SUSTAINABILITY METER FOR ECONOMIC SITES

Guide and measuring instrument for the development of new economic sites and the redevelopment of existing economic sites

Version 2.0, January 2014

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ACE ANSWERS TO THE CARBON ECONOMY

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0. INTRODUCTION

0.1. INTRODUCTION

To prevent the global temperature from rising by more than 2°C above the level of the pre-industrial era, all developed countries need to reduce their greenhouse gas emissions by 80 to 95% below 1990 levels by 2050.

The European Union has already promised to reduce greenhouse gas emissions by 20% by 2020 and to generate 20% of its energy from sustainable sources. If the European Union is prepared to reduce emissions by as much as 30%, it is on course to reduce emissions by 80-95% in 2050.

The City of Ghent has resolved to take a different approach, and seeks to promote economic sites that are energy-efficient, easily accessible and carefully manage natural resources and the increasingly scarce space. Among other things, these ambitions fit into the Local Climate Plan developed by the city in 2008 to reduce greenhouse gases by 20% by 2020. This plan consists of 105 actions to achieve a climate-neutral city by 2050. A new climate plan is currently being prepared, which will be ready in 2013-2014.

To achieve this objective, the sustainability meter for economic sites has been developed. The various steps to be taken to ensure a sustainable project are clearly set out in this compendium. Sustainability and sustainable building are clearly defined and given concrete form.

The sustainability meter for economic sites of the City of Ghent described here should result in forward-looking pilot projects.

SUSTAINABILITY BECOMES PART OF QUALITY.

0.2. WHAT IS THE SUSTAINABILITY METER?

0.2.1. STRUCTURE

Sustainability has little to do with green improvements. At the Rio and Kyoto environmental conferences, sustainability was defined as follows: “Sustainable development is development which meets the needs of the present without compromising the ability of future generations to meet their own needs.” The concrete implementation of this concept has not only purely ecological, but also social and economic implications, both locally and globally. All these aspects must be in balance.

Sustainability is achieved by striving for a multitude of qualities in an integrated manner. To guide this process, the sustainability meter was designed. It involves an objectifying method for measuring concern for sustainability and providing the implementing party with a guide for achieving a sustainable project.

The method is based largely on existing international certification systems, BREEAM Communities in particular, and examines how these can be translated to the local context, supplemented and implemented. Here, local context is understood to mean European, federal, regional and municipal regulations and methods, current standard practice as well as "best practice", local market conditions, etc.

In more than 100 points, the quality to be achieved is defined and arranged according to specific chapters during the various phases in the development of an economic site.

0.2.2. A STEERING INSTRUMENT

The 100+ points are structured around the same pattern, to produce a sustainable economic site. They have a steering effect, and are structured according to the following principles:

1. Creating conditions to ensure a proper project process and management.

   For example, preparing a design brief, assembling the project team

2. Developing instruments and gathering data that enhance the project team's knowledge and enable effective communication of the knowledge.

   For example, drawing up a water management plan or signage plan, gathering map data (flood map etc.), setting up a digital platform

3. Formulating objectives and providing opportunities to achieve this so that the designers still have sufficient design freedom.

   For example, rainwater-neutral project, minimising the use of energy from non-renewable sources

4. Listing criteria for achieving an effective sustainable economic site.

   For example, developing a balanced cut and fill, use of FSC-certified wood

5. Encouraging innovative measures: providing space for new developments and honouring them, even if they do not appear in the sustainability meter.

   For example, specific new techniques and applications, certification, education

0.2.3. A PROCESS- AND DESIGN-ORIENTED INSTRUMENT

The creation of a sustainable economic site is the result of contributions from public and private partners before, during and after the development. A sustainable project is only possible on the basis of a sustained and coherent vision throughout the entire design process, including the relevant policy. Finally, sustainability is measured against the project, not the efforts made by one or more project partners.

The sustainability meter should therefore be seen as a guide for the development of economic sites, not as a list of obligations imposed on public or private developers or on individual companies.

The sustainability meter for sustainable economic sites does not precede the design process. An inherent feature of the sustainability meter is that it aims to make sustainability objectifiable. Although the quality of the architecture and the urban space is not alien to the term sustainability, the sustainability meter is not designed to impose a standard on the aesthetics of the design.

Well-structured design research is an essential condition to achieve an integrated approach that goes beyond checking off a list of measures. The sustainability meter incorporates a number of guarantees based around a good working process.

0.2.4. A PRAGMATIC INSTRUMENT

The sustainability meter is largely based on explicit policy ambitions in the various sub-areas, but nevertheless a lower limit and a target value for the score are proposed. Little local empirical data is available on the integrated application of sustainability. The study will nevertheless propose a lower limit and a target score.

Although the sustainability meter is conceived as a practical instrument, the project team is required to pay continuous attention to sustainability and specific monitoring and reporting.

0.2.5. STRUCTURE AND OPERATION

Different chapters

The combined points are a summary of various measures for the sustainable development of an economic site. The various points have been combined into chapters. The introductory chapter outlines the project process, while the other nine address site-related measures.

1. Integrated project process
2. Site, programme, design
3. Mobility
4. Natural environment
5. Water
6. Raw materials and products
7. Energy
8. Health, quality of life and accessibility
9. Social and economic aspects
10. Innovation

Mandatory

Each chapter contains various mandatory points that must be complied with at all times. Other points are optional.

Criteria

The various points are only obtained if specific criteria are met. The measures may be defined as performance levels (distinguishing criteria whose scores depend on the performance achieved) or as different criteria from which a choice can be made (cumulative criteria whose scores can be added together). This is clearly specified for the relevant measure.

Score

The assigned points are added together and weighted against the total number of possible points to obtain a percentage. This score is indicated in a clear bar chart so that you can see in which chapters you scored well or poorly.

