Brownfield Navigator (BFN)

The BFN is under development and at this moment (end of 2012) the BFN consists out of:

1. An online environment, where the BFN is hosted and will be expanded. This is the base of the BFN. Currently this environment is hidden behind a log in, because the tool is work in progress (steps 2+3);

2. A hard-copy description of the zero brownfields framework which will be implemented in the BFN. The zero brownfields framework describes different steps in the land-use cycle including a description of proposed tools for each step. The steps and proposed tools will be further implemented as buttons and options in the online environment of the BFN. At the moment the zero brownfields framework description is still a concept and will be elaborated in more detail the next period.

3. A map and sketching functionality in the online environment, that supports and guides through the different steps of the zero brownfields framework. This is the most elaborated part of the BFN, but the layout and some of the functionalities (such as uploading your own maps) will be improved.

The main focus for the further development of the BFN is item 2. The zero brownfields framework (see "Brief facts about HOMBRE" on page 8) will be further worked out, by fitting the described steps and tools in the final zero brownfield framework on which the HOMBRE work packages are working on. We expect to have in 2013 sufficient 'luggage' for the framework to make it operational in the BFN online environment. The BFN steps, the corresponding tools and how we propose to use them will be described in a report, which is under construction and will be finalized next year. After finalizing the framework in sufficient detail to operationalize it into the BFN, the software will be built in the online environment completing the BFN.

This work will continue until the end of 2013. Also during this time parts of the framework will be tested, such as the indicators, synergies and technology trains. The process/ steps of the BFN and some of the tools will be tested using stakeholder focus groups.

Figure 8: Example of a design table of the Brownfield Navigator

UPCOMING ACTIVITIES

HOMBRE at the AquaConSoil 2013

On **16-19th April 2013** the AquaConSoil (www.aquaconsoil.org), the 12th International UFZ-Deltares Conference on Groundwater-Soil-Systems and Water Resource Management, will be held in Barcelona/Spain.

During the AquaConSoil HOMBRE together with the related FP7 project TIMBRE (www.timbre-project.eu) will have a special session on "Sustainable Brownfield Regeneration – synergies with the land cycle" on 17th April 2013, 16.00 – 17.30 h.

You are kindly invited to join the session to learn more about sustainable brownfield regeneration and the potential opportunities and services for society that can be offered by brownfields.

We are looking forward to meeting you in Barcelona!

UPCOMING ACTIVITIES

Why consider a CEN Workshop Agreement in HOMBRE?

A CEN Workshop is a platform offered by the European Committee for Standardization (CEN) to elaborate a consensus document with agreed positions concerning a certain defined issue, the "CEN Workshop Agreement" (www.cen.eu/cen/Products/CWA/Pages/default.aspx).

It is not a formal standard run by standards bodies. Rather it is a means of developing a discussion about key harmonization needs, and is open to any group of stakeholders to use directly and in an informal way.

Participation in the CEN Workshops is open to stakeholders from all institutions inside and outside Europe who are interested and willing to contribute to a particular topic.

After detailed discussions internally and with its Advisory Board, HOMBRE has decided to use the CEN Workshop mechanism to elaborate a shared glossary of terms for dealing with brownfield regeneration. HOMBRE hopes that this activity will be shared by several other FP7 projects with related research interests to provide a common terminology between then them to facilitate communication and discussion, and also to avoid end-users being faced with different terms from different projects. Ideally, HOMBRE would also like to go further and link this terminology to equivalent or comparative definitions from related communities, such as spatial planners to ease the mutual understanding. Participation in the CWA will be widely promoted and open to all.

HOMBRE's principal interest is to better communicate the concept of "circular land use management" (illustrated in Figure 9), an integrative, strategic and governance approach. Its aim is to primarily and systematically seek to exploit the potential to develop existing building sites and reuse derelict land. This concept will provide a frame and the background for the glossary. In addition findings and results developed in the different HOMBRE work packages will also be integrated.

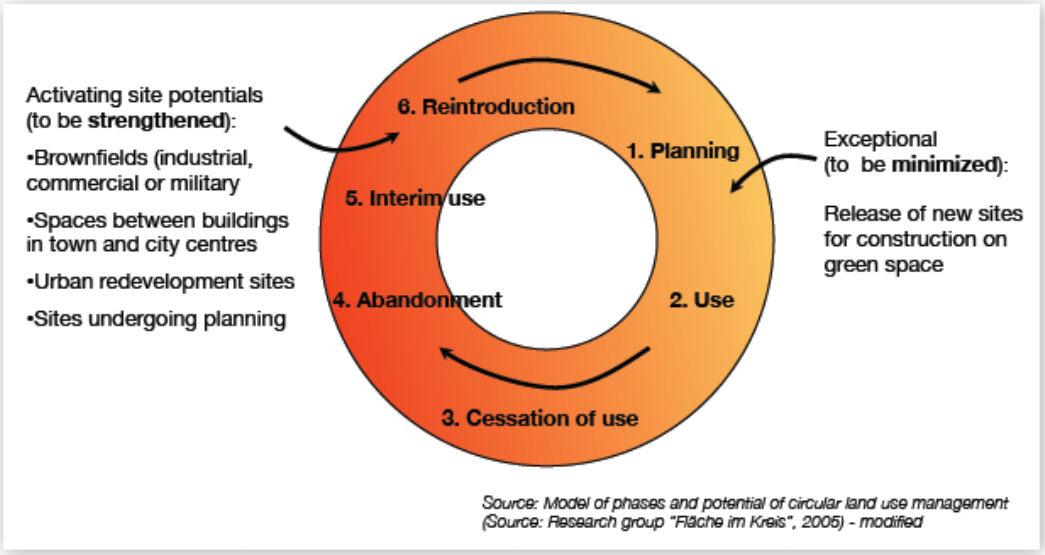

Figure 9: Circular land use management: Model of phases and potentials (modified from German Institute of Urban Affairs – Difu, Research Group "Fläche im Kreis", 2005).

The advantages of the CEN Workshop mechanism are that it carries little bureaucracy, and is fair and transparent, cost-efficient and fast. The process of developing the HOMBRE CWA will last for approximately 18 months.. The tasks, objectives and working procedures will be laid down in a workshop business plan that then has to be approved in the CEN Workshop kick off meeting. This kick-off meeting will be held at DECHEMA in Frankfurt am Main in Germany on 25th March 2013 (for further information on the kick-off meeting and the participation in the HOMBRE CEN Workshop in general please contact Katja Wendler, wendler@dechema.de).

After the kick off meeting the workshop will work predominantly electronically, i.e. in addition to an exchange by e-mails, online meetings will be held – to ease communication and input and to save time and travel expenses.

Please feel kindly invited to join and contribute to the development of the HOMBRE CEN Workshop Agreement!

Brief facts about HOMBRE

Objectives:

HOMBRE seeks to create a paradigm shift in sustainable brownfield land management practice to "Zero Brownfields" where brownfields become areas of opportunity that deliver useful services for society, economy and the environment, instead of derelict areas that are considered useless. This ambition will be met by looking at how synergies between different types of services might leverage change where none was possible before.

The HOMBRE shift in thinking relates not only to the redevelopment itself, but also to gaining better understanding in early recognition and prevention of land that might become a brownfield in the future, and how to monitor this as part of the land use cycle.

The goal is to enable better communication between stakeholders about opportunities and inspire them to find better solutions with higher benefit. HOMBRE will illustrate what might be possible with a number of case studies where implementing suites of 'hard' and 'soft' technologies, has facilitated cost-effective, timely, and sustainable brownfield regeneration along with broader services.

Approach:

HOMBRE will develop practical, science based guidance to deliver the concept of a land cycle as a working system for planners and land managers – the **"Brownfield Roadmap"**. The strategy will be based on indicators for early recognition of why, how, and when brownfields come into existence, as well as on indicators that signal potential for sustainable, cost-effective and timely site renewal. By monitoring these indicators, timely intervention may avoid brownfield formation or at least mitigate the negative effects. It will ensure that scarce resources are focused on solving genuine problems, e.g. by avoiding unnecessary remediation, and on creating long lasting opportunities. The final **"Framework for Zero Brownfields"** will also incorporate the experiences obtained from the HOMBRE case studies, market and stakeholder guidance on all methodologies and technologies developed, and a policy brief on Brownfield regeneration.

Furthermore HOMBRE will develop integrated stakeholder communication and decision support technology for the optimal selection of brownfield regeneration options, approaches and technologies of decision making, the **"Brownfield Navigator"**. This will apply a set of common principles, but support their use at different geographical scales and different stages in land management decision-making. The Brownfield Navigator will enable to assess the key environmental, economic and social aspects of brownfield regeneration scenarios in both local and regional contexts. It will integrate a set of rules and principles from HOMBRE's strategic guidance; modelling and GIS technologies using the 'design table' visualization approach to support interactive and cross sectoral decision-making.

A **"Technology Train"** is a term to describe how different technical approaches can be combined to offer an enhanced benefit. HOMBRE will explore Technology Trains in two contexts: the 'hard' built environment context, and a 'soft' re-use context linked to urban greening and/or bio-energy production. The following combinations are being investigated:

- Train 1: Energy re-use and contaminated water restoration
- Train 2: Resource efficiency (e.g. of building materials) and contaminated soil management.
- Train 3: Remediation, sustainable urban drainage and soil capacity building.
- Train 4: The benefits of remediation and urban green space
- Train 5: Remediation, organic matter recycling and bio-energy production to provide a solution and revenue for abandoned land.

Project References:

Contract number: 256097;
Theme: FP7 ENV.2010.3.1.5-2: Environmental technologies for brownfield regeneration;
Duration: 12/2010 to 11/2014

Organisations:

ACCIONA Infraestructuras – Spain
(www.acciona.es)

BRGM – Bureau de Recherches Géologiques et Minières – France
(www.brgm.fr)

DECHEMA e. V. – Society for Chemical Engineering and Biotechnology – Germany
(www.dechema.de)

Deltares – The Netherlands
(www.deltares.nl)

Geo-Logik – Poland
(www.geo-logik.pl)

PN-Studio/Italy
(www.pnstudio.net)

Projektgruppe Stadt + Entwicklung – Germany
(www.projektstadt.de)

r³ environmental technology ltd. – UK
(www.r3environmental.com)

Tecnalia – Spain
(www.tecnalia.com)

TNO – Netherlands Organisation for Applied Scientific Research – The Netherlands
(www.tno.nl)

University of Nottingham – UK
(www.nottingham.ac.uk)

University of Rome "Tor Vegata" – Italy
(www.uniroma2.it)

University of Science and Technology in Cracow – Poland
(www.agh.edu.pl/en)

University of Wageningen – The Netherlands
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HOMBRE

NEWS

ISSUE 01 / 2013

SEVENTH FRAMEWORK PROGRAMME

HOLISTIC MANAGEMENT OF BROWNFIELD REGENERATION

EDITORIAL

Land is a finite resource, therefore Society needs to become keen to protect unspoiled habitats and ensure sustainable use of land. Over the last 50 years there has been significant increase in land uptake for buildings and roads, and this process will accelerate if no action is taken. According to the latest publication from the European Court of Auditors about regeneration of industrial and military brownfield sites, the number of brownfields in Europe is estimated to range from a few hundred in small Member States to a few hundred thousand in larger Member States with a rich industrial past. These sites are often located and well connected within urban boundaries. However, their effective and sustainable regeneration will require the full support of planners as well as innovative and integrated approaches.

This newsletter highlights the regeneration process of brownfields in the municipality Solec Kujawski (Poland). In Poland the area of brownfields is estimated to be higher than 8,000 km².

