Project co-funded by the EC within
the Seventh Framework Programme
(2009-2012)

Project no.: 265097

HOMBRE

"Holistic Management of Brownfield Regeneration"

D 3.1: Decision support framework for the successful regeneration of brownfields

Due date of deliverable: 31.11.2012

Actual submission date: 19.12.2013

Start date of project: 01.12.2010 Duration: 48 Months

Deltares

Revision: final

Project co-funded by the European Commission within the Seventh Framework Programme (2007-2013)		
Dissemination Level		
PU	Public	X
PP	Restricted to other programme participants (including Commission Services)	
RE	Restricted to a group specified by the consortium (including Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	

Document Information

Title	Decision support framework for the successful regeneration of brownfields
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Distribution	
Report Number	D3.1

Document History

Date	Version	Prepared by	Organisation	Approved by	Notes
29/07/13	1.1 draft	Maring	Deltares		First draft
13/10/13	1.2 draft	Maring	Deltares		First complete draft
01/11/13	1.3 draft	Maring/Blauw	Deltares		Final draft
19/12/13	2.0 final	Maring	Deltares		Final version

Acknowledgement

The work described in this publication was supported by the European Community's Seventh Framework Programme through the grant to the budget of the HOMBRE project, Grant Agreement Number 265097.

Disclaimer

Summary

This report describes the decision framework for the Brownfield Navigator (BFN), to facilitate successful Brownfield regeneration. Next to regeneration, attention is also paid to the emergence/ prevention of BFs. This decision support framework will be incorporated in the software tool "the Brownfield Navigator" (BFN), the ultimate product of work package 3. The BFN is developed for a "municipal" target group as many BF cases start with the intervention of municipalities or regional authorities. Their actions, or inaction, have a decisive impact on the manner and pace at which brownfield land is brought back into beneficial use, or the degree to which it might remain under-used or derelict.

The HOMBRE BFN supports the study of brownfield emergence/prevention and brownfield regeneration processes by providing guidance and tools through the various management phases of the land cycle and by map functionality, examples and documentation. The management phases that are distinguished in the HOMBRE decision framework are:

1) Anticipating change (pre-BF);
   The concept of anticipating brownfield emergence using "early warning indicators (EWI)" is developed in HOMBRE. It aims at anticipating at an early stage if a location is at stake of becoming a BF, so the obstacles for change are still surmountable. For the purposes of the BFN, a method for anticipating these changes has been proposed. Based on a set of EWI, this method should allow for the mapping of areas which may be at risk of having brownfield emergence on various spatial scales (neighbourhoods, towns and possibly regional).
2) Planning the management and realisation (Regeneration. This phase can also be used for the planning of preventive actions of a pre-BF site);
   In the planning phase, stakeholders plan the transition towards the next use of a site. When value can be created and/or opportunities are foreseen that exceed the costs of regenerating the site while risks for regeneration are predictable, a site will probably be redeveloped by the private sector (A-type BFs). When value cannot easily be created for acceptable costs, a site will probably not redevelop and consequently won't transient to the next use phase unless a continuous flow of resources is guaranteed, e.g. by funding subsidies from authorities (C-type BFs). When the added value of a site is doubtful and/or not easily predictable while costs are relatively high, a site can only be redeveloped by private and public partnerships (B-type BFs). HOMBRE investigated different concepts that might enable regeneration of B and C sites. In the BFN, for this phase, three different steps are defined that can focus on different scales:
   1. Scoping: once consensus has been reached (by an initiative group) that intervention is needed at a site, a first assessment is proposed to understand what is, and has been going on at the site and its surroundings (up to the regional scale). Data collection is performed for a first generic determination focussed on the type of site. Also stakeholders are identified and how they should participate to support the transition towards the new use phase.
   2. Opportunities: stakeholders define their ambitions and vision, thus needs of the site, and investigate (together) the opportunities of the site and region; with this information scenarios are developed how these opportunities and needs can be reached. In this step, the different HOMBRE concepts on finding synergies, and opportunities are found. The HOMBRE input focuses e.g. on the opportunities for soft re-use.

3. Assessment: a design step where different scenarios from step 2 are assessed, choosing the most optimal scenario and setting up the redevelopment plan (towards realisation). In this step, HOMBRE technology trains for hard re-use are found.

3) Managing the realisation (the management and maintenance phase following a BF regeneration project).
The last phase of the Land Management Cycle is "Managing the realisation" where the redevelopment plan developed in the previous phase is realized. One of the main obstacles in redeveloping a site, is that redevelopment projects are often not (seen as) successful. This can have different reasons, for example when (maintenance) costs are higher than expected and/or goals set in the planning phase are (presumably) not met or realistic. Often criteria for success, service, and sustainability are not defined, monitored and evaluated, resulting in a scattering of decisions made by individual stakeholders. By monitoring the indicators set in the planning phase at a central point, the success of a project can be better determined. In HOMBRE tools are developed, and will be entered in the BFN, to set up service and success criteria, forming these into indicators and how to monitor and evaluate these indicators. It also makes the BF redeveloper aware of the possibility that the chosen indicators can show signs that the site is changing again and losing its function, thus moving towards the 'anticipating change' phase. This closes the land cycle again.

In each module of the BFN, different steps are defined in the BFN. In each step, several items are proposed, advising or providing guidance and / or tools. The steps and items are not necessarily subsequent in their use. They can be used iteratively, simultaneously, or even left out by the user. The objective of this decision support framework is not to make decisions itself, but to support those, that have to make decisions by providing an overview of helpful modules, including visualization, information and tools. The BFN will therefore not replace the BF manager, but gives insight in management phases, decisions and to stimulate the use of the (HOMBRE) highlights that research on BF regeneration has provided and that can add to the business as usual.

The Brownfield Navigator is at this moment only available as an online tool, developed using only open source tools and software. The development of the BFN is still work in progress. In the final year of the HOMBRE project (2014), the HOMBRE concepts will be further elaborated and tested and incorporated in the decision support framework and the BFN.

Contents

1 Introduction and background

The main objective for WP3 is to provide better planning and more attractive communication technology that allows a more holistic appraisal of brownfield (BF) regeneration options and early stakeholder involvement. To choose optimal regeneration strategies, technologies and approaches for BF regeneration, there is a need for more elaborated and integrated decision making tools and processes during the planning phase of a BF that help stakeholders to 'navigate' holistically towards a successful BF regeneration. It is possible to assess the key environmental, economic and social aspects of BF regeneration scenarios in both local and regional contexts.

The BF Navigator therefore facilitates interactive stakeholder involvement, which helps to picture planning scenarios and balance the financial viability and conformity of planning objectives with broader sustainability indicators. The BF Navigator is targeted in decision making at the level of area planning, managing a portfolio of sites, or project planning. With the BF Navigator, stakeholders can visualize alternatives of development scenarios and regeneration plans, enabling them to design better balanced combinations of uses that will meet planning objectives and indicators (quicker, cheaper and more sustainable).

1.1 Reports aim and scope

This report describes the decision framework for the Brownfield Navigator (BFN), to facilitate successful BF regeneration (version November 2013). The decision framework is developed in HOMBRE work package 3, in close cooperation with the work of other work packages (2, 4, 5 and 6). Next to redevelopment, the BFN will also pay attention to the emergence/ prevention of BFs. This decision support framework will be incorporated in the software tool "the Brownfield Navigator" (BFN), the ultimate product of this work package. This report is the second deliverable of WP3 and follows on D 3.2: Software and procedure of the Brownfield Navigator. Deliverable 3.2 consisted of the first setup of the software and an accompanying report (Maring et al., 2013).
In this report, the different chapters will lead the reader through the journey from theory of existing and newly developed concepts for BF regeneration and prevention towards an outline of the Brownfield Navigator. The definite description (functional and technical designs) of the BFN is not yet incorporated in this report because our journey has not ended yet. The final year of the HOMBRE project is the testing phase for the BFN (WP3.3 November 2013 - November 2014). In this phase the different items within the BFN will be further elaborated. The results of this phase will be elaborated in deliverable 3.3 "Evaluation on cases".
The BFN will be made available online after the tool has been tested.
In this chapter (1) the reader finds some background to the HOMBRE project and the Brownfield Navigator. The remaining chapters cover the following:

- Chapter 2 presents the overall HOMBRE storyline and HOMBRE concepts;
- Chapter 3 presents these concepts within the decision support framework for the BFN;
- Chapter 4 presents conclusions and makes recommendations for the development of the BFN and for the HOMBRE project;
- Chapter 5 presents a wrap up with some points of attention and future work;
- Appendices

1.2 HOMBRE project

The HOMBRE project's overarching aim is to develop new approaches to improve Brownfield regeneration and prevention in terms of performance and sustainability in a holistic way. The HOMBRE project will show new opportunities to generate more value for private and public investors.

HOMBRE's strategic goal can be specified by the following research objectives:

- Better understanding why, how, where and when BF's are formed in order to avoid future BF's , in different areas in the EU and in three main fields: 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 long-term land use of current and potential future BF's.

HOMBRE consists of different work packages (figure 1.1), from which WP3 focuses on the development of the Brownfield Navigator.

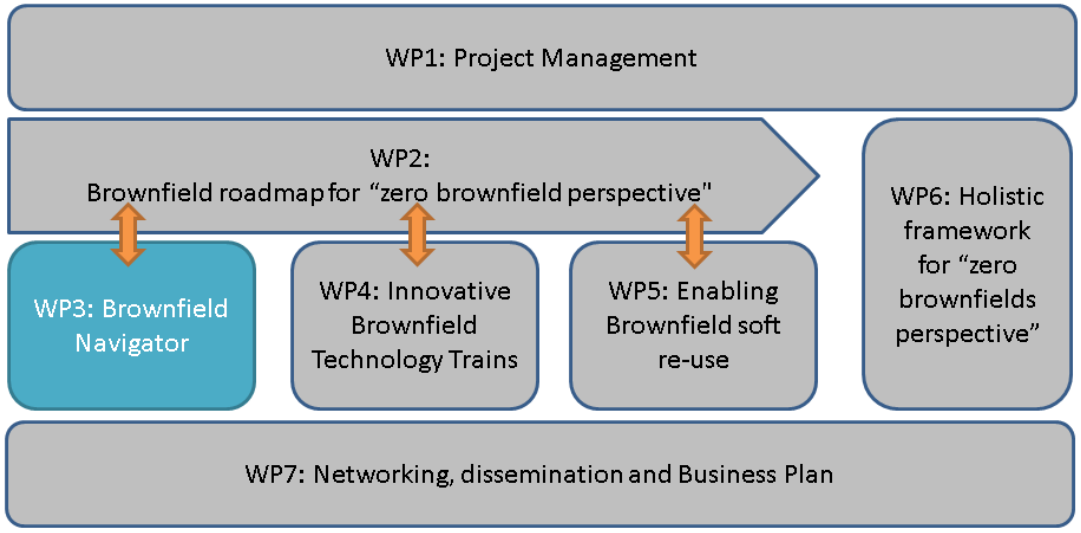


Figure 1.1 HOMBRE Work packages

1.3 The Brownfield Navigator

Since Brownfield (BF) sites are in most cases difficult to redevelop for many reasons, it is necessary to identify in an early stage how a particular BF site can be successfully regenerated. To choose the best regeneration strategies, technologies and approaches for BF regeneration, there is a need for more elaborate guidance and integrated decision making tools during the planning phase of a BF regeneration project, that will help stakeholders to 'navigate' holistically towards a successful regeneration project.
Following the Description of Work (Dow), the objectives of work package 3 Brownfield Navigator are to provide better planning and more attractive communication technologies that allow for more holistic appraisal of BF regeneration options and early stakeholder involvement. WP 3 consists of three tasks:

- Task 3.1.: Identification and integration of success indicators in DSS (D3.1 decision support framework for BF regeneration).
- Task 3.2. Development of the BFN, an interactive spatially based IT decision making tool (D3.2 BF Navigator software and procedure (Maring et al., 2013)
- Task 3.3 Testing of the BFN in case studies. This task will also be used for adapting and refining the software procedure (D3.3 Testing and evaluation due by month 48)

Figure 1.2 Example of an interactive design table with the BFN

In the HOMBRE description of work an ambitious but broad spectrum of functionalities is described (box 1.1)

Box 1.1 Objectives for the BFN from the description of work

Existing planning tools for land cycle management and an interactive design table (figure 1.2) will form the basis for the BFN. Using innovative information technologies in which decision support systems, geo information systems and tools are or can be integrated, it is possible to assess the key environmental, economic and social aspects of BF regeneration scenarios in both local and regional contexts. The BFN is targeted in the support for decision making at the level of managing a portfolio of sites, area planning, or project planning (chapter 2).
The BFN is intended to support the management and the design of BF re-use across a full range of land uses in an integrated way. The BFN supports the design of suitable (combinations of) intervention, regeneration strategies and solutions to meet the requirements of the new use. In case there is no intention to develop any built environment (residential, commercial, infrastructural, etc.) in an area or on a site, the BFN will support the design of alternative or 'soft' re-use of the BF.
Ultimately, the BFN will help to obtain an adequate BF regeneration concept. With the BFN stakeholders can visualize alternatives of development scenarios and regeneration plans, enabling them to design better balanced combinations of uses that will meet planning objectives and indicators (quicker, cheaper and more sustainable). This will enhance the uptake of BF regeneration projects and therefore prevent urban sprawl.

This was specified to the following objectives for what the BFN should do: The BFN provides an online DSS framework with map functionality, examples and documentation. It has a modular set-up with in each module different steps along the land cycle (The land cycle is described in chapter 2). Several items are given, advising or providing guidance and / or tools within each step of the BFN (table 1.1, Maring et al, 2013). The steps and items within them are not necessarily used subsequently. They can be used iteratively, simultaneously, or even left out if the user chooses this.

Table 1.1 Modules, steps and items in the BFN

MODULES	STEPS	ITEMS
The modules of the BFN correspond with the phases in the land management cycle	Each module contains 1 or more steps, that the user needs to take within the regeneration	Each step contains several items. Items can be tools, advice, a description. The items support the work of the user. Also some step-independent items (overall items) are given, such as the mapping and documentation function

All proposed items in the steps aim at facilitating interactive stakeholder involvement in BF regeneration projects and early warning for the emergence of BFs. They also aim at helping the stakeholders to picture possible planning scenarios. The conformity of the stakeholders' planning objectives with broader sustainability (people, planet and profit) indicators can be assessed with the proposed items. Chapter 3 presents the various BFN modules, steps and specific built in items. Also an extra "module" is elaborated: the early warning for BFs. This new HOMBRE concept was incorporated in the BFN set-up following HOMBREs overall goal to achieve better, cheaper and faster BF regeneration and ultimately, a zero brownfield perspective.

The BFN was developed for a “municipal” target group as many BF cases start with intervention of municipality or regional authority. Their actions, or inaction, have a decisive impact on the manner and pace at which brownfield land is brought back into beneficial use, or the degree to which it might remain under-used or derelict. CABERNET (Concerted Action on Brownfield and Economic Regeneration Network) already stated that there is a strong need for a brownfield specific strategic approach for regeneration on the local government level. (Ferber et al., 2006-II) Also case stakeholders involved in the HOMBRE project are all working for municipalities.

If we speak in this document about “the user” of the BFN, note that this is not necessarily the end-user or solely the municipality. It can be the moderator of the BFN (e.g. a consultant) or even a group of stakeholders using the instrument. The BFN was not meant to be used for just one person/institution; it is a multi-stakeholder tool and prepares a structure for the dialog on BF prevention and regeneration. Several parts of the BFN can support, or be used in interactive stakeholder sessions.

2 Hombre storyline

This chapter sets out the generic storyline of HOMBRE. It describes the HOMBRE ambition of "Zero Brownfields", the different management phases and its key topics to enable this. It describes also how in HOMBRE developed tools and concepts support this ambition. This storyline is the backbone for the BFN decision support framework for the regeneration of Brownfields (chapter 3). Parts of this storyline are also described in D2.1 'Early Warning indicators' and D2.2. 'Cost effective monitoring within the Circular Land Management Framework' (Ellen et al, 2013-I and 2013-II). The concepts described in this storyline are elaborated in the different HOMBRE WPs and their deliverables.

2.1 Introduction

Europe is one of the most urbanised continents in the world. European cities and urban areas are the engines of Europe's economic, social and cultural development. The historic and on-going expanse of European cities not only results from population growth, but also from the change from agricultural to industrial to service-based economies, and the concurrent attractiveness of an urban life style for a larger proportion of population. A clear disadvantage of this development is the associated land degradation in its various forms, which is a fundamental and persistent problem in Europe. Land take and associated soil sealing lead to the loss of important soil functions, such as water infiltration, water storage, and food production.

Clearly, a more sustainable use of land is needed. The "Roadmap to a Resource Efficient Europe" (COM (2011) 571), sets the aim to achieve zero net land take by 2050. An important contribution to reaching this goal is the regeneration of brownfields (BFs) instead of greenfield development. For the definition of BFs HOMBRE uses the definition of the expert network CABERNET (Concerted Action on Brownfield and Economic Regeneration Network): "BFs are sites that have been affected by former uses of the site or surrounding land; are derelict or underused; are mainly in fully or partly developed urban areas; require intervention to bring them back to beneficial use; and may have real or perceived contamination problems" (Ferber et al., 2006-II).
Though BFs are being redeveloped successfully, at the current pace more BFs are coming into existence than are being redeveloped. In current practice BFs are often considered lost, due to absence of appropriate land management concepts, and taken out of the land use cycle when no long-term use is readily available. Land recycling should therefore be an important part of land management strategy aimed at sustainable land use.

In the philosophy of circular land management, land is perceived as a resource that is in continuous renewal. The concept looks to reduce the consumption of un-built land, including the land for associated infrastructure, through prioritizing inner-urban development over outward urban sprawl. This approach has been developed and tested in Germany (Preuß and Ferber, 2006) and incorporated into the practice of city planning in Central Europe with the ERDF project CircUse: Circular Land Management[1]. The cyclic process encompasses planning, utilisation, cessation of use, abandonment and finally reintroduction (Figure 2.1). Within this concept, BFs are a stage in the overall dynamic process of land use and they evolve to acquire beneficial use by revitalization.

[1] http://www.circuse.eu/

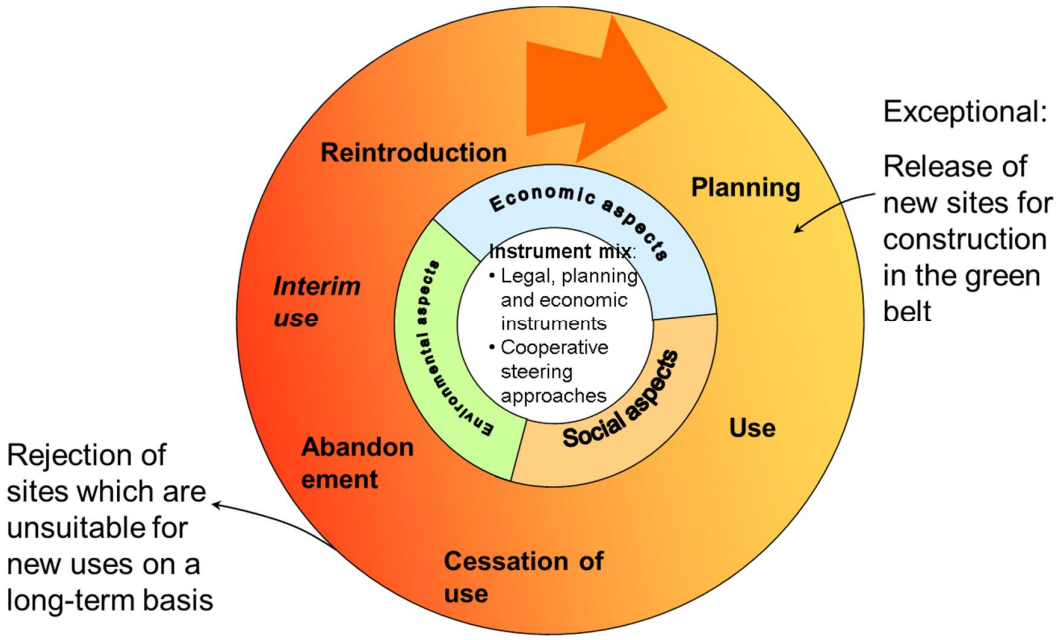


Figure 2.1. Visualization of the Circular land use management (Research group "Fläche im Kreis", 2005).

Changes in policy, governance and management practice do not simply start to happen. It takes time to change mind-sets and enhance awareness. It also needs to be supported by appropriate technological and decision support tools and underlying concepts. As already outlined by "The Concerted Action on Brownfield and Economic Regeneration Network" CABERNET, the current ease (and hence speed) at which BF sites are being redeveloped, depends largely on the perceived cost/benefit ratio of a redevelopment project (Type A, B, C site; Fig 2.2). For type A sites, circular land use is realised through market mechanisms. Sustainable land management should ensure that all land is used well and facilitate that also type C sites move faster through the land use cycle (Ferber et al., 2006-II).

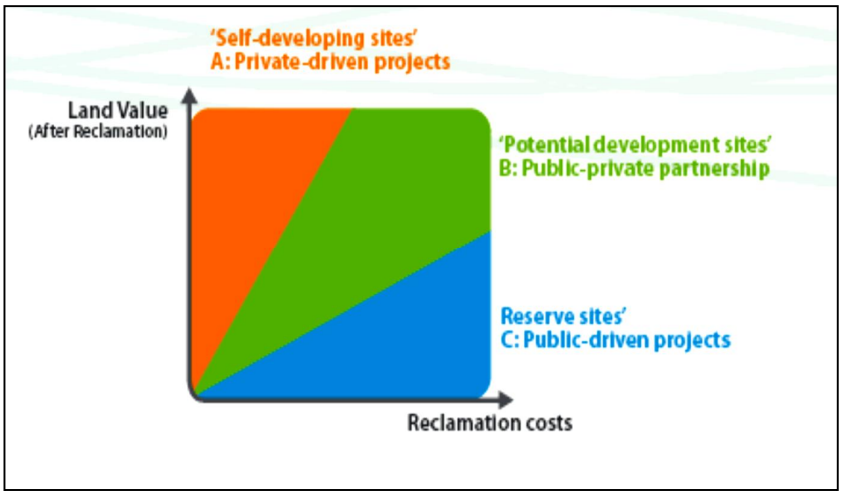


Figure 2.2 Schematic overview of A, B, C type BFs (Ferber et al, 2006-II)

Currently in Europe it is unknown how many BF sites exist that are difficult to redevelop (sites type C) as each country has own definitions for BFs. A site can therefore be identified as a persistent BF in one country whereas in other countries the BF labelling remains absent. There are regions (e.g. Saxony/Germany, Thuringia/Germany) where around 60-70% of brownfield land has been categorized as hard to develop C sites as and both developers and local authorities avoid these in favour of A or B sites (www.brachflächenrevitalisierung-sachsen.de).

2.2 "Towards Zero Brownfields": from problem to opportunity

The ambition of 'Zero BFs' can be aimed for by both regeneration and prevention of BF sites. For this, it is necessary that land is 'mobilized' effectively through the land use cycle. Important part of the HOMBRE mission is that, both for currently stalled and new BF regeneration projects, sustainability aspects of the regeneration process itself and the projected land use are integrally included in the decision making process. HOMBRE therefore focuses at strategies, technologies and solutions for BF management, that emphasize the positive value of available resources and potential social, economic and environmental benefits.

The circular land use management cycle shown in figure 2.1, includes two perspectives: land use and land management. To enable the HOMBRE ambition Zero BF's, developed tools, strategies and concepts need to be linked to the different management stages in the land cycle. To obtain a better fit with the Zero BF perspective, the land use management cycle is adapted. In D2.2 'Cost effective monitoring within the Circular Land Management Framework' (Ellen et al, 2013-II), two cycles concerning BF regeneration are developed and defined: 1) the circular land use, from occupation perspective (Figure 2.3a), and 2) the circular land management, from administrative management perspective (Figure 2.3b).