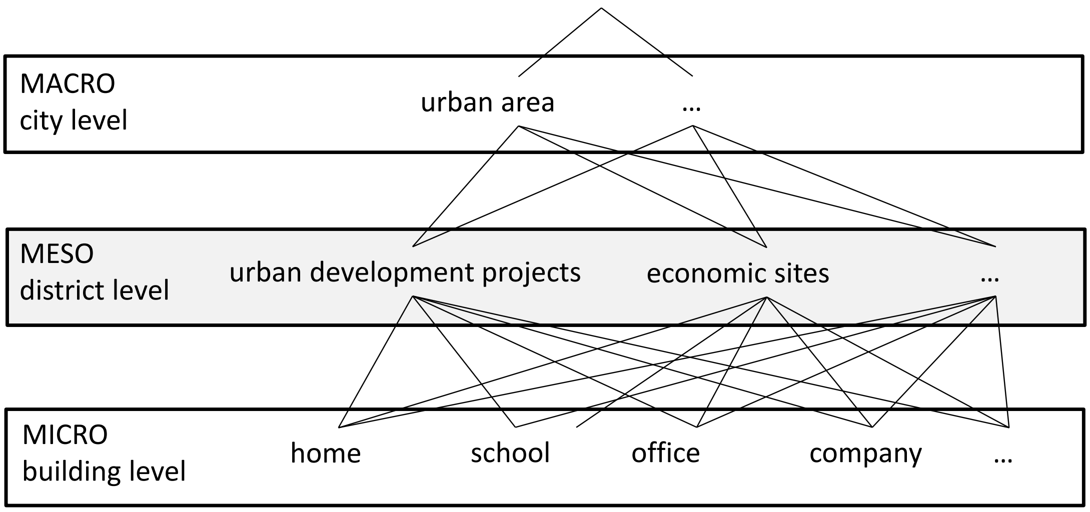
0.2.6. AREA OF APPLICATION: SITE AND SUB-PROJECTS

The sustainability meter focuses almost entirely on the meso-scale, with the link to the macro-scale being made where necessary. The meso-scale provides the initial impetus at the building level.

The **macro-scale** frames the economic site from the wider urban field. This is vital, because an economic site is often of considerable size and can therefore contribute towards improving the spatial quality of an urban area.

The **meso-scale** views the economic site as a whole. This is essential to create a single set of sustainable framework conditions for the site, and thus define a sustainable issuance policy. This whole is divided into sub-fields/development fields. A sub-field generally corresponds to the legal property boundaries of the owner or developer in question.

The **micro-scale** addresses the concept of sustainability at building level. This is not discussed any further in the Ghent sustainability meter for economic sites.



0.2.7. PHASING

At the key decision points in the project process, the project is evaluated using the sustainability meter. The construction team then prepares a dossier with explanations to be able to establish a score. The sustainability meter certainly does not therefore define the phasing of the project; rather, this phasing must be viewed as verification points.

Interim evaluations are not included here, but the construction team is advised to organise this internally.

The phasing of the sustainability meter for economic sites differs slightly from the sustainability meter for urban projects. This is a refinement of the existing system, and focuses on the specific project process of economic sites. One important addition is the operationalisation and management of the decisions taken, at both macro- and meso-level.

The phases are divided into two parts: firstly the development plan, secondly the implementation of the collective parts of the development plan.

1. Development plan

Part 1 is designated by the term "development plan", which refers to a number of process steps and documents that are required to begin the sustainable development of the site. First the site is chosen, then the site's design plan is produced. The next step is to convert this into an issuance policy. A good issuance policy is the only way of ensuring the quality of the plan in the future.

A distinction is made here between the following types:

- "Ex nihilo" sites: new economic sites designed sustainably from the outset
- "Redeveloping" sites: the sustainable rethinking of existing economic sites

1.1. Siting / Collective strategies at macro-scale

The right site or right activities/programming for a particular site are sought. The sustainability meter can be used to weigh up different locations. Where applicable, this can be combined with a feasibility study.

- Ex nihilo: the feasibility of a new economic site is examined using various location criteria. This phase ends with a go / no go decision, with the process starting again at another location where appropriate.
- Redeveloping: if the project involves an existing site that is being redeveloped, in this phase the collective strategies are outlined, and the extent of the transition and transformation of the site is determined.

Based on this, the acquisition of the land can then be considered.

1.2. Design plan

This phase covers the preparation of the project (project organisation) to the "final" design plan. Here, the sustainability meter can be used throughout the entire process:

- Preliminary design plan,
- Comparison of different (preliminary) designs, e.g. for tender or competition
- Decision-making process and design cycle en route to a sustainable design plan
- Finalising of the sustainable (and flexible) design plan

1.3. Issuance / Operationalisation

The issuance policy must be designed on the one hand to implement the objectives of the design plan and business plan, but also to allow the site to be managed in the medium and long term. The issuance policy must adapt to the times and look far enough ahead to be able to provide an answer to changing circumstances. The rights that are ceded in the issuance policy are preferably time-bound and conditional.

The chosen strategies are given concrete form here, for both "ex nihilo" and "redeveloping" sites. This can be, for example, through urban planning regulations or conditions of sale.

This phase results in a **first interim evaluation**. This is not only to assign scores to the design plan, but also the way in which decisions on a macro-scale are transferred to the managers and designers on a meso-scale.

2. Implementation of the collective parts of the development plan

In part 2, the development plan is implemented.

In the sustainability meter a score is entered for the implementation of the development plan for the public and (where applicable) shared private space and infrastructure.

This again highlights the importance of, on the one hand, a project manager who keeps an eye on all developments and, on the other hand, a good issuance policy that requires the sub-project developers to complete the development plan.

2.1. Sketch design

The start and design phase of the sub-project. Intensive examination of sustainability choices.

2.2. Preliminary design

The sub-project is worked up into a final draft. The urban planning permit defines the organisation and spatial impact of the sub-project.