The municipality of Solec Kujawski has been progressive and active in regenerating brownfields in their urban area. HOMBRE and the municipality of Solec Kujawski have collaborated on two workshops about brownfield regeneration for stakeholders in the region of Solec Kujawski.

In other news a summary of the contributions of HOMBRE at AquaConsoil conference in Barcelona this year is given, and there is a peep behind the project, introducing four HOMBREs and their work in the project.

Finally, a key concern of HOMBRE has been to establish a common working language for brownfield regeneration internationally. You are all cordially invited to join the CEN Workshop kick-off meeting "Glossary of Terms for Holistic Management of Brownfield Regeneration" 28 of August 2013 in Frankfurt am Main, Germany. We hope to welcome you there after the nice summer holiday!

AquaConSoil: Session on „Sustainable Brownfield Regeneration – synergies with the land cycle and the role of new tools and technologies" (April 2013)

AquaConSoil is the major contaminated land and water event that takes place in Europe. Its most recent meeting was held on 16th-19th April 2013 in Barcelona, Spain. HOMBRE contributed several papers and made a number of workshop inputs to the conference. Copies of these can be downloaded from the HOMBRE web site at http://www.zerobrownfields.eu/Displaynews.aspx?ID=559.

HOMBRE also collaborated with its sister project TIMBRE to host a special session on "Sustainable Brownfield Regeneration – synergies with the land cycle and the role of new tools and technologies".

The aim of the session was to make the audience aware of potential synergies and services that can be delivered during brownfield regeneration processes and to find out which are the most important demands and the policies needed to realise Brownfield regeneration.

The session started with an introduction to the projects "HOMBRE" and "TIMBRE" and their focus with regard to the land use cycle. Both projects see the importance of involving stakeholders to better understand and integrate their requirements of any regeneration process. This means that any measures developed by HOMBRE or TIMBRE must meet the needs of a wide range of stakeholder needs to gain acceptance. While HOMBRE and the tools developed in its work packages address and try to support stakeholders in all phases of the land use cycle, TIMBRE has a more specific focus on a certain phase of the land cycle where brownfields have already emerged.

Figure 1: During the session on „Sustainable Brownfield Regeneration – synergies with the land cycle and the role of new tools and technologies" (Photo: DECHEMA e.V.)

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Policy needs to implement new ways of Brownfield regeneration

Dominique Darmendrail (Common Forum) gave an overview of the wide range of policy sectors that affect brownfield management at a European level. Together with other national and regional requirements and directives they form the regulatory environment for brownfields in Europe. Thus decision makers have to deal with a complex regulatory and policy environment.

The discussion that followed the presentation made clear that it is important for sustainable regeneration projects not only to consider the technical or economical side of the brownfield regeneration, but also take into account site specific social aspects, e.g. in former mining areas where people have to think of new ideas and ways of using the land.

Brownfield sites need an image change within the land use cycle – the focus needs to shift to opportunities from a site rather than its.

Decision support tools in the two projects

Linda Maring (Deltares) introduced to the "Brownfield Navigator" (BFN), a decision support tool being developed in HOMBRE which aims to support stakeholders visualize their project and its location in a geographical sense, to help the guide the stakeholder towards successful brownfield regeneration. Its steps and the proposed tools are related to the phases of the land use cycle. A key innovation in the BFN is avoidance of the emergence of brownfields and keep the land in the use cycle The BFN will be an online tool that will be freely available at the end of the HOMBRE project.

Michael Finkel (University of Tübingen) introduced the audience to the Megasite Management Toolsuite (MMT) which has been enhanced within the TIMBRE project. The MMT is a web based decision support tool for the integrated planning and assessment of revitalisation options for brownfields.

The BFN and the MMT have different approaches, but both aim to show reuse options.
Both the MMT and the BFN are decision support tools. The decision is still in the hand of the customer, but the tools will aim to help make the decision easier; more transparent and more communicable; and to widen the range of ideas about how a site could be used.

Case studies in HOMBRE: The site in Solec Kujawski, Poland

What is the case about?

The urban and postindustrial case study Solec Kujawski is located in Northern Poland on the Vistula River. It is approx. 15 km away from Bydgoszcz – the main city of Kuiavia-Pomeranian Voivodship. The HOMBRE case study site is located inside the city limits, near the city center of Solec Kujawski. The abandoned, triangle-shaped terrain of the former manufacture for wood impregnation with a surface area of approximately 16,44 ha forms the main part of the HOMBRE case study.

This brownfield is located between housing estates (high-rise blocks, school, shops etc.) in the North and North-East, the railway line between Bydgoszcz and Torun in the South and the city forest in the West where a leisure and sports centre is located, as well as a local touristic attraction named "Jura Park". (see Figure 2).

Figure 2: Location of the HOMBRE case study site (A) in Solec Kujawski, Poland:
A – brownfield: former wood impregnation manufacture,
B – cityforest with regional attraction: Jura Park,
C – housing estates (blocks),
D – forest area,
E – shoe industry, former tannery and its spill ponds,
F – metal, car industry, heating plant and railway area.

Several other brownfields are located on the other site of the railway line: old multi using buildings and storages as well as a small complex of shoe industry on the former tannery area. In this part there were detected places which were used in the past as spill ponds (waste water from tannery and from metal industry). These days these are used as small private gardens, a young forest and also a communal heating plant is located there.

The whole area dedicated for HOMBRE expertise is ca. 80 ha (incl. the heavily contaminated area of the former wood impregnation plant with a size of the 16,44 ha).

How did the case become a brownfield?

The land was degraded as a result of more than one hundred years of use for wood impregnation between 1876 – 2001. This was followed by a period of unregulated use for several years. The area was finally bought by the Municipality of Solec Kujawski in 2009. Its buildings were demolished subsequently, but the ground and groundwater are still heavily polluted by creosote, detected in in-

vestigations made for private (2001) and public (2009) plans of investments. In addition to the creosote, mineral oil and PCBs were used as additions. Many creosote components are toxic and carcinogenic (e.g. Naphthalene, Benzo(a)pirene, Benzene). The heavy pollution of ground and groundwater makes remediation difficult and expensive, so the area is abandoned as brownfield.

Figure 3: Contaminated underground installation found during excavation works (done during the preparation for the soil washing field tests within the TIMBRE project) (Photo: Geo-Logik)

Redevelopment of the site so far

Investigations were carried out in 2010 to investigate the feasibility of bioremediation. This study found that bioremediation combined with another in situ method (such as in situ separation of the most contaminated old "ground material") might be the best option for rehabilitation due to the large area of the brownfield.

Now the owner – Municipality of Solec Kujawski – is trying to start the rehabilitation using a Remediation Action Plan (RAP) prepared in 2012. According to this plan the postindustrial area will be redeveloped as a zone for service, education, recreation and sport.

Figure 4: View of parts of the brownfield site (Photo: Geo-Logik)

The main reasons for remediation and redevelopment are:

a. The location of the area, which is situated in the city centre, next to sports facilities (arena, swimming pool, sports hall) and the leisure centre "Jura Park" which makes the area a good place for big public investment;

b. The intention to stop the uncontrolled development of the area which is highly contaminated by incompetent private investors interested only in financial profits.

c. The heavy contamination both in the ground and the groundwater of the area of the former wood impregnation plant as well as on the adjacent areas, situated along groundwater flow direction to the Vistula river.

d. The negative influence of contamination on the environment – contamination of soil, underground and groundwater is especially dangerous for people's health as it contains carcinogenic compounds.

e. The social environment and safety – this uncontrolled, completely devastated site is a place for informal meetings of young people and for risky youth and children games.

In November 2012 the Municipality of Solec Kujawski received financing support from the EU within the "Regional Operational Programme" redistributed by the Regional Fund for Environmental Protection and Water Management. Now the Remediation Action Plan prepared in 2012 will be executed and needs adequate technologies and performance, quality control and social acceptation. The remediation (e.g. in situ biodegradation) is not a quick process and needs time as well as a smart redevelopment plan for future use of this area.

What are the most important benefits of the redevelopment of the area?

The redevelopment of the postindustrial area will result in:

- improvement of natural environment's condition and therebyas well improvement of general health condition of city inhabitants;
- improvement of children's and youth's safety as at the moment it is dangerous for the health of the children to play at the brownfield site;
- gaining area in the city centre purposed at leisure, service, education and sport, which will improve the quality of life of the city inhabitants and might also lead to tourism growth in the region (together with existing Jura Park in the city forest);
- financial profits from commercial hire of sports' venue for non-public events (shooting range, arena, playing fields)

1st Stakeholder Workshop at Solec-Kujawski, Poland (April 2013)

On 8-9th April 2013 HOMBRE organised its first stakeholder workshop for the Solec Kujawski case study in Poland. This involved representatives of the municipality of Solec Kujawski and members of the HOMBRE project. The aim of the meeting was to exchange ideas and information about the case study site and to make the representatives of Solec Kujawski more familiar with the outputs HOMBRE is producing. Its goals were to see where HOMBRE might be able to provide methodological support for the redevelopment of the case study brownfield site and to begin preparation of a second stakeholder workshop scheduled for 6-7th June 2013 for a larger group of regional stakeholders.

Pauline van Gaans from Deltares introduced to the HOMBRE project and the "zero brownfield" concept. The philosophy of "Zero brownfields" aims to avoid the emergence of brownfields or accelerate their regeneration once they have formed. Pauline van Gaans described strategies for avoiding the evolution of brownfields by improving the monitoring and assessment of different "early indicators" during the phase when the land is being used. "Service indicators" help to assess if a completed management step/action was successful. HOMBRE's "Brownfield Navigator" provides a map-based online instrument to support stakeholders in navigate towards successful brownfield regeneration. HOMBRE pays special attention to exploiting possible synergies during the regeneration and re-use of brownfield sites.

The mayor of Solec Kujawski, Teresa Substyk, gave an introduction to Solec Kujawski. This is a small town with an increasing population of approximately 16.000 inhabitants. The local authority wishes to develop the town in a sustainable way. In order to strengthen the economy of the area infrastructure is being developed to attract especially young companies.

The municipality already organises local consultations on the development of the areas in close cooperation with affected stakeholders as "bottom-up planning". One example for the good cooperation between the authority and the inhabitants was the development of a former military area into a radio broadcasting facility. Here the municipality provided good information services and thus was able to convince the majority of the inhabitants on the benefits of this project supporting a vote in favour of this development.

Discussions focused on the planned future use of the brownfield site of the former wood impregnation plant, and its linkage to Solec Kujawski's spatial planning for the period 2012-2020. Historically the area has always been known for sport and recreation, being surrounded by large forests. Thus the municipal development strategy follows the two approaches to strengthen: 1. the industrial/commercial activities (e.g. by tax benefits) and 2. Providing sport and recreation services at a national and international level.

A range of HOMBRE concepts were tested. The case study aims and site situation were placed in a land cycle concept (see figure 6) and the participants exchanged on the future use plans for the Solec Kujawski case site.

Figure 5: Introduction to the situation in Solec Kujawski, given by the mayor, Teresa Substyk

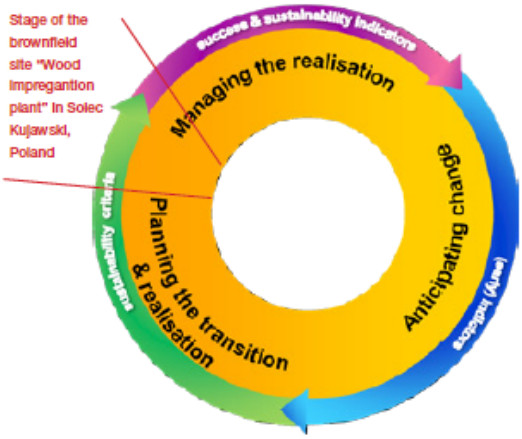

Figure 6: Stage of the HOMBRE case study site "Former wood preservation plant" of Solec Kujawski in the land management cycle. The blue, green and purple parts of the cycle are management tools that could be used to forecast and assess changes in the land use.