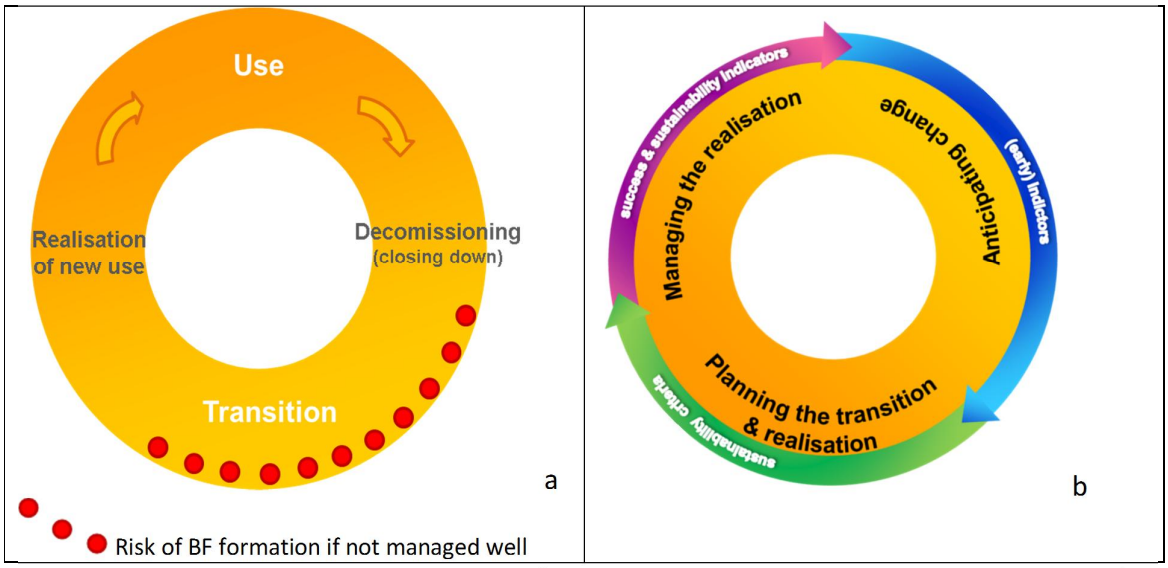


Figure2.3 Matching the Zero BF ambition a) Land use cycle from occupation perspective; b) Land management cycle from administration/management perspective.

The land use cycle describes the different occupation stages of a site. There are two land use stages: “in use” and “in transition”. The stage “in use” depends on two action stages: realisation and decommissioning. The land use cycle is dependent on actions based on the land management cycle. BFs may form when land is not well managed: when the responsible stakeholder does not anticipate timely on the change of land use and does not start to plan the transition phase. In the ambition of ‘Zero BFs’, BFs should be prevented to originate or when a BF emerges to shorten this stage to an acceptable period. The land management phases may overlap each other as often several sites are managed simultaneously or at one site different management phases can occur at the same time (Figure 2.4).

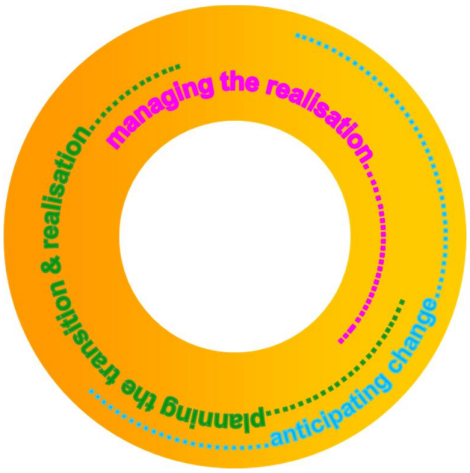


Figure 2.4. Overlapping land management stages at regional/portfolio scale.

In this chapter (paragraph 2.3-2.5), the three phases of the land management cycle are analysed and described. For each phase the (generic) management challenges and options are determined. Although the outcome of the analysis is specific for each phase and case, the basic questions to be answered are essentially the same. These relate to:

- Geographical and time scale

The relevant geographical scales discerned vary from single site, to portfolio, to local, regional or larger areas (e.g. global). The time scale to be considered may vary with the different perspectives associated with BF regeneration and the stakeholders that are involved. Each phase may have a different focus in scale, e.g. anticipating change is probably on a larger spatial scale than planning the transition and realization of a site.

- Stakeholder roles, responsibilities and liabilities

The stakeholder analysis not only involves the identification of relevant parties, but also the clarification of their roles (e.g. initiator, actor, beneficiary, financer, disadvantaged, authority, regulator, and interest group), responsibilities/powers, interests, objectives and liabilities. Furthermore, to create the needed support for BF regeneration, it is important for the stakeholders to know from each other what their role, responsibility and interest/expectation are.

The liability gap presented in Figure 2.5 is a representation of a range of factors related to environmental liability that obstruct or restrain the ability or willingness of liability holders to engage in the BF redevelopment process: these factors can be described as 'obstacles'. However there are also factors that can encourage the engagement of liability holders in the BF development process: the project 'drivers'. Maximising the effectiveness of these drivers is a key to unlocking the potential for Brownfield development (Ferber et al., 2006-II).

Regulations and policies can either be a driver or blocker for BF redevelopment. The main policies and regulations set by the EU that may have a positive or negative influence on the redevelopment are analysed and summarised in appendix E.

Figure 2.5 Amended CABERNET Stakeholder Model including the liability gap (NICOLE Brownfields Working Group from Ferber et al., 2006-II)

- Key choices or decisions

This forms the core of any decision framework: identifying what choices are at hand, what questions should be answered. This part of the analysis has a clear link to the stakeholder analysis, as it should also be made explicit who has the responsibility and power to make the actual decision. Examples are the choice for a new land use, the time frame in which the existing land use needs to cease, and connected issues, such as the choice for a feasible remediation option. With the type of choice, a first list of options can already be available, but making such a long-list or short-list could well be one of the questions to be answered.

- Key obstacles

In a way, this is an extension of the key choices analysis. The idea is to identify what precludes the desired progress along the management cycle from being made. For example crucial information is difficult to obtain, an essential stakeholder is not on board or there are technical issues that need to be resolved. Lack of money should not be as such termed a key obstacle as it actually means that no interested stakeholder, that could provide the financing in return for expected revenues, has yet been identified.

For each phase and case, barriers for BF regeneration can be identified. However, even though barriers are case and phase specific, general barriers that often occur with BF redevelopment are identified in different literature (Davis (ed.), 2002; Alphenaar and Nauta, 2011; Ferber et al., 2006-II, Nicole 2011):

REGULATORY / LEGAL:

- Legislation;
- (Complexity in) regulation;
- Clouded national, regional and local environmental and legal policies;
- Liability concerns;
- Ambiguous legal liability;
- Absence of identifiable and consistent clean-up standards;
- Difficult to assess potential risks;

ORGANISATIONAL

- Absence of a consistent redevelopment framework;
- Lack of concentrated expertise;
- Entrenched attitudes among regulators;
- Public opposition, acceptability of re-using BF land;
- Complexity land owners;
- Lacking sense of urgency;

ECONOMICAL

- Potentially substantial capital costs (marketability of BF land);
- 'Insufficient financing', no interested investors or insufficient communication;
- Limited demand for redeveloped sites ;
- Competition and availability Greenfield land;
- Effectiveness of transfer mechanisms.

➢ Information needs

Before making any choices and decisions, information is needed. For each phase it must be clear what type of choice or decision is needed and what information is required to support the process. The first step in information assessment is to check whether or not the required information is available and if stakeholders agree on the content of the information. If not, a new key choice emerges: do stakeholders need to collect the missing information in order to make a decision?

To determine where the tools, strategies and concepts developed in HOMBRE fit in the framework and to clarify the added value of HOMBRE concepts and tools two additional topics are analysed per management phase in this chapter:

➢ HOMBRE solutions

The (HOMBRE) concepts and technologies that could help overcome any of the key obstacles, or could provide the necessary information are identified.

- Role of the BFN

Here, the relevant BF Navigator tools are listed that can be employed in the specific phase and situation. The role and items in the BFN are explained in more detail in chapter 3. Important roles of the BFN for all management phases are the visualization (GIS) of maps, the examples and the opportunity to documents what information is used, what stakeholders are involved and in which role, what decision is made and why, and what are consequences for future decision process. In this way a narrative of the BF and its regeneration is set up.

During an internal HOMBRE workshop (HOMBRE Milestone 2.1; Frankfurt 2013) these analyses were made for the complete management cycle. The results of this workshop are shown in Appendix A-1.

As the focus of HOMBRE is to prevent or minimize the formation of BFs, the storyline starts with 'anticipating change', the phase where pre-BF phase where HOMBRE wants to anticipate on the formation of BFs to by using early warning indicators.

2.3 Anticipating Change

Social, economic and environmental changes often affect the needs and requirements of land function. When these needs or requirements of land function change, the current use needs to be adjusted or new plans need to made and realized to suit the function of land with the new requirements/needs. When this is not managed timely, a site will eventually be closed down and decommissioned. Without plans for a transition, there is a large possibility that the site turns into a BF for longer periods of time. Two major historical developments of the past half century that turned many sites in Europe into BFs are deindustrialisation and suburbanisation (Tang and Nathanail, 2012). On-going globalisation and economic change currently create BFs and "Greyfields" from abandoned social infrastructure, housing and commerce (Ferber, 2010).

There are numerous reasons that a site fails a timely transition toward a new use and becomes a (persistent) BF; such as (e.g. Coffin, 2003):

- Liability concern of stakeholders (and thus reluctance for action);
- Lack of awareness that an area is changing/site is becoming a BF;
- Insufficient communication: obstructing consensus between stakeholders incl. with community and investors;
- Short-term thinking (due to quick results and election cycles);
- Market forces are not able to drive redevelopment (no return of investment);
- Fragmented ownership.

The trick is to anticipate at an early stage if a location is at stake of becoming a BF, so the obstacles for change are still surmountable. If it can be concluded that a location is changing negatively, the stakeholder(s) will have to start thinking about new possible opportunities for the location and which other stakeholders need to be involved. The first and main decision that should be taken by involved stakeholders in this management phase is to decide if action is needed to stop the degradation of the site. If the outcome is "yes", then it should be decided who takes the lead of the action, thus who will be responsible and will benefit from early anticipation.

To be able to make these key decisions and to overcome part of the above mentioned obstacles, information is needed. First of all it is essential to be able to identify whether an area may have sites at risk of becoming a brownfield. In the HOMBRE Deliverable 2.1 (Ellen et al, 2013-I), "early warning indicators (EWI)" are proposed for this purpose. The report proposes a basic set of early indicators and describes how an adequate selection of BF related (early) indicators could effectively be monitored in practice. In theory, these EWI can be applied on multiple spatial scales. The concept relies on the monitoring of early indicators that should raise awareness of areas with potential for BF formation. HOMBRE envisages that the monitoring of such indicators is to take place at the municipal level (e.g. a town's departments for development and planning, economic affairs and environment) as they have the responsibility to plan and regulate their area/sites/region. Based on this information the following phase may start "planning the transition and realisation" of a new use of the site.

Besides the municipality other stakeholders (should) have a role and can take the lead during the 'anticipating change' phase, e.g. land owners who want to avoid (value) loss of their land or project executioners who are searching for sites with potential to start new projects. Therefore it is advised that an inventory should be made of stakeholders that are or need to be involved for the further planning of the area.

The role of the BFN in this phase is mainly to help the Local Authorities and urban planners identify and make them aware that an area/ site may become a BF, by assisting stakeholders in the selection and assessment of EWI by qualitative analysis. Also it can help in the communication between the municipality and other stakeholders, when identifying opportunities and issues with each other.

2.4 Planning the transition and realisation

Once a site falls out of use, there is a high possibility that the site will become a BF. The possibility that a site will turn into a BF and/or remains a BF for an unacceptable period of time, depends on the balance of obstacles and drivers (potential benefits) of the site in its new use. In cases where it is highly likeable that sufficient value can be created and/or opportunities are foreseen that exceeds the expected costs of regenerating the site, a site will probably soon be redeveloped by private parties (A-type BFs as defined by CABERNET; Figure 2.2). When it is not likely that value can be created for acceptable costs or when uncertainties either on value regeneration or cost estimation are too high, a site will probably not been redeveloped and consequently won't transfer to the next use phase unless a continuous flow of resources is guaranteed, e.g. by funding subsidies from authorities (C-type BFs). When the created value of a site is doubtful and when risks for not creating this value are high, a site can only be redeveloped by private and public partnerships (B-type BFs).

In the planning phase, stakeholders plan the next use of a site. Depending on the type of site these are private and/or public parties. The use can have a permanent or temporary character, respectively 'final use' or so called 'interim use'. In this phase focus should not only be on the specific site and planned/desired use, but also broader perspectives should be considered:

- What other sites in the area/region are to be redeveloped?
- Are there any sites in the area/region that would be more appropriate for this use?
- Could the site serve needs that are more urgent and are not being realised elsewhere?
- What are potential synergies between development at this site and at others that are contemporaneously being (re)developed?
- What are the opportunities of the site for the region/area, meeting ambitions and societal goals?

The planning of the transition and realisation phase comprises three different steps that can focus on different spatial scales:

1. Scoping: investigating, after analysed that intervention is needed at a site, what is and has been going on at the site and in the region; data collection for a first generic determination of the type of site; and which stakeholders should be involved.
2. Opportunities: stakeholders define their ambitions and vision, thus needs of the site, *and* investigate (together) the opportunities of the site and region; with this information scenarios are developed how these opportunities and needs can be reached.
3. Assessment: a design step where different scenarios from step 2 are assessed, choosing the most optimal scenario and setting up the redevelopment plan (towards realisation).

Chapter 3 describes these steps in more detail for the BFN.

In the planning phase the focus shifts from obtaining a broad/generic overview of the site and the region through choosing the best scenario for redevelopment towards the setting up the realisation plan for a particular site. Therefore, the different topics that need to be analysed for each phase are here analysed for each step. Figure 2.6 shows the flow chart for the analyses to be made for each step and phase. In this chapter the generic stakeholders, key decision and obstacles are discussed.

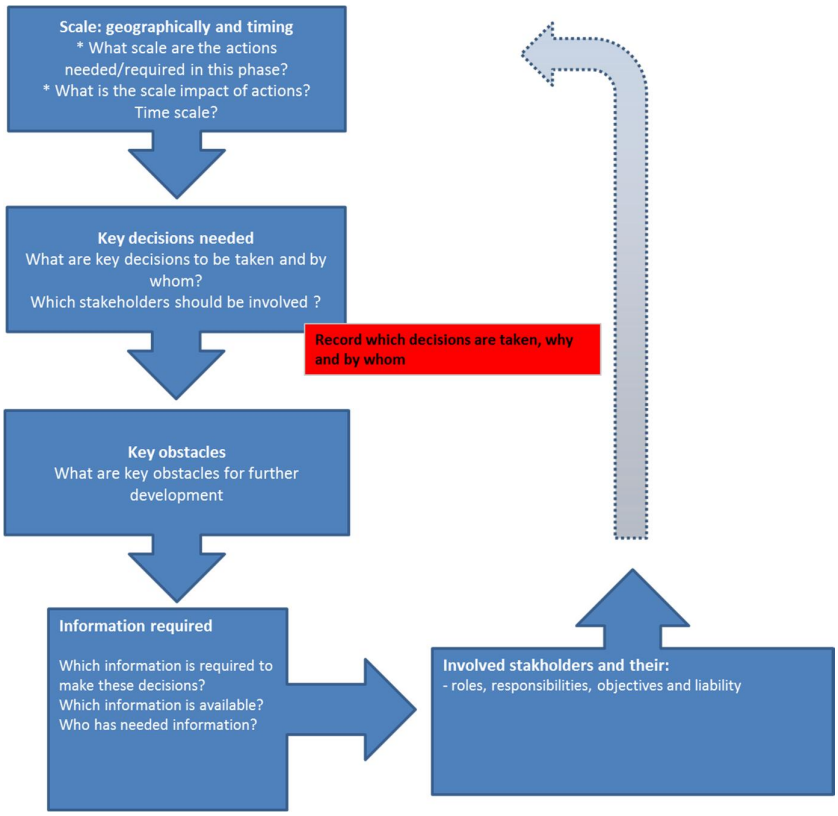


Figure 2.6 Flow chart for topics to be analysed for each (sub) phase.

In the 'Anticipating change' phase stakeholder(s), e.g. the municipality or a project developer, identified that the use of the site is changing and action/intervention is needed. Therefore, the main decisions to be made in the 'Planning the realisation and transition' phase are: what actions are needed/wanted & executed and by whom. In general, the stakeholder that mainly benefits from the regeneration should be the main responsible and leading stakeholder.

As mentioned, many different stakeholders play a role in the redevelopment or will be affected afterwards, and their (in)flexibility influences the decision process. Therefore stakeholders should be consulted and involved in an early stage. Besides authorities (on different levels), also land owners and (future) users of the site, project executioners (from developer to investors) and the community have a role in the planning of the redevelopment of the site.

Due to different obstacles, the above mentioned decisions can often not be taken or are taken slowly. One of the main obstacles for stakeholders is to take responsibility in the redevelopment process, due to possible liabilities and accompanying financial and planning risks (e.g. land-use planning limitations). Uncertainty in the planning process and subsequently in costs for redevelopment and maintenance, due to possible (unknown) contaminations, lack of interface between realisation and maintenance or other issues, make brownfields unfavourable to redevelop.

Another obstacle is often the complexity of these projects, and the involvement of many different stakeholders (incl. different land owners). Due to the scale and complexity of the site it is often harder to see possible end-situations. And the involvement of many (sometimes inflexible) stakeholders it is even harder to reach consensus about the planning of the site. A third obstacle in the planning and realisation phase is often lack of policy support or unsupportive policy. It is lacking in overcoming liability and financing barriers, tax incentives to redevelop brownfields instead of greenfields. Unsupportive policy can be found in: e.g. municipal election structures, winning elections every 4 years making long-term planning hard; ownership constraints, owners are reluctant either to sell or to undertake development themselves; and in lack of support for innovation.

To decide which actions are needed, stakeholders first need to know what is going on at the site and what the site can offer (scoping step): type of site (A, B or C), site characteristics, site history, possible resources from the site and who will benefit /affected by regenerating the site (stakeholder analysis).

An important aspect of the 'Zero BF' strategy is that a BF is not a site only with problems, but also an area that has its own potential for delivering useful combinations of "services" (i.e. delivering new opportunities) and hence value. These opportunities and services can match the ambitions set by stakeholders on different scales: land owner(s)/community ambitions, city/region, societal ambitions and demands (e.g. national, EU, global scale). Unfortunately, these services and opportunities are not for each site even easily obtained (money and time wise). Therefore, HOMBRE developed decision support tools that will assist stakeholders identifying opportunities and value from BF regeneration at an early stage and from a broad perspective. Concepts supporting such decision tools are described for example in deliverable 5.1 "Valuation approach for services from regeneration of Brownfields for soft re-use on a permanent or interim basis. Creating opportunities from synergies between environmental, economic and social improvements." (Menger et al 2013). With such concepts and tools, synergies between BF regeneration and sustainable land management are identified and project value improved (the potential). By identifying synergies in services to create surplus value and assessing the extra value created, opportunities can be framed making the regeneration process more viable. The set ambitions, and subsequently needed/wanted services and opportunities can be met in different ways (e.g. difference in timing, costs, sustainability), thus in different scenarios. In the final step, the assessment, different scenarios are assessed on feasibility and most favourable, based on the earlier defined ambitions and demands. Each scenario has its advantages and disadvantages, in e.g. costs, degree of meeting ambitions, duration of the realisation, meeting expectation(s) of stakeholders. The assessment is based on a balance between wider benefits (private and public) obtained from the regeneration and the costs associated with the regeneration (private and public) over the whole life cycle of land-use. Finally a redevelopment plan is set to realise the regeneration.

The HOMBRE project focuses on the management phase "planning the transition and realisation". Underneath a few of the "HOMBRE concepts" that can be used in this management phase are described.

1) Technology Trains – A unique mean to solve a BF problem and simultaneously deliver useful services.

Technology trains are integrated processes. They represent a mean to bridge the gap between a site in its current state and a specific objective for land use (i.e. associated with delivery of services). Ideally, Technology Trains contribute to the increase of benefits (lowering the cost/benefit ration) in the "new use phase" and/or to the decrease of (real and perceived) costs in the "regeneration phase" as depicted in figure 2.7 and 2.8. Costs and benefits are thereby seen in broad perspective (tangible and non-tangible); not only in financial terms of currency but more in terms as time, expenses and gain for the environment, society and economy. Opportunities can be found through seeking synergy between, for example, technologies and spatial planning and by taking into account as well the regeneration phase as the *after phase* (new use phase). These opportunities can be an unlocker to develop a C-site.

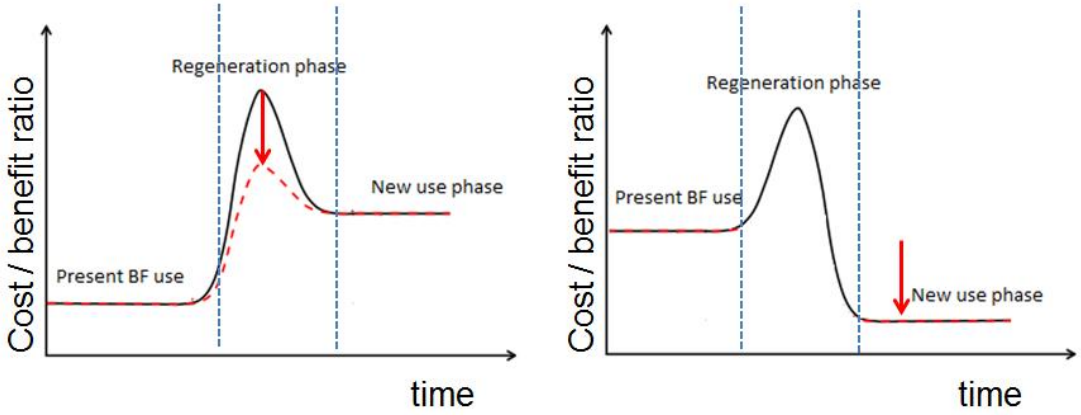


Figure 2.7 Effects of technology trains within transition of land use phases (red arrows) (Grotenhuis et al., 2012).

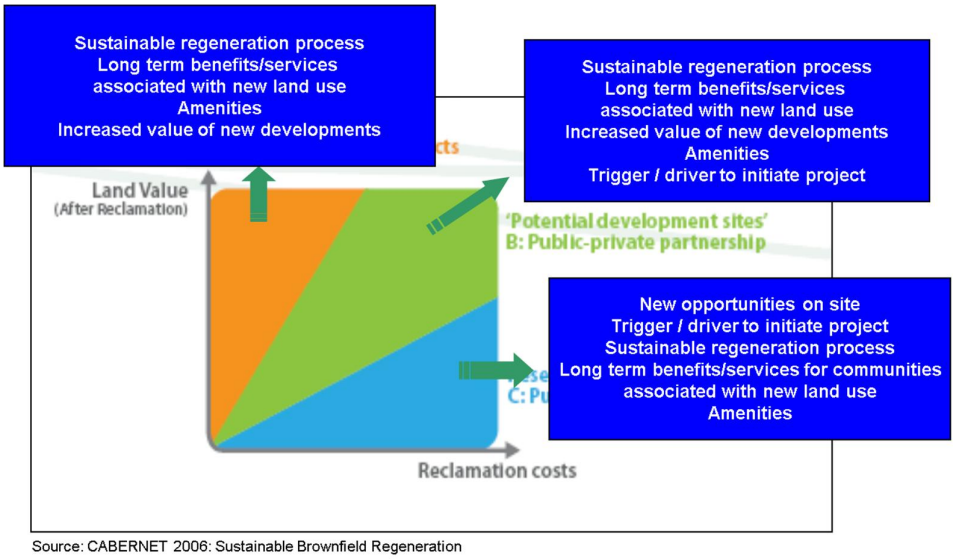


Figure 2.8 How Technology trains can assist in the ABC type sites.

2) Synergies: Finding synergies is about the assessment of added value (synergies) on short term (interim use) and long term for a project site functions (more services or same service at lower costs). Opportunities (value) are created by delivery of designed-in outputs (project services). The implementation of Technology Trains shall enable addressing multiple objectives along a BF regeneration / redevelopment project:
    a. single process: improved efficiency and sustainability value oriented i.e. providing a service for a specific receptor/beneficiary;
    b. integrated processes/ technology trains: synergies effects between techniques; outputs of various processes can present emergent properties;
    c. Holistic process at level of land use cycle: land use as outcome of implemented technology train provides useful services for specific beneficiaries (value);
    d. Looking for soft re-use possibilities (Menger et al., 2013).

3) Interim Use
   Mean to create benefits and value on short term when long term BF redevelopment solutions are considered non-viable or not technological feasible at the moment. In times of absence of economic drivers to redevelop land, interim uses may be an opportunity to restore some functionalities to land (and hence value) during this period and prevent surrounding areas to depreciate;
4) Service, sustainability and success criteria
   To ensure that the ambition and demands are met during and after the regeneration of the site, success, service and sustainability criteria are defined on basis of the concept which is and will be described in deliverable 2.2 Ellen et al., 2013-II and deliverable 2.3 (planned in 2014). On basis of these criteria, indicators can be defined which can be monitored during and after the regeneration phase, measuring whether the set ambitions are met.

The BFN guides stakeholders through the process, advising which steps should and could be taken towards redevelopment and gives examples for inspiration for site redevelopment. The steps in the BFN not only advice or include items that are developed in HOMBRE but also other existing tools and information.