This phase results in a **second interim evaluation**, which assigns scores to the ambitions.

2.3. Implementation design & specifications

During the tender procedure, material choices, details, installations, etc. are defined.

2.4. Provisional acceptance

The final score is only put into practice after acceptance. A score may still vary subsequently, for example, as a result of certification obtained or increased frequency of public transport.

This phase results in a **final evaluation**. This assigns scores to the actual implementation of the ambitions of phase 2.2.

2.5. Preparation of management

The smooth running of the site and the sub-projects must also be guaranteed after the site has been operationalised and the sub-projects delivered. The objectives in preparation for management of the site must be communicated properly, and embedded as far as possible in regulations and contractual documents.

0.3. LEVEL OF AMBITION

0.3.1. GHENT'S POLICY

The sustainability meter allows the ambition of the project to be managed. Is the preference for an energy-neutral or a water-neutral project? It is therefore important to properly underpin the weighting of the chapters. This weighting does not include the mandatory chapters and the chapter on innovation, because these are not aimed at a specific area of sustainable development. In the current project, it was decided to base the level of ambition of the sustainability meter partly on Ghent's ambition for 2020. The following policy documents form the key in this regard.

The Ghent Local Climate Plan

Ghent's climate plan expresses the ambition to reduce greenhouse gas emissions by more than 20% for the entire city by 2020. This climate plan ties in with the Kyoto Protocol for Flanders and Europe. The chapters of the sustainability meter directly linked with this are the chapters on Energy, Mobility, Siting & Layout and Raw Materials and Products

Ghent's Main Strategic Objectives

The main strategic objectives form a single policy for completing the mission in 2020. The objectives are based on the following five pillars of sustainable development:

- Knowledge, innovation and creativity
- Social pillar of sustainability
- Economic pillar of sustainability
- Spatial and ecological pillar of sustainability
- Communication and participation

Regional Zoning Plan for Ghent (RSG)

With the Regional Zoning Plan for Ghent, the City of Ghent outlines how space in the city will be used in the future. Anyone concerned about the quality of our space will recognise the need for planning. A structure plan makes important statements about how we will organise our space in the future. It approaches the city as a cohesive whole into which all key spatial decisions must fit.

Mobility Plan

The Ghent Mobility Plan sets the limits for the development of traffic in Ghent for the coming years. Accessibility is a major asset in the economic, social and cultural development of the city. The Ghent Mobility Plan has brought about far-reaching changes to traffic in the historic inner city. Among other things, it led to the introduction of a large low-traffic area and associated parking route; the stimulation and promotion of walking, cycling and public transport and the construction of new car parks and the abolition of above-ground parking facilities.

Integrated Plan for the Public Domain (IPOD)

The City of Ghent wants to bring greater cohesion to the organisation of its streets and squares, and to do so it needs a reference framework when drawing up design plans for the public domain, allowing a certain amount of streamlining to take place. The integrated plan for the public domain is based on the Regional Zoning Plan for Ghent, and actually constitutes a further development of the intentions outlined in the structure plan.

0.3.2. WEIGHTING OF THE CHAPTERS

Alongside the ambitions of the City of Ghent, a further variable is included in the weighting. This concerns the choice between effect-oriented and process-integrated criteria. Process-integrated measures are cheaper and have more effect than effect-oriented (or protective) measures.

The following strategy is adopted for the weighting:

- The chapters related to reducing greenhouse gases count for half. The other chapters, which strive for a more integrated sustainable approach, also count for half. The emphasis is above all on the ecological pillar of a sustainable policy, and on greenhouse gas emissions in particular. This is justified by the fact that in Flanders (and Ghent) we have already achieved a great deal on a social and economic level, but our ecological footprint lies well above the average level.
- Greenhouse gas emissions in Flanders are just as high for households as for mobility. However, the chapter on 'Mobility' deals mainly with effect-oriented measures. The location criteria come under the chapter on 'Siting and layout', which means they carry a heavier weight.

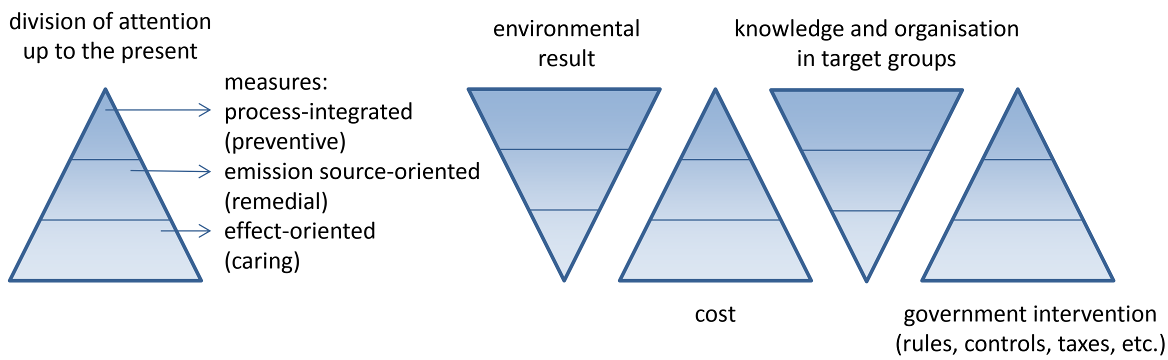


Figure: overview of process-integrated measures versus effect-oriented measures

The overview of the effects and characteristics of the different types of measure shows that process-integrated measures are the most interesting in the quest for sustainable urban development. The triangle indicates the weighting of the topic. Thus, the current division of attention is mainly focused on effect-oriented measures, whereby the environmental result is small (1), the cost is high (2), more or less knowledge is required (3) and government intervention is the greatest (4).

Source: Leren om te keren, environmental report for Flanders, VMM.

0.4. SCORES

The sustainability meter for economic sites is primarily a design-based instrument, intended to test the sustainability of a project in development and assign a value against a reference level.