2nd Stakeholder Workshop in Solec-Kujawski, Poland (June 2013)

Approximately 30 participants joined the 2nd stakeholder workshop that was held in Solec Kujawski, Poland on 6-7th June 2013. The workshop was organized as a joint event of the EU FP7 project HOMBRE and the municipality of Solec Kujawski, with participation of the EU FP7 project TIMBRE and regional stakeholders. The target of the event was to exchange on the management of the regeneration of brownfields by discussing possible policy options and technical solutions, pointing at the local and regional benefit and barriers.

After the welcome by Barbara Białkowska (vice mayor of Solec Kujawski) and an introduction to the city of Solec Kujawski, its historical and present situation, the participants got an overview on the different brownfields in and around the city. The municipality is very active in advancing the remediation of contaminated brownfields and trying to find new solutions for the abandoned areas in order to make the city attractive for its inhabitants. A good example is the "Jura Park", a theme park built in parts of the town park with approximately ½ million visitors per year. In order to attract new investors an industrial park was founded – here the industries can make use of the benefits of the Solec Kujawski's location between two big cities Bydgoszcz and Torun, close to a big road and Wisla river.

After a general introduction to the problem of urban sprawl Grzegorz Malina (University of Science and Technology in Cracow) gave an overview on the background and targets of the HOMBRE project, its framework and tools (such as the "Brownfield Navigator" and the monitoring and assessment of "early indicators"). Inspirations how synergies can be used during the regeneration process are developed within the research and work on "technology trains", which aim to provide a solution to a problem and at the same time offer added value/services.

In the following, the participants exchanged on the situation in Solec Kujawski and on ways how to apply outcomes/products of HOMBRE at their brownfields. The discussion also addressed financial issues, which are always important for regeneration projects, but of course should not be the only driver for actions related to soil.

Grzegorz Boron (Municipality of Bydgoszcz) introduced to some brownfields in the region and from all over Poland and showed how some of them were successfully redeveloped, e.g. the "Exploseum" in Bydgoszcz, a former nitroglycerine plant that is now used as a museum. He also reported on the experiences from the EU

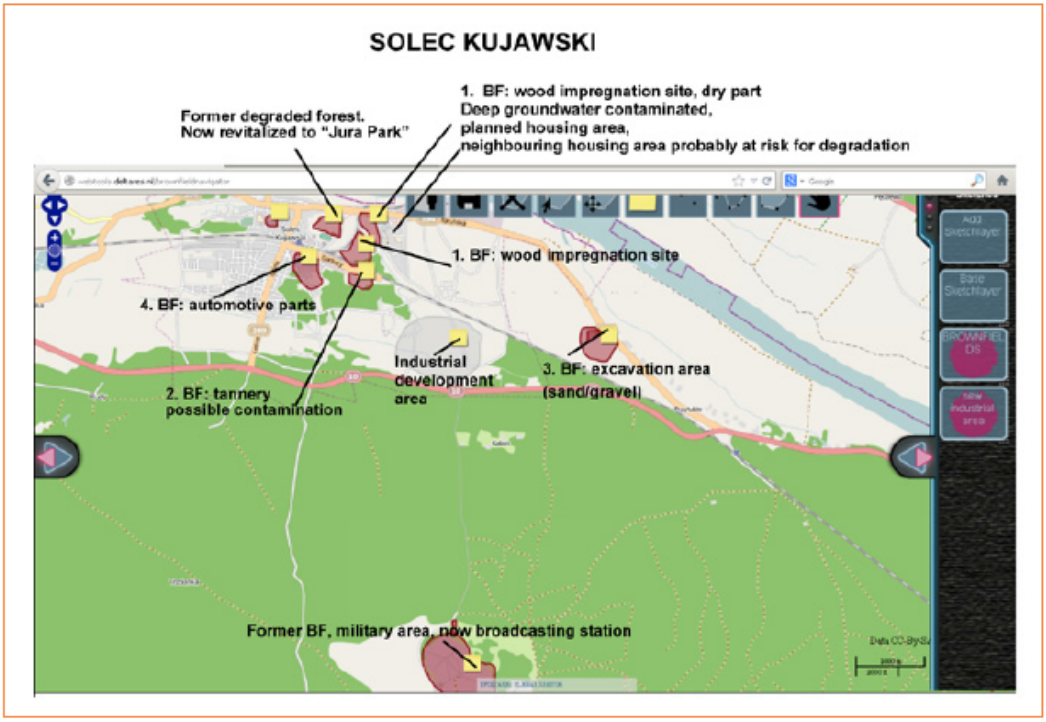

Figure 7: Location of the different current and former brownfield (BF) sites in Solec Kujawski (shown on the HOMBRE Brownfield Navigator)

Figure 8: During the "world café" discussions (Photo: DECHEMA e.V.)

project "COBRAMAN" where a database was developed as well as materials for courses to train brownfield managers.

In the afternoon the workshop participants went on a field trip to the former and current brownfields in and around Solec Kujawski (see figure 7) and got a better idea on what is currently under development there and which redevelopments already have been accomplished successfully.

The second day of the workshop started with an introduction to the TIMBRE project given by Janusz Krupanek (IETU). Targets of TIMBRE are to support the redevelopment of brownfields and especially the transformation of megasites with complex environmental and social problems.

Afterwards Nicolas Fatin-Rouge (Université de Franche-Comté) presented the results of the in-situ soil flushing tests with re-used fluids for the remediation of creosote-contaminated soil that were run within the TIMBRE project for 5 weeks on the former wood preservation site in Solec Kujawski.

The idea of the world café discussion that followed was to think of new ideas and points of view for Solec Kujawski to be used in the spatial planning for 2013 – 2020 (Figure 8). In small groups the participants exchanged lively on the question "what are useful environmental, economic and social indicators that point towards brownfield emergence?" In a second round the participants discussed on pros and cons of possible scenarios for future developments in Solec Kujawski taking into account social, environmental and economic issues.

Interviews with the "HOMBRES"

With this section we would like to introduce you to people working with and for HOMBRE – and their very different tasks and challenges.

My name is Oriana Capobianco and I am PhD student under the supervision of Prof. Renato Baciocchi at the University of Rome "Tor Vergata" – Group of Sanitary Engineering, Department of Civil Engineering and Computer Science Engineering.

What is your role in HOMBRE?

In a number of cases, abandoned or underused industrial sites could be also affected by a certain kind and extent of contamination. In these cases, remediation activities are mandatory prior to reintroduce the site into the land cycle.

My role in the project mainly deals with the application at lab scale of different combination of technologies on contaminated soil and other solid material as well as groundwater.

Specifically, the two alternative scenarios ex situ and in situ treatment have been considered.

The aim is to assess the possibility to combine technologies in order to improve the environmental and mechanical properties of the treated material and to get multiple benefits (e.g. groundwater remediation + subsoil structural improvement + industrial alkaline residues stabilization with CO_2).

What is your HOMBRE challenge?

The real challenge is to exploit material and resources already present at the brownfield site, or generated by remediation/regeneration activities, in order to achieve two major goals:

- get a "product" which can be used in the site itself, for example as construction material;
- keep the material in situ, without any need of excavation, transport and landfilling.

In both cases a better resource optimization and lower environmental, social and economic impacts from land management could be achieved.

What is your special HOMBRE moment?

Visit at the small village of Papigno, Terni (Italy) where a brownfield site is located (one of the HOMBRE case studies, see issue 02/2012 of this newsletter). It was a great opportunity to better understand the problems and opportunities related to the specific site and also to come in contact with the local stakeholders.

My name is Lourens Dijk and I work at the User Interface Software Department within the Deltares Software Centre. Usually I do my job in a .NET environment, sometimes I take a trip to JavaScript or Python. I mainly work in a team of varying colleagues, trying to close the gap between the clients requirements and the technical software challenges.

What is your role in HOMBRE?

My role within HOMBRE is mainly as a JavaScript and C# programmer for the Brownfield Navigator. I focussed on the GIS (Geographical Information System) aspect of the application.

What is your HOMBRE challenge?

The Brownfield Navigator can be called a success when it can be used independent of the location you are at and with minimal hardware requirements; when useful outcomes can be retrieved from processed input. When users experience the application and philosophy behind it as natural and pleasant, I'm satisfied.

What is your special HOMBRE moment?

Working with a team with diversity of skills. The different views of the team members contribute to the success of the project. The project period as a whole is inspiring to me.

My name is Matthijs Schaap, visualisation expert and creator of serious games. I work within the Deltares Software Centre together with a variable group of colleagues on the Brownfield Navigator.

What is your role in HOMBRE?

Thinking about the workflow and interface for the Brownfield Navigator web application. This includes design and implementation. Me and my colleagues try to find and embed the workflow for recognising brownfields and reintegration planning of said workflow within a browser. My personal role is designing an interface that not only looks nice but also helps the user getting to their goals as best as possible.

What is your HOMBRE challenge?

The only time I am happy is when the user is happy. My challenge within Hombre is making something that is useable and "real", while the process that needs to be fitted is still evolving.
Also we are trying to be platform independent and the web application should work on all browsers, which is really something that will get you a headache from time to time… but when you solve the problem, all is forgiven.

What is your special HOMBRE moment?

This project made a real name for itself within Deltares and the techniques used for the Brownfield Navigator are now widely asked for. My HOMBRE moment is that I could show our own people that thinking about interface and workflow is something that is very much needed for every software product.

My name is Rens van den Bergh, for over six years I have been working on serious games and game based technologies. The goal is to use these technologies to support the transfer of knowledge.

What is your role in HOMBRE?
My role is to support the building and designing of the Brownfield Navigator. I'm also trying to bridge the gap between the software development world with the world of the experts.

What is your HOMBRE challenge?
To end with a product that will be used in practice. In order to achieve this, the product will need to be practical and user friendly. The challenge is to fit all the complex expert knowledge and procedures in the product and still make it easy to use.

What is your special HOMBRE moment?
I love to see the product slowly grow and take shape. With new insight and experience the product is developing more and more to its final stage.

UPCOMING ACTIVITIES

Kick-off Meeting for CEN Workshop 74 "Glossary of Terms for Holistic management of Brownfield Regeneration (GoT-HOMBRE)" on 28th August 2013 in Frankfurt am Main, Germany

A CEN Workshop is a platform offered by the European Committee for Standardization (CEN) to elaborate a consensus document with agreed positions concerning a certain defined issue, the "CEN Workshop Agreement".

As announced in the previous issue of the HOMBRE newsletter the HOMBRE project partners have decided to run a CEN Workshop – **CEN Workshop 74 "Glossary of Terms for Holistic Management of Brownfield Regeneration (GoT-HOMBRE)"**. The idea of elaborating a shared glossary of terms for dealing with brownfield regeneration and land use planning is to provide a common terminology in order to facilitate communication, discussion and also the dissemination of project results. Wherever applicable HOMBRE will make use of existing definitions from related CEN and ISO Technical Committees. HOMBRE will also try to go further and link this terminology to equivalent or comparative definitions from related communities, such as spatial planners to ease the mutual understanding. Participation in the CEN Workshop is open to stakeholders from all institutions inside and outside Europe who are interested and willing to contribute to this particular topic.