2.5 Managing the realisation: "Just do it"!

The last phase of the Land Management Cycle is "Managing the realisation" where the redevelopment plan developed in previous phase is realized. The main focus of scale is the site and the impact on the neighbourhood/region. In this phase the main stakeholders are the project developer, land owner, contractor and community. The project developer and land owner are responsible for the realisation of the redevelopment plan. This can be a public and/or private body. The contractor is responsible to execute the plan in time and as budgeted.

One of the main obstacles in redeveloping a site, is that redevelopment projects are often not (seen as) successful. This can have different reasons, often because (maintenance) costs are higher than expected and/or goals set in the planning phase are (presumably) not met.

Often costs are higher than expected because the maintenance costs are not taken into account. Frequently the focus is to keep the realisation costs as low as possible, forgetting to include the long-term design conditions and thus maintenance costs. This is mainly because the interface between the realisation and maintenance is missing. Developers focus on the realisation and move to a next project 'forgetting' the after phase with the needed maintenance or assume that other stakeholders take up this responsibility (e.g. community). Also the limited time horizon of municipalities, due to election cycles, brings about that their actions concentrate for the period they are responsible. Another reason why maintenance costs are higher is lack of interest for long-term design conditions (durability). One way to overcome this is using other types of contracts, like DBMO (design, built maintenance and operation) or DBFM (design, built, finance and maintain) contract. With such contracts the long-term conditions are included, thus the maintenance costs. Type of contract is one of the key decisions in this phase. By including the life after realisation, actions and technologies for redevelopment can become more efficiently, time and cost-wise. This is one of the goals of technology trains, developed in HOMBRE, to show the improvement of value of better design (quality, lifetime, sustainability).

Another obstacle for successful realisation is that goals are not met or presumed that they are not met. Often the earlier set criteria for success, service, and sustainability are not monitored and evaluated. Reasons are: no ownership for monitoring/feeling responsible, no budget, but also not wanting to know whether a redevelopment project was a success or not (due to accountability). By monitoring the indicators set in the planning phase the performance of a project can be determined. This is important to be able to determine whether expectations were realistic, which can be used for following redevelopment projects and to discard the negative image of BF redevelopment projects. In addition, some of the monitored criteria can become early warning indicators. They can indicate that the site is losing its function and that it might become a BF.

The HOMBRE project assists in setting up, monitor and evaluate indicators and criteria (Ellen et al., 2013-II).

The BFN assists in setting up the different required indicators, and how to evaluate and monitor these. It also makes the BF redeveloper aware of the possibility that the chosen indicators can show signs that the site is changing again and losing its function, thus threatened of becoming a new BF (then the land management cycle is closed as it returns to the phase of 'anticipating change', see section 2.2 figure 2.3b).

3 Decision support framework for regeneration of brownfield

3.1 The BFN divided in modules and project steps

The HOMBRE BFN supports the study of brownfield emergence/prevention and brownfield regeneration processes by providing guidance and tools through the various management phases of the land cycle (chapter 2). The BFN proposes a modular approach for the three following management phases (figure 2.3b):

1. Anticipating change (pre-BF);
2. Planning the management and realisation (regeneration. This module can also be used for the planning of preventive actions of a pre-BF site);
3. Managing the realisation (the management and maintenance phase following a BF regeneration project).

In each module, different steps with different items are provided to support the user during their management actions (table 3.1).

Table 3.1 modules steps and items in the BFN

MODULES	STEPS	ITEMS
The modules of the BFN correspond with the phases in the land management cycle	*Each module contains 1 or more steps, that the user needs to take within the regeneration*	*Each step contains several items. Items can be tools, advice, a description. The items support the work of the user. Also some step-independent items (overall items) are given, such as the mapping and documentation function*
Anticipating change	• Identification	e.g. Selection and assessment of early warning indicators
Planning the transition and realization	• Scoping • Opportunities • Assessment	e.g. stakeholder analysis e.g. Approach for local community involvement program e.g. Evaluation service criteria
Managing the realization	• Evaluation and monitoring	e.g. Defining sustainability indicators for monitoring

Although project development is usually a cyclic process, normally a number of project steps are distinguished. Because most of the researchers within HOMBRE are environmental engineers and not planners and because different (expert, stakeholder) groups use different (names for) project steps, some regeneration or (re)development research projects were investigated. The objective was to divide each module for the BFN in recognizable steps based on existing literature (Appendix B).

Most of the research projects work with:

- An investigation/initiative step. In this step, the playfield around the (re)development or regeneration project is determined: the data, information, stakeholders, problems and opportunities (corresponds with BFN step SCOPING);
- A research step. In this step opportunities and ways to realize opportunities are investigated in scenarios (corresponds with BFN step OPPORTUNITIES);
- A design step. In this step an assessment on the scenarios is performed and the best scenario is chosen and elaborated in more detail (corresponds with BFN step ASSESSMENT);
- An implementation step. In this step the plan is realized (corresponds with BFN step EVALUATION AND MONITORING).

In the BFN, most emphasis lies on the planning of the transition and the management (steps SCOPING, OPPORTUNITIES and ASSESSMENT). In each step the HOMBRE-approaches are explained. The steps and the items within are not prescribed and they can be followed in different orders and in an iterative way (section 3.3).

In the BFN we also added the IDENTIFICATION step. Because this is a pre-project step (phase "anticipating change") it is not surprising that we do not see this step in most other project divisions. The REUSE project also recognizes an identification step, but the starting point here is a certain area, where there is already reason for the community to act, because problems occur. After developing a community vision for the area, it pinpoints single BF sites to start with actions (Rice (editor), not dated). In HOMBRE, the IDENTIFICATION aims at the selection and monitoring of early warning indicators for a portfolio, area or site to be able to anticipate in an early stage on signs of deterioration to prevent the emergence of BF. (section 3.2).

The EVALUATION AND MONITORING step, during and after the realisation, is also not a common phase in the other projects. Because this is for HOMBRE one of the main objectives: to prove that the HOMBRE concepts provide a better, cheaper and faster regeneration this is an important step to add. HOMBRE suggests that in this step different project services are monitored and their value for stakeholders estimated. Doing this, the "success" and viability of the regeneration can be estimated. If services cease to be delivered and the regeneration goals are not being reached, intervention might be needed to prevent the site from becoming a BF again. (section 3.4).
An overview of the BFN modules, steps and items is given in figure 3.1.

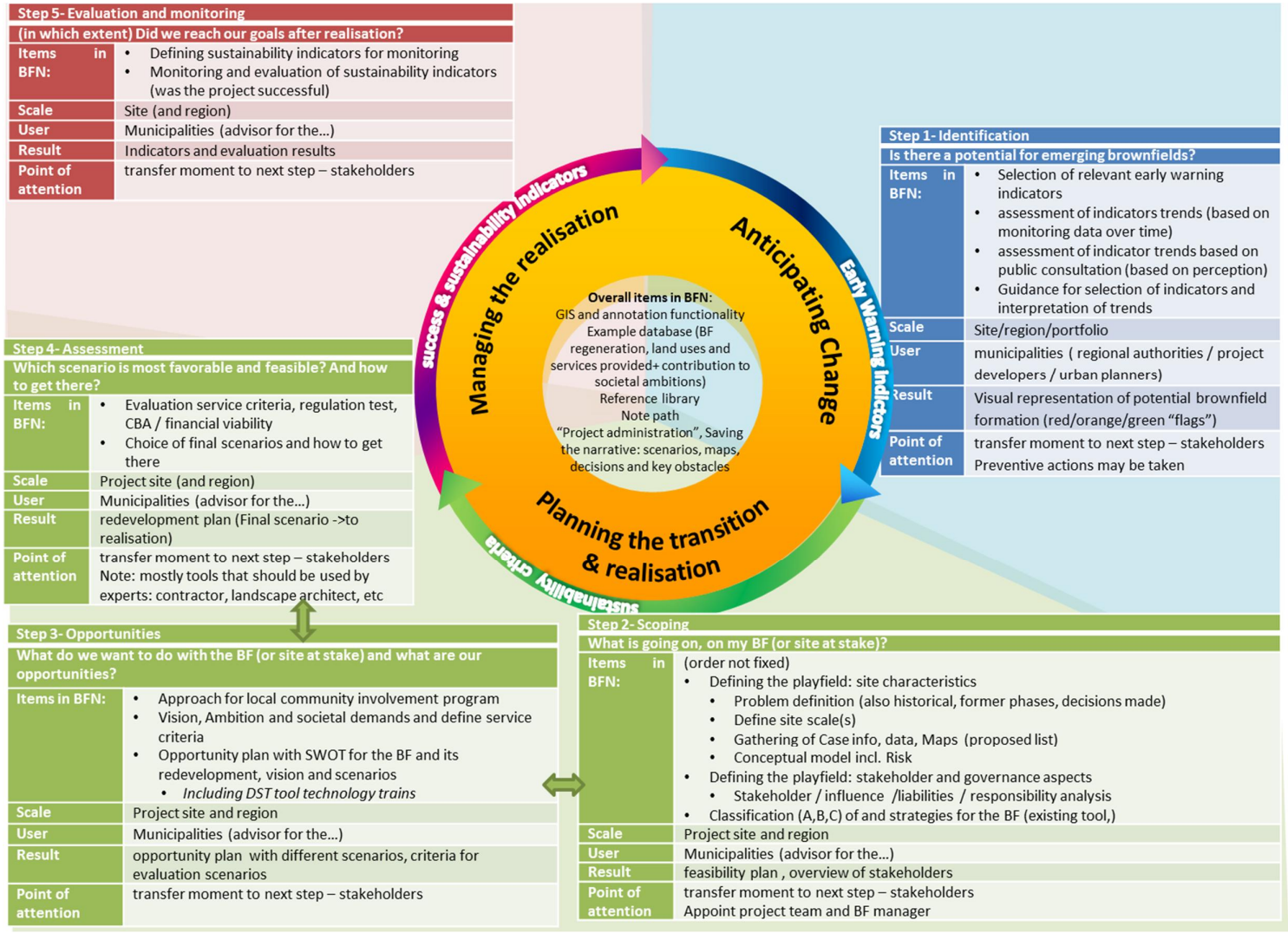


Figure 3.1 BFN management modules (blue / green / red), steps (the tables) and items

Some items with standard functionalities will be available within all steps of the BFN. These are the GIS utility, example database with BF regeneration projects, land uses and services, a digital notepad and a document library to save decisions, maps and plans during the regeneration process. They are described in section 3.5.

3.2 Module Anticipating change

3.2.1 Back ground to brownfield emergence work in HOMBRE

One of the first objectives of the HOMBRE project is to better understand brownfields emergence and ideally prevent their formation as much as possible. To this end, early warning indicators (EWI) have been identified. Their monitoring over time aims at anticipating brownfield formation and identifying related problems at an early stage (Ellen et al. 2013-I). Data availability and monitoring of such indicators have been assessed by Ellen et al., 2013-II.

In the HOMBRE "zero-Brownfield" perspective, a methodology for anticipating brownfield emergence using the concept of early warning indicators has been proposed. This is a method for determining and incorporating early warning indicators for timely detection of BFs being at risks. Despite being still under testing on real cases of brownfield emergence in Europe, it is proposed to make this methodology available in the BFN module “Anticipating change” and the step “identification”.

Therefore, under the current setup of the BFN, potential brownfield emergence should be looked into by the end-user under “Step 1 - Identification” during the management phase anticipating brownfield emergence” (see table 3.2 below).

Table 3.2 Anticipating brownfield emergence – identification of BFs

Step 1 Identification	
Is there a potential for emerging brownfields?	
Items in BFN:	• Selection of relevant early warning indicators • assessment of indicators trends (based on monitoring data over time) • and or assessment of indicator trends based on consultation (based on perception) • Guidance for selection of indicators and interpretation of trends
Role of the BFN	Raise awareness, anticipation for local authorities and urban planners, communication between stakeholders
Scale	Site/region/portfolio
User	municipalities (regional authorities / project developers / urban planners)
Result	Visual representation of potential brownfield formation (red/orange/green “flags”)
Point of attention	transfer moment to next step – stakeholders Preventive actions may be taken

"Step 1 – Identification" will provide guidance within the BFN on the proposed HOMBRE methodology for anticipation of brownfield emergence, i.e. on obtaining potentials for brownfield formation from either of two approaches presented below (consultation amongst land planners and/or monitoring over time). A specific tool is under development to integrate this methodology into a set procedure and in order to be integrated into the BFN (see paragraph 3.2.5).

3.2.2 HOMBRE Module "Anticipating Change": who is if for?

The expected users of the Module "Anticipating Change" are mainly local authorities and urban planners. Indeed, local authorities within municipalities usually inherit from brownfield sites to manage. Thus they usually become "problem owners" or having to manage a regeneration project to redeveloped brownfield sites as no private investors are interested. Local authorities and urban planners also have to take up actions to prevent/minimise risks in brownfield formation Therefore they could be interested to identify as early as possible potential brownfield formation, i.e. before problems emerge and take the initiative with the relevant stakeholders to prevent the land from becoming brownfields.

Therefore, it is envisaged that end-users of this module can be users from various departments/authorities involved in land planning, with relevant sectorial knowledge of the urban system being under consideration e.g. on real estate markets, environmental aspects, social aspects, etc. The BFN is not meant to be used by one person/institution. It is a multi-stakeholder tool and prepares a structure for the dialog on BF prevention and regeneration. Several parts of the BFN can support, or be used in interactive stakeholder sessions.

3.2.3 HOMBRE Module "Anticipating Change" – a proposed methodology

The module on "Anticipating change" and the proposed methodology on anticipating brownfield emergence should help the local authorities and urban planners on agreeing priorities and actions, especially if various departments/authorities are involved in land planning. The proposed methodology can be seen as part of the decision making process when considering issues with potential brownfield formation. It is important to note that it is not proposed to use this methodology on its own. It should be seen as one decision making tool amongst many others that can be used.

The proposed steps for the methodology of anticipating brownfield emergence in urban areas are as follow (and presented in more details in Appendix D):

- Obtain base map for the area being considered
- Define limits of studied area
- Decide on relevant early warning indicators
- Organise data collection for assessing chosen indicators
- Assess trends or results for these indicators - fill in form with criteria on potential BF formation
- Display results on GIS support tool

These steps are expected to be prompted to the end user in the Module "Anticipating Change"/Step "Identification". At the present time, the methodology is looking into proposing two different approaches for data collection/potential for BF assessment that may be followed separately or looked at in combination.

The first approach is for local authorities and urban planners to consult internally those persons with most relevant sectorial knowledge e.g. on real estate markets, environmental aspects, social aspects, etc. Such consultation should use specific indicators from the EWI list and target their perception of potential brownfield emergence over a period of time. The idea of such consultation is obtain a first glimpse of whether an area has potential for brownfield formation. The outcome should not be considered as site precise but indicates needs for the development of preventive measures at the urban level.

The second approach is for local authorities, urban planners to monitor over a sufficient period of time, relevant and well-chosen indicators which trends may indicate potentials for brownfield formation.

Both approaches aim at identifying zones of potential brownfield(s) formation within a municipality, a neighbourhood and possibly an important area of land such as megasites. Possibilities of developing a tiered approach for data collection if data cannot be retrieved are being considered.

It has to be noted that despite the results from a consultation are purely based on perception and may not reflect the reality; they should be easily obtained within a short time span. However, the monitoring of specific indicators may require more resources in relation to data collection, data trend analysis. Despite these constraints, the objectives of such approaches are to signal whether or not brownfield may be developing in specific zones of an urban area and whether intervention is needed (preventive or corrective measures).
In addition, following a public consultation on potential brownfield formation, the second approach of looking into monitoring data over time may be chosen as a preventive action.
It is proposed that whether a public consultation is carried out or whether the assessment of real monitoring data trend is carried out, it results in an inventory of brownfield potential formation in each of the zone under consideration. For each of the following possible category, specific actions should be recommended:

- Additional information is needed in order to evaluate brownfield formation potential;
- Little potential for brownfield formation, but carry on monitoring of key early warning indicators. No specific action needed;
- Potential for brownfield formation; preventive measures are necessary;
- High potential for brownfield formation and or brownfields already exists; preventive measures are necessary; and or brownfield regeneration is necessary to bring the land back into use.

At the moment, it is believed that both approaches cannot apply to major and single temporal event that would lead to very rapid (sudden) brownfield formation (e.g. sudden political changes such as fall of communism, major des-industrialisation, etc.). They also mainly should apply to slow to long term changes/events that lead to brownfield formations in urban areas. Therefore the procedure should apply to long term development of brownfields. But these hypotheses will have to be tested and confirmed it is actually the case.
Testing of the methodology is being carried out on European urban areas. Testing comprises of looking into the relevance of the proposed initial default list indicators, availability of needed data and assessment of trends from obtained monitoring data. The assessment of trends will be carried out on historic monitoring data relating to urban units with sites that are already known as brownfields. Indeed, the time frame of the HOMBRE project is not sufficient for monitoring of real brownfield emergence cases. However, the proposed testing should enable a critical evaluation of the proposed methodology and the mock-up. It should result in making them evolve before the final integration into the BFN.

3.2.4 HOMBRE Module "Anticipating Change": the use of early warning indicators

So far, not much research has focused on studying "why, how, where and when" brownfield sites emerge in European municipalities. Based on the literature review of British, American, French and German work on the subject, about 40 early warning indicators of brownfield emergence have been identified (Ellen et al., 2013-I, appendix C). The objective of such indicators is to have a "signalling function" towards stakeholders that are responsible of land planning.
The early warning indicators have been grouped into clusters within the "sustainable development" categories of economic, social and environmental indicators. Emphasis can be seen on the economic factors as they are identified as a main cause to brownfield emergence.

Municipal urban planners and local authorities were initially expected to select from the generic list the ones that are most relevant and convenient in their local situation and regional/national framework. However, research is still being carried out on how to select the most relevant early warning indicators from the generic list. The full rationale behind each of the currently proposed indicators is still being worked out (Ellen & all 2013-II). In addition, the procedures for monitoring specific indicators for a given territory (neighbourhood, municipality, etc.) are currently being studied. Availability and access to data for the monitoring are some of the most crucial element to appreciate whether an indicator is worth being monitored.
At the present time, the following indicators are being looked into as they are showing the most likely relevant links with brownfield emergence. (1) change in land use, (2) age of buildings, (3) employment, (4) property prices, (5) vacant housing space, (6) average age, (7) perception of contamination and (8) area of green space. These may be used for either the consultation approach or the monitoring approach over time.

3.2.5 HOMBRE Module "Anticipating Change": the EWI tool

Based on the initial list of indicators presented in paragraph 3.2.4, a decision aid making tool linked with a GIS application and a web interface is currently foreseen in the BFN. This tool is called the "Early Warning Indicators tool" (EWI tool). Following the assessment on BF potential from the monitoring approach or the consultation approach, the tool will integrate these results and display zones of potential brownfield formation within an urban area.

These spatial results are the information that should help end-users in anticipating changes and making decisions in urban planning. However, it is acknowledged that a moderator working for or with the end users should be handling the EWI tool as it involves geographical information (GIS) and some knowledge in programming.

A mock-up for the EWI tool is under development. Depending on the results from the testing on the methodology (see 3.2.4) , and if technical constraints can be overcome, the EWI tool will be integrated into the Module "Anticipating Change" and Step "Identification" of the BFN.

When the outcome of the EWI tool is that an area is under danger of the formation of BFs, the next phase starts: planning a transition and realisation. However, this phase is focused on a specific site of cluster of sites. How to get from anticipating change phase to the planning the transition and realisation phase, or more concrete, how to pinpoint specific BF sites in the area and how to choose which once to start with, has not been elaborated in HOMBRE yet.

3.3 Module Planning the transition and realisation

This management phase is about taking action 1) to avoid BF from emerging or 2) to redevelop and regenerate BF. The main questions here are: what is going on, on my BF (at stake)? What do we want to achieve and what are the opportunities (and challenges)? Which scenario is most favourable and feasible and how to get there?
Getting from the initiative to a final plan is not necessarily a linear path. In most cases a tiered approach with much iteration is used, e.g. when new information becomes available or stakeholders change. This process can take years to decades, depending on the complexity of a project, the consensus between stakeholders and willingness to take action and obstacles that are encountered during the process.
In figure 3.2 the three steps with tasks for the BFN's management phase "Planning the transition and realisation" described. These steps can be seen as three tiers in the planning process. Note that these steps do not represent all aspects needed for planning a redevelopment project. The main items of BF regeneration as well as the concepts as considered important by, or developed within the HOMBRE project, are taken up.

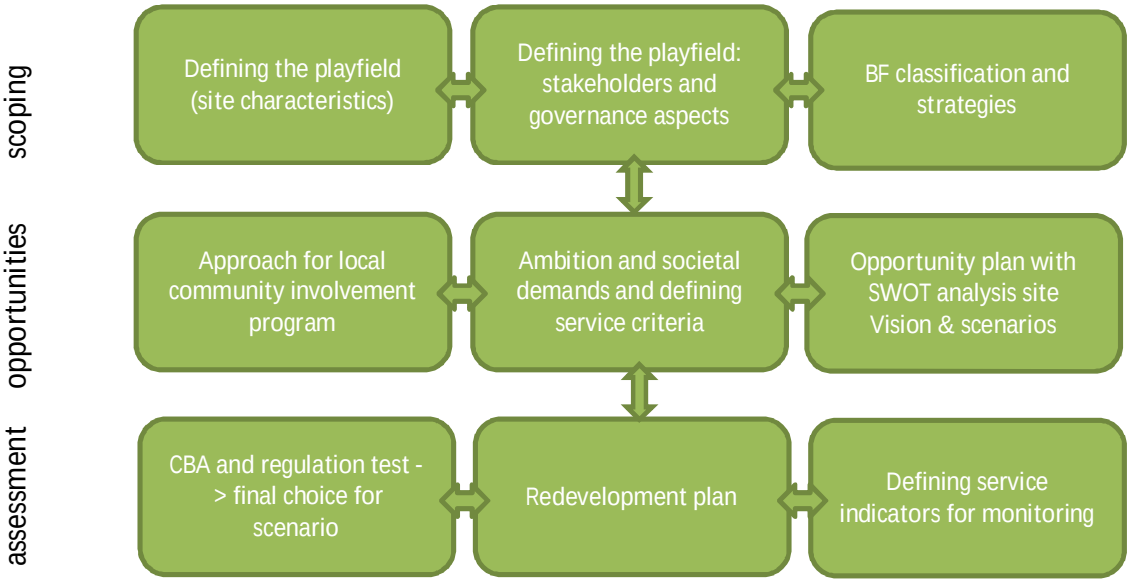


Figure 3.2 Three BFN steps with items for the BFN's management phase "Planning the transition and realisation"

The role of the BFN in this planning the transition and realisation is to:

- Visualize the information
- Assist the user by handling scale (temporal and spatial) and complexity of BF projects
- Communication between stakeholders, link communities
- Support problem definition
- Help identifying and visualising conflicts (e.g. spatial overlap) of interest and manage them
- identify and visualize options, opportunities, support to find synergies (Locate vacant land)
- Share the vision / plan
- Document the information
- Assist portfolio management to ease transition
- Give examples of successful BF regeneration projects
- Inspire

3.3.1 Step Scoping

The scoping step is about defining the playfield, what has happened and is happening on the BF (or site at stake)?

Table 3.3 Planning the transition and realization - scoping

Step 2- Scoping	
What is going on, on my BF (or site at stake)?	
Items in BFN:	(order not fixed) • Defining the playfield: site characteristics o Problem definition (multiple dimensions: social, economic, environmental, cultural, landscape etc. also historical, former phases, decisions made) o Define the scale of the land-use problem (i.e. define the BF, define the site(s): decide on weather single site approach or multiple site approach (with simultaneous or consecutive actions) is recommended (iterative process) o Gathering of case info, data, maps o Conceptual model incl. risk • Defining the playfield: stakeholder and governance aspects o Stakeholder / influence /liabilities / responsibility analysis (the process of defining the stakeholders will be in line with the definition of the "site", i.e. likely to be iterative) Classification (A,B,C) of and strategies for the BF (existing tool,)
Scale	Project site and region
User	Municipalities (advisor for the…)
Result	Data and stakeholders overview – a consensus is found on the scope of a problem associated with a land use issue
Point of attention	transfer moment to next step – stakeholders Appoint project team and BF manager

Different actions should be performed by the initiators of the regeneration: gathering information, data, finding out who is or should be involved, what are their roles, responsibilities and liabilities, etc. It is important to work on a sound site and situation characterization and problem definition, including the historical perspective, to understand and appreciate the BF and its context. This will help the initiator to get a grip on the complexity of the problems ánd opportunities. It also helps the stakeholder involvement and support for the regeneration. This problem definition should be done with respect to the "content" (site characteristics), as well as the "process" (stakeholders and governance aspects). The items as described underneath will be taken up in the BFN. The order is not linear, items can be performed simultaneously. The final product of the scoping step is an overview with relevant information and stakeholder overview for the BF.