Scores may be assigned at different times. The key verification points are defined as phases, but an evaluation can be performed at any time.

- At the start: ambitions of the project
- During: adjustment of the design
- After: verification of the result

Scores may be assigned by different people / bodies:

- Self-check: a check of the project and/or its sub-projects to be carried out independently.
- External check: in principle, the City of Ghent can decide over time, after a test phase, to link the instrument to a certificate. In this case the check can be carried out by an external, impartial authority.

0.4.1. SCORE SYSTEM

Chapters

The sustainability meter is divided into 10 chapters. In each of these chapters a score can be achieved by obtaining one or more points for various criteria. In each chapter the value of a point always remains the same, except for a number of criteria where a distinction is made according to the category of the economic site (see below). The weighting of a chapter is not assigned afterwards.

Within the Innovation chapter, the design team is given the chance to earn more points for extra performances in relation to sustainability on top of the measures described. This emphasises that the sustainability meter is a guide and not a rigid list.

In addition to the criteria in the 10 chapters, there is therefore the opportunity to increase the score by up to 10% by submitting innovation criteria. If, for example, a building achieves a score of 65%, it is then possible to add up to 10 x 1% if 10 innovation credits are submitted and all 10 are honoured. However, this would be exceptional, since strict criteria are imposed on innovation criteria.

Categories of economic site

The Regional Zoning Plan for Flanders (as well as the West Flanders Intermunicipal and the Regional Zoning Plan for Ghent) recognise the following categories of industrial estate:

- IA - Mixed industrial estate (traditional)
- IB - Mixed industrial estate (modern)
- II - Transport & distribution
- III - Water-bound industrial estates
- IV - Airport-bound industrial estates
- V - Science parks
- VIA - Office and service zones
- VIB - Offices (public-oriented)
- VIIA - Retail zones (retail & leisure)
- VIIB - Leisure & event (sports stadiums, trade fairs, film, etc.)
- VIII - Industrial estates for agro-industry
- IX - Zones for waste processing and recycling

Different types of economic sites can have very different mobility profiles, raising other key issues. For example, for a transport and distribution site, accessibility by lorry will be much more important than for a science park, and conversely, good accessibility by bicycle can be more important for a science park than for a transport and distribution site. A number of the criteria or sub-criteria therefore carry more or less weight in the total score depending on the type of industrial estate. This system provides a more specific measurement tailored to each type of economic site. However, this does not affect the reciprocal weighting of the chapters.

It may sometimes be necessary to split the site into various sub-sites, depending on the different categories. In the remaining treatment, the score must be determined for each sub-site and added together to know the score at site level.

The Category IV - Airport-bound industrial estate is not addressed in the sustainability meter for economic sites because it does not apply to Ghent.

0.4.2. DIGITAL SPREADSHEET

The digital spreadsheet automates all calculations. It consists of the following elements:

- A summary sheet with the total score and the scores for each chapter
- The various chapters, each with their criteria

To start, you enter a score for each of the criteria. As long as this ambition has not been realised, you enter the feasible score. This means that the score can fluctuate through the various phases, depending on whether or not the postulated ambitions are achieved, or exceeded.

The actual score for the project is measured in the last phase, when preparing for the management and smooth running of the project (after provisional acceptance).

0.4.3. MINIMUM SCORE

To achieve the high level of ambition which the City of Ghent has set itself by means of the Local Climate Plan and the Main Strategic Objectives, a high score is required. Because the various economic developments differ considerably and not all points are achievable everywhere, a gradation is applied to the valuation of the scores.

Total score after acceptance

After the project has been implemented, a single overall score is obtained. A score of **70%** is the target. If the sustainability meter is not used from the initial phase, it may be necessary to deal with this pragmatically and propose a custom target.

Score for each phase

An interim score is obtained for each phase. Ambitions or commitments for later phases can also be included here, so **70%** is also the target here (or any other custom target value).

Score for each chapter

The scores for the various chapters should preferably be constant. The bar chart shows what score was achieved for each chapter and whether these scores are evenly distributed. A score of **50%** is set as the minimum target for each chapter.

Mandatory points

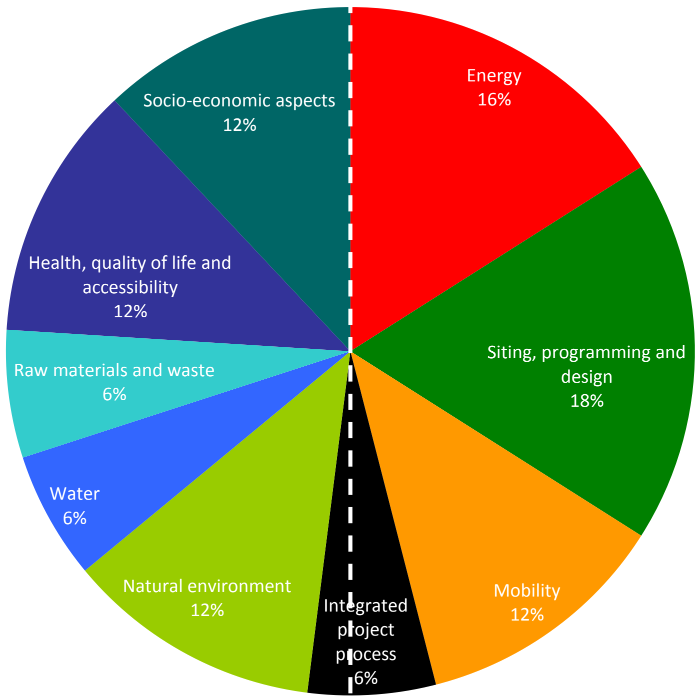
Various criteria are mandatory because they are vital to a sustainable project. Mandatory points must be complied with. If a mandatory measure is not satisfied, 2 percentage points are deducted from the total score.