The **kick-off meeting** for the HOMBRE CEN Workshop 74 "Glossary of Terms for Holistic Management of Brownfield Regeneration (GoT-HOMBRE)" will be held on **28th August 2013** in Frankfurt am Main, Germany.

More details on the HOMBRE CEN Workshop, the draft *business plan*, the *agenda* and the details regarding the *registration* are available on the **CEN website** (www.cen.eu/cen/Sectors/TechnicalCommitteesWorkshops/Workshops/Pages/WS74.aspx).

As a first step the concept of **"circular land use management"** (http://edoc.difu.de/edoc.php?id=8K2TRD63) developed based on a study of the national research programme "Experimental Housing and Urban Development" (Ex-WoSt) between 2003 and 2007 will provide a frame and the background for the glossary. It is an integrative, strategic and governance approach that aims to primarily and systematically seek to exploit the potential to develop existing building sites and reuse derelict land. In addition findings developed in the different HOMBRE work packages will be integrated.

For further information on the kick-off meeting and the participation in the HOMBRE CEN Workshop in general please contact Katja Wendler, wendler@dechema.de.

Do not miss the opportunity to contribute and bring in your ideas and views to the CEN Workshop Agreement, as the terminology developed in this CEN Workshop 74 might also be used as input to the work of ISO Technical Committee ISO/TC 190/SC1 "Evaluation of criteria, terminology and codification". Your perspective is very much appreciated and very valuable for the development of this common glossary of terms!

UPCOMING ACTIVITIES

SAVE THE DATE:

HOMBRE Final Conference
(14 – 16th October 2014 in Frankfurt am Main, Germany)

The HOMBRE Final Conference will be held on 14-16th October 2014 in Frankfurt am Main, Germany as a joint conference with CABERNET (www.cabernet.org.uk) and the EU FP7 projects "TIMBRE" (www.timbre-project.eu) and "Greenland" (www.greenland-project.eu) as

CABERNET 2014:
Tailored & Sustainable Redevelopment towards Zero Brownfields

4th International Conference on Managing Urban Land

In Association with the Final Conferences of the EU FP 7 Projects "Greenland", "HOMBRE" and "TIMBRE"

The event will cover the following key topics:

- Integrated urban land management and European funding programmes
- Innovative technologies and management tools for land redevelopment
- Economic, social and environmental instruments for sustainable land use management
- Land demand for renewable energy production on brownfields
- European and national policies and regulation
- Best practice case studies
- Communication, training, education and professionalism
- Sustainable land use and grand challenges

More information on the conference and the call for papers will follow in autumn 2013.

CABERNET www.cabernet.org.uk | GREENLAND www.greenland-project.eu | HOMBRE www.zerobrownfields.eu | timbre www.timbre-project.eu

1st HOMBRE brochure - published 02.06.2011

Deltares Hombre, dec 2010

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Deltares
Enabling Delta Life

Urban redevelopment – Brownfield regeneration

Assignment
The first of December 2010 the European Commission awarded the contract for the HOMBRE project to Deltares as coordinator and the 13 European partners under the SEVENTH FRAMEWORK PROGRAMME, THEME FP7 ENV.2010.3.1.5-2:
Environmental technologies for Brownfield regeneration; The HOlistic Management of Brownfield REgeneration (HOMBRE).

Client
The European Commission Directorate General Research co-finances the project. The partners contribute to this project.

Keywords: Redevelopment of urban areas, harbour areas, industrial areas, mining areas. Remediation of soil and groundwater contamination, Brownfields, Urban life cycle

Deltares Hombre, dec 2010

Period
The 4 year project will be implemented from Dec. 2010 untill Dec. 2013.

Introduction
Today most of us perceive Brownfields as a legacy of the past. Our urban landscape expands at an ever increasing rate and we travel ever increasing distances across this landscape. Perhaps in our urban sprawl we are also already busy creating the Brownfields of tomorrow. These might be different from the post-industrial Brownfields of today but will nonetheless be exploited and abandoned land. The concept of 'zero waste' has ushered in a paradigm shift in attitudes to resource use. The same paradigm shift is long overdue in attitudes to land use. HOMBRE seeks to bring about and enable this paradigm shift: 'zero Brownfields'.

Zero Brownfields
HOMBRE is based on providing the scientific and technical backbone to support four very simple 'zero-Brownfield' concepts:

- Land-use life cycle: Land is the ultimate finite resource. It is also a resource that is in a cycle of use. Brownfield land can be a stage in this cycle, but for many economic, environmental and social reasons it is important that future Brownfield generation is prevented, and where land is already Brownfield

- Intermediary land use: The best management solution is prevention, following that is remediation where some processes are needed to bring land back into suitable re-use. It is on us to find some form of intermediary land use for such abandoned land where its values and unearthed can be capitalized on. The land can be gradually restored until it can be fully re-integrated into the land use cycle.
- Added value by combining technologies: Integrated solutions offer a great opportunity to surmount the costs barrier by sharing the land management costs with other services and opportunities for society such as renewable energy and urban green space and climate control. The potential for revenue from diverse renewable energy / climate control technologies from ground source heating and cooling to bio-energy not only provide revenue opportunities to enable remediation.
- 'Zero Brownfields': With this stake come benefits and responsibilities for many stakeholders. A more intelligent design for Brownfield management potentially brings important sustainability benefits. For the planet there may be benefits of better resource optimization and lower impacts from land management; for people there may be societal benefits from a better urban landscape and for profits there may be economic benefits from avoiding the 'over-design' of stand alone remediation solutions.

Products
Strategic management products: the Brownfield Roadmap and Framework for Zero Brownfields. HOMBRE will develop practical, science based guidance to deliver the concept of a land cycle as a working system for planners and land managers. The strategy will be based on indicators for early recognition of why, how, and when Brownfields come into existence, as well as on indicators that signal potential for sustainable, cost-effective and timely site renewal. By monitoring these indicators, timely intervention may avoid Brownfield formation or at least mitigate the negative effects. It will ensure that scarce resources are focused on solving genuine problems, e.g. by avoiding unnecessary remediation, and on creating long lasting opportunities. The final Framework will incorporate the experiences obtained from the HOMBRE case studies, market and stakeholder guidance on all methodologies and technologies developed, and a policy brief on Brownfield regeneration.

A practical and hierarchical decision making approach: Brownfield Navigator. HOMBRE will develop integrated stakeholder communication and decision support technology for the optimal selection of Brownfield regeneration options, approaches and technologies of decision making. This will apply a set of common principles but support their use at different geographical scales and different stages in land management decision-making. For example, during the planning phase there is a need for more elaborate and integrated decision making tools and processes that help stakeholders to 'navigate' holistically towards a successful Brownfield regeneration across an area. The Brownfield Navigator will enable to assess the key environmental, economic and social aspects of Brownfield

Hombre, dec 2010 Deltares

regeneration scenarios in both local and regional contexts. It will integrate a set of rules and principles from HOMBRE's strategic guidance; modeling and GIS technologies; and the 'design table' visualization approach to support an interactive and cross sectoral decision-making environment Integration of technologies:
treatment trains and operating windows. A 'treatment train' is a term to describe how different technical approaches can be combined to offer an enhanced benefit. HOMBRE will explore treatment trains in two contexts: a 'hard' built environment context, and a 'soft' re-use context linked to urban greening and/or bio-energy production. Across the portfolio of treatment trains there will be a technology development of interest on a broad European basis:

- Train1 Energy and water, where energy re-use and contaminated water restoration are combined
- Train 2 Building materials and soil, where resource efficiency and contaminated soil management are combined.
- Train 3 Soil and water where remediation and sustainable urban drainage and soil capacity building are combined.
- Train 4 Urban greening and restoration where the benefits of remediation and urban green space are combined
- Train 5 Bio-energy and remediation where combining organic matter recycling and bio-energy production provides a solution and a revenue for abandoned land

2nd HOMBRE brochure – published 26.10.2013

HOMBRE HOLISTIC MANAGEMENT OF BROWNFIELD REGENERATION

Overall value is a function of three factors: (1) direct financial returns (costs vs. financial benefits); (2) wider effects which are nonetheless economically tangible (such as improving local property values, or impacts such as impacts on infrastructure); and (3) wider effects which cannot be readily valued in economic terms - intangibles (such as effects on a landscape, or community acceptance) – which nonetheless affect the value of a project's "goodwill". Goodwill can have an important bearing on project implementation and outcome, for example in terms of how easily it can meet planning requirements and how attractive it is for use; as well as having significant commercial and organisational importance, for example via reputational risks and benefits. Improving overall value should be a key part of project scoping and design, identifying opportunities for synergies and additional project services.

A holistic approach to understanding project sustainability increases the chances of identifying these opportunities. A concept of "sustainability linkages" can be used to relate project services and project wider effects and facilitate this design and evaluation of designs, guiding stakeholders in decision making all along the life cycle of regeneration projects and land use.

For the time remaining, HOMBRE investigations will (1) develop these concepts into a decision framework or tool building also on outputs from several other projects; (2) develop further the concept and viability of bio-energy clusters with worked examples and (3) refine knowledge on "operating windows" of two low input "gentle remediation" technologies: 1) use of modified charcoal and 2) organic matter recycling.

WHAT NEXT?

- For the upcoming months special focus will be on the elaboration of an overarching approach that will synthesized and integrated all findings of the different work packages of HOMBRE in a "Holistic framework for zero brownfield perspective" providing guidelines and a policy brief on more efficient brownfield regeneration.
- Within a CEN[1] Workshop a shared glossary of terms for dealing with brownfield regeneration will be worked out to ease dissemination of project results and mutual understanding with related communities, e.g. spatial planners.

1 CEN: European Committee for Standardization

PROJECT REFERENCES

Contract number: 265097
Theme: FP7 ENV.2010.3.1.5-2: Environmental technologies for brownfield regeneration
Duration: 12/2010 to 11/2014

CONSORTIUM

ACCIONA Infraestructuras
Spain *(www.acciona.es)*
BRGM – Bureau de Recherches Géologiques et Minières
France *(www.brgm.fr)*
DECHEMA e.V. – Society for Chemical Engineering and Biotechnology
Germany *(www.dechema.de)*
Deltares
The Netherlands *(www.deltares.nl)*
Geo-Logik
Poland *(www.geo-logik.pl)*
PN Studio
Italy *(www.pnstudio.net)*
Projektgruppe Stadt + Entwicklung
Germany *(www.projektstadt.de)*
r3 environmental technology ltd.
UK *(www.r3environmental.com)*
Tecnalia
Spain *(www.tecnalia.com)*
TNO – Netherlands Organisation for Applied Scientific Research
The Netherlands *(www.tno.nl)*
University of Nottingham
UK *(www.nottingham.ac.uk)*
University of Rome "Tor Vegata"
Italy *(www.uniroma2.it)*
University of Science and Technology in Cracow
Poland *(www.agh.edu.pl/en)*
University of Wageningen
The Netherlands *(www.wur.nl)*

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HOMBRE

Holistic Management of Brownfield Regeneration

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www.zerobrownfields.eu

HOMBRE HOLISTIC MANAGEMENT OF BROWNFIELD REGENERATION

BACKGROUND AND OBJECTIVES OF HOMBRE

Preventing sites from becoming brownfields and regenerating existing brownfields is important to tackle urban sprawl and ensure a more sustainable built environment. Thus HOMBRE seeks to minimise the costs and maximise the benefits from the (re-) use of brownfields. HOMBRE aims to create a paradigm shift in sustainable brownfield land management practice to "Zero Brownfields" where brownfields become areas of opportunity that deliver useful services for society, economy and the environment, instead of derelict areas that are considered useless. Within the project, HOMBRE will look for strategies and technologies that will facilitate the integrated assessment of brownfield regeneration options within local and regional development, and that highlight brownfield site potential through available resources and opportunities for local and regional stakeholders.