Item: Defining the playfield: site characterisation

A first action is to define the BF scale(s). It is important to realise that a BF has impact on its surroundings and the other way around. It can be beneficial to regenerate the BF together with its surroundings, or even regenerate a cluster of (BF- and other) sites together. During the whole phase of planning the transition and the realization it is crucial to consider multiple scales to find synergies, solutions and opportunities, but also to identify obstacles for the regeneration.

A site characterisation exists of gathering the relevant data on the site and its surroundings. When e.g. contamination exists (which is not in all, but for many occasions the case for BFs), also a conceptual site model and a risk assessment should be made. Information needed for a site characterization can be found in table 3.4.

Table 3.4 data need in the scoping phase

geographical context[1]	"cultural" project context
Land cover	Land use, administrative boundaries [1]
Site conditions[1]	Basic information (location, inner/outer zone, photos etc.)[2]
Terrain (slope, natural/artificial terrain)[2]	Previous use, intermediate/residual use Development (existing building stock, condition, monument protection)[2,3]
Soil characteristics, geology en topography[3]	(Transport) infrastructure (availability, expandable) [2,3]
Hydrology[3]	Surface Sealing (degree of sealing, material)[2]
Geochemics[3]	Ownership/land value[2]
Historical and current contamination situation, research[1,2,3]	Restrictions on future use[2]
Behaviour and spreading of the contaminants in soil [3]	Municipal planning (land-use plan, landscape plan etc.)[2] /Spatial developments[3]
Identification of receptors, threatened objects[3]	Building law (permitted type and degree of building and land use)[2]
Other relative information...[2]	

Sources: 1) Welcome, 2004 (http://publicwiki.deltares.nl/display/imsw/Inventory+of+Information)
2) Ferber et al., 2006-I, 3) Keijzer et al., 2010

Conceptual model and Risk assessment
For describing brownfield sites, an approach for building a Conceptual site model for megasites (large industrial contaminated sites) can be used. In the "integrated management strategy of the EU-Welcome project the method to construct a Conceptual Model (CM) for megasites is described (FP5, EESD, EVK1-CT-2001-00103, 2004: http://publicwiki.deltares.nl/display/imsw/Building+a+Conceptual+Model). A CM is here a simplified, schematic representation of megasite, which includes a source-pathway-receptor approach, as well as the main characteristics of a risk-based management approach. It therefore represents a working model under continuous development in the subsequent phases of a regeneration project.
The conceptual model is developed to obtain a first insight into the associated risks and possible scope of the problem and to help define general priorities within the site (example in figure 3.3a). The conceptual model assists the user in understanding the relevant environmental information The CM can be updated during the whole life cycle of the project, as EPA advices (for clean-up projects). They call this the life cycle conceptual site model. (Dyment and Adam, 2011).

The CM of a BF should take more than just environmental information into account, also social and economic aspects are of importance. In CABERNET the Interaction Matrix is proposed, demonstrating interactions between social, environmental, economic and governance factors in urban systems (figure 3.3b). The Interaction Matrix has been applied to urban regeneration. (Ferber et al, 2006-II). In HOMBRE the Interaction Matrix will be elaborated in the HOMBRE framework (work package 6, planned for 2014).

In the scoping step of the BFN, only the basic information already available can be used. Most of the knowledge needed for the conceptual model build-up is obtained mainly through expert judgment instead of data files and BF databases. When more data becomes available in the project, more information can be added to the CM.

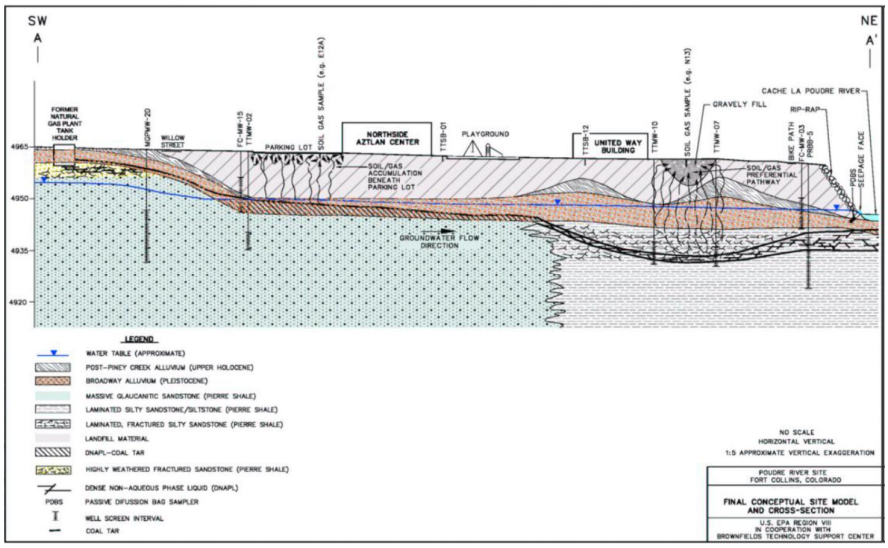


Figure 3.3a Environmental CSM captures key design considerations, such as site attributes; geologic, hydrogeological, and chemical information; and fate and transport processes, in support of remedy design. (Dyment and Adam, 2011).

Environmental	Health protection	Attract tourists	Environmental
Provide habitat in parks	**Social**	Provide a market	Prioritise policy choices
Fund habitat conservation	Provide jobs	**Economic**	Provide tax revenue
Prevent unnecessary use of resources	Mixed cost housing	Impose CSR or other reporting rules	**Institutional controls**

Figure 3.3b CABERNET CM: Illustrative interaction matrix for the urban land system (Ferber et al, 2006-II)

Assessing risk is an important aspect in the site characterization. Risk assessment is 'The formal process of evaluating the consequence(s) of a hazard and their likelihoods/probabilities' Risk assessment comprises the following stages: hazard identification; hazard characterization; risk estimation; and risk evaluation. Hazard characterization is based on understanding the toxicity, fate and transport of the contaminant(s) in isolation or as a mixture. Risk estimation delivers a value (ideally quantitative) of the level of risk posed by specific contaminant(s) to a specified receptor via specified pathway(s) as well as a statement on the confidence in that value. Risk evaluation determines whether a given level of risk, and the confidence with which it is known, warrants intervention. The decision has to be made within specific legal or policy constraints and may reasonably differ from place to place or from individual to individual (Nathanail 2013). An extended report on risk assessment was developed by the scientific cooperation between European countries: the Concerted Action on Risk Assessment for Contaminated Sites (CARACAS) (Ferguson et al. 1998).

The focus is both for the 'traditional' CM as the risk assessment on contamination. A schematic and complete representation of a BF site should also integrate other dimensions, like social and economic drivers and problems in the area. However, this will be elaborated further in HOMBRE in the final year (2014).

Item: Defining the playfield: site characterisation stakeholders and governance aspects

Apart from the site characteristics, it is crucial to map the stakeholders that are or should be involved. It is important to define WHY a stakeholder analysis (SA) is performed, so the result is the right information needed for the specific task. Stakeholder analyses can be used for the preparation and evaluation of projects (ODA, 1995; Grimble and Chan, 1995), for the facilitation of stakeholder involvement in participatory projects or in cooperative resource management (MacArthur, 1997; Grimble and Chan, 1995), for strategy development by project managers to assure the implementation soundness of projects or policies (Crosby, 1992; MacArthur, 1997; Varvasovszky and Brugha, 2000), for understanding the general issues related to conservation and degradation of natural resources (Grimble and Chan, 1995; Grimble and Wellard, 1997), and for a comprehensive analysis to understand better past policy making processes or to assist in formulating new policies (Varvasovszky and Brugha, 2000). (Hermans 2005)
In regeneration projects, different kinds of SA's might be needed for different tasks. It is also important to realise that the stakeholder group, or their interests, might change during the project and the management phases Therefore HOMBRE advices to repeat the stakeholder analysis for each management phase or when (major) changes occur in boundary conditions, involved parties etc.
Different methods for performing a SA are available. For the HOMBRE project the Crosby method (Crosby, 1992) is advised. It is a pragmatic and concise method; based on consensus within an organisation / other stakeholders. The objective of this SA is to give support for analysts or local managers in policy projects. This objective fits to the HOMBRE objective for performing a SA and helps to organise the necessary means: knowledge, budgets, support for the regeneration.

Table 3.5 Procedure for stakeholder analysis: general steps of the Crosby method (Hermans, 2005)

Step	Crosby method
General purpose of SA	Support for analysts or local managers in policy projects
Identify stakeholders	Draw initial ample list of stakeholders and relative importance
Collect primary input data	Use local informants to complete stakeholder table
Structure and analyse data	Fill in stakeholder tables / matrices (table 3.6)

Table 3.6 Example of a blank stakeholder analysis table (Crosby, 1992)

Group	Group's interest in Issue	Resources	Resource Mobilization Capacity	Position on issue

It is important that the tables give an overview. The stakeholder behaviour and their management strategies cannot be 100% predicted by tables. It requires effort to guarantee analytical soundness and to prevent personal bias (Hermans, 2005). In table 3.7 the participation of stakeholders can be defined: how to involve the stakeholders in the different phases of the project. This is a choice that is based on (e.g.) available means, position towards the issue (see table 3.5). Not everybody needs to be involved in the same way. For example: if there is sufficient money, stakeholders that provide money are not needed, it can be a better choice to focus to groups that pose societal opposition.

Table 3.7 Example of a blank stakeholder participation matrix (based on ODA, 1995; Mac Arthur, 1997)

Stage in cycle	BFN step	Type of participation			
		Inform	Consult	Partnership	Control
Anticipating change	IDENTIFICATION				
Planning the transition and realisation	SCOPING				
	OPPORTUNITIES				
	ASSESSMENT				
Managing the realisation	REALISATION (not in BFN)				
	MONITORING AND EVALUATION				

Next to the stakeholder analysis, HOMBRE advises to keep track of the key decisions and obstacles for each phase or event within the regeneration project. (section 3.5.3).

Item: BF classification and strategies

When taking initiative of the BF regeneration, it is advised to use the ABC-classification (figure 2.2) of the Cabernet network to anticipate on the strategies the initiators can choose. Depending on criteria on land value and cost for development, all brownfield and vacant land sites are classified in a first approach by their marketability respective of their development potential. The classes are:

A – easy marketable
B – marketable with restrictions
C – not feasibly marketable due to the very high effort needed

For this assessment a tool was developed in Germany for the Saxony area (Ferber et al., 2006-I). The recommendation for a strategy (figure 3.4), following the classification, is also derived from this tool.

The resulting strategy is based on the automatic and manual input of different factors (such as former / current (interim) use, existing buildings / heritage protection, traffic infrastructure, soil sealing, topography, contamination, ownership, land value, and so on) from a municipal portfolio-management system. Because not all sites can be returned into beneficial use due to various social, economic and environmental criteria, the municipality can appoint priority sites upon which municipal action should be concentrated. The tool is based on the general assumption that the need for the development of a site correlates with its relevance to enable effective urban planning and that the financial expenditures rise with a higher effort of mobilization (e.g for demolition, underground infrastructures or contaminations). Six strategies can be defined based upon the factors mentioned above:

1. "marketing",
2. "occupy development actively",
3. "develop actively",
4. "use intermediately",
5. "unseal/renaturate", and
6. "occupy passively".

The first two strategies are 'self-developing' areas, and do not necessarily need the HOMBRE framework. For the latter strategies, the HOMBRE framework can give input, inspiration and guidance on how and what to do.

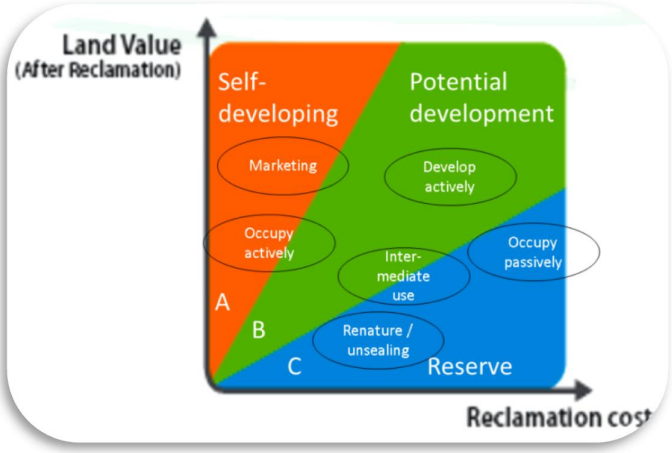


Figure 3.4: Basic types of strategy ABC scheme (after Ferber et al., 2006-I and II).

3.3.2 Step Opportunities

The opportunities step is about finding the different opportunities on the BF (or site at stake).

Table 3.8 Planning the transition and realization - opportunities

Step 3- Opportunities	
What do we want to do with the BF (or site at stake) and what are our opportunities?	
Items in BFN	• Approach for local community involvement program • Ambition and societal demands • Defining service indicators • Opportunity plan with SWOT for the BF and its redevelopment, vision and scenarios ▪ *Including DST tool technology trains*
Scale	Project site and region
User	Municipalities (advisor for the…)
Result	opportunity plan with different scenarios
Point of attention	transfer moment to next step – stakeholders

The results of the scoping step are used here as input and can be added to. The main question is: What do we want to achieve and what are the opportunities (and challenges)? To foster the probability of success, it is essential to involve stakeholders, in particular local communities, guided by a skilled BF Process Manager (Ferber et al., 2006-II). The stakeholders will have to work together here to come to a realistic set of scenarios. They start with making a SWOT for the BF and its redevelopment as part of the opportunity plan. The stakeholders create a vision for the site, with (societal) ambitions. A specific HOMBRE addition is here to define criteria, to monitor if the projects ambitions will be reached. These criteria can be partly the same as the early warning indicators, but also other and site specific. As a result, broad scenarios are set, and technology trains can be identified how to get there. The final product of the Opportunity step is an opportunity plan (box 3.1).

Box 3.1 Opportunity plan

The Opportunity plan (OP) is not a technical tool, but mainly a communication tool addressed to non-experts: citizens, stakeholders, decision makers, politicians. For the sustainable regeneration of brownfield sites and contribution to the comprehensive regeneration of a wider area by delivering environmental protection, local economic and social benefits, it is necessary to develop and deliver opportunity plans. (Ferber et al., 2006-II). In the opportunity plan, the strengths and weaknesses, opportunities and threats of a site are highlighted to a community, in order to build “places for people”. We have to remember that usually BFs are derelict places in which people are not happy to live in and probably ashamed of it. The OP allows to show scenarios for regeneration including, since the very beginning of the regeneration process, needs, desires and dreams of stakeholders. For all these reasons, the OP needs to be led by a specific professional, a BF Manager, able to facilitate the exchanges between technicians and people, in order to match utopia with pragmatism through a sustainable BF regeneration project. The BFN is an asset in this process, enabling everyone to have an immediate and veritable access to the scenarios.

Item: Approach for local community involvement program

The convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters, usually known as the Aarhus Convention, was signed on June 25, 1998 in the Danish city of Aarhus. (UNECE, 1998) This means that for BF regeneration, the local community should be informed and consulted. CABERNET emphasizes this by having a position statement: "CABERNET believes that effective citizen participation in decision-making enhances the sustainability of brownfield regeneration projects. However, CABERNET also comments that although there is a well-developed knowledge base relating to the inclusion of citizen participation in decision-making within BF regeneration, it is commonly undervalued or misunderstood. Much broader discussion and dissemination of tools and good practice is therefore required" (Ferber et al., 2006-II).
Chanan (1999) wrote a handbook for good practice for local community involvement in schemes to develop or regenerate disadvantaged localities. The text is designed to serve policy makers, planners and practitioners, including organisations belonging to the local community itself. The content is limited to principles and lessons which apply to some degree or another across all Member States, with some illustrations from policy statements and research. Local practice is extremely varied, and it would be foolish to propose a single model for all countries and regions.
Local community inclusiveness in BF regeneration planning in early project stages is a strong driver and guaranty for future active participation of community groups. As a result, communities are willing to claim more ownership of the project outcomes and feel more responsible for the land-use maintenance over its whole life cycle, thus strengthening social cohesion. (Chanan, 1999, Figure 3.5).

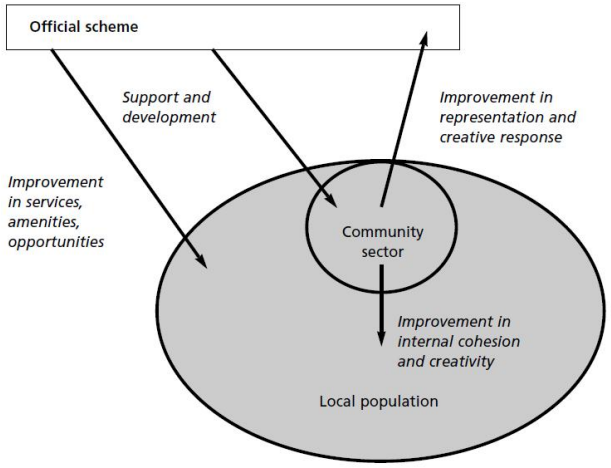


Figure 3.5 Scheme/population/community sector (Chanan, 1999)

The BFN can support the involvement of the local community by visualizing the state of the BF (common problem definition), the scenarios and by keeping track if goals are being reached by monitoring service indicators.

Item: Vision, Ambition and societal demands

When investigating the opportunities for a BF, first a vision and ambitions should be determined for the BF and its surroundings. Setting ambitions for the BF regeneration, together with the stakeholders is needed to get from imagining to realizing possible futures. It is important to define together where we want to go, which objectives and societal challenges are targeted with the regeneration. This sets boundary conditions to the possible designs, and supports the management of stakeholder's expectations.
The EU's horizon2020 research and innovation programme (Com (2011) 808) defines societal challenges to which the research and innovation should contribute. These challenges are:

A. Green cities
B. Climate change mitigation / adaptation
C. Sustainable energy / Energy transitions
D. Human well-being and health
E. Sustainable food production (and resource efficiency)
F. Strong and viable societies
G. Efficient use of space
H. Accessibility and connectivity

Many of these challenges will also be addressed during regeneration of BF's. These challenges emerged through different forces, such as demographic changes, climate change and the increasing scarcity of natural resources, along with the present economic crisis and more specific, local forces. BF regeneration is affected by these issues but also offers a variety of possibilities to contribute to solutions for these global and regional societal challenges by means of an effective and sustainable use of services (Figure 3.6) (After Otte et al., 2012).

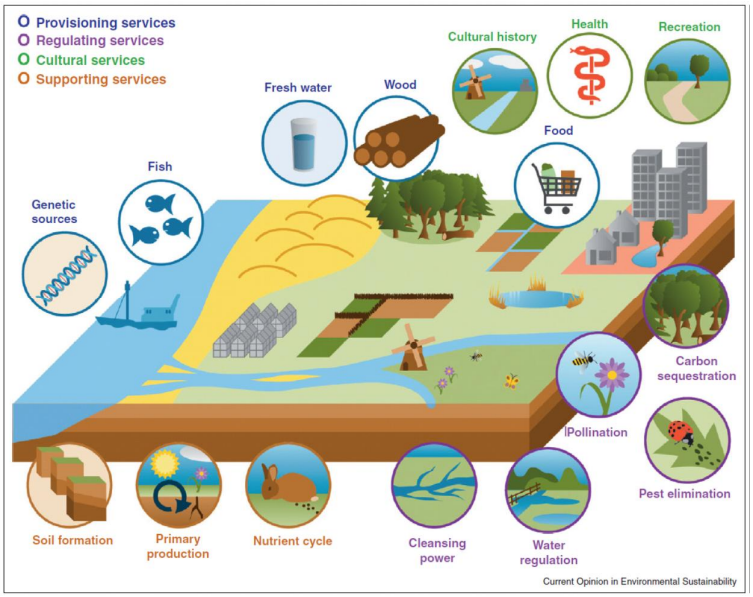


Figure 3.6 Ecosystem services in the Netherlands (Otte et al., 2012).

Obviously, in different projects on the topic of BF's, the importance of a vision, setting objectives and ambitions for environment, economy and society is stressed. Cabernet comments: For BF regeneration schemes to fully realize sustainability goals, more attention needs to be paid to achieving social and cultural benefits (Ferber et al., 2006-II) instead of just cleaning up the site until regulatory boundaries and setting economical goals. In the RESCUE project, a set of sustainability objectives for BF regeneration are given (figure 3.7).

	RESCUE SUSTAINABILITY OBJECTIVES	Responsibility for objective									
		Pr. Managers	Landowners	Developers	Planners	Policymakers	Regulators	Citizens	Contractors	Designers	Advisors
1	To reduce negative environmental impacts on the site and on the neighbourhood including human health risks	■					■		X	■	
2	To minimise waste and maximise recycling and reuse of soil and debris	■					■		X	■	
3	To ensure cost-effectiveness and technical feasibility of the management of risk from contamination and the reuse of soil and debris.	■					■		■	X	
4	To improve social acceptance through identification and engagement of all stakeholders.	X									■
5	To retain buildings and infrastructures on brownfield sites	■			X					■	
6	To reuse existing buildings and infrastructures, or components thereof, on brownfield sites.	■								X	
7	To recycle materials of existing buildings and infrastructures on brownfield sites	■								X	
8	To minimise energy demand and produce renewable energy on the site									X	
9	To minimise water demand and reduce waste water production									X	
10	To promote land use functions that match socio-economic demands and needs.		■	■	X						
11	To integrate the reuse of brownfield sites into regional land management		■	■	X						
12	To integrate the reuse of brownfield sites into urban development		■	■	X						
13	To achieve benefits for and prevent adverse impacts on the local neighbourhood.		■	■	X						
14	To generate and safeguard employment and economic development.		■	X	■						
15	To promote land use functions that suit the natural and man-made environment of the site and its neighbourhood.		■	■	X						
16	To save resources.	■		■	■					X	
17	To increase the possibility of the public traversing former brownfield sites.			■	X					■	
18	To provide adequate access.			■	X					■	
19	To achieve high urban design quality.			■	■					X	
20	To create and maintain flexibility and flexible urban design.			■	■					X	
21	To obtain a better quality of the information itself.	X		■		■					
22	To obtain a better quality of the information flow in the decision-making process and a more efficient information use.	X				■					
23	To have a fair discussion process and a better resolution of conflicts.	X				■					
24	To increase the legitimacy of the decision-making process.					X					
25	To improve the efficiency of the process in terms of duration and cost.	X				■					
26	To empower citizens, especially those representing non-organised interests.					X					
27	To delegate responsibility to lower decision levels and to stimulate a sense of ownership.	X									
28	To adopt an interdisciplinary project team approach.	X									
29	To facilitate efficient project delivery.	X									
30	To promote and manage stakeholder participation.	X									
31	To provide a framework for transparency in decisions, flow of information and improved communication structures.	X									
32	To protect human health and safety and the environment during site operations.	X							■		
33	To adopt an approach that integrates social, economic and environmental aspects.	X									

Figure 3.7 RESCUE sustainability objectives and responsible parties. Many objectives are shared by stakeholders but the principle responsible party is highlighted thus X. (Edwards et al., 2005)

To determine the vision (where do we want to go) and ambitions (to what do we want to contribute to) the first three steps of figure 3.8 can be followed by stakeholders.

Figure 3.8 Vision/societal challenges / ambitions /criteria (after Maring et al. 2009)

Note that the scoping step gives crucial information for the vision and ambitions. The information about the site is collected, as well as the information on stakeholders and how they can influence the path from ambition to realisation. The vision and ambitions should be realistic and the stakeholders should be able to steer towards the right direction. An unrealistic ambition or an ambition that cannot be steered upon is useless and will cause disappointment.

Item: Defining service criteria

When stakeholders have set their objectives, it is necessary to set "criteria" as well to be able to see if these objectives for the project are reached. The criteria can be used to score the scenarios resulting from this opportunity step. The assessment of criteria might be done using expert judgement of the stakeholders involved. This comparison of the scenarios happens in the BFN in step ´assessment'. It is important to define distinguishing and clear criteria. It is also important to define the situation at the starting point moment, and when a criterion can be scored as positive (goal reached). Therefore it is recommended to define a threshold (figure 3.8).
The defining and assessing of criteria is part of work package 2 and will be reported in deliverable 2.3 (planned 2014). At the moment of reporting deliverable 3.1, this work has not started yet.

Item: Scenarios and how to get there

To define different (realistic) scenarios, an interactive and creative process should be started. This process can be done in a charrette. "A charrette is an intensive, multi-disciplinary design workshop designed to facilitate an open discussion between stakeholders of a regeneration project. A team of design experts meets with community groups, developers and neighbours over a period from 3-4 days to 2 weeks long" In the charrette, the vision and ambitions that are set beforehand or during the process are used. (http://www.charrettecenter.net/).