0.4.4. INTERPRETING THE USE OF SCORES

The score obtained is never absolute. The following aspects should be considered when making assessments using the sustainability meter:

- The project is always assessed in its entirety. As a consequence, in addition to the efforts of the developer, other points are also evaluated over which the latter has no control: e.g. the location criteria. When assigning scores, a distinction is therefore made between the various phases, with the choice of the location and the function being assessed separately.
- The sustainability meter allows different proposals to be compared on the same site. The choice of the right site is crucial. At urban level it is important to assign scores to and weigh up the choice of site. If the score is too low, it is best to look for another site, as very low scores can only be offset by scoring very well on all other measures.

Chapters aimed at sustainable policy versus chapters aimed at climate neutrality



0.5. MANUAL

0.5.1. THE COMPLETE SUSTAINABILITY METER WITH MANUAL

This version is intended for distribution to services of (local) authorities, urban development companies, designers, engineering firms and other stakeholders. The sustainability meter can be downloaded in the form of a pdf file from the website of the City of Ghent (http://www.gent.be/eCache/THE/1/58/275.html).

0.5.2. THE SPREADSHEET

The spreadsheet is intended to help you check and monitor the project. The score can be recalculated during each phase. The spreadsheet is available in Excel format.

It consists of the following elements:

- A summary sheet with the total score and the score for each chapter
- The various criteria, divided into chapters
- The score for each phase, translated into a spider diagram and/or bar chart

Several tools are provided to facilitate monitoring:

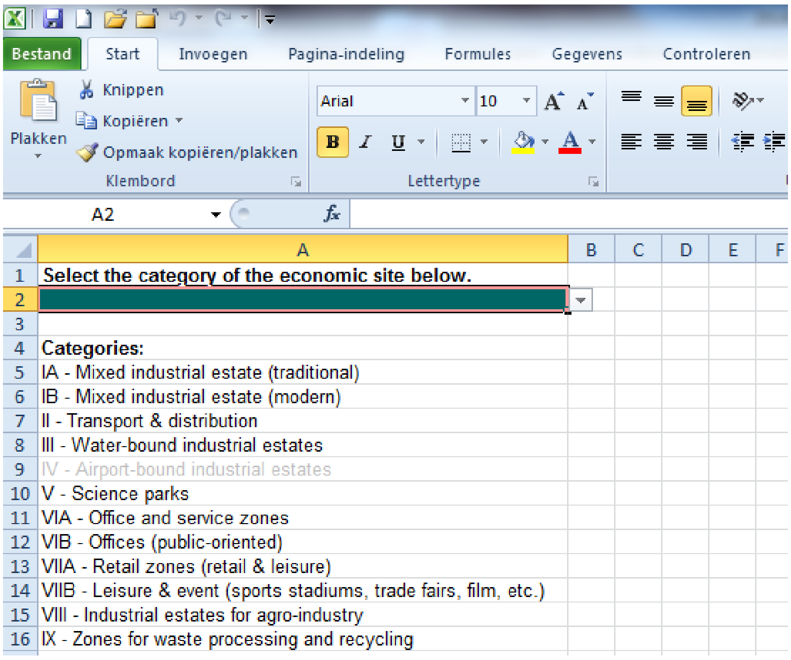
- The action points are supplemented during the project process, and keep track of what has to be done to achieve the different criteria for each point.
- The logbook keeps track of the actions undertaken and any criteria definitively achieved.

0.5.3. MANUAL

Category

The first thing to be done when assessing the sustainability of an economic site is to specify the category of the industrial estate.

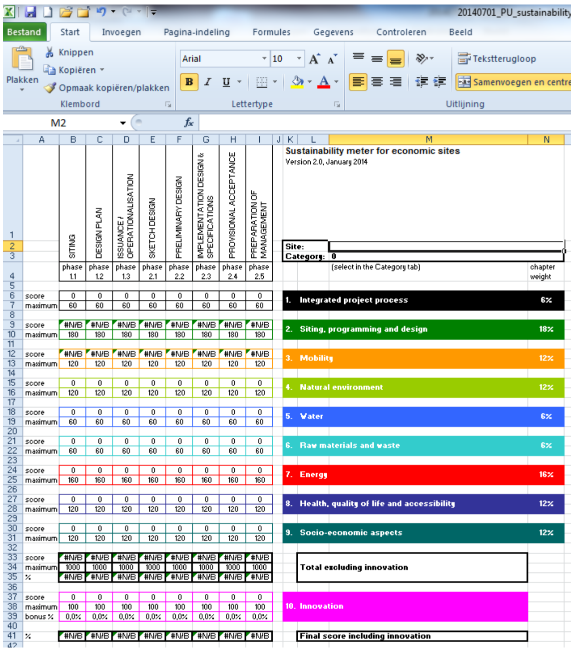
This is done in the 'Category' tab.



Score overview

In the 'Score' tab you will find an overview of all the subjects with their weighting in the total score.

This page shows the overall result; nothing has to be filled in.

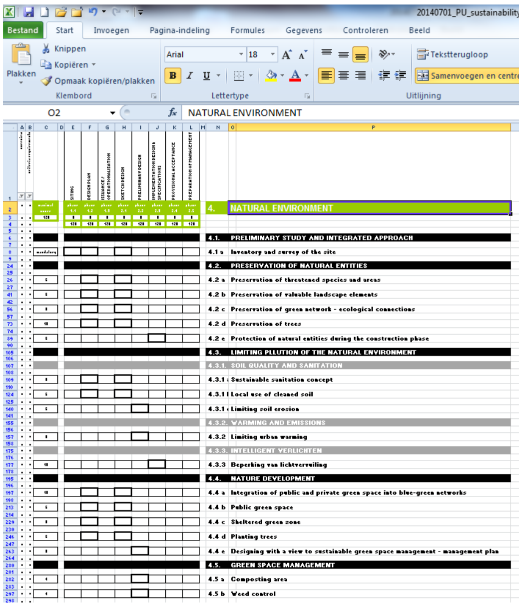


Subject tabs: e.g. Natural Environment

When filling in the sustainability meter, each subject is run through per tab.