There are several European case studies in HOMBRE located in Italy, Germany, Romania, UK and Poland. HOMBRE aims to check the practicability of the results gained in the different work packages at the case studies and learn from their experiences.

With an overarching approach all findings of the different work packages of HOMBRE will be synthesized and integrated in a holistic framework for zero brownfield perspective.

WORK PERFORMED SO FAR

First steps were taken to come to a strategy and vision for brownfield regeneration, a **roadmap for the zero brownfield perspective**. A set of early indicators (economic, social and environmental) and monitoring approaches has been elaborated that should help to better understand why, how, where and when brownfields are formed in order to avoid the genesis of new brownfields and to come to a faster and cheaper regeneration of brownfields with less environmental impact.

The **Brownfield Navigator (BFN)** is a map-based online instrument that aims to support and guide stakeholders to identify in an early stage how a particular brownfield site can successfully be regenerated, i.e. by choosing the best regeneration strategies, technologies and approaches: Furthermore the BFN aims to show synergies between services and the opportunities they create at different stages of the land use cycle.

The BFN combines decision support frameworks with a geographical information system (GIS) and is targeted in decision making at the level of area planning, managing a portfolio of sites, or project planning. So far a first set up for the BFN was developed that contains a map and sketching functionalities. The focus of the BFN will be on early indicators, synergies, success criteria and assessment of success and visualization.

The proposed five steps of the BFN with their corresponding tools start with the identification of one or more brownfields (step "Identification"), to developing a vision on the brownfield (step "Scoping") and exploring opportunities for development (step "Opportunities") and finalizing with an assessment of the feasibility of development, until evaluation and monitoring of the success of the solution for the brownfield regeneration by the testing against defined success criteria for sustainable redevelopment of brownfields (step "Evaluation & Monitoring").

Technology Trains: More cost-effective, more timely, and more sustainable and thus optimized regeneration of brownfields is achieved through the development of specific technology combinations ("technology train concept"). The idea is to close cycles for energy, water, soil and materials and thus to reduce costs, generate returns on investments and minimize the impact on the environment.

View on parts of the Polcevera site in Genoa/Italy – one of HOMBRE's case studies (Photo: Francesco Tomasinelli, PN Studio)

So far three technology trains (energy/water, soil/building materials and soil/water) were defined and their feasibility was analysed by desk-study. In order to demonstrate the synergy of combining (at least) 2 topic fields (e.g. energy and water), three technology trains are elaborated in the laboratory and explored how these new, innovative technology trains can fit into the framework of (any) brownfield regeneration project. The combinations that are tested on lab-scale are the following:

Energy/water: Combination of Aquifer Thermal Energy Storage (ATES) with groundwater remediation (in situ chlorinated ethane (PCE) degradation).

Soil/building materials: Stabilization of soils and other materials using carbonation. Here the aim is to develop an understanding on critical parameters, both process based as materials based. Besides this work, a concept is elaborated in which stabilization of soil is combined with enhancement of the structural capacity of soil.

Soil/water: A new sustainable concept for in situ grouting at brownfield sites was developed, that provides combined potential for the creation of foundations as well as removal of volatile contaminants for groundwater. „Ecogrout" as this technology is named, is based on the coupled reactions of CO_2 degassing and the precipitation of calcite (stalagmites/stalactites) that occur naturally in caves.

Brownfield soft re-use: HOMBRE is assessing the opportunities of innovative strategies, techniques and appraisal methods to improve the value of brownfield regeneration into "soft re-use" (i.e. non sealed land-uses) on an interim or long term basis. The project focuses on two principle classes of soft re-uses: 1) open space (i.e. land used for the provision of public amenities like urban parks and 2) land for biomass and bio-energy production.

A draft valuation approach for brownfield regeneration into soft re-use has been developed. The approach considers services and sustainability provided by regeneration options as overarching principles for value creation. This suggests that the case for investment is based on the design of "project services", such as risk management or biomass production. However, determining overall value requires an understanding of wider project effects.

HOMBRE Final Brochure – published 14.10.1014

HOMBRE

Holistic Management of Brownfield Regeneration

HOMBRE's Role in Brownfields Management and Avoidance

Urban Land Management 2065

Co-funded by the European Union's Seventh programme for research, technological development and demonstration under grant agreement no. 265097.

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IMPRINT

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Editors:
HOMBRE Partners

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Table of contents

Policy brief: Profitable places for people

Take home messages:

1. Europe's urban brownfield sites are valuable latent resources
2. Urban land use decisions should be expected to deliver a clear 'Return on Investment' (RoI)
3. Understanding urban systems in terms of their environmental, social, economic and governance performance is an essential part of sustainable urban land management
4. Looking for new opportunities with a future long term perspective in mind
5. Looking multiple land uses are both possible and most likely to deliver adequate RoI
6. Implementing (sub) surface technologies in serial or parallel can uplift RoI
7. Multiple soft end uses can deliver multiple services and uplift RoI for land unsuited or unneeded for hard development
8. Online map tools can assist local stakeholders identify creative land use options

Brownfield sites are the secret weapon in delivering sustainable European cities. Admittedly such sites have been affected by former uses of the site or surrounding area, they: are derelict or underused; are mainly in fully or partly developed urban areas; **may** have real or perceived contamination problems but certainly require intervention to bring them back to beneficial use (CABERNET 2007). They are often also in the **right place** to deliver **profitable places for people**. Brownfields were originally seen as a disease in their own right whereas they are in fact a symptom of structural change and ordinary cycles of human endeavor.

Over the past 40 years many European cities have made a transition from polluting, heavy engineering or mining centres to clean, service or advanced manufacturing centres. As an example Germany's Ruhr or the UK's Leeds have transformed their environment and economy and are now reaping social dividends. Elsewhere examples show that the transition has either faltered or gone into reverse resulting in shrinking cities or mass youth unemployment.

An empirical approach to improved management of brownfields is increasingly unaffordable: "Build and let's see what happens" is a luxury of a bygone – pre Global Financial Crisis era. Too many redevelopment projects petered out once the initial capital outlay was exhausted.

"Invest with a predictable Return on Investment" (RoI) is the new norm. The challenge is making robust, reliable predictions of that RoI. However, conventional cost benefit analysis is inadequate for appraising long term investments that span generations. Only by developing, and then regulating on the basis of a better understanding of complex, dynamic city systems, can the RoI of brownfield reuse be appreciated.

Cities serve similar functions, offer similar services and make similar demands. Yet they have distinctive features, resources and constraints. As such generic models of urban land management have a role to play in developing broad awareness but city specific models – conceptual, qualitative, and quantitative – are needed to gain the deep understanding needed for evidence based decision making. Going beyond static models, dynamic simulations of functioning cities can help discern the scale and nature of the consequences of different decisions and courses of action.

Tradition linear, sequential land use and management systems have been effective but often inefficient. Avoiding obvious unsustainable waste means **synergies** and **concurrent activity** are needed. Thinking about the land use after next, anticipating when a given parcel of land is likely to be free for reuse, seeking the **maximum service** out of a given consumption of resources.

HOMBRE considers urban **brownfields** as **a latent resource in sustainable urban land management**. As Europe's cities progress their need for land will fluctuate: some cities will need more land and some less. HOMBRE has developed both a new way of thinking – **decoupling the land use and land management cycles**; seeking synergies; expecting tangible value from soft reuses – and new techniques to improve city system understanding, simulate the effects of land reuse, enhance the environmental benefits of remediation and material recovery technologies. HOMBRE's Brownfield Navigator contains a flexible spatial visualization tool and signposts the HOMBRE tools and technologies described above.

Europe's policy of creative, stable and eco-efficient cities is nearer to being realised because of the deeper understanding and more sophisticated solutions HOMBRE has developed. Previous approaches to the built environment have revolved around a general linear pattern of land use based on a 'consume & dispose' approach to construction materials. Once buildings came to the end of their useful life, they would lie vacant or be demolished and most of the resulting debris would be discarded. A life cycle approach to both land use and resource stewardship is emerging in both land and construction materials. By dismantling rather than decommissioning, the creation of large amounts of unusable and highly problematic mixed waste is avoided by materials being reused or recovered. The past no longer has to – or even ought to – be the key to the future. We can both envision a new future and contribute to its delivery.

1 Introduction

EU 2050 net land take perspective

Over recent decades, land recycling has become a major concern in European regional policies. Land and soil are being increasingly recognised as vital resources in Europe's continued development. Since the 1990s the rate of land take in the EU is around 1000 km² per year and the European Commission intends to limit this land take and to promote re-use of the land in already built-up areas. Therefore comprehensive strategies and programmes to limit urban sprawl, to deal with the problems of shrinking cities and to encourage brownfield revitalisation have been developed in many cities, regions and countries of Europe.

Towards zero land consumption by 2050

Recent initiatives by the European Commission make the stewardship of soil resources and the management of land use activities as key policy objectives of the European Union. The flagship initiative „A Resource Efficient Europe" (COM(2011) 571 final) of the EUROPE 2020 Strategy explicitly recognises „land" as a resource and, for the first time, the European Commission's General Union Environment Action Programme for 2020, titled 'Living well, within the limits of our planet', sets a target for zero land consumption by the year 2050. An expected **communication in 2015 on "Land as a Resource"** will outline aims of:

- Raising *awareness* about the **value of land as a resource** for crucial ecosystem services (provisioning, regulating, cultural, etc.),
- Providing guidance for **further action at EU level** through the evaluation of the effectiveness of current policy instruments on the national, EU and global levels.

With this ambition and vision in mind, the European Commission launched a number of research and development (R&D) initiatives aimed at *preventing* sites from becoming brownfields and *regenerating* existing brownfields. The project Holistic Management of Brownfield Redevelopment (HOMBRE) is one of the R&D initiatives to support this ambition. HOMBRE aligns itself with this integrated perspective on land as a multi-purpose resource and also recognises the important role played by actors on the European level in influencing land use and its management.

HOMBRE results & benefits in a nutshell

From problem based to opportunity driven

The HOMBRE project's vision encompasses a wider view of and approach to the redevelopment of brownfields than contemporary practice would suggest.

The step-change realised is a move from a stand-alone, problem-oriented approach such as development comprising monolithic housing estates or focusing on in situ and ex situ remediation activities, towards a more all-encompassing approach focusing on synergistic use of urban brownfields by deploying different technologies combined with local and regional opportunities, to provide multiple services that meet the demands of Europe's citizens for sustainable urban development.

Synergies between improvements in environmental condition, economic performance and social services can leverage the return on investment of brownfield redevelopment and help expand opportunities for brownfield re-use.

Create synergies by combining different approaches

Technology trains that deliver multiple services have been developed and tested to serve as examples for end-users. The wide range of services possible (by deploying "hard- and soft uses") needs to be tailored for each site and setting. "Hard uses" are engineered solutions which have direct impacts on the subsurface, water, energy or construction conditions. "Soft uses" are directed more to so-called green approaches such as using bio energy, dealing with carbon sequestration and improving soil. They usually have an impact in the mid- to long term.