Within the scenario design, obviously good (=feasible) ideas for a new use-phase are necessary. Traditionally, the focus is set on solving problems that are associated with brownfields. Economic (monetary) obstacles are seen as the dominant factor that prevent the transition towards a new use phase. A closer look at those economic (monetary) obstacles show that mismatches between the current status of a site/area and the intended use of a site are the main bottleneck, leading to high costs or disappointing revenues. An overview of potential values (either positive or negative) on site and on municipal level can help to choose "optimal" new use functions for sites, either brown- and greenfields. (Grotenhuis et al., 2012)

Where economic drive for 'hard' solutions is weak or technologies still need to be developed, also alternative or interim 'soft' re-use of BFs is explored. Such measures are focused on a sustainable environment, and create societal assets from the services offered by the regenerated BFs. HOMBRE distinguishes hard and soft land usage using EU policy on soil sealing (EC, 2012) as a context. Hard land usage is defined as re-use that predominantly contains built or paved development. Soft land-use is where the land remains unsealed and the soil remains in biologically productive use, for example for agriculture, habitat, forestry, amenity or landscaping. The two scenarios are not mutually exclusive and are in fact in many cases combined (Menger et al., 2013). It is important to be flexible within the planning phase for alternative solutions (Arkel, van, 2012). Temporal "interim" land uses can add value to a place during or after the regeneration and even before: to avoid further decline. This temporary use can be both soft and hard and the time span of the use can differ between days until years. Examples can be found on the website of the SEEDS-project. SEEDS is promoting the short-term re-use of vacant land and buildings as a legitimate part of longer-term planning and development: http://www.seeds-project.com.

Once a, or some possible new uses and a preliminary planning are defined, the focus can shift towards the optimization of costs and benefits. BF innovative technology trains are intended to optimize this balance by increasing the production of services and goods (benefits) with decreasing costs, both during the transition and the next "use" phase as can be seen in figure 3.9.

A distinction can therefore be made between technologies that provide goods and services that are required for the regeneration itself (such as building materials, landscaping, soil physics, and mitigation of acute environmental risks) and goods/services that are required for the use of the area (such as water, energy, and mitigation of non-acute environmental risks). This aftercare should be appraised to make a more transparent comparison between different redevelopment scenario's (incl. different technology (train) choices). Opportunities can be found through seeking synergy between, for example, technologies and spatial planning.

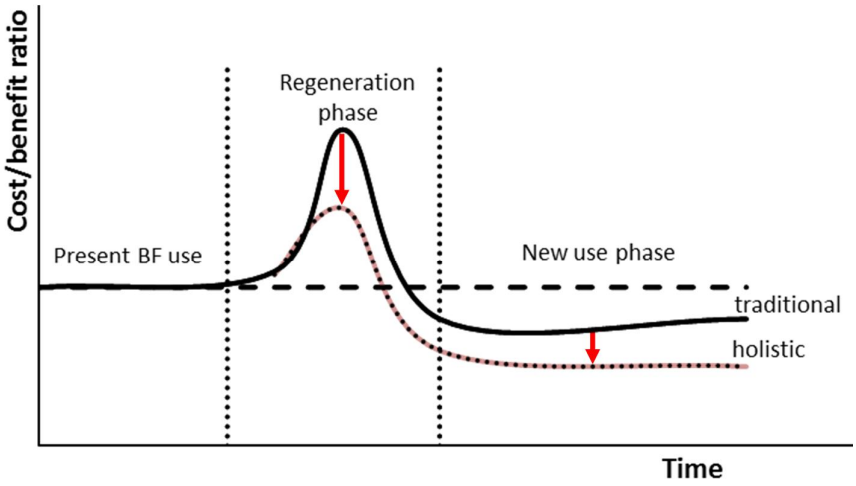


Figure 3.9: effects of technology trains within transition of land use phases (red arrows) (Grotenhuis et al., 2012)

In most cases of BF regeneration, investments are needed before the new use phase commences. In figure 3.9 this is visualized as the temporary increase of the cost/benefit ratio compared to "do nothing" represented by the horizontal dashed line. The setup of technology trains are chosen to facilitate land re-use and to extend the original land use in the two following ways:

- Red arrow in "regeneration phase": reduce investments by re-using available resources (soil and materials) and optimization of technologies (regarding time, space, and money) to improve the brownfield to a level that intended use is possible,
- Red arrow in "new use phase": lower the costs/benefit ratio for the "new use phase" either by reducing costs of energy, water and resource usage, by increasing revenues (adding activities or new land uses to the area, valorisation of environmental quality, real estate potential, and –possibly- interim use), and reducing costs of the regeneration phase (pay back costs like interest). Also providing services for surrounding area's (as is one of the directions within WP5) is such an improvement. (Grotenhuis et al., 2012)

In HOMBRE's WP 5 a decision support tool for the soft uses and technologies is being developed. This tool is still in development. In box 3.2, the outline of how this tool might be elaborated is described. Note that the tiered approach overlaps with the scoping – opportunities - assessment steps of the BFN.

Box 3.2: version 1 of the proposed decision support system on soft uses and technologies using the operating window concept

Introduction and overview

Soft end uses of brownfield, such as for biomass or green space, can provide services which add value to a regenerated site, both in their own right and integrated with hard uses such as for buildings. The purpose of this decision support "tool" is to provide a framework and procedure for evaluating these opportunities considering: (1) the services that can be provided, their wider effects, and any synergies or trade-offs between them; (2) the processes or interventions that might deliver these services; (3) their overall value to a project both directly and considering a wider sustainable development context. The approach taken is an iterative one with explicit use of stakeholder engagement. The approach is tiered beginning with simple steps. It uses a concept of operating windows to help decision makers rapidly identify the optimal use of the processes or interventions available and to be aware of situations where while an application may be possible, it could carry higher technical risks. There are three tiers in this process, which are shown in figure 3.10.

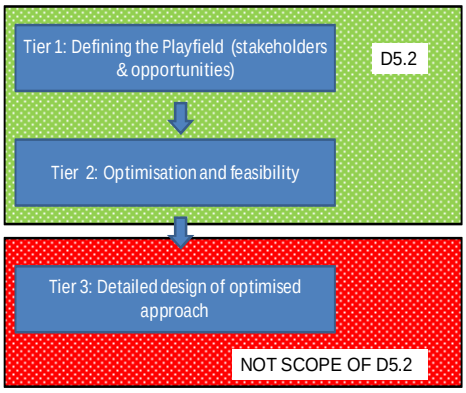


Figure 3.10: Tiered Approach to Brownfield Re-Use in the Decision Support Tool

A common feature across all three steps is stakeholder engagement. Stakeholder engagement is widely seen as critical for improving the value, acceptability and speed f implementation of regeneration projects. However, the process of stakeholder identification and engagement has to be carefully managed so that the right people are involved at the right time to avoid unnecessary or wasted work and to avoid disincentivising those people on whom a project's value depends. The engagement process proposed here is combines the Dutch ecodynamic design approach with the charrette workshop process of design and development, both of which have been widely used. A stakeholder engagement plan needs to be in place before the commencement of Tier 1.

Tier 1 Opportunity Matrix

For a regeneration project to occur it is promoted by someone / an organisation, who will have a vision of what they would like to achieve. This vision may be fairly specific with a range of re-uses already envisaged. However, in some cases the promoter for regeneration work may not have a clear idea of what could be done, for example, it may be a local authority motivated by a need to improve a brownfield that has yet to begin a design process.

Another possibility may be that an area is seen as being at risk of becoming a brownfield site, for example as a result of early indicator monitoring, and this has triggered a desire to explore re-use options that have a more robust long term use. A final possibility is that a promoter is considering an interim use for a site, pending a change in conditions or a longer term re-use, for example, a soft re-use might maintain a site suitable for housing development during an economic down-turn. These possibilities are not mutually exclusive and a range of opinions about a site might exist. The opportunity matrix is a simple tool that allows stakeholders together to examine the pros and cons of different interventions for soft end uses for a site: the services they provide, their possible inter-connections with hard end uses, and how multiple uses / services might be combined.

Figure 3.11 illustrates the general features of the Opportunity Matrix. It lists a range of example interventions for a site (for example cultivation for willow coppice biomass) and matches them against a range of possible services (for example revenue generation, biodiversity improvement). Linked to each cell of the matrix are links or references to case studies These are intended to illustrate practicality and feasibility to the stakeholders gathered during the design charrette process. The aim at Tier 1 is simply to imagine the range of possibilities and develop some favoured combinations of interventions and processes that can be taken forward for more detailed evaluation in subsequent phases.

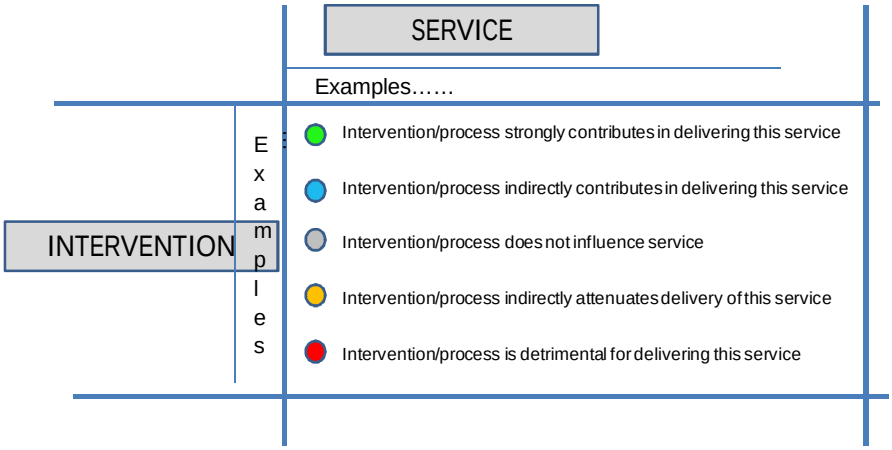


Figure 3.11 General Features of the Opportunity Matrix

Tier 2 Investigating Synergies, Trade-Offs, Sustainability and overall value

Tier 1 will have identified a range of ways in which a brownfield might be regenerated and the services that this would provide, perhaps as several different visions of what might be possible for a site. Tier 2 makes use of several HOMBRE tools for benchmarking these visions against overall sustainability to optimise service delivery and value, and provide a viable option for detailed design. During Tier 2 it is possible that some alternatives will be found to be unviable and therefore will be discarded, whereas wider sustainability assessment may identify hitherto unappreciated service opportunities.

Tier 3 Detailed design
Detailed design is outside the scope of the D5.2 decision support framework. However, a matrix of available tools has been provided, including operating windows, that support detailed design and implementation, for example biomass deployment, selection of low impact (gentle) remediation alternatives.

(*Unpublished, will be included in HOMBRE's deliverable 5.2*)

The extensive elaboration and implementation of the tools from work package 4 and 5 for the BFN is not finished yet. Future work done for deliverables 4.3 (Description of operating windows for successful implementation of the technology trains for uptake in work package 2 and 3 (due by May 2014)) and 5.2 (decision support for soft end-use implementation, based on operating windows (due by March 2014)) will give input for the opportunity step in the BFN.

3.3.3 Step Assessment

The Assessment step assesses the different scenarios resulting from the preceding steps (Scoping, Opportunities) and details the plans.

Table 3.9 Planning the transition and realization - assessment

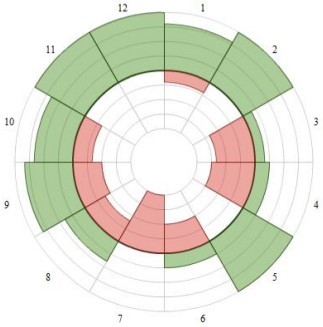
Step 4- Assessment	
Which scenario is most favourable and feasible? And how to get there?	
Items in BFN:	• Evaluation service criteria, regulation test, CBA / financial viability • Choice of final scenarios and how to get there
Scale	Project site (and region)
User	Municipalities (advisor for the…)
Result	redevelopment plan (Final scenario ->to realisation)
Point of attention	transfer moment to next step – stakeholders Note: mostly tools that should be used by experts: contractor, landscape architect, etc.

The main question is: Which scenario is feasible (based on cost-benefits, and regulation) and most favourable (based on the set service indicators)? And how to get there? The role of experts becomes more important in this step. As a result, the final scenario is detailed in a working plan and ready for realization. HOMBRE does not cover the production of working plans and the actual realization. The next step HOMBRE covers, is the evaluation and monitoring during the management of the realization phase (section 3.4).

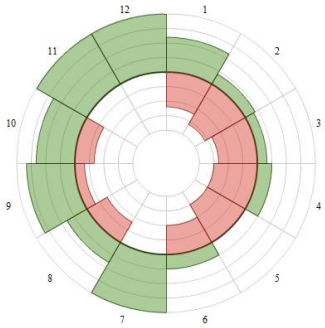
Item: Test against service indicator criteria

The criteria (as set in step opportunities) can be used to score the scenarios as described in the opportunity plan. The assessment of criteria can be done using expert judgement of the stakeholders involved. Because the situation at the starting point is known, as well as the desired situation, the scoring for each criterion can be done using three values: positive (better than threshold), neutral (same as threshold) and negative (below threshold). This results in a composite overview of criteria. Because the user was asked to prioritize ambitions, it is possible to use this overview in the further decision making for a final plan. Figure 3.12 gives an impression of the result of service criteria test.

Scenario 1



Scenario 1



Omgevingswijzer.org is a widely used Dutch method to assess sustainability for large soil, water and infrastructure construction projects. The pieces of the pie represent different themes (soil, water, spatial quality, social relevance etc) and in each piece of the pie, multiple aspects can be scored within this theme if it is scored positive neutral negative.

Figure 3.12 probable impression of the result of service criteria test

This will be further elaborated in work package 2, deliverable 2.3. The work has not started yet.

Item: External regulation testing

(Local, regional and EU) regulation can offer potential project incentives and project stoppers. It is important to check regulation for the scenarios that result from a creative process. This is done 1) to find potential project stoppers that have to be solved (discuss with (local) authorities, etc.) and 2) finding incentives, these can also be linked to funding opportunities.
For this item a set of EU-directives, EU-reports and international publications were reviewed on the topic of brownfields and related environmental aspects. In appendix F, a list of publications is taken up that have been scanned for objectives, regulations and observations. The objective was to identify opportunities and challenges for brownfield regeneration processes, resulting from the EU perspective. National and regional policies and interpretations of these EU policies are not included in this activity. Note that this list is a result from a short desk study and not a complete overview of all to BFs related EU regulations.
The desk study resulted in a table with 3 categories: environmental sustainability, economic feasibility and social participation. Each category has multiple themes in which the relevant quotes from the documents (objectives, regulations and observations) are clustered. After each quote is a reference included to where the quote has been found. At the most right column a short remark is made about how this quote may potentially influence brownfield regeneration. The table can be found in appendix E.

Item: Cost benefit analysis/ financial viability

Cost benefit analysis is a form of economic analysis in which costs and benefits are converted into monetary values for comparison (known as “private costs”). Cost benefit analysis considers a diverse range of impacts (known as “public costs”) that may differ from one proposed solution to another, such as the effect on human health, the environment, the land use, and issues of stakeholder concern and acceptability by assigning values to each impact in common units. Deciding which impacts to include or exclude from the assessment is likely to vary on a site-by-site basis. (Bardos et al., 2011). There are different methods for CBA and the tools for CBA differ per member state. It is however an important part of the decision making in BF regeneration. Therefore a specialist should perform a sound CBA with the subscribed or (by stakeholders) accepted CBA tools for the different scenarios that were developed for the BF. Understanding overall value and making a convincing proposition of value to Private and Public Sector stakeholders, funders and investors is the key to the successful delivery of the HOMBRE concept. For more information on cost benefit analysis we refer to the EU guide to cost benefit analysis of investment projects (Florio et al., 2008). HOMBRE deliverable 5.1 reviews tools that have been or could be used to examine value, costs and benefits from regeneration (Menger et al., 2013). Here also wider benefits than monetary value alone are taken into account.

Item: Choice of final scenarios and how to get there

When all information is gathered, scenarios are formed and investigated, the stakeholders can make a final choice and give assignments to different experts (architects, project developers, landscapers, urban planners, environmentalists) to make a detailed final working plan. Making detailed plans for the realization of the final plan is beyond the scope of HOMBRE. However, some points of attention here (not exhaustive) are to:

- involve the long-term (maintenance and management phase and even ending of the use)
- stay flexible within the plan
- keep the information available for the different parties
- keep guard over the set objectives
- inform and involve stakeholders (including local community) if plans are changed
- look at possibilities for smart contracting to stay within time, money and project objectives

3.4 Module Managing the realisation

The actual realization of the project is not within the HOMBE scope. However, part of managing the realisation is guarding if the projects objectives are met in in what extent. Indicators can be set and monitored for this purpose. At the certain moment, this phase (module) continues into the anticipating change phase (module).

3.4.1 Step Evaluation and monitoring

The evaluation and monitoring step is about setting targets and defining indicators for the project and to monitor them. Furthermore it is very important that monitoring is focused on learning or adaptation. Therefore it is also important to anticipate what possible actions will be taken if a certain level of the indicator is reached. This to prevent a stalemate after the monitoring starts.

Table 3.10 Managing the realization - assessment

Step 5- Evaluation and monitoring	
(in which extent) Did we reach our goals after realisation?	
Items in BFN:	Defining sustainability indicators for monitoring Monitoring and evaluation of sustainability indicators (was the project successful)
Role of the BFN	Project evaluation through time Support expectation management Documentation
Scale	Site (and region)
User	Municipalities (advisor for the…)
Result	Indicators and evaluation results
Point of attention	transfer moment to next step – stakeholders

Important aspects mentioned in HOMBRE for the successful regeneration of a brownfield are financial viability, conformity with planning objectives and broader “sustainability indicators” (environmental risk, water supply and water management options, reuse of energy materials, reuse of soil, building materials, water, social aspects, landscape issues etc.). For each project, the stakeholders are advised (how) to set up indicators and to monitor them. This is elaborated in Hombres work package 2 (deliverable 2.2. Ellen et al., 2013-II).

Item: Selecting and constructing sustainability indicators

The selection and construction of sustainability indicators can be done following a few steps (figure 3.13)

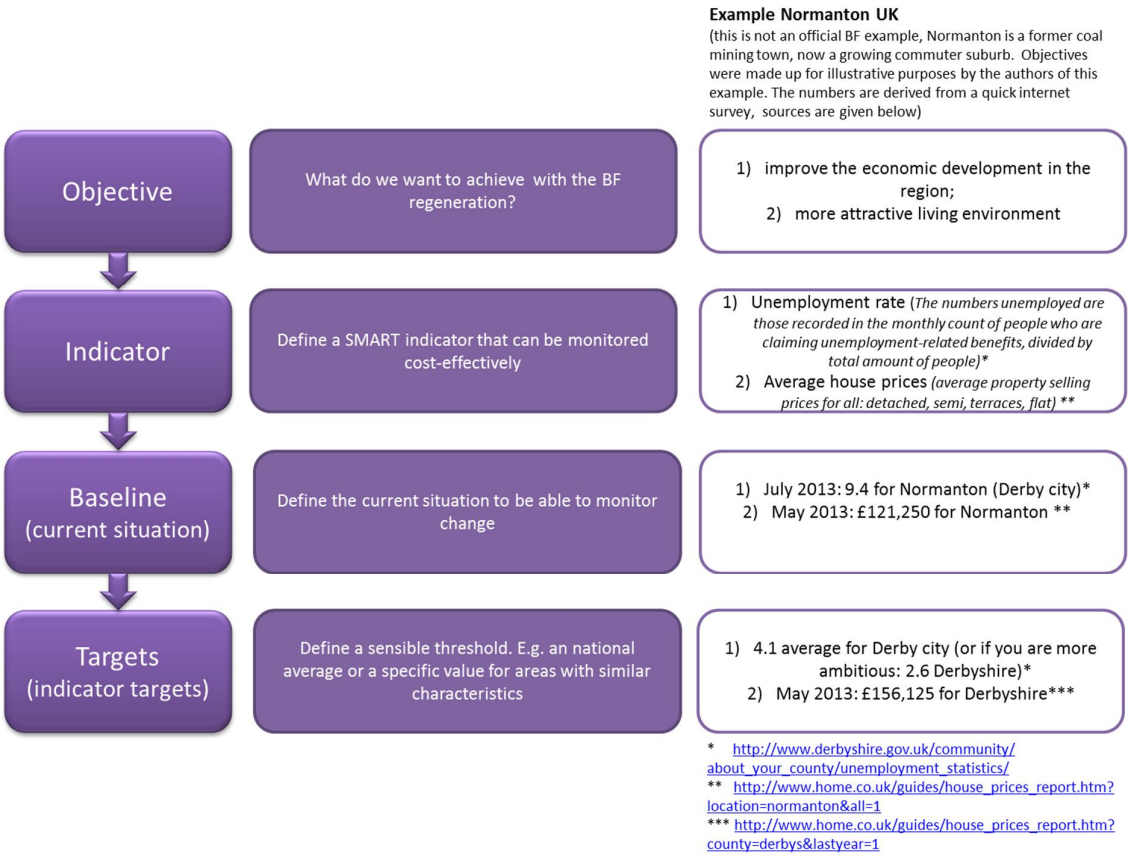


Figure 3.13 Selecting and constructing service criteria

In the first step, the objectives for the project on a longer time span are reviewed by the stakeholders. The central question is: what do we want to achieve with the regeneration in terms of wellbeing, environment and prosperity.
Note that some of the set ambitions and criteria from the opportunity step can be used here. However: if the ambitions (and criteria) are linked to a direct project result (such as 'building 2000 houses'), this is a good criterion, but not a useful indicator to monitor, because it will not change during and after the realisation. Employment rate is a good indicator, because it says more about the projects impact and it will change in time.
The second step is to define a SMART[2] indicator. The data to measure the indicator should also be obtainable without too much effort and/or costs, which is of course relative in relation to the costs of the project.
The third and fourth steps are to determine the "current" situation to be able to monitor change. This t0 should be recorded and is normally the situation before the actual realization starts (BF stage). Also a target (consisting of a threshold value) should be determined. When is the goal reached? In many cases this will be an average of a comparable area, or a national average. Be sure this value is attainable (the A from SMART.)

[2] specific, measurable, attainable, relevant and time-bound

Item: Monitoring indicators

The aim of the monitoring of the service indicators is to certify on an *ex post* basis if the (sustainability) goals set for the project by its stakeholders are actually met, and if the project was successful in delivering the required 'services'. (Ellen et al, draft 2013-II)
When it comes to monitoring we can identify three main stages within the monitoring process: (1) monitoring design, (2) collection of data; (3) use of results. (Ellen et al, 2013-II)

3.5 Supporting items

The role of supporting items described in this chapter support the decision making and the different aspects of the decision support framework. In the BFN, they are available in all modules and steps.

3.5.1 GIS and annotation functionality

Visualisation of information supports the main objective for WP 3: to provide better planning and more attractive communication technology for BF regeneration and stakeholder involvement.

The map utility of the BFN contains Basic map functionality like navigate, zoom and find a location. For sketching on the map, the user can use free hand drawing, polygon, paths and points. They can be deleted and moved. If the user wants to take note or add text there is an option for adding post-it with an icon. The user can save his/her sketch and load previous sketches. The user can also add own layers of data. By accessing the file manager and selecting the file. If the file has time data there is option to use this with the time slider. It is also possible to arrange data layers. Data layers can be higher of lower in the stack, set in transparency or be turned off and on. Box 3.3 gives more information on the formats and projection of the data layers.

Box 3.3 data types, projection for maps in the BFN

The accepted data types that can be added by the file manager are the following formats: kml, json and shape file. The admissible projection (coordinate system) is Web Mercator (Auxiliary Sphere) (EPSG:3857). Various GIS application are capable of converting data between various formats and projections. The shape file and json formats do not support storage of symbols. The possible mark-up that accompanies the shape file in a GIS viewer is lost in another viewer. Kml format supports screen overlays. Screen overlays are anchored relative to the screen and are added in the kml code. Screen overlay data is supported within the brownfield navigator, making it possible add a legend, logo, banner, or other image to the project.

3.5.2 Example database and Reference library

The example library for the BFN will be included in the tool to provide users with inspirational examples of brownfield regeneration and land use (figure 3.14). A format (appendix F) with three levels of examples is developed:

1. Brownfield redevelopment case studies;
2. (New) land use examples;
3. Societal ambitions contributed to by services, generated from brownfield redevelopment / land use.

For the classification of land uses, the land uses classes from the UK National land use database version 4.4 were used. (Harrison, 2006). For the (ecosystem) services the classification of the Millennium Assessment was used (MA, 2005). For the societal ambitions, the challenges as described in the research and innovation programme Horizon2020 were used (COM (2011) 808).