The overview of each subject is parallel to that of the Score Overview. In the subject Mobility and for one criterion in the subject Siting and Layout, the differentiation according to category is specified for the relevant (sub-)criteria.

The score obtained for each criteria requirement is now filled in. The score obtained for each subject and in the total appears on the same tab and on the Score Overview.



Filling in points

When filling in the sustainability meter, attention should be paid to a number of elements:

- A weighting is not applied to the chapter scores afterwards to obtain a total score.
- In a number of criteria a distinction is made according to the category of the economic site. This concerns criterion 2.1 d on the accessibility of the site by various forms of transport and a group of criteria in the chapter on mobility. This is explained for the relevant criteria.
- The points from the criteria requirements are always added together save where it says "or" between 2 criteria requirements. In this case, there is a choice between a strict and a less strict criteria requirement.
- The formulated criteria requirements are the ultimate objective of a particular measure. For each phase, these criteria requirements must be translated into a necessary intervention. See simulation: In 1.3 the preservation of trees must be made compulsory in the issuance policy, this is not literally translated into a criteria requirement in the sustainability meter, and in this case it is up to the City of Ghent to translate this criteria requirement into an issuance policy.
- The phases with a bolder outline are the phases of the decision point. Here the measure is actively implemented into a design or an issuance policy. (See simulation: In phase 1.2 it is decided that the trees will be preserved.)
- In certain phases a measure is therefore not actively implemented. Here, scores are assigned to the ambition. In other words: the criteria requirement can and will be satisfied in a subsequent phase.

0.5.4. USING A SIMULATION

Here, filling in the sustainability meter is explained by means of a simulation. Measure 4.2 d Preservation of trees is fictionally assigned scores to illustrate how scores are used.

4.2 d Preservation of trees

Max. score		1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5
10									

Purpose of the measure

As many as possible of the trees present on the site must be preserved because they contribute significantly to the quality of life of the site and its surrounding area. Existing trees can also have an historical value because of the time they need to grow.

Explanation of the measure

The trees and tree structures listed in 4.1 a are preserved, strengthened, supplemented or moved with good reason. This criterion concerns trees with a certain landscape or ecological value. A girth of 50 cm at a height of 100 cm is the threshold for the obligation to apply for planning permission. Trees of at least this size are always viewed as potentially valuable; the following aspects should be evaluated and weighed up against the planned design of the site:

- The species: e.g. native versus exotic
- The landscape value: e.g. is the tree view-enhancing, is the tree located in an environment with little other green space or in a park, etc.?
- The age
- The condition

Criteria requirements

4	Preserve all valuable trees (maximum 20% relocation or replacement by trees of equivalent value).
3	Offset the grubbed-up trees, preferably in kind, and plant the new trees in accordance with the Technical Vademecum for Trees.
3	In the case of a forest, the forest must be offset in kind on the site itself. If there is no forest on the site, these points are automatically assigned.

References

Tree Plan of the City of Ghent

Explanation of use of scores

Part 1: development plan

- Phase 1.1: Siting / Collective strategies on a macro-scale: score 3/3.

  A site is chosen where the development of the necessary programme allows trees to be preserved. The decision to preserve trees cannot yet be taken here, but the ambition is there, so the score is 3.

- Phase 1.2: Design plan: score 3/3.

  This is the point at which the criteria requirement applies for the first time in part 1. All previous steps were ambitions.

  The requested minimum ambitions of the City of Ghent formulated in the specifications include the preservation of valuable trees, compensation and the use of the Technical Vademecum.

  In the design plan, 80% of the trees are preserved, and those trees to be uprooted are compensated in kind; the ambition is to plant the trees in accordance with the Technical Vademecum.

- Phase 1.3: Issuance / Operationalisation: score 3/3.

  The spatial implementation plan (RUP) is drawn up on the basis of this design plan. It includes the preservation, compensation and use of the Technical Vademecum for Trees.

Part 2: implementation of the collective parts of the development plan

- Phase 2.1: Sketch design: score 3/3.

  This is the point at which the criteria requirement applies for the first time in part 2.

  In the sketch designs of the sub-projects, all specified measures are complied with.

- Phase 2.2: Preliminary design: score 3/3.

  The ambitions of the preliminary draft are properly translated into the design that is submitted to obtain planning permission. The design is approved, since it meets town-planning regulations.

- Phase 2.3: Implementation design & specifications: score 2/3.

  The implementation dossier does not mention the Technical Vademecum for Trees.

- Phase 2.4: Provisional acceptance: score 2/3.

  The new trees are not planted in accordance with the Technical Vademecum for Trees during implementation.

- Phase 2.5: Preparation of management: score 2/3.

  A document is produced that provides an owner with information such as the location and type of the trees. This document serves as a first step towards management.

0.6. GLOSSARY

DHM is the abbreviation for sustainability meter.

DHM ECON refers to the sustainability meter for economic sites.

BREEAM: the measuring method developed by the BRE (Building Research Establishment) for the sustainability performance of buildings and areas. BREEAM stands for Building Research Establishment Environmental Assessment Method.

BREEAM Communities: the area accreditation mark 'Communities' (2012) distinguishes between five test categories: Governance, Well-being, Ecology, Resources and Transport. The BRE issues a certificate with a score expressed in stars (from 0 to 5 stars).

BREEAM-NL Area: the measuring method developed by the Dutch Green Building Council for the sustainability performance of an area. The DGBC offers two accreditation marks for areas: for areas in development and for existing areas. The DGBC issues a certificate with a score expressed in stars (from 0 to 5 stars).

Economic site or industrial estate: site of the economic development.