The Brownfield Navigator (BFN) software guides end users through the process of anticipating and accelerating the return of the brownfield to beneficial use and beginning the redevelopment process. The life cycle of urban land use and the associated management cycle are at the core of this BFN and the results of the different project elements are comprehensively included. The HOMBRE case study partners have reported that using the BFN generated new insights and approaches to their sites and encouraged them to modify their daily practice to a more comprehensive way of brownfield redevelopment.

Find, communicate and realise opportunities with all actors: the Brownfield Navigator

Generic BFN tools and functions
- Map and Sketching
- Notepad
- Example library
- Rounds Model
- Reference library

Module Anticipating Change
- Anticipating BrOWnfield Emergence Tool methodology (BOWET)

Module Make the Transition
- Vision Ambition & societal demands
- CircUse Management Tool
- Regulation checklist
- BR2 tool
- Workshop for Technology Trains
- Brownfield Opportunity Matrix
- Bioenergy tool
- Construction & Demolition waste tool
- Scenario evaluation

Module Check Performance
- Check achievements

HOMBRE case study site: **Genoa (Polcevera Stream valley), Italy**

View on parts of the case study site in Genoa, Italy

Polcevera Stream valley is an important link between the eastern and the western part of the city of Genoa, in Northwestern Italy. Genoa is part of an important transit for the north-south transport of goods, especially along the European corridor 24 Genoa-Rotterdam.

At the moment the Polcevera stream delta is a heavily urbanized area, inside the borough of Cornigliano, with a steel industry brownfield lying to the west of the stream for about 6 ha. The Polcevera stream mouth hosted steel industries on the west bank that ceased production in 1996 due to the iron crisis. In 1998 a bufferzone was created around the industrial area.

Two stakeholder workshops were held in Genoa. The participants tested the Brownfield Navigator (e.g. sketching tool, vision/ambition tool and biomass flowchart) and the Brownfield Opportunity Matrix.

2 The "Zero" Brownfields concept: The Land Management and Land Use Cycles

All land in a built up area should contribute to sustainable urban development. When a land use ceases to be beneficial to society, land management should facilitate the transition towards another sustainable use.

Land use, especially in urban areas, is dynamic: cities need to adapt to changing societal needs *and* opportunities (for jobs, health, living standards, logistics, etc.) as well as building in resilience to environmental stresses caused by climate change. HOMBRE realised from the outset that one of the keys to improve brownfield redevelopment is a better understanding of the life cycle of urban land use and of the specific role brownfields – their emergence, persistence, and redevelopment – has within this cycle. Brownfields emerge when a given land use, for example a factory or business estate that provided a large number of jobs, turns from being highly beneficial to society to having a marginal or even detrimental effect or simply comes to an end. As such, brownfields are a symptom of changing times. While the presence of brownfields provides the necessary "free" space for new developments within the urban environment – to meet evolving societal demands – brownfields often persist for longer than desirable. The customary view is that a negative legacy of the former use, such as local unemployment or contamination, poses too costly a barrier to overcome. HOMBRE argues that a clearer vision on what the brownfield site has to offer in responding to current and emerging societal challenges would help overcome such barriers.

From brownfield restoration to brownfield redevelopment

HOMBRE fosters a shift in mindset from contemplating brownfield *restoration*, which basically only looks back on what has been lost, to brownfield *redevelopment*, taking a forward looking perspective of new opportunities for future developments. Indeed, with changing societal needs, restoring the past may not be a sustainable solution. HOMBRE therefore offers tools and techniques that help uncovering this potential of brownfields to provide beneficial services anew and, based on this, help develop a vision for overall sustainable urban development and successful social redevelopment. Where pathological remnants from the past need to be addressed, HOMBRE advocates searching for suitable "Technology Trains" that combine remediation – to remove legacy problems – with the provision of new useful services such as energy generation, space creation or materials recovery. Examples are the on- or off-site re-use of excavated soil and construction waste which typically arises with site redevelopment, or exploiting the synergy between seasonal aquifer thermal energy storage and in-situ bioremediation of organic contaminants.

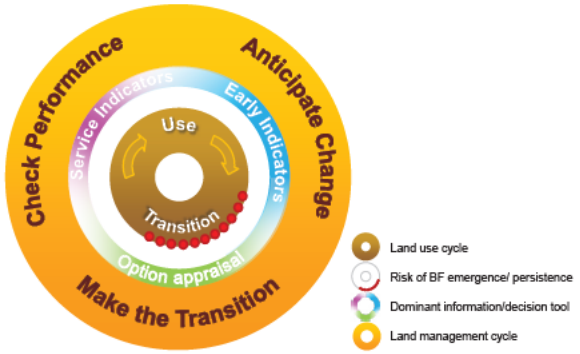

Figure 1: The HOMBRE Zero Brownfield framework: administrative land management cycle (outer cycle) addressing land use transitions in the land use cycle (inner cycle).

Towards sustainable land use: cyclic land use and management

The dynamics of urban land use are cyclical: site developments are planned, realised and then utilised and maintained until the development is decommissioned or simply abandoned, after which a new cycle for site re-development starts. The land use cycle comprises periods of beneficial use alternated with periods of transition. Brownfields are periods of wasteful unfulfilled potential. The paradigm shift presented by HOMBRE is that land use and land management each have their own tempo and do not – and need not – necessarily run at the same pace. The land management considered is that which is within the remit of administrative authorities or other agencies that have long term (multi-cycle) responsibility for sustainable land use within an area or portfolio of sites. Ensuring BF redevelopment obviously is about transitions in land use, but it should not be limited in time to these periods only. Therefore, the management phase of "Making the Transition" is preceded by "Anticipating Change", and followed by "Checking Performance". Together, these phases provide management continuity throughout the life cycle of urban land use and should shorten the time land lies idle or underused.

Creating the HOMBRE Zero Brownfield framework

Figure 1 illustrates the (outer) administrative land management cycle decoupled from the dynamics of the (inner) urban land use cycle and thereby avoid unnecessary emergence and undue persistence of brownfields. For this, the term 'Zero Brownfields' was coined in analogy to zero waste. It is not meant to imply that no underused or vacant land should ever exist, but that this brownfield land should receive proper management attention and that its transition to beneficial use should not be stalled for an excessive period.

The basic land use cycle comprises two phases of Use and Transition. The red dots indicate where in the land use cycle there is a danger that brownfields may emerge and persist

HOMBRE case study site: Markham Vale, UK

The former Markham Colliery (left) and plans for Markham Employment Growth Zone

Markham is a former colliery in Derbyshire UK. The colliery closed in the early 1990s, with the majority of the site laying derelict until the Markham Employment Growth Zone (MEGZ) began planning redevelopment in the early 2000s. The colliery was one of the main employers in the North East of Derbyshire area and its loss is partly the responsible for the higher than average depravation and child poverty in the area. MEGZ's objectives are to create 5000 jobs in a sustainable environment. The site is largely in the transition phase the land use cycle.

The site consists of three employment zones covering 120 hectares, along with the two former tip areas totalling more than 100 hectares. The North tip includes a short rotation coppicing scheme and public open space including areas of particular habitats.

In consultation with the MEGZ management team, the Brownfield REMIT/RESPONSE (BR2) systems tool and the Brownfield Opportunity Matrix (BOM) have been applied retrospectively look at the regeneration strategy on the site.

for too long. Of course the duration of subsequent use phases may vary considerably: from less than a year in case of temporary or interim use in anticipation/preparation for more permanent use, to decades or even centuries. The land management cycle is represented by the outer cycle. The brownfield redevelopment phase is more generically termed "Make the Transition" as, from a Zero brownfield perspective, the transition from one beneficial land use to another could skip any stage of dereliction. A clear benefit of land management within the HOMBRE Zero Brownfield framework is restricting the magnitude and duration of negative societal impacts from land in decline.

Tools to support the HOMBRE Zero Brownfield framework

The HOMBRE Zero Brownfield framework includes guidance for the use of tools in each of the management phases. HOMBRE proposes a number of tools that help in analysis and decision making for "Making the Transition". These include tools to explore possible synergies between decommissioning, remediation and site redevelopment. Other tools secure and support adequate stakeholder participation. How the specific brownfield site can best contribute to sustainable development, according to the stakeholders, depends on the contemporary societal challenges to be addressed, what resources and services the site has to offer, and what development actions or interventions are feasible and how they will affect the wider urban system. Suggestions and examples are provided on how to assess the sustainability of both techniques and methodologies used in the redevelopment process, and of the envisaged land use.

Monitoring and control: the keys for successful land use management

In the "Anticipating Change" phase, so called early indicators are monitored to detect changes in the balance between societal costs and benefits of contemporary land use and to signal whether an area or site is at risk of becoming underused. Such signals should trigger management interventions, for example a change in policy, either to prolong the sustainability of the contemporary land use or to accelerate a desired transition. In both cases, "Anticipating Change" helps limit the duration of dereliction and the magnitude of negative societal impact. Early awareness also encourages planning for transition to be taken up at an early stage. This has the added advantage of providing more time for stakeholder consultations, including the search for potential investors. It also allows for exploring synergies between upcoming redevelopment projects and more strategic timing of consecutive transition projects at different sites. Both aspects can contribute to further limiting the need for greenfield developments.

The management cycle includes the "Checking Performance" phase to determine the actual sustainability of the new land use. In addition to checking project goals were achieved, it calls for monitoring performance against the defined service needs and sustainability objectives. Setting up this post-transition monitoring ensures a forward looking perspective and prevents benefits of the new land use being too short-lived. Even longer term monitoring, to determine if the land use services realised continue to meet changing societal needs and challenges, should then become part of the early indicator monitoring, which effectively closes the Zero Brownfield land management cycle.

3 Tools & Methodologies

A wide range of tools and methodologies to support the HOMBRE Zero Brownfield framework were developed by HOMBRE. Managing an intervention typically follows a linear, but iterative process (Figure 2). HOMBRE has translated this process into the HOMBRE Zero Brownfield framework. Figure 3 shows how the different management elements are linked with the cycle and which tools are available for support in practice. The tools are described further below.

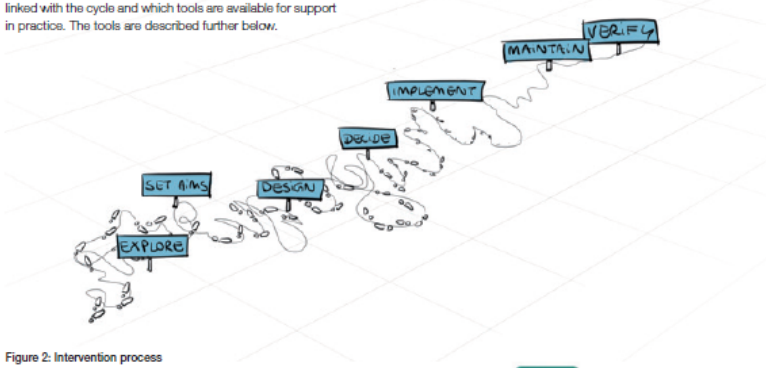

Figure 2: Intervention process

Figure 3: Tools to put the HOMBRE Zero Brownfield framework into practice

3.1 Early Warning Indicators

To apply the HOMBRE Zero Brownfield framework in practice, those in charge need adequate information that enables them to prepare for upcoming changes and look ahead for potential solutions and synergies. The urban management level that HOMBRE had in mind primarily, when developing its framework, is that of municipalities responsible for local development and spatial planning. However, private developers or public agencies that own or manage a portfolio of sites could also benefit.