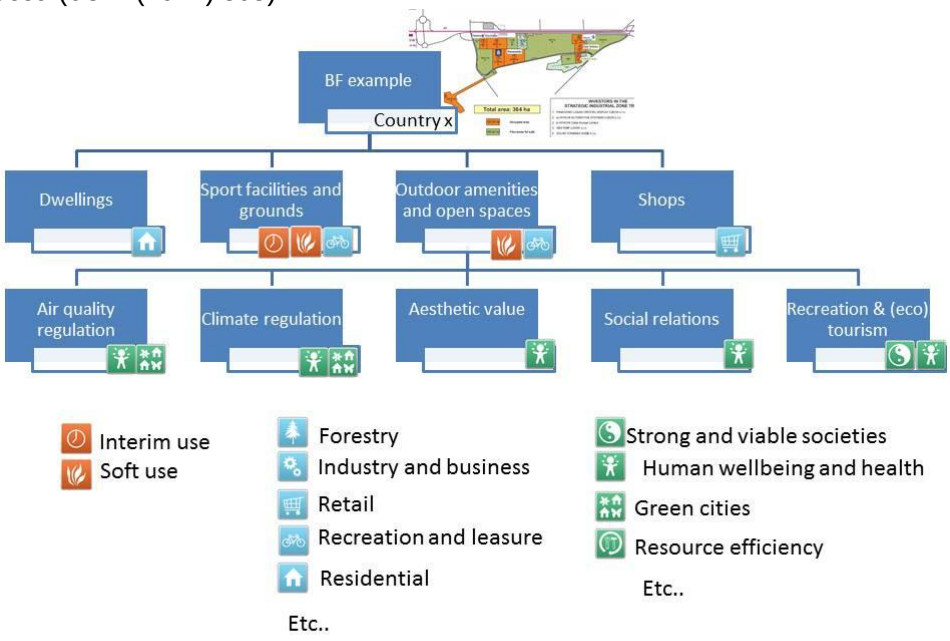


Figure 3.14 Structure of the example library.

3.5.3 Rounds model

To register and know which decisions and "boundary judgements[3]" will and have been made, it is important to look at the decision making process. The decision making process can be reconstructed with a "rounds model" (Teisman, 2000). With such a model, each round represents a specific time or event. This model gives a good overview of the historical playfield and insight in the involved parties, the main decisions and their character, and potential boundary conditions (example figure 3.15). The stakeholders, their participation and the key information for each round can be updated in this rounds model (appendix A-2).

[3] Boundary judgements are those decisions that demarcate the project (Teisman et al, 2009)

	Round 0 Initial plans	Round 1 Intervention of the film industry	Round 2 Research and analysis	Round 3 Crisis
Year	1996-1997	1997-2002	2002-2008	2008-present
Agents involved	• Municipality of Terni • Melampo company • Federazione canoistica	• Municipality of Terni • Melampo company • Regione of Umbria • Province of Terni • National government	• Municipality of Terni • Regione of Umbria • Province of Terni • National government • Comitato (2003) • ARPA • Cinecittà film studios (2005)	• Municipality of Terni • Regione of Umbria • Province of Terni • National government • Comitato • ARPA • Cinecittà film studios
Main Decision	*1997* master plan	*2002* Placing the Papigno brownfield on the site of national Interest and update of the master plan	*2008* Site of public interest for industrial reconversion (due to government changes no money was made available)	*2012* Awaiting permission to start remediation works and searching for financial resources to realize implementation of executive plans
Characterisation of content / direction	Tourism: Green area, water sports, Museum	Cinema Tourism	Cinema Tourism	Cinema Tourism

Figure 3.15 decision-making process Terni Papigno (Arkel, van, 2012)

3.5.4 "Project administration"

In the overall items, a note path is available to add all information needed. Each different BF regeneration project can be stored by a user in "My BFN" a directory with a common folder structure where: results, scenarios, maps, decisions etc. can be stored

3.6 Technical information of the BFN

As mentioned, the Brownfield navigator is at this moment only available as an online tool, developed using only open source tools and software. It is written in PHP, a programming language for web development but also used as a general-purpose programming language. The project runs on an Apache HTTP Server, commonly referred to as Apache, a web server known for playing a key role in the initial growth of the Internet.
For the map function is OpenLayers used. OpenLayers is an open source JavaScript library for displaying map data in web browsers. It provides a strong basis for the geographic elements of the BFN similar to Google Maps and Bing Maps. For the visual elements of the geographic elements the BFN uses OpenStreetMap. This is a collaborative project to create a free editable map of the world. These open source tools are combined as building blocks for the Brownfield Navigator.

4 Wrap up

This report describes the decision support framework for successful brownfield regeneration that is used for the Brownfield Navigator. As the reader may conclude, it is still work in progress. Underneath the main points of attention and the planned activities are described. In the framework, lot of bits and pieces gathered from literature, workshops, experiences, HOMBRE and other research were used. These were used to give an overview of the land cycle phases – related to management activities that belong to these phases (what to do, which decisions to make).

The objective of this decision support framework is not to make decisions, but to support them who have to make decisions, with visualization, information and tools. The objective of the BFN is not to replace the BF manager, but to give insight in management phases, decisions and to stimulate the use of the (HOMBRE) highlights that research on BF regeneration has provided and that can add to the business as usual.

At the moment of writing, we can mention some of the highlights in HOMBRE:

1. Technology trains and project services, helping us to explore and realize opportunities
2. Project criteria: setting ambition, monitoring, assessing if goals are reached.
3. Evaluation and monitoring indicators
4. Early Warning Indicators
5. A storyline that helps us to close the land cycle
6. Development of a Brownfield Navigator that can be used to imagine futures together with stakeholders (visualisation, gathering material, examples, references) and that can be elaborated further due to its modular set up.

In the deliverable, we coupled the storyline to the Brownfield Navigator (highlights 5 & 6) and concepts from WP 2/4/5 (highlights 1, 2 ,3 ,4). And we put this in a modular decision structure.

Some points of attention:

- The workflow in the BFN is not coherent yet. The BFN provides information but the transfer from one management phase to the other, from step to step and from item to item should be made by the users. Attention should be paid to bridge the gap between the different items in each step (especially in the opportunity step).
- The transition from the outcome of the EWI tool (i.e. an area in which BF may occur) and the beginning of the planning the transition (which is at site scale) has not been elaborated. There is a gap between management phases “anticipating change” and “planning the transition and realisation”, The BFN does not provide guidance on how to choose one site rather than another within an area at risk.
- The emphasis in most items is on the environmental, rather than on the social and economic aspects. Eg, the description for a conceptual site model and risk assessment is derived from environmental literature. Elaboration towards broader, BF related aspects, social / economic dimension(including wider benefits), yet has to be done in the HOMBRE project.
- The emphasis and elaboration of items differ widely per step/item. Some methodologies and tools are likely to be well elaborated (e.g. the proposed

methodology on brownfield emergence EWI tool) before the end of the project while others are yet to be developed (e.g. the link with the technology trains). As described in chapter three, some items will be elaborated in the final year. Other items will remain confined to a short instruction or a link to more information outside the BN. When feasible, recommendations for further elaboration will be given.

- For some items, the rationale should be tested. This will be done in some cases in WP4, 5 and 6, (testing the decision support tool and opportunity matrix the technical work packages 4 and 5) but in other cases this may not be possible within the timeframe of the project (e.g. testing early warning indicators to predict BF emergence.)

In the final year of the HOMBRE project (Dec 2013-Nov 2014), more attention will be paid to the HOMBRE framework and how the different HOMBRE aspects (work packages) connect. This can have an influence on the content and arrangement of HOMBRE items.
Also, 2014 comprises the testing of the BFN. In task 3.3 (parts of) the BFN are tested. This testing will be used to improve the software and it will be used to improve or further elaborate the BFN content (items) as well as the decision support framework as a whole. During the testing the final recommendations for the BFN are formulated. The results will be described in deliverable 3.3.
The BFN will remain work in progress even after the HOMBRE project. The use experiences and the desires from the user form the next versions. Due to the modular set up for the BFN, it is possible to add to and improve the tool.

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Appendices

Appendix A-1 Key decisions
Appendix A-2 format rounds model
Appendix B different steps in (re)development, regeneration research projects
Appendix C Early Indicators for Brownfield origination
Appendix D EWI tool
Appendix E EU regulations and policies related to Brownfield Management
Appendix F Formats developed for the BFN example library

Appendix A Stakeholders, decisions, obstacles and information per phase

This appendix gives an overview of stakeholders, their key obstacles and decisions they can encounter and the required information for each management phase. These tables were filled in during a workshop in 2012 by the HOMBRE project partners (milestone 2.1). They were not based on a real case and therefore, a stakeholder analysis was not performed , nor are these tables complete. The most common stakeholders and their responsibilities, key decisions, obstacles and information were gathered by the HOMBRE project partners. For each specific situation we advice the user to add their case-specific information.

Anticipating change

Stakeholders

Stakeholders		Roles	Responsibilities	Objectives
authorities	Municipality	Land management, monitoring	Plan, regulate and realise "great places"	
	regional authorities			
	national authorities		Set up policy	
owners/users	land owner			Keep their land in use; or get their land back into use Avoiding or controlling loss
	current users/beneficiaries			
project executioners	potential investors	Development of new land use		Locate potential locations at an early stage
	project developer	Set up new projects		
	urban/landscape architect			
	contractor	Maintain and refurbish		
potentially impacted	local residents individually	Generate wealth	Pay taxes	Be happy
	local/regional community		Think locally, vote & active	Be happy

Obstacles

Key obstacles
Reluctance of land owners in taking action and/or being open about conditions
Lack of awareness / knowledge that a site is becoming underused: e.g. who will monitor early warning indicators (EWI) and who pays? (partly due to short election cycles)
Tax: developers of brownfield properties generally pay higher property taxes than developers of greenfield sites.
Fear of change: e.g. neighbourhood, community, municipality, water boards.

Weak communication towards the community, financial investors (banks)
Lack of interest, thus no urge to anticipate on cessation of use
Lack of resources, due to missing urge
No clear lead-responsible or not wanting to take responsibility → therefore postponing the situation
Liability of municipality, land owner
Lack of consensus between the main stakeholders
Only part of the stakeholders are involved →(not-involved) stakeholders can become show stoppers

Decisions

Key decisions to be made
Is there a problem? This needs to be decided sooner (before the site has become a BF).
Who benefits from "early anticipation"?
Who needs to take the lead → decide on ownership
Mobilize land owners what/where/how/when
Which stakeholders need to be involved
How to avoid that the site becomes a BF?
Decide what next?

Information

Information required
Inventory of issues and problems
Who are the stakeholders?
Select and monitor the right EWI
Monitoring options and accompanying costs
(What is the) value (baseline) of action (Δ€)

HOMBRE

HOMBRE solutions
Early warning indicators
Tool to select relevant early warning indicators
Tool to assess trends of potential BF formation

Planning the transition and realisation

Stakeholders

Stakeholders		Roles	Responsibilities	Objectives
authorities	municipality	Land management, spatial planning	social stability-wellbeing, plan and regulate great places	- Meet regulations - Economy - Win re-election
	regional authorities			
	national authorities	Yes, sometimes (if spatial planning is on national level e.g. national policy on urban problem areas)		
owners/users	land owner			- avoiding costs - avoiding liability - making money
	future users			- avoiding costs - avoiding liability - making money - happiness
	current users/beneficiaries			Not loosing what you have
project executioners	potential investors		Corporate social responsibility Long-term Euro	1 policy, 2 making money
	project developer			
	urban/landscape architect		Help client	EURO minus liability
	contractor		Help client	
potentially impacted	local residents individually	Depends on what will be realized (e.g. housing, industry, soft re-use)	Depends	Better living conditions, € (house price etc.)
	local/regional community			Safe, attractive new use
	action groups	Represent specific interests		Safeguard sustainable redevelopment

Obstacles

Key Obstacles
Lacking catalogues of vacant land
Lack of consensus between stakeholders, due to conflicting interests
Liabilities
Community as project-killers, when not taken on board in the development process
Negative value in books (=can also be an incentive to do something)
Unsupportive tax and other policy

Fragmented land ownership
Fragmented visualization of perspectives of the problem
Lack of imagining possible end-situations (due to scale and complexity)

Decisions

Key decisions to be made (and by whom)
Decide if it is a BF and what for type of BF (A, B, C)
If not decided in Step 1, who takes the lead? Point of attention: possible fear of being first (responsibility) / risk adverse. Appoint a BF manager.
Acceptance of lead
Determine vision and ambitions
Allocating risks and benefits (=transition)
Select options (=transition)
Decide and act on what are we going to do next?
Give permissions (land owner, municipality)

Information

Information required
Site info: ecological value, natural resources, history of site (former decisions and plans made, monitoring/data of the site), contamination etc
Stakeholder s analysis (including roles, responsibilities, objectives)
Site potential (chances, synergies) and obstacles

HOMBRE

HOMBRE solutions
Interim use → encourage flexibility
Formulating technology trains
Identifying synergies
Identifying ABC sites
Give inspiration/examples
Quick scan on site building materials
Defining service criteria

Managing the realization

Stakeholders

Stakeholders		Roles	Responsibilities	objectives
authorities	municipality		Monitoring the success, policy compliance, positive boundary conditions	policy compliance local wellbeing
	regional authorities		Avoid nuisance Avoid future liabilities	
	national authorities			
owners/users	land owner		Manage and maintain the realisation	Money
	current users/benificiaries	Maintain property correctly		Benefit from land use function
project executioners	potential investors	Invest	Invest	Earn money Realise a successful project
	project developer		Execute development	
	urban/landscape architect			
	contractor	Realize and maintain	Complete in time and at cost	
potentially impacted	local residents individually			Benefit from land use function
	local/regional community			

Obstacles

Key obstacles
Limited time horizon for authorities and project developers→ don't foresee future costs (e.g. maintenance)
Lack of interface between realization and maintenance
Lack of interest in long term design conditions
Lack of policy support for innovation
Mortgaging the future
Nuisance during realization

Decisions

Key decisions needed
Types of contract (DBMO: Design, build, maintain and operate contracts, PFI: private finance initiative)
What will be the value after realization?
Risk and benefit allocation during developments
Accessibility of the site
Mitigating measures nuisances on short and long term / Compensation (who, when, how much)
Taking into account “Resource efficiency”

Information

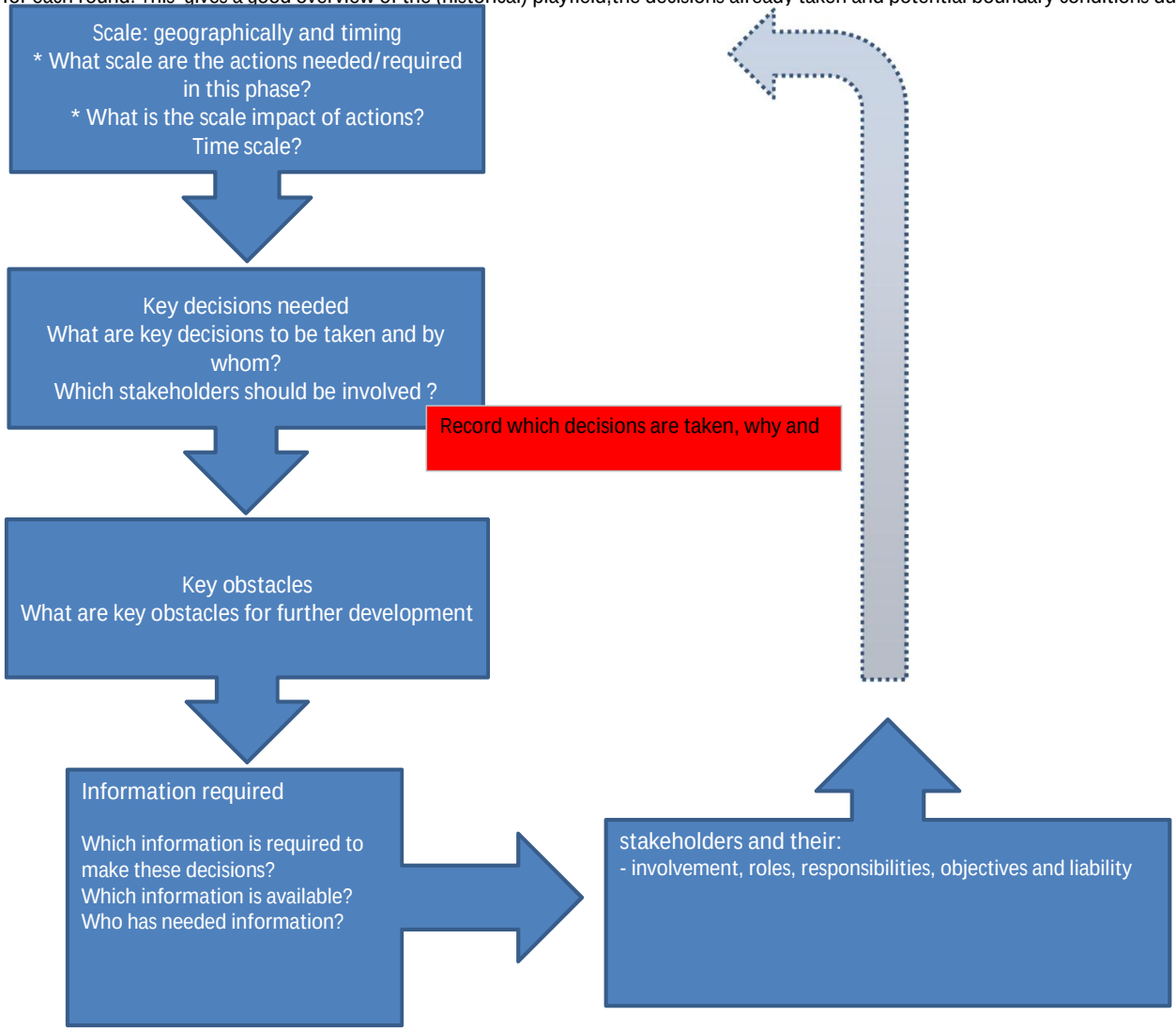
Information required
Monitoring set indicators (did the project reach its objectives)
Monitoring “sustainability “
Monitoring "value" creation
Ecosystem response
Archive decisions made, monitoring results etc

Overview BFN

Step 5- Evaluation and monitoring	
(in which extent) Did we reach our goals after realisation?	
Items in BFN:	Defining sustainability indicators for monitoring Monitoring and evaluation of sustainability indicators (was the project successful)
Scale	Site (and region)
User	Municipalities (advisor for the…)
Result	Indicators and evaluation results
Point of attention	transfer moment to next step – stakeholders

Appendix A-2 Stakeholder analysis and rounds model

For each "round" the stakeholders, the main decisions, obstacles etc can be given Each round represents a specific time or event.
Make a new sheet for each round. This gives a good overview of the (historical) playfield,the decisions already taken and potential boundary conditions during the project.



Round x

Draw initial ample list of stakeholders and relative importance, Use local informants to complete stakeholder table, Fill in stakeholder tables / matrices.
Specify (in the last column) the kind of participation for each stakeholders

Stakeholder Analysis					Type of participation
Group	Group's interest in Issue	Resources	Resource Mobilization Capacity	Position on issue	(consult / inform / partnership)

Key decisions (to be) made (and by whom)

Key obstacles

Information required (also consider Scale: geographically and timing)

Anticipating Change

Is there a transition, with a risk of BFs ahead?

Draw initial ample list of stakeholders and relative importance, Use local informants to complete stakeholder table, Fill in stakeholder tables / matrices.
Specify (in the last column) the kind of participation for each stakeholders

Stakeholder Analysis					Type of participation
Group	Group's interest in Issue	Resources	Resource Mobilization Capacity	Position on issue	(consult / inform / partnership)

Key decisions (to be) made (and by whom)

Key obstacles

Information required (also consider Scale: geographically and timing

Planning transition and realisation

Draw initial ample list of stakeholders and relative importance, Use local informants to complete stakeholder table, Fill in stakeholder tables / matrices.
Specify (in the last column) the kind of participation for each stakeholders

Stakeholder Analysis					Type of participation
Group	Group's interest in Issue	Resources	Resource Mobilization Capacity	Position on issue	(consult / inform / partnership)

Key decisions (to be) made (and by whom)

Key obstacles

Information required (also consider Scale: geographically and timing

Management Realisation

Draw initial ample list of stakeholders and relative importance, Use local informants to complete stakeholder table, Fill in stakeholder tables / matrices.
Specify (in the last column) the kind of participation for each stakeholders

Stakeholder Analysis					Type of participation
Group	Group's interest in Issue	Resources	Resource Mobilization Capacity	Position on issue	(consult / inform / partnership)

Key decisions (to be) made (and by whom)

Key obstacles

Information required (also consider Scale: geographically and timing

Appendix B different steps in (re)development, regeneration research projects

	HOMBRE *(figure 3.1, main text)*	RESCUE (figure B.1,)	REUSE (figure B.2)	Building with nature (figure B.3)	Upside down (Ondersteboven) (figure B.4)	Cabernet (figureB.5)
Aim	Describe management phases along life cycle	Describe project phases for sustainable land use and urban design on brownfield sites	Describe phases for community-based brownfield redevelopment strategies	Describe consecutive phases for project development, though a cyclic process	Describe redevelopment steps of contaminated sites / Brownfields	Describe phases for Sustainable Brownfield Regeneration and involvement of dedicated agencies
Anticipating change	Identification	(not included)		(not included)	(not included)	(not included)
Planning the transition and realization	Scoping	Initiating phase, project preparation	Step 1: Develop a Community Vision Step 2: Identify Brownfield Sites* *individual sites in a problem area)	Initiative	Orientation Initiative	Step 1 Establish the vision
	Opportunities	Characterisation phase	Step 3: Assess Level of Contamination Step 4: Determine Reuse Options	Planning and design* • Understanding the system • Identify realistic alternatives • Valuate the quality of alternatives and pre-select an integral solution • Elaborate selected alternatives • Prepare for implementation in the next phase on the road to realization	Investigation	Step 2 Consult on the vision Step 3 Develop necessary infrastructure & public realm standards

						Step 4 prepare site development briefs
	Assessment	Planning and design phase Preparation of project implementation	Step 5: Evaluate Cleanup Options		Development	Step 5 training and employment access principles
						Step 6 developer-partner selection
						Step 7 developer-partner agreement
Managing the realization		Implementation phase: demolition, remediation	Step 6: Implement a Redevelopment Plan	Construction	Contracting	Step 8 implementation
		Implementation phase: local public infrastructure construction, development		Operation and maintenance	Allocation contracts	Step 9 training and employment linkages activated
					Realisation	
	Evaluation and monitoring	Project closure			Management and maintenance	Step 10 aftercare
Source	Maring et al. (2013)	Brüggemann et al. (2004)	Rice (ed.) (not dated)	http://www.ecoshape.nl/en_GB/wiki-guideline.html/guideline/162-EDD+-+Introduction+-+Five+Steps	Alphenaar and Nauta (2011)	Ferber et al. (2006-II)

Figures

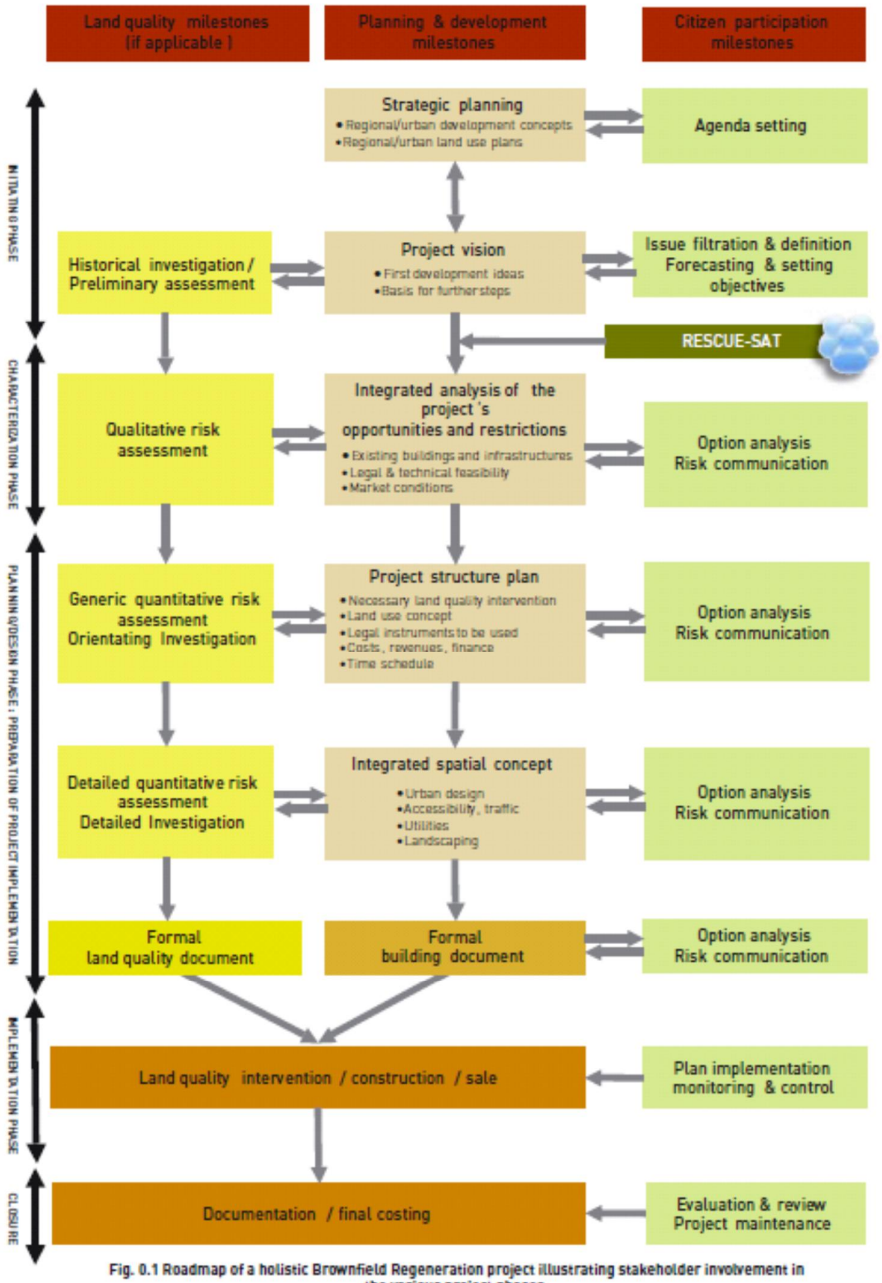
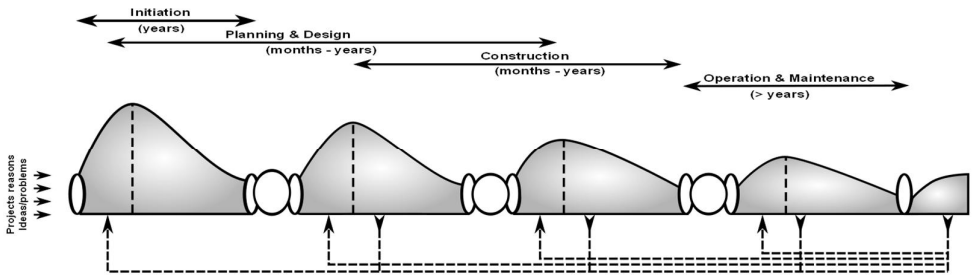


Fig. 0.1 Roadmap of a holistic Brownfield Regeneration project illustrating stakeholder involvement in the various project phases.