Plan boundary: the actual (physical) boundaries of the area to be developed. These are normally defined by the client (definition: BREEAM-NL Area Development v2012, DGBC).

System boundary: a boundary not defined in advance which, depending on the subject, can also lie (well) outside the area. Where relevant, the system boundary will be defined (definition: BREEAM-NL Area Development v2012, DGBC).

Development plan: umbrella term that brings together the technical, spatial and commercial aspects that are to be recorded in, among other things, the Design Brief, the design plan and the strategic business plan.

Design plan: collection of all plans and visions related to the design and layout of the industrial estate.

Issuance plan: indicates how the industrial estate is made available and to whom and under what conditions.

Management plan: indicates how the industrial estate will be managed (in both the public and private domain).

Strategic business plan: guiding commercial strategic document that defines the financial, economic, organisational and legal vision on the scale of the site.

Issuance policy: policy on the renunciation of property or building rights for land to third parties.

Design Brief (DB): technical reference note (see 1.1.2 c).

Implementation note: note in which the steps are defined that lead to actual realisation.

Maintenance test: the subjecting of design decisions to a critical analysis concerning the impact of maintenance.

Life Cycle Cost Analysis (LCCA): analysis of the long-term financial impact of an investment, taking into account the initial investment cost, the operating & maintenance cost and the "end of life" cost. The LCCA can be expressed in e.g. return on investment periods.

Clustering: Clusters (are) defined as techno-economic networks of interdependent companies that are interlinked through their specific contributions to the creation of value in a production chain.

Sub-project: design and construction project of a section derived from the global design plan. A distinction is made between shared sub-projects (e.g. roads, infrastructures, etc.) and sub-projects. Only collective sub-projects are discussed in this sustainability meter.

Facility: infrastructure or establishment that facilitates or serves: road, outdoor construction, pipes, infrastructure, water treatment, stops, catering, etc.

Private facility: privately owned facility.

Collective facility: private facility intended for several or all stakeholders on the site.

Public facility: facility with public status.

Site-bound facility: umbrella, public or collective facility on the scale of the site.

Domain property: the property to which legal entities under public law have right of ownership. Within domain property, a distinction is made between property belonging to the public domain and property belonging to the private domain.

Public domain: property intended for the use of all.

Private domain: the complement of the public domain, so is always negatively described; specifically it includes the domain property that does not belong to the public domain.

Public road: any road open to public traffic, even if its bedding is private property. The extent of the public road is in no way limited to the "carriageway", but also includes anything intended for preservation, anything created for the benefit of the road, etc., for example pavements, cycle paths, verges, etc.

Public space: space that is freely accessible to the public (a very broad definition that is interpreted differently by different regulations).

Private space: space not freely accessible to the public.

Non-public site: this term is defined in the road traffic law as a site that is only accessible to a certain number of people.

Private road: a road that people construct on their property for private use - such as lanes or industrial roads. The private nature of the road is generally apparent from a notice (sign reading "private road") or an action (for example the annual barring of passage by bailiff's deed).

1. INTEGRATED PROJECT PROCESS

Whereas sustainability is classically defined by the three Ps (people, planet, profit), some are calling for a fourth pillar to be added, namely “governance”.

The quality of a project's policy is not only a key condition for efficiently achieving quality, it also becomes a value in itself if emphasis is placed on the democratic aspect, the social embedding and the involvement of all stakeholders.

Here, the governance or management of an economic site is defined on the basis of 3 sub-themes: project management, participation and integrity.

Project management

The (re)development of an economic site is a multidisciplinary activity from the beginning. To bring together the necessary quality guarantees, it is essential, from the outset, to work closely with a competent team consisting of representatives from all sub-disciplines. To guarantee that the process also proceeds efficiently and in a structured fashion, it is of vital importance to clearly define the project to be implemented and translate this into a set of requirements. In a sustainable process, it is essential that as many problems, influences and issues as possible that arise in the various phases of the project are taken into account from the outset and resolved as quickly as possible.

An 'integrated project process' attempts to achieve efficient cooperation between the members of a multidisciplinary team that pursues the same vision with a clear ambition. Such a project process is not strictly linear, but rather becomes a cluster of various sub-disciplines that strengthen each other. The advantage of this form of integrated cooperation is that possible problems, influences and issues that arise in the various phases of the project are taken into consideration much more quickly. Only in this way can sustainability be included as a starting point from the outset instead of applying subsequently added sustainable measures, which are much less efficient in terms of both investment cost and result.

Moreover, sustainability is a phenomenon that involves a wide variety of aspects that are constantly subject to new developments in relation to the economy, environment(al technology), spatial planning, etc. In practice it is also important to develop the general principles in an area-oriented and typological approach. In fact, not every principle can simply be applied to each type (category) of industrial estate. The development of sustainable industrial estates therefore requires a process-based approach, with adequate room for the necessary process time and attention to a clear definition of the roles of the parties concerned.

Participation

The degree of participation is a measure of the quality of the decision-making processes. The concept of participation covers the interaction between the various stakeholders during the decision-making process: directors, civil servants, experts, owners, residents, users, institutions and other stakeholders.

Integrity

Integrity covers topics such as liability, legality, objectivity, justice, transparency and careful decision-making.

This document, the sustainability meter, is an instrument that allows transparent, objective communication on sustainability targets.

At a higher level, the sustainability meter allows objectives to be formulated and produces an integrated assessment of the different chapters. This makes it possible to examine whether social objectives are included in a balanced manner.

Another instrument required for careful decision-making is the quality chamber, an independent body that can rule on quality-related aspects.

References

Han Vandevyvere, Strategieën voor een verhoogde implementatie van duurzaam bouwen in Vlaanderen, toepassing op het schaalniveau van het stadsfragment, PhD KULeuven, October 2010.