Become aware of changes: early warning indicators

A list of around 40 "Early Warning Indicators" was developed as a starting point for early warning monitoring. Changes in these indicators can signal if a management intervention in the land use cycle is required to either prevent a brownfield from being created in the near future or to take early action for a well-managed transition of land use. The indicators are grouped into subcategories within the main dimensions of sustainable development: economy, society and environment. As an example, a selection of indicators within the four economic subcategories is shown in Table 1. Not surprisingly, the economic drivers are found to dominate brownfield formation.

As local situations will always differ, the table also shows the general line of thinking to follow to prioritise and select indicators. Starting from relatively broad categories that influence brownfield emergence (second column), and that may or may not be relevant in the local context, more specific issues can be identified (column 3), leading to a final selection of indicators (column 4). This line of thinking can also identify additional indicators – outside the suggestions given in the list- that are particularly suited for a given municipality or responsible organisation. An important aspect in the selection of early indicators for brownfield emergence is that the information should be easily available, preferably from information sources that are already in use within the organisation. Relevance and availability are the two main criteria in the selection of early warning indicators.

The added value: from analysis towards prioritisation

The Early Warning Indicator can also serve in a first step to spatially single out those urban areas that are particularly in need of monitoring or preventive actions. Thus, policy measures aimed towards more sustainable urban development can be more effective. The HOMBRE Anticipating BrOWnfield Emergence Tool (BOWET) proposes a four steps approach to identify the potential of brownfield emergence in various districts of a study area. Steps to be followed are:

Table 1: Selection of economic indicators from the HOMBRE list of Early Warning Indicators

CATEGORY	Issues indicators might need to consider	Suggested indicators	Effect on short/long term < 10 years >	Scale Local/ Regional/ National/Global	Source for data / info
Restructuring of economic activities	Composition of GDP	Percentages of GDP in industrial and service sector	Short term and long term	Local National	EUROSTAT National statistics
	Employment	Long term unemployment	Long term	Local National	EUROSTAT Local / national statistics
	Real estate market	Property price	Short term	Local	Local / national statistics Online directories Property assessment cooperation
Transportation	Accessibility, mobility, operational efficiency	Lost time due to congestion	Short term and long term	Local	Local infrastructure plans
	Safety	Number of accidents	Short term and long term	Local	Local statistics
	System Preservation	Age of distribution of infrastructural elements	Long term	Local	Local infrastructure plans
Urban sprawl	Property Price	Ratio of the property price in a municipality to the adjacent municipalities	Short term and long term	Regional	Real estate agents
Recession	Withdrawing investment from region/area	Industrial production	Short term and long term	National Global	EUROSTAT National statistics
		Wholesale-retail sales	Short term and long term	Local	Chamber of commerce

1. Define the spatial limits of the study area and urban units within and procure relevant base maps
2. Select the most relevant early warning indicators for the study area
3. Gather spatially differentiated data for the chosen indicators and evaluate the potential for brownfield emergence for each urban unit
4. Compare results to maps of existing brownfields – to generate general predictive models for brownfield emergence – and consult local experts to discuss the validity of the results

The resulting visuals and maps are especially valuable in initiating a dialog process with stakeholders.

A workshop with local authorities and other stakeholders in which the results are discussed can initiate thoughts about the possibilities for meaningful intervention. A test to assess the feasibility and relevance of the methodology has been carried out and applied on two European towns. The results of the test run have shown that is indeed possible to obtain modelling equation for the prediction of brownfield emergence. To date only site specific implementations of the full tool have been developed however the methodology is available in the Brownfield Navigator.

Figure 4: Consultation meeting with city officials to explain the early warning indicator results

3.2 The Brownfield REMIT/RESPONSE (BR2) tool for Understanding urban system dynamics

The 'Brownfield REMIT/RESPONSE (BR2) tool is a systems based analysis tool which allows a deeper understanding of an urban system and supports the comparison of the impacts and weaknesses of different redevelopment options for a site.

The interacting network of population, environment, economy and regulation in an urban area constitutes a complex system. When deciding between potential future uses for a site, particularly a long-term brownfield site, it is important to consider, not just each potential use in isolation but also the site's place within the wider urban system and whether that new use would work with or against that system.

The BR2 technique utilises a matrix-based systems analysis approach which a cross-section of stakeholders populate and analyse in order to compare potential re-use scenarios, assessing how each would interact with the prevailing urban system: identifying likely problem areas and bottlenecks affecting the ultimate success of the project, and whether the project itself fits within the system or is disconnected from it.

Within agreed system boundaries (for example: within a particular planning authority's boundaries) BR2 divides the system into a number of generic urban system components (table 2). Relationships between pairs of components are considered sequentially and scored according to importance to the system and the site, initially using simple binary coding where a '1' indicates that one component affects another and a '0' indicates no effect, along with justification for the designation. Semi-quantitative scoring systems are then used so that the relative importance of each interaction and whether the effect is positive or negative is captured for a further analysis.

BR2 uses these scores to populate a matrix. Each row and each column of the matrix are summed and these represent the particular component's effect on the system (row, termed 'CAUSE') and the system's effect on the component (column, 'EFFECT').

Plots of Cause versus Effect are then produced (C,E plots). The position of each component on the chart and how its position changes for each potential re-use scenario is used to determine the interactivity of the whole system and of each individual component and hence how vulnerable the system is to change. The dominance of a component in the system and its critical relationships are then used to indicate potential weaknesses.

Table 2: BR2 Generic Urban System Components

Biodiversity	Public Economic
Natural Environment	Private Economic
Built Environment	Individual Economic
Demographics	Local Institutional Controls
Quality of Life	Central/EU Institutional Controls

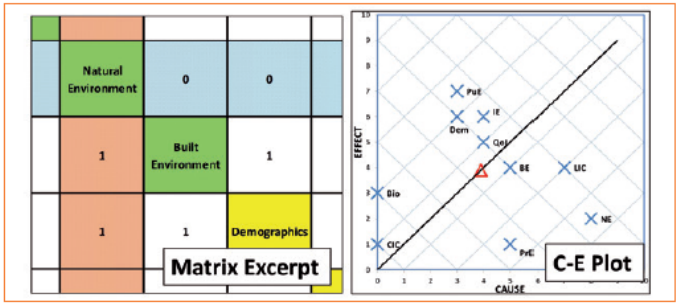

Figure 5: An excerpt from a completed Interaction Matrix (left) and Cause-Effect plot (right)

3.3 Technology Trains for brownfield redevelopment: on track for unlocking latent value

Technology trains draw on knowledge and techniques from different fields to overcome environmental and resource challenges in brownfield redevelopment by systematically assessing resource and service supply and demand of the redevelopment site and its vicinity.

The technology train concept aims to define the playing field in which technological solutions needs to be found to enable the brownfield sites redevelopment in an economic, ecological and socially acceptable way. As at each brownfield site the obstacles and boundary conditions are different, it is unrealistic to formulate a complete list of technologies that can potentially be applied in the redevelopment of brownfield sites. Therefore a framework is developed to define the playing field within which technologies have to operate. This framework seeks to effectively use resources that are present at the brownfield to fulfil demands on goods and services that are needed in the redeveloped site.

Assembling technology trains at brownfield sites: Key considerations

An important aspect of assembling a technology train is a set of key considerations for specific brownfield sites. These should be the subject of structured workshops with some or all stakeholders during the Make the Transition phase. The considerations are divided into three categories of questions:

1. Local context to define relevant fields for technology trains
   a. What are the early warning indicators for brownfield site emergence and/or what are the identified barriers for brownfield redevelopment?
   b. What are the adverse effects if nothing is done on the brownfield site?
   c. What are the (local) policies on energy supply/greenhouse gas emission, water quantity, environmental quality, waste handling to establish demand for services
   d. What are the markets and opportunities in the region for services that can potentially be provided by the brownfield site to define which supply is needed
2. Defining the scope for technology design: how can technology trains support the redevelopment plan of the brownfield site in time and space?
   a. Application of technologies to enhance the competitiveness of the redeveloped brownfield compared to greenfield development (e.g. lower remediation and infrastructure or utilities costs during redevelopment and lower energy costs during usage)
   b. Application of technologies that contribute to meeting demands (and policy targets) outside the brownfield site without major investments with respect to:
      i. energy usage / Greenhouse gases (renewable energy generation or sequestrating carbon),
      ii. water management (buffering storm water, aquifer recharge, tertiary polishing),
      iii. water quality (removing or immobilizing large scale (mobile) contaminants in groundwater and surface water),
      iv. noise and visual impact (barrier function),
      v. risk of accidents (cordon sanitaire function)
3. Elaborating the technology trains
   a. How to organise technological interventions during brownfield redevelopment?
   b. How to organise their financing during brownfield redevelopment

Technology trains are directed to fit basic demands for goods and services at brownfield sites, namely 1) Energy and water,

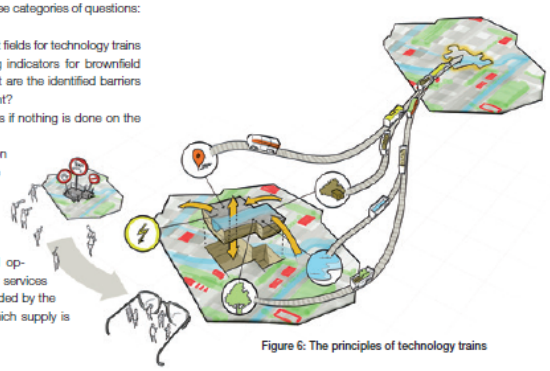

Figure 6: The principles of technology trains

2) building material and soils, and 3) Soil and water. Assembling technology trains results from technology pull processes that balance supplies and demands at a specific brownfield site.

Examples for technology trains: hard technologies trains for different demands

Three specific technology trains were elaborated by HOMBRE as examples to represent the different basic demands for goods and services (corresponding to the three basic demands, above):

Technology Train 1. Aquifer Thermal Energy Storage (ATES) combined with bioremediation of chlorinated ethenes to reduce primary energy demand for buildings and improve aquifer quality. The extraction and re-infiltration of large volumes of groundwater (more than 50,000 m³ per year per well) for ATES affects the soil chemistry and thereby the redox processes. In Fe(III) reducing aquifers, the mobilization of organic compounds improved the bioremediation potential which reduced the need for additional (more costly) interventions. Long term operation of ATES systems can therefore contribute to improved groundwater quality.

Technology Train 2. Solidification/Stabilization of contaminated (industrial) soils by carbonation. This technology train aims to minimise off-site disposal by converting the contaminated soil on site into building and construction materials that can be used on the site itself or the surrounding areas. This combination of remediation and materials manufacture was shown to be a promising approach for obtaining a product with sufficient mechanical strength to be used in civil engineering application and improved physical/chemical behavior (i.e. minimal leaching).

Technology Train 3. Reinforcing unstable soils by the EcoGrout process. In the EcoGrout process, cementation of soil particles is achieved by the reaction between $CaCl_2$ and $NaHCO_3$ which are injected in the aquifer or other porous matrix. The CO_2 produced by the Ecogrout reaction may be employed to aid the stripping of Volatile Organic Compounds, such as toluene or trichloroethene, from groundwater.

HOMBRE case study site: **Solec Kujawski, Poland**

View of the case study site in Solec Kujawski (left) and view on parts of the brownfield site with half full creosote container (right)

The urban and postindustrial case study Solec Kujawski is located in Northern Poland on the Vistula River. At the terrain a former manufacture for wood impregnation was located between 1876 – 2001. This led to a heavy contamination of the ground and groundwater with PAHs, BTEX and phenols.

Since July 2013 the area is being remediated stepwise using co-financing from the EU Cohesion Fund for National Programme "Infrastructure and Environment".