Figure B.1 RESCUE roadmap of a holistic BF regeneration project illustrating stakeholder involvement in the various project phases. (Edwards et al., 2005)

Figure B.2 REUSE project stages (Rice (editor), not dated)



Each phase is divided in different tasks, eg the planning & design step:

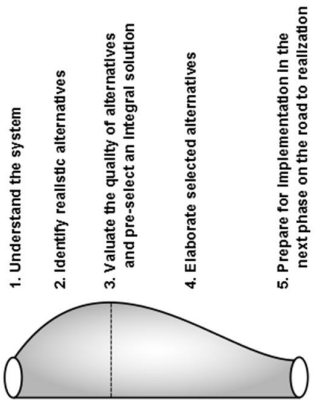


Figure B.3 Project steps of Ecoshape, Building with Nature guideline (http://www.ecoshape.nl/en_GB/wiki-guideline.html/guideline/162-EDD+-+Introduction+-+Five+Steps)

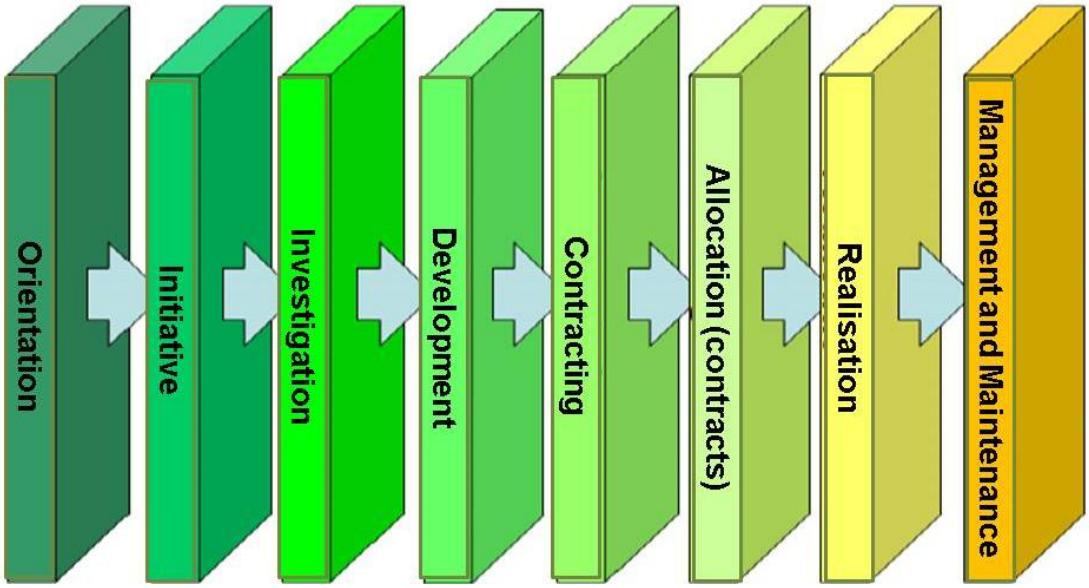


Figure B.4 Project phases for redevelopment of contaminated industrial sites (Alphenaar and Nauta,2011). Translated from Dutch

Fig. 5.3 Optimum lifecycle of a brownfield site

	Dedicated agency role
Step 1. establish the 'vision'	coordinator & champion
Step 2. consult on the 'vision'	coordinator & champion
Step 3. develop necessary infrastructure & public realm standards	driver, champion & facilitator
Step 4. prepare site development briefs	deliverer & coordinator
Step 5. training & employment access principles	champion & coordinator
Step 6. developer-partner selection	independent coordinator & adjudicator
Step 7. developer-partner agreements	independent body
Step 8. implementation	facilitator
Step 9. training & employment linkages activated	coordinator
Step 10. aftercare	coordinator/deliverer

Figure B.4 Cabernet project phases and possible role of dedicated agencies (in reality the model is not necessarily linear, and many of these steps can be approached simultaneously) (Ferber et al., 2006-II)

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Appendix C Early Indicators for Brownfield origination

ELEMENT	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
Economy	deindustrialisation or restructuring of the economic activities	Land use	the change of the percentages of areas under industrial land use	Short term	Local and National	EUROSTAT
			floor spaces for industrial, retail and office use	Short term	Local	Local/national statistics[1]
		Composition of employment	percentages of employment in industrial sector and service sector within municipalities	Short term and long term	Local and national	EUROSTAT Local/national statistics
		Composition of GDP	percentages of GDP in industrial sector and service sector within municipalities	Short term and long term	Local and 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	average time from facility to major highway network/train facility	Short term/ Long term	Local	Local infrastructure plans
			bridge weight limits	Short term/ Long term	Local	Local infrastructure plans

[1] For example:http://www.communities.gov.uk/planningandbuilding/planningbuilding/planningstatistics/previouslydevelopedbrownfield/

			lost time due to congestion	Short term/ Long term	Local	Local infrastructure plans
			volume/capacity ratio	Short term/ Long term	Local	Local infrastructure plans
		Safety	Number of accidents	Short term/ Long term	Local	Local statistics
		System Preservation	Percent of roadway/bridge system below standard condition	Long term	Local	Local infrastructure plans
			Age 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/ Long term	Regional	
	Recession	Withdrawing investment from regions experiencing recession	National real GDP	Short term/ Long term	National/ Global	National Statistic Eurostat
			Real income	Short term/ Long term	National	National Statistic Eurostat
			Employment rate	Short term/ Long term	National	National Statistic Eurostat
			Industrial production	Short term/ Long term	National/ Global	National Statistic Eurostat
			Wholesale-retail sales	Short term/ Long term	Local	Chamber of commerce

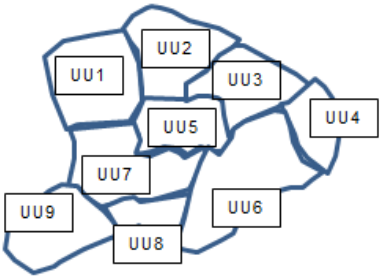
ELEMENT	CATEGORY	ISSUES INDICATORS MIGHT NEED TO CONSIDER	SUGGESTED INDICATORS	Effect on short/long term <10 years >	Scale Local/Regional/ National/Global	Source for data/info
Social	Societal development	Population wealth	% social rent dwellings % of uniform houses versus diversification of houses % change in income groups in certain period	Short term	Local	Local statistics
		Education level	% of university/higher education in certain period	Short term/ Long term	Local	Local and national statistics
		Available services	Average distance to schools / shopping areas / restaurants etc (specific to case)	Short term	Local	Local statistics
	State of the social system	Crime	# of vandalism incidents reported in certain period compared to regional statistics # of criminal incidents reported in certain period compared to regional statistics	Short term	Local/Regional	National Databases For example in the Netherlands: http://www.ad.nl/ad/nl/1401/home/integration/nmc/frameset/nieuws/misdaadmeter.dhtml
		Health	Average age of death	Long term	Local/National	Local and national statistics
		Social cohesion	Change in the distribution of age groups in area.	Long term	Local	Local and national statistics
			% of people feeling some sort of commitment with area		Local	

ELEMENT	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
Environ-mental	Pollution	Soil	Contamination amount/density; soil quality assessment	Short term/ Long term	Local	Local/National statistics
		(Ground)Water	EBI index	Short term/ Long term	Local/Regional	Local/National/EU statistics
		Air	NOX/pm10 concentrations	Short term/ Long term	Local	Local/National/EU statistics
	Green areas	The presence of green area at site and its quality	m2 of green area per inhabitant	Long term	Local	Local/National statistics
	Ecology	Biodiversity	Number of species per m2	Short term	Local	Local/National statistics
	Hindrances	Amount of hinder due to noise	amount of dB at different sites throughout the area	Short term	Local	Local/National statistics

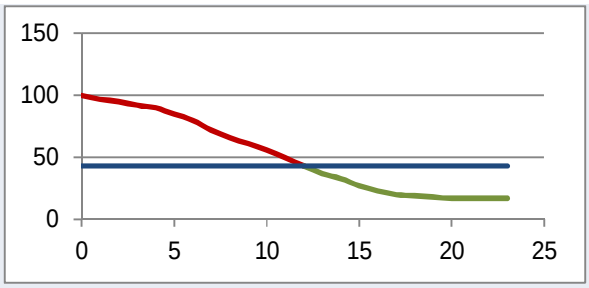
Appendix D– HOMBRE methodology on anticipating brownfield emergence – Module "Anticipating Change" and Step 1 identification of the BFN

This appendix gives an overview of the proposed activities to be followed when applying the proposed HOMBRE methodology to anticipating brownfield emergence

A mock-up for the EWI tool is under development. Once on line, the following activities for step "identification" of the BFN are expected to be prompted to the end user

BFN Setp 1 identification	
1	<u>Obtain base map</u> The end-user is prompted to obtain relevant basemap(s) that should encompass the studied area (base maps are usually cadastral systems). Note: The monitoring approach should be applicable to a municipality, a neighbourhood or a specific area of land (e.g. megasite).
2	<u>Define limits of studied area on BFN GIS support tool</u> The end-user is prompted to define the limits of the urban studied area and the various urban units within studied area The end user can be a moderator with relevant GIS/programming skills working for the official end-users (land planners, urban planners) that work together on decision-making (multistakeholders). Note: An urban unit present a functional area. Data could ideally be collected by administrative boundaries, wards/neighbourhoods or even a site. Or should be generated from existing sources. The end-user can either draw manually the boundary of the studied area into a shapefile within the BFN GIS tool or import an existing boundary shapefile into the BFN GIS tool. The same applies to the urban units which are subdivision of the overall studies area.  Example of a shapefile representing the urbanised area divided into urban units (uu)
3	<u>Decide on relevant indicators</u> A list of indicators is proposed by default to the end-user. The end-user may decide that additional early indicators are needed if they are more relevant for the specific studied area.

	With a ponderation system, the user estimates that some indicators should have more importance than others in the overall score.	
	For the Monitoring approach	For the consultation approach
4	Organise data collection The end-user is prompted to check that needed data is available for the monitoring of the chosen indicators.	Organise data collection The land planners/urban planners organise an internal consultation with relevant stakeholders on potential brownfield emergence in a specified area. Guidance should be provided (identification of relevant stakeholder, communities, communication of objectives, etc.)
5	It is proposed to provide on-line guidance to the end-user with rationales for the default list indicators and with suggestions of methodologies to analyse data trends. Thresholds for potential of brownfield formation may be proposed. Apart from guidance, the BFN tool is not necessarily needed at this stage.	
6	Collect data The end-user is prompted to collect the chosen indicator data over a time period and frequencies that is relevant for each of the urban unit (it may be statistical or empirical data).	Collect results The end-user is prompted to collect data by running public consultation on perception of attendees of brownfield emergence in a specified studied area. All attendees are required to give their opinion on the trends the chosen indicators may have gone through over a specific period of time based on their appreciation of the studied area, experience, knowledge, etc. They are to use questionnaires on the day to hand them over to the organisers/end-user (Local Authority, urban planners).
	For any of the approaches afterwards	
7	Assess trends or asses results – fill in online form After reviewing trends from the monitoring data or reviewing the scoring from the consultation process, the end-user has to fill in an online form on potential brownfield formation for each of the urban unit. The end user will be prompted to analyse trends before filling in the questionnaire (either from long term monitoring datasets relevant to each of the default indicators or from the land planners consultation). For each indicator, the user will have to score whether a specific indicator indicates a potential for brownfield formation of not (using scoring system from 1 to 10 for example).	



Monitoring of an indicator over time with hypothetical thresholds for brownfield formation (statistical data)

6 Display 1st results on BFN GIS support tool

The end-user is prompted to generate visual results for each indicator on the GIS basemap

Figure XXX – Example of a shapefile representing the potential for brownfield formation based on the Indicator A

7 Display main results on BFN GIS support tool

The end-user is prompted to generate an overall scoring for potential brownfield formation within each urban unit (using an algorithm integrating the scores from all indicators per zone).

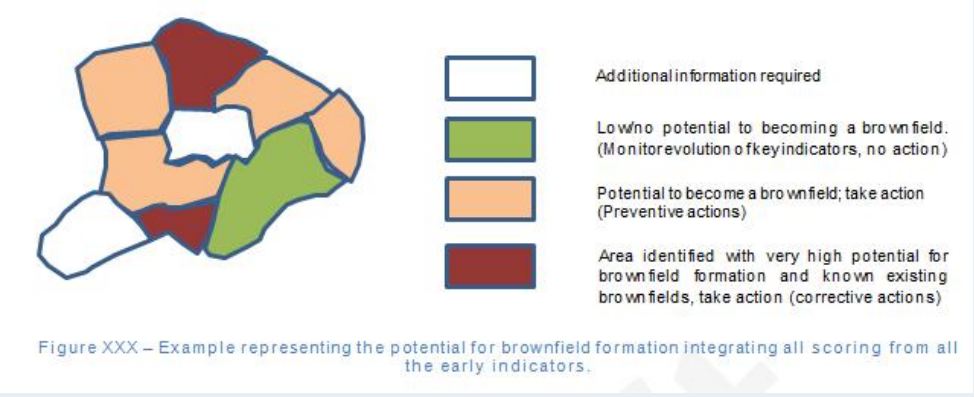


Figure XXX – Example representing the potential for brownfield formation integrating all scoring from all the early indicators.

8 Decision making

If end user is local authority/urban planners, decision may be taken and preventive or corrective measures put in place

Appendix F EU regulations and policies related to Brownfield Management

This activity consists of scanning EU-directives, EU-reports and international publications on the topic of brownfields and related environmental aspects. Below is a list of publications that have been scanned for objectives, regulations and observations. The objective of this activity is to identify opportunities and challenges for brownfield regeneration processes, resulting from the EU perspective. National and regional policies and interpretations of these EU policies are not included in this activity.

The result of this activity is a table with 3 categories: environmental sustainability, economic feasibility and social participation. Each category has multiple themes in which the quotes (objectives, regulations and observations) are bundled. After each quote is a reference included to where the quote has been found. At the most right column a short remark is made about how this quote may potentially influence brownfield regeneration.

Directives

Council directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora

Council directive 98/83/EC of 3 November 1998 on the quality of water intended for human consumption

Directive 2000/60/EC of the European parliament and of the council of 23 October 2000 establishing a framework for Community action in the field of water policy

Directive 2003/4/EC of the European parliament and of the council of 28 January 2003 on public access to environmental information and repealing Council Directive 90/313/EEC

Directive 2004/35/CE of the European parliament and of the council of 21 April 2004 on environmental liability with regard to the prevention and remedying of environmental damage

Directive 2006/118/EC of the European parliament and of the council of 12 December 2006 on the protection of groundwater against pollution and deterioration

Directive 2008/98/EC of the European parliament and of the council of 19 November 2008 on waste and repealing certain Directives (Text with EEA relevance)

Directive 2009/147/EC of the European parliament and of the council of 30 November 2009 on the conservation of wild birds (codified version)

Directive 2010/31/EU of the European parliament and of the council of 19 May 2010 on the energy performance of buildings (recast)

EU publications

COM(2006) 231 final. Communication from the European Commission. Thematic strategy for soil protection.

COM(2011) 571 final Communication from the Commission. Roadmap to a resource efficient Europe.

Committee of the Regions (2012). Opinion of the Committee of the Regions on 'A resource-efficient Europe — Flagship initiative under the Europe 2020 strategy'. Doc.nr 2012/C9/08

European Commission – Environment (2013). "Mapping and Assessment of Ecosystems and their Services. An analytical framework for ecosystem assessments under Action 5 of the EU Biodiversity Strategy to 2020". Discussion paper

European Commission – Environment (2011). Brochure on the EU biodiversity strategy to 2020. Doc.nr. 10.2779/39229.

European Court of Auditors (2012). Have EU structural measures successfully supported the regeneration of industrial and military brownfield sites? Report nr. 2012-23. QJ-AB-12-024-NL-C

Other publications

Thornton, G., M. Franz, D. Edwards, G. Pahlen and P. Nathanail (2007). The challenge of sustainability: incentives for brownfield regeneration in Europe. In: Environmental Science and Policy nr. 10-2007

United Nations and Economic Commission for Europe (1998). Convention on access to information, public participation in decision-making and access to justice in environmental matters. Conducted at Aarhus, Denmark.

Gong, Yuyang(2010) International experience in policy and regulatory frameworks for brownfield site management. Discussion paper 57890. World Bank Washington D.C. USA

Appendix E part2 table Incentives and barriers BFR		
Quote	Reference	Remarks
Environmental sustainability		
Measurable indicators for sustainability		
Recommendation: Adopt a 'basket' of four main resource-use indicators: land footprint, use of raw materials (biodiversity, biological and mineral resources), water footprint and greenhouse-gas footprint	Opinion of the Committee of the Regions on 'A resource-efficient Europe — Flagship initiative under the Europe 2020 strategy', doc.nr 2012/C9/08	If brownfield regeneration is more sustainable than other options, a better quantification of these main indicators will contribute to include these effects in the consideration. brownfield regeneration will then become a more favourable option. Quantifying these indicators will likely require demonstration projects, for which a brownfield regeneration project can be suited
Recommendation: propose, in cooperation with Member States and on the basis of scientific evidence and best practices: (i) EU standards for the definition of contaminated sites and the significance of the environmental and health risks they pose; (ii) an EU methodology for the definition of site-specific remediation standards taking account of final site use	"Have EU structural measures succesfully supported the regeneration of industrial and military brownfield sites?" Report of the European Court of Auditors. Report nr. 2012-23. QJ-AB-12-024-NL-C	This is an incentive for policy makers to set the priorities for brownfield regeneration. For a specific site this may be less relevant. Standards and clear definitions may reduce uncertainties and therefore contribute as an incentive
Recommendation: Compile lists of brownfield sites where contamination is suspected and classify them according to the corresponding health and environmental risks. Sites should be prioritised for remediation to facilitate the preparation of remediation plans contributing to health protection and to the achievement of EU environmental objectives, such as the good water ecological status required by the European Water Framework Directive.	"Have EU structural measures succesfully supported the regeneration of industrial and military brownfield sites?" Report of the European Court of Auditors. Report nr. 2012-23. QJ-AB-12-024-NL-C	This is an incentive for policy makers to set the priorities for brownfield regeneration. For a specific site this may be less relevant. Standards and clear definitions may reduce uncertainties and therefore contribute as an incentive
Recommendation: Structural Funds are allocated at the point of delivery (regional/sub-regional) on a competitive basis. Successful proposals are evaluated in terms of their potential to deliver more ''outputs'' (measured numerically) such as number of jobs created, area of land reclaimed, etc. No consideration is made of the methods used to create these outputs (i.e. sustainable proposals are not differentiated from unsustainable proposals).	"The challenge of sustainability: incentives for brownfield regeneration in Europe", G. Thornton, M. Franz, D. Edwards, G. Pahlen and P. Nathanail. In Environmental Science and Policy nr. 10-2007	Better defined criteria and improved ability to measure them will benefit sustainable brownfield regeneration projects.
Aichi Biodiversity Target 2. By 2020, at the latest, biodiversity values have been integrated into national and local development and poverty reduction strategies and planning processes and are being incorporated into national accounting, as appropriate, and reporting systems.	"Mapping and Assessment of Ecosystems and their Services. An analytical framework for ecosystem assessments under Action 5 of the EU Biodiversity Strategy to 2020". Discussion paper final april 2013	These developments will indirectly support broad defined brownfield regeneration processes.
Ecosystem and biodiversity		
Recommendation: Protect and restore ecosystem services	Opinion of the Committee of the Regions on 'A resource-efficient Europe — Flagship initiative under the Europe 2020 strategy', doc.nr 2012/C9/08	brownfield regeneration and remediation may be supported by this recommendation
Objectives: maintain a good level of preservation of endangered or protected species, bird and habitats.	Bird- and Habitatdirectives. Directive nr. 1992/43/EEG and 2009/147/EG	brownfield regeneration might benefit from these directives. Soil remediation and additional environmental measures may support a (nearby) habitat or species. On the other hand, abandoned terrains might have developed high quality habitats or became the habitat of protected species. Removing these habitats becomes difficult once these species have settled there.
Target 2: The strategy also calls for the development of a green infrastructure for Europe. The EU is one of the most fragmented continents in the world. Thirty percent of the land is moderately to highly fragmented due to urban sprawl, infrastructure developments and changing land uses. This not only affects biodiversity but also undermines the many services that healthy ecosystems provide society, such as a clean water supply, protection against floods and erosion etc. Building a green infrastructure can help overcome many of these challenges. It can reconnect fragmented natural areas and improve their functional connectivity within the wider countryside. It can also encourage a better use of naturebased approaches to tackle climate change and to improve resource efficiency, for instance through more integrated spatial planning and the development of multifunctional zones that are capable of delivering benefits to both biodiversity, the land user, and to society at large. The Commission intends, therefore, to put forward a new strategy on an EU-wide green infrastructure by 2012.	"EU biodiversity strategy to 2020". EU adopted strategy in May 2011	Urban sprawl is here mentioned as one of the factors that cause fragmentation and by that pose a threat to ecosystems and biodiversity. Connecting brownfield regeneration to the green infrastructure or remove barriers for migration of animals and plants might create opportunities. brownfield regeneration most often also contributes in reducing urban sprawl (see soil sealing).
Aichi Biodiversity Target 14: By 2020, ecosystems that provide essential services, including services related to water, and contribute to health, livelihoods and well-being, are restored and safeguarded, taking into account the needs of women, indigenous and local communities, and the poor and vulnerable.	"Mapping and Assessment of Ecosystems and their Services. An analytical framework for ecosystem assessments under Action 5 of the EU Biodiversity Strategy to 2020". Discussion paper final april 2013	brownfield regeneration may indirectly contribute to this target by preventing additional pressures on ecosystems.