HOMBRE held 3 stakeholder workshops there in April 2013, June 2013 and September 2014 – one of them together with the EU project TIMBRE. The stakeholders (amongst others mayor/vice mayor, city representatives, local authorities) intensively discussed and exchanged on the Early Warning Indicators, HOMBRE land use and management cycle, "Golden Rules" for Technology Trains.

3.4 Assisting soft re-use of brownfield sites

Soft re-use of brownfield sites, such as for biomass production or green space, can provide services which enhance regeneration, both in their own right and when integrated with hard uses such as for buildings. One of the underpinning concepts of HOMBRE is that redevelopment projects that deliver a broader range of services have improved overall sustainability and economic value. The totality of services delivered by a completed project is seen as the project drivers that incentivise the investment necessary for a redevelopment to take place.

Soft re-use: an opportunity for interim and/or permanent solutions

Some important drivers for soft re-uses of brownfields can be identified:

- In many European countries, densely urbanised areas still need the development of open spaces. Brownfield sites are potential locations for such open space.
- A renaissance of and innovations in urban gardening, community gardens and urban farming increases demand for urban brownfields.
- Soft re-uses are an option for renewable energy generation (non-food biomass production).
- Soft re-uses, if designed appropriately and sited at strategic locations, represent green infrastructure that offers communities such as mitigation of heat island effects, improved urban comfort.
- Trees can improve urban air quality by filtering and retaining air particles and contaminants generated by traffic and industry as well as providing shade and eye-candy. Green infrastructure provides habitat for migrating birds and other species.
- Many leisure activities are more enjoyable and effective in soft rather than hard landscapes (e.g. Nordic walking, ball games, boot camps, cricket).

In specific contexts where the conventional financial benefits of redevelopment are not always easily identifiable, as is the case when brownfields are to be deployed for soft end-uses, decision-makers should be fully aware of the broader opportunities and benefits that can emerge. Soft re-uses can address not only local but also regional and even global challenges (for example climate change resilience, energy generation, preserving biodiversity, reducing car dependency, offering educational and health facilities).

HOMBRE's decision guidance is based on an iterative discussion process supported by simple tools to help decision makers identify what services they can expect from possible interventions on their site, how these interact and what the initial default design considerations might be. It supports the activities taking place during the pre-exploratory and exploratory stages of decision making, with the objective of improving overall sustainability and value. The screening tool used is called the "Brownfield Opportunity Matrix" and has been developed under HOMBRE for soft end uses only.

Figure 7: Site visit during a stakeholder workshop at the HOMBRE case study site in Solec Kujawski, Poland.

3.5 The Brownfield Opportunity Matrix option appraisal tool

The "Brownfield Opportunity Matrix" is a simple Excel based screening tool to help decision makers identify what services they can get from soft reuse[1] interventions for their site, how these interact and what the initial default design considerations might be. The matrix essentially maps the services that might add value to a redevelopment project against the interventions that can deliver those services, as shown in broad terms in Table 3.

Table 3: Main services and interventions within the Brownfield opportunity matrix

Services	Interventions
Soil Improvement	Soil Management
Water Resource Improvement	Water Management
Provision of Green Infrastructure	Implementing Green Infrastructure
Risk Mitigation of Contaminated Soil and Groundwater	Gentle Remediation Options
Mitigation of Human Induced Climate Change (global warming)	Other Remediation Options
Socio-Economic Benefits	Renewables (energy, materials, biomass)
	Sustainable Land Planning and Development

The matrix identifies where there are strong synergies between interventions and services, and also the relatively infrequent occurrences of antagonism. Wherever a particular intervention delivers a service, this interaction creates an opportunity to add value. The matrix describes the kinds of value that each opportunity might generate.

The types of value generated by soft re-use considered are:

- **Revenue Generation Opportunity**
- **Natural Capital:** developed in a number of ways, including (but not limited to) providing green infrastructure, improvement of the local climate, improvement of water resources and mitigation of contamination (protecting and enhancing local ecosystem/environment).
- **Cultural Capital:** developed by improving the social environment (by improving the aesthetics of an area and/or creating a sense of place/belonging for e.g.) and can be a direct result of an increase in natural capital.
- **Economic Capital – tangibles:** e.g. increase of land and property values in the area (feeding back into Cultural Capital) providing benefits to the local community and also the investor.
- **Economic Capital – intangibles:** benefits that are immeasurable but can include for example, an improvement of the image of the investor (be it a company or individual).

1 i.e. uses where the soil is not sealed by buildings or other infrastructure

The brownfield opportunity matrix: mapping prospects and identifying potential values

Thus, the matrix can be used to map the prospective range of opportunities that might be realised by a brownfield redevelopment project and the project's consequent sources of value. For each opportunity there is a hyperlink to additional information, including a case study. There is also supporting information to describe the various services and interventions listed in the matrix.

Overall the brownfield opportunity matrix can:

- Support initial identification or benchmarking of soft re-use options for brownfields at early stage
- Support exploratory discussions with interested stakeholders
- Provide a structure to describe an initial design concept, in support for example of planning applications
- Provide a structure for more detailed sustainability assessment of different re-use combinations, and similarly for cost benefit comparisons.

3.6 Service indicators; guidance for development and monitoring

In the ideal Zero Brownfield scenario, an impeding transition has been identified well in advance, all relevant stakeholders have been involved at the appropriate time and, with the use of their creativity and the HOMBRE tools, an innovative and sustainable redevelopment project has been realised. So will they now live happily ever after?

Service indicator: visualise performance and benefits of your efforts

At this stage a consideration of potential future situations is needed. Awareness of changes in those external conditions (for which the project was more or less optimised) is needed as with time they may affect the realised benefits of the land use. To check on this continued performance so called Service Indicators, which represent these benefits and potential impacts, can be monitored. Based on various schemes for developing indicators, HOMBRE identified as the four key steps:

1. **Agree on goals/objectives**
   Identification of appropriate Service Indicators may begin in the 'making the transition' phase as in that stage the societal challenges to be met and also wider sustainability goals are defined by the stakeholders
2. **Select relevant Service Indicators**
   A similar approach to that used in selecting the Early Warning Indicators can be followed here, going from broader goals as defined, to issues of particular importance, to indicators that are both relevant and practical to monitor.
3. **Obtain baseline data**
   This is both a test of the ease of monitoring and the clarity of definitions, protocols, and other operational aspects as well as setting the baseline with which to compare the forthcoming monitoring data. In the case of a Brownfield redevelopment project, the baseline could either represent the "old" situation that is now going to improve, or the newly realised situation that – within certain margins-is to be maintained.
4. **Define targets**
   Using the goals and objectives from step 1 and the baseline data from step 3, realistic targets can be set in terms of upper and/or lower limits for the selected indicators. At this stage the actions that should be taken if those limits are breached should also be decided.

Service Indicator monitoring can then provide relevant management information, for example the time it takes to fully realise the various benefits envisaged of the new land use, the effect of external drivers on if and how fast the targets are reached, and not least if at some point the benefits of the new land use are at risk of falling below the required limits and additional effort or action is needed to safeguard the contribution of the project to sustainable urban development. The set of Service Indicators may shrink with time, as some may become irrelevant when targets are reached or no further change is anticipated. In the longer term, project based Service Indicator monitoring can be integrated into the more general Early Warning Indicator monitoring, providing information on when – not if – a new Zero Brownfield land management intervention may be called for.

Figure 8: Stakeholders at Genoa case study site in Italy working with the brownfield opportunity matrix

3.7 The Brownfield Navigator – tool for spatial teamwork

The Brownfield Navigator (BFN) aims to facilitate a more holistic appraisal of brownfield redevelopment opportunities and early stakeholder involvement by offering an attractive online collaboration tool.

What is the BFN?

The BFN is an online environment which accompanies and supports decision makers, thought leaders and stakeholders through the different management phases in the land cycle. The BFN is divided into three modules, corresponding to the three land management phases: anticipating change; make the transition, check performance. In each module, the BFN offers information, examples, visualization possibilities and tools. The BFN offers access to the HOMBRE tools described before. Although all phases of the land management cycle are represented, the emphasis is on the "make the transition" phase.

Users can create their own project specific brownfield session in the BFN. The session is secured with a username and a password. Only people provided with this login information can enter the session. In the BFN-session, users can upload and store the brownfield information: maps, sketches, data, decisions made, stakeholder analyses, opportunity plans and feasibility plans. The user can use the BFN for different purposes, in different phases of the project and in the order that is suitable for the user. Unique among other online mapping tools, BFN uses the language and provides mapping symbols relevant to land management and land use visioneering. The BFN includes a library of brownfield redevelopment projects throughout Europe, which include the transitions that were are taken up as well as the societal challenges that were dealt with and benefits that were provided. This was found to be very useful during the Markham Vale case study. BFN also contributes to the process of brownfield redevelopment. It can be used in discussions with stakeholders, for example when discussing current situations, ambitions or future land use scenarios. In this case the easy to use map-functionality facility allows users to draw, add notes or symbols and then save and share sketches can simplify the production of a spatial overview and record the outcomes of discussions.

Finally

The BFN is currently freely available online (bfn.deltares.nl). It can be used on desktop, laptop or tablet computers. The BFN collection of generic tools allows customization for site specific situations and tasks. Since the BFN is based on Open Software architecture users can add functionality (e.g. financial modelling or route visualization) or approach the BFN creators Deltares for such services bfn@deltares.nl.

The Brownfield Navigator: your instrument to support sustainable land use management

4 HOMBRE Case Study Sites

The HOMBRE project involved several case studies located in different parts of Europe:

- Gelsenkirchen, Germany: former coal mining area (22ha)
- Genoa, Italy: industrial and urban area (22 ha)
- Halle/Saale, Germany: urban area (3ha)
- Markham Vale, UK: mining and urban area (220 ha) – additional case study site in the project
- Solec Kujawski, Poland: urban and post-industrial area (80 ha)
- Turceni /Jiu, Romania: mining and rural area (250 ha)
- Terni, Italy: industrial area (10 ha)

The target of the involvement of these sites was to

- Learn from case stakeholders' experiences and knowledge to understand relevant drivers and pressures around brownfield origination and barriers for regeneration
- Introduce stakeholders to HOMBRE's outcomes and tools, test their applicability and feasibility.
- Support stakeholders to find visions and opportunities for bringing their brownfields back to beneficial land use again.

Acknowledgements

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The deliverables of HOMBRE can be found at the project website **www.zerobrownfields.eu**

HOMBRE tool/product	For more information
Early Warning indicators	D2.1 "Early Indicators for Brownfield origination"
Service Indicators	D2.2 "Cost effective monitoring within the Circular Land Management Framework"
Anticipating BrOWnfield Emergence Tool (BOWET)	D3.3 "Evaluation of test results from the Brownfield Navigator use in case studies"
Technology Trains	D4.1 "In Depth Analysis and Feasibility of the Technology Trains" D4.2 "Report of testing of principles and description of critical design parameters of technological and process aspects of the technology trains" (lab results) D5.4 "Operating windows of two important low input technologies for greening urban brownfield" (lab results)
Brownfield Opportunity Matrix	D5.2 "Decision support for soft end-use implementation"
Brownfield Remit /Response (BR2)Tool	D6.2 "Integrated Framework for systematic evaluation of brownfield regeneration options"
Brownfield Navigator	D3.1"Decision support for successful regeneration of brownfields" Website: bfn.deltares.nl

Infographics:
JAM visueel denken (http://www.jamvisualthinking.com)

Pictures:
DECHEMA e.V., Germany
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