Aichi Biodiversity Target 15: By 2020, ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced, through conservation and restoration, including restoration of at least 15 per cent of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and to combating desertification.	"Mapping and Assessment of Ecosystems and their Services. An analytical framework for ecosystem assessments under Action 5 of the EU Biodiversity Strategy to 2020". Discussion paper final april 2013	brownfield regeneration contributes to this target by restoring degraded ecosystems and preventing greenfields to become degraded.
Soil sealing		
Recommendation: Reduce the extent of existing soil sealing wherever needed	Opinion of the Committee of the Regions on 'A resource-efficient Europe — Flagship initiative under the Europe 2020 strategy', doc.nr 2012/C9/08	brownfield regeneration directly contributes to this recommendation
Milestone target: By 2020, EU policies take into account their direct and indirect impact on land use in the EU and globally, and the rate of land take is on track with an aim to achieve no net land take by 2050	"Roadmap to a resource efficient Europe". Communication from the European Commission. Doc.nr COM(2011) 571 final	brownfield regeneration directly contributes to this milestone
Recommendation: promote the regeneration of brownfield sites, avoiding the use of greenfield unless strictly necessary and otherwise requiring the application of compensation measures;	"Have EU structural measures succesfully supported the regeneration of industrial and military brownfield sites?" Report of the European Court of Auditors. Report nr. 2012-23. QJ-AB-12-024-NL-C	This recommendation is a direct support of brownfield regeneration
Proposal for directive: In order to achieve a more rational use of soil, Member States will be required to take appropriate measures to limit sealing by rehabilitating brownfield sites and to mitigate its effects by using construction techniques that allow maintaining as many soil functions as possible.	Thematic strategy for soil protection, communication from the European Commission. Doc.nr COM(2006) 231 final	This requirement (in the proposal of the soil-directive) will lead to the need for policies and funds at national and EU-level. This may affect the opportunities for brownfield regeneration positively
Soil quality		
Observation: Extensive evidence shows that most of the costs of soil degradation are not borne by the immediate land users, instead they are often borne by society at large and by players far from the location of the problem (off site).	Thematic strategy for soil protection, communication from the European Commission. Doc.nr COM(2006) 231 final	This observation may lead to policies for sustainable (economical) recalculation of costs and benefits. Then it may become a ground for a claim for funding
Guiding principle 1: Prevent further soil degradation and preserve its functions	Thematic strategy for soil protection, communication from the European Commission. Doc.nr COM(2006) 231 final	The soils under brownfields are most often already degraded. This principle is not a direct support for brownfield regeneration
Observation: Soil degradation affects other environmental areas. Soil functions enormously contribute to areas such as biodiversity and marine protection, coastal management, and to the mitigation of climate change.	Thematic strategy for soil protection, communication from the European Commission. Doc.nr COM(2006) 231 final	If brownfield regeneration restores soil functions that support other environmental areas, these benefits may support other policy objectives. This may be a ground for funding.
Observation: food safety – uptake of contaminants in the soil by food and feed crops and some food producing animals can have a significant impact on the safety of feed and food, which are traded freely within the internal market, by increasing their level of contaminants, hence posing a risk to human or animal health.	Thematic strategy for soil protection, communication from the European Commission. Doc.nr COM(2006) 231 final	In the case that a brownfields becomes farming land (urban farming), this aspect must be taken into account when setting remediation targets.
Further research is necessary to close the gaps in knowledge about soil and strengthen the foundation for policies.	Thematic strategy for soil protection, communication from the European Commission. Doc.nr COM(2006) 231 final	Research programs on this topic might be an opportunity for additional funding of the process of brownfield regeneration.

Waste reduction and circular economy		
Observation: overall waste generation is stable in the EU, however, generation of some waste streams like construction and demolition waste, to sewage sludge and marine litter is still increasing.	"Roadmap to a resource efficient Europe". Communication from the Commission. Doc.nr COM(2011) 571 final	brownfield regeneration combined with revitalising buildings and/or sustainable reuse of demolition waste can contribute to alter this trend
Observation: Other EU developments, such as the Landfill Directive, which seeks to make waste disposal the last resort (particularly contaminated soil), are providing parallel legislative and economic drivers that can enable the necessary changes to be enacted rather than resisted.	"The challenge of sustainability: incentives for brownfield regeneration in Europe", G. Thornton, M. Franz, D. Edwards, G. Pahlen and P. Nathanail. In Environmental Science and Policy nr. 10-2007	This may be an incentive to reuse brownfields without creating much demolition waste
Recommendation: Achieve a zero-waste society through optimising waste prevention and seeing waste as a resource within a circular economy	Opinion of the Committee of the Regions on 'A resource-efficient Europe — Flagship initiative under the Europe 2020 strategy', doc.nr 2012/C9/08	brownfield regeneration based on the prevention of demolishment of obsolete buildings (e.g. revitalise the buildings) can contribute to this recommendation
Milestone target: By 2020 the renovation and construction of buildings and infrastructure will be made to high resource efficiency levels. The Life-cycle approach will be widely applied; all new buildings will be nearly zero-energy and highly material efficient, and policies for renovating the existing building stock will be in place so that it is cost-efficiently refurbished at a rate of 2% per year. 70% of non-hazardous construction and demolition waste will be recycled.	"Roadmap to a resource efficient Europe". Communication from the Commission. Doc.nr COM(2011) 571 final	If brownfield regeneration results in highly efficient and life cycle concept based buildings, it may support this target
Recommendation: Better options to enable an increase in soil and waste reuse need, and deserve, support.	"The challenge of sustainability: incentives for brownfield regeneration in Europe", G. Thornton, M. Franz, D. Edwards, G. Pahlen and P. Nathanail. In Environmental Science and Policy nr. 10-2007	Better options for reuse will make it easier to comply to objectives of the Waste Directive and make brownfield regeneration more sustainable
Target (article 11): by 2020, the preparing for re-use, recycling and other material recovery, including backfilling operations using waste to substitute other materials, of non-hazardous construction and demolition waste excluding naturally occurring material defined in category 17 05 04 in the list of waste shall be increased to a minimum of 70 % by weight. Article 14 describes the principle that the owner of the waste shall borne the costs of disposal.	Directive on waste. Directive nr. 2008/98/EC	In the near future, demolition waste should be reused in a large extent. Depending on who should be responsible for reusing the waste, this might require additional effort to find a good destination for these materials. In case the owner of the waste was not obliged to pay for discharging the materials, this might become an additional cost factor.
Water		
The objective of the drinking water directive shall be to protect human health from the adverse effects of any contamination of water intended for human consumption by ensuring that it is wholesome and clean.	Directive on the quality of water intended for human consumption. Directive nr. 1998/83/EG	This directive is barely applicable for brownfield management, unless the contamination may affect human health at these sites by entering the drinking water chain/network.
The water framework directive gives a framework for an integrated approach on regional and river basin management. If a brownfield has an influence on relevant water bodies, than the Water framework Directive is applicable. Water management organizations must then report how they are going to manage the site and which measures will be taken.	Water Framework Directive. Directive nr. 2000/60/EG	This directive is applicable if the site has a direct influence on waterbodies (groundwater and surfacewater). If this is the case, the water management organization might have direct interests in a water quality improvement
Objective: In order to protect the environment as a whole, and human health in particular, detrimental concentrations of harmful pollutants in groundwater must be avoided, prevented or reduced	Groundwater directive. Directive nr. 2006/118/EC	This directive is about groundwater bodies, which are much larger than a single pollution site. The groundwater bodies should have a good chemical status and support ecological objectives. At locations nearby extractions for especially drinking water, the quality should be sufficient in order not to pose a threat for human health.
Energy		
Objective: the application of minimum requirements to the energy performance of new buildings and new building units;	Directive on Energy Performance of Buildings. Directive nr. 2010/31/EU	New buildings must meet these minimum requirements. This poses no additional costs or benefits compared with new buildings on green fields
Objective: the application of minimum requirements to the energy performance of: existing buildings, building units and building elements that are subject to major renovation; building elements that form part of the building envelope and that have a significant impact on the energy performance of the building envelope when they are retrofitted or replaced; and technical building systems whenever they are installed, replaced or upgraded	Directive on Energy Performance of Buildings. Directive nr. 2010/31/EU	When renovating existing buildings, the new construction parts must meet these minimum requirements
Objective: national plans for increasing the number of nearly zero- energy buildings	Directive on Energy Performance of Buildings. Directive nr. 2010/31/EU	In case the brownfield regeneration project has high ambitions on this aspect, this EU objective might generate support from these national plans

Economic feasibility		
Focus on feasible targets		
Recommendation: Brownfield regeneration projects should be part of an integrated development plan for the city or area concerned; ask promoters to carry out a market analysis and consider the relevant options for the possible future of brownfield sites which should be based on the integrated development plan:	"Have EU structural measures succesfully supported the regeneration of industrial and military brownfield sites?" Report of the European Court of Auditors. Report nr. 2012-23. QJ-AB-12-024-NL-C	In general, this would be wise to do in a brownfield regeneration-project. This will likely become a requirement for EU funding.
Recommendation: Consider setting up brownfield site regeneration strategies with clear targets	"Have EU structural measures succesfully supported the regeneration of industrial and military brownfield sites?" Report of the European Court of Auditors. Report nr. 2012-23. QJ-AB-12-024-NL-C	The term "clear targets" refers to consider lower remediation targets when the proposed function of the area allows this. This may reduce costs of remediation and therefore contribute to the feasibility of contaminated brownfield regeneration
Guiding principle 2: Restoring degraded soils to a level of functionality consistent at least with current and intended use, thus also considering the cost implications of the restoration of soil	Thematic strategy for soil protection, communication from the European Commission. Doc.nr COM(2006) 231 final	This is a direct support for brownfield regeneration projects in which the target is to restore the soils to a state that suits current or intended use of the soil.
Environmental liability and the polluter pays principle		
Recommendation: Consider measures to address problematic sites that are privately owned where the owner fails to take the necessary action. Require the extent to which the polluter pays principle can be applied to be explicitly considered for all regeneration projects and application of that principle to be made a condition for granting EU funding. Consider the opportunity to define EU common principles for the application of the polluter pays principle in case of contamination originating before the introduction of the principle in the law	"Have EU structural measures succesfully supported the regeneration of industrial and military brownfield sites?" Report of the European Court of Auditors. Report nr. 2012-23. QJ-AB-12-024-NL-C	This recommendation and the eventually following actions may support the legal opportunities to achieve a better distribution of costs and benefits among the involved parties. These principles may help reduce uncertainties about the distribution of costs and benefits and thereby help brownfield regeneration processes.
Principle: "the pollutant pays" as a basic rule to prevent society for being responsable for the costs of environmental damage	Environmental liability directive. Directive nr. 2004/35/EG	Recent pollutions have clear liabilities: the pollutant (or legal successor) or the insurance company who took over the risk are liable
Directive: The environmental liability directive must be implemented in national law between 2004 and 2007.	Environmental liability directive. Directive nr. 2004/35/EG	The environmental liability directive does not offer any support in case of already existing pollutions, dating till the implementation of the directive
Directive: The environmental liability directive is not applicable to activities for national defence	Environmental liability directive. Directive nr. 2004/35/EG	Military brownfields are excluded from the environmental liability directive.
A just distribution of private investments and public funding that matches the private risks and public targets		
Recommendation: Thoroughly assess the funding gap for each project	"Have EU structural measures succesfully supported the regeneration of industrial and military brownfield sites?" Report of the European Court of Auditors. Report nr. 2012-23. QJ-AB-12-024-NL-C	In general this is already required for each project. This is meant as a special attention, because the costs and benefits of brownfield regeneration are very complicated
Make detailed checks to ensure that subsidies for remediation are not provided in respect of sites for which a promoter has already received purchase price discounts. For this, the public authority should have a reliable market valuation of the land, a realistic assessment of the likely costs of remediation works, and full transparency of terms of the land acquisition and any price discounts included therein:	"Have EU structural measures succesfully supported the regeneration of industrial and military brownfield sites?" Report of the European Court of Auditors. Report nr. 2012-23. QJ-AB-12-024-NL-C	This is a specific point regarding concealed state aid. This will likely become a requirement for receiving EU funding
Recommendation: Include a reimbursement clause in all grant decisions for regeneration projects to allow the possibility for them to reassess the financial performance of projects in the light of developments over a longer period (say 15 years), and to allow where projects have generated more revenues than expected, part or all of a grant to be clawed back. The Commission should follow up the application of such reimbursement clauses	"Have EU structural measures succesfully supported the regeneration of industrial and military brownfield sites?" Report of the European Court of Auditors. Report nr. 2012-23. QJ-AB-12-024-NL-C	In case the private benefits are larger than expected, a part of the funding should be returned. This will likely become a requirement for receiving EU funding
Observation: the most significant financial incentive in existence for sustainable brownfield development is EU Structural Funding and without such funding regeneration activity in Europe would have been almost exclusively restricted to economically feasible sites—the so called 'A' sites	"The challenge of sustainability: incentives for brownfield regeneration in Europe", G. Thornton, M. Franz, D. Edwards, G. Pahlen and P. Nathanail. In Environmental Science and Policy nr. 10-2007	This means that without EU funding no or very low numbers of B and C sites would be regenerated. That makes EU funding a high priority for brownfield regeneration.
Observation: three EU Structural Funds are important for brownfield regeneration. 1. Development and structural adjustment of regions whose development is lagging behind. The European Regional Development Fund (ERDF) finances it. 2. Economic and social conversion of areas facing structural difficulties. The European Regional Development Fund (ERDF) finances it. 3. Adaptation and modernisation of national policies and systems of education, training and employment (development of human resources). The European Social Fund (ESF) finances it.	"The challenge of sustainability: incentives for brownfield regeneration in Europe", G. Thornton, M. Franz, D. Edwards, G. Pahlen and P. Nathanail. In Environmental Science and Policy nr. 10-2007	66% of the funding of the ERDF goes to areas with low gross domestic product. Also, in more wealthy areas, sites with structural socioeconomic problems may have funding from this Fund (ERDF). In the other regions (besides the regions under 1.) the ESF is for creating opportunities for human capital. If the brownfield regeneration is connected to social objectives, the ESF may co-finance the brownfield regeneration. As funds are quite essential for brownfield regeneration, knowing the possibilities of (European) funding is important.

Community guidelines on State Aid for environmental protection act as an important legal incentive for improved brownfield regeneration. The objectives of the guidelines are two-fold: to ensure that state aid allowed for environmental purposes complies with the ''polluter pays'' principle and is consistent with the internal market and EU competition policies. These guidelines contain a specific subsection, E.1.8, which provides for a clearer regime for state aid granted for the rehabilitation of polluted industrial sites. The guidelines only concern interventions made by firms. Thus, interventions made by public authorities fall out of its scope. In practice the distinction between firms and public authorities will not always be obvious.	"The challenge of sustainability: incentives for brownfield regeneration in Europe", G. Thornton, M. Franz, D. Edwards, G. Pahlen and P. Nathanail. In Environmental Science and Policy nr. 10-2007	The rules for State Aid in the case of brownfield regeneration are already clearly written down, although some discussion may remain. The clarity makes brownfield regeneration more feasible by reducing uncertainty about the extent and allowance of funding by governments
Level playing field and clarity about priorities		
Recommendation: Require regional or local authorities to maintain registers of brownfield and contaminated sites; these should be standardised at least at Member State level in order to allow for their consolidation into a national register to facilitate the implementation of a brownfield regeneration and remediation policy	"Have EU structural measures succesfully supported the regeneration of industrial and military brownfield sites?" Report of the European Court of Auditors. Report nr. 2012-23. QJ-AB-12-024-NL-C	Having a clear definition of brownfields and knowing which sites are entitled so, might increase the opportunities for national and/or EU funding
Observation: Distortion of the functioning of the internal market – the wide differences between national soil protection regimes, in particular as regards soil contamination, sometimes impose very different obligations on economic operators, thus creating an unbalanced situation in their fixed costs.	Thematic strategy for soil protection, communication from the European Commission. Doc.nr COM(2006) 231 final	International competitiveness may be an argument for setting lower remediation targets (or acquire EU funding) in a brownfield regeneration-process to keep an area competitive
Proposal for directive: Within seven years of implementation, the member states must draw up national remediation strategies including: remediation targets, a prioritization strategy, starting with those sites that pose a significant risk to public health, a timetable for implementation, and allocation of funds. The remediation strategy has to be made public within eight years and is to be reviewed every five years.	World Bank discussion paper on brownfield site management. World Bank, september 2010	For brownfield regeneration this would be an incentive: this will make priorities including funding clear
Social participation		
Access to information		
Pillar I, Access to Information - access to environmental information ensures that members of the public can understand what is happening in the environment around them. It also ensures that the public is able to participate in an informed manner.	United Nations / Economic Commission for Europe - Convention on access to information, public participation in decision-making and access to justice in environmental matters. Conducted at Aarhus, Denmark, on 25 June 1998.	The access to information is a first requirement for public participation. Information about the extent of pollutions and the remediation alternatives will be known to interested citizens. brownfield regeneration process managers should take this into account.
Objective 1: guarantee the right of access to environmental information held by or for public authorities	Directive on public access to environmental information. Directive nr. 2003/4/EC	The access to information is a first requirement for public participation. Information about the extent of pollutions and the remediation alternatives will be known to interested citizens. brownfield regeneration process managers should take this into account.
Objective 2: ensure that, as a matter of course, environmental information is progressively made available and disseminated to the public in order to achieve the widest possible systematic availability and dissemination to the public of environmental information.	Directive on public access to environmental information. Directive nr. 2003/4/EC	This requires governmental organizations to pro-active inform citizens about the environmental status of a brownfields. This will be less applicable to a specific brownfield regeneration-process, but may on the longer term influence the priorities in regenerating brownfields.
Observation: Resistance from certain commercial interest groups, including real estate trade associations, will focus on the disclosure of compulsory soil-status reports to the regulator. These commercial interest groups believe that the Soil Directive will not only increase the cost of transactions, but that it may attract unwanted third-party attention in certain circumstances.	World Bank discussion paper on brownfield site management. World Bank, september 2010	This kind of confidentiality between private companies might be threatened by disclosure. Public and private parties should contemplate on which information in what form can be disclosed.

Arranging participation		
Pillar II, Public Participation in Decision Making – this requires more than simply following a set of procedures; it involves public authorities genuinely listening to public input and being open to the possibility of being influenced by it.	United Nations / Economic Commission for Europe - Convention on access to information, public participation in decision-making and access to justice in environmental matters. Conducted at Aarhus, Denmark, on 25 June 1998.	Working according to this pillar will lead to a participative process: this will affect speed and outcome of the process. This may be positive or negative depending on the expectations
Observation: The EU-funding seems to ignore sustainability and public participation processes due to a lack of hard criteria on these aspects at time of this article	"The challenge of sustainability: incentives for brownfield regeneration in Europe", G. Thornton, M. Franz, D. Edwards, G. Pahlen and P. Nathanail. In Environmental Science and Policy nr. 10-2007	This may be an obstacle to receive funding for these additional objectives. It is here not further researched whether this observation is still valid.
Recommendation 4. There is a widespread lack of knowledge and understanding among developers, authorities and politicians regarding the potential added value that Citizen Participation can provide. To illustrate the feasibility of Citizen Participation, the European commission should encourage and support pilot projects in each of the affected EU-countries	"The challenge of sustainability: incentives for brownfield regeneration in Europe", G. Thornton, M. Franz, D. Edwards, G. Pahlen and P. Nathanail. In Environmental Science and Policy nr. 10-2007	Public participation is the "new" reality. brownfield regeneration processes with this approach should be able to receive more or faster funding.
Access to justice		
Pillar III, Access to Justice - this enforces both the information and the participation pillars in domestic legal systems, and strengthens enforcement of domestic environmental law.	United Nations / Economic Commission for Europe - Convention on access to information, public participation in decision-making and access to justice in environmental matters. Conducted at Aarhus, Denmark, on 25 June 1998.	A brownfield regeneration process that encounters resilience from citizens or private companies might be interrupted by legal procedures
Cultural aspects		
Recommendation: The European Commission should more explicitly promote the inclusion of industrial buildings within listings of cultural heritage monuments to enable and facilitate reservation of industrial buildings and infrastructures.	"The challenge of sustainability: incentives for brownfield regeneration in Europe", G. Thornton, M. Franz, D. Edwards, G. Pahlen and P. Nathanail. In Environmental Science and Policy nr. 10-2007	This aspect may create better opportunities to broaden the scope of brownfield regeneration towards cultural aspects.

Appendix F format example database BFN

Project summary

Description date: m/yyyy

Please give a short and clear description of the case, in which the following questions are addressed:
1) What was the problem (why did the area become a brownfield?)
2) Why was the area redeveloped? (who took the initiative + why)
3) To what new use was the area redeveloped?

Key features

Name	Name of the case
Area	City / country
Status	Running / finished (year)
Scale [ha]	Scale [ha]
Former land use order	Choose from appendix A
Former land use group	Choose from appendix A
Specification	Own description / name of the partial area

Stakeholders

Please provide an overview of the stakeholders involved in this redevelopment, in the following format:

- Stakeholder 1 (role…)
- Stakeholder 2 (role…)
- …..
- Stakeholder x (role…)

New land use(s)

Land use order	Land use group	Specification	Status	Temporary	Soft
Use standard classes from table, *in appendix A*	Use standard classes from table, *in appendix A*	Own description / name of the partial area	Realized / planned (year)	Y/N	Y/N

Societal ambitions

Check if applicable (are they addressed in the project?):

- Green cities
- Climate change mitigation and adaptation
- Sustainable energy
- Human well-being and health
- Sustainable food production
- Resource efficiency
- Strong and viable societies
- Efficient use of space
- Accessibility and connectivity

*If in this project specific services were addressed by a specific land use, please indicate this in the level B part

References

Give a here the references to articles, reports, websites or personal contact information upon which this description is based.

Geographic data

Maps and plans

Figures

Photos and other information

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*Level B

(optional, only if specific services were addressed by a specific land use in the case)

Land use: choose from the list in appendix A

Check if applicable:

- Soft use
- Temporary use

[Description: Please, describe here the land use example]

[*Figure*: If desired, an image illustrating the land use example can be uploaded here]

[*Reference*: Please, give here the reference(s) to articles, reports, websites or personal contact information upon which this description is based]

[Please indicate in the table below to which (ecosystem) services and societal ambitions this example contributes]

In this example, the following (ecosystem) services and societal ambitions are contributed to:

Services	Societal ambitions
Choose one or multiple services from the list in appendix B	Choose one or more ambitions from the list - Green cities - Climate change mitigation and adaptation - Sustainable energy - Human well-being and health - Sustainable food production - Resource efficiency - Strong and viable societies - Efficient use of space - Accessibility and connectivity
...	...

Appendix A: Standard land use classes

Land use order	Land use group
AGRICULTURE AND FISHERIES	agriculture
	fisheries
FORESTRY	managed forest
	un-managed forest
MINERALS	mineral works and quarries
RECREATION AND LEISURE	outdoor amenities and open spaces
	amusement and show places
	libraries museums and galleries
	sport facilities and grounds
	holiday parks and camps
	allotments and city farms
TRANSPORT	transport tracks and ways
	transport terminals and interchanges
	car parks
	vehicle storage
	goods and freight terminals
	waterways
UTILITIES AND INFRASTRUCTURE	energy production and distribution
	water storage and treatment
	refuse disposal
	cemeteries and crematoria
	post and telecommunication
RESIDENTIAL	dwellings
	hotels, boarding and guest houses
	residential institutions
COMMUNITY SERVICES	medical and health care services
	places of worship
	education
	community services
RETAIL	shops
	financial and professional services
	restaurants and cafes
	public houses and bars
INDUSTRY AND BUSINESS	manufacturing
	offices
	storage
	wholesale distribution
VACANT AND DERELICT	vacant
	derelict
DEFENCE	defence
UNUSED LAND	unused land

Source: Harrison, Andrew R (2006) National land use database version 4.4. landinform Ltd, for the office of the deputy prime minister, London UK

Appendix B: Services

default' links between societal challenges en services		Green cities	Climate change mitigation and adaptation	Sustainable energy	Human well-being and health	Sustainable food production	Resource efficiency	Strong and viable societies	Efficient use of space	Accessibility and connectivity
provisioning services	food					x	x	x		
	fiber						x	x		
	biomass			x				x		
	ecosystem goods: minerals, fuels, etc			x?			x	x		
	genetic resources						x			
	biochemicals / natural medicins and pharmaceuticals				x		x	x		
	fresh water				x		x	x		
	water,soil, wind energy			x			x	x		
regulating services	air quality regulation	x			x					
	climate regulation	x	x		x					
	water regulation	x	x		x					
	erosion regulation	x	x		x					
	water purification and waste treatment	x			x					
	disease regulation	x			x					
	pest regulation	x			x					
	pollination	x				x				
	natural hazard regulation	x	x		x					
cultural services	cultural diversity				x			x		
	spiritual and religious values				x			x		
	knowledge systems				x			x		
	educational values				x			x		
	inspiration				x			x		
	aestatic values				x			x		
	social relations				x			x		
	sense of place				x			x		
	cultural heritage values				x			x		

	recreation and ecotourism				x			x		
supporting services	soil formation	x				x				
	photosynthesis	x				x				
	primary production	x				x				
	nutrient cycling	x				x				
	water cycling	x				x				

Ecosystem services from: MA (2005). Millennium Ecosystem Assessment. Ecosystems and Human Well-being: Synthesis. Island Press, Washington, DC

red: depends not on land use, but mainly other factors

Purple: added to the services list of Millennium ecosystem