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1.1. PROJECT MANAGEMENT

1.1.1. PROJECT TEAM

1.1.1 a Coordination of clients

Max. Score
mandatory

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

Various private and public parties are often directly involved in the (re)development of economic sites. It is extremely important that coordination between the various initiating parties can take place within a unified structure, so that a shared vision and objectives can be formulated. After all, a sustainable economic site stands or falls with the willingness of the parties directly involved to cooperate.

Explanation of the measure

To develop sites into sustainable economic sites, a coordinated approach is required between the public and private partners directly involved in the project. The government often has the most potential to coordinate various partners and to adopt a controlling approach to spatial developments. Associations of businesses, large companies, project developers, regional bodies, etc. can also take the initiative to develop sites or provide leverage for their development.

A suitable structure must be created in which the various stakeholders can participate and a shared dynamic can be established that encourages a shared vision of the (re)development. This structure must also make it possible for the client to enter into a dialogue with the other project parties from clear positions. To this end, a project manager is appointed who disseminates and monitors the shared positions throughout the implementation process.

The project manager is a person or organisation who/which (independently) formulates objectives over time and steers towards these. This person has a defined mandate to perform these tasks (see 1.1.1 a). This project manager has a demonstrable mandate, time and resources available to be able to perform his/her/its tasks.

The first step for the project manager is to draw up a project plan with a project-based description of the development process. For this, refer to 1.1.2 and 1.1.5 b. The project manager is responsible for monitoring this plan, or appoints people to do so.

The transfer of tasks and information from and by the project manager to a possible form of inter-company collaboration and any parties involved such as ESCOs, is a point to be considered in this regard. For example: the dynamic data of the baseline energy demand, as referred to in chapter 7 (7.2 a and 7.2 b). See also 1.1.1 b.

Criteria requirements

v	Meet the following requirements: • Provide a list of all parties directly involved. • Identify the appropriate structure to achieve coordinated commissioning. • At the start, indicate the project manager who is authorised to enter into a dialogue with the design team. • Reporting by means of a note or report.

1.1.1 b Composition of project team and working group

Max. Score
mandatory

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

Put together a project team that provides minimum guarantees in relation to the creation of a sustainable economic site.

Explanation of the measure

The project team is responsible for the actual development of the project, and as such determines the form, structure, etc. of the site. It is often assisted by experts, such as a spatial design team, property specialists, market researchers, engineers, etc.

Serious consideration must be given to the project structure and the division of legal powers.

Since such a development path is complex, it is advisable for the project team to be led by a project manager. The transfer of tasks, responsibilities and files (project content) between phases and between people/organisations belongs primarily to the tasks of the project manager. For example, the transfer of information from the project manager to a possible park manager.

Composition of project team

- Project manager (see also 1.1.1 a)
- Market researchers
- Town planner
- Architect
- Technical engineer for special techniques
- Stability engineer
- Building physics design agency
- Energy expert (at both building and area level)
- Environmental expert (specialist in abiotic aspects)
- Ecologist (specialist in biotic aspects)
- Property expert
- Landscape architect
- Soil expert
- Water expert
- Mobility expert
- Surveyor
- Communication specialist
- etc. (List to be adjusted beforehand as a function of the project)

Criteria requirements

v	Meet the following requirements: • Identify the project manager. • Choice of the designers is based on a pre-defined and transparent procedure. • The decision powers of the project team members are defined in a protocol. • Put together a project team that possesses the above competencies and specify at

	which stage their input is required. • At the start, designate the person who will be responsible for monitoring and reporting on the sustainability meter. • Reporting by means of a note or report.

1.1.2. DOCUMENTS

The development must be managed and given shape within a physico-spatial, technical, organisational-economic and temporal framework.

Here, five reference or basic documents are defined that serve as guides during the design and implementation process: the summary strategy plan, the design plan, the technical design brief, the business plan and the project plan.

These 5 documents define the project during the development process and are continuously updated and validated. They are the essential communication tools in an integrated design, to which all members of the project team can refer.

In addition, three documents are defined that are aimed at implementing the measures: the issuance plan defines framework conditions for the transfer of rights, the zoning plans define the town-planning framework, and the management plan defines the terms of use. The issuance plan and the zoning plans allow the sustainability objectives to be anchored in law. The management plan prepares the ground for the further management.

1.1.2 a Strategy plan: project definition, vision and level of ambition

Max. Score
mandatory

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

To specify the ambitions, and define and communicate the outlines of the project.

Explanation of the measure

Summarise the economic vision and ambitions of the (re)development project. In each process step, the up-to-dateness of the document must be verified and the document re-validated.

This summary project definition serves to make economic vision and ambitions concrete, define the outlines and make the key aspects of the project communicable. It functions as a substantive, qualitative basis during the entire development and management process. This includes, but is not limited to, such aspects as economic vision, mobility vision, vision of energy consumption and supply, sustainability in a general sense, possible interlinking with other functions in or around the site, etc.

Criteria requirements

v	Reporting by means of a note.

1.1.2 b Design plan

Max. Score
mandatory

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

By producing a design plan, taking into account local and supra-local framework conditions and the specific needs surrounding the economic site, to achieve a sustainable industrial estate that meets the economic needs.

Explanation of the measure

The design plan[1] contains at least a description of the existing situation, the general design principles with the internal and external access and utility infrastructure of the site in relation to the surrounding plan area, the town-planning and economic aspects of the site, and indicates the possibilities for ecological and general safety measures. The design plan can consist of a special zoning plan (BPA) or a spatial implementation plan (RUP).

The design plan should in any case contain measures that lead to an intensive and careful use of space, on both public and private properties, according to the planned economic activities.

The following components of the design plan must be specifically developed:

- Integration into the landscape: in relation to the condition and intended use of the site, the plan includes, among other things, the integration of the industrial estate into its surrounding landscape, in terms of street pattern and drainage, the planting of greenery, the buffering and the integration of existing landscape or historic elements. If possible, the new architecture is also integrated into this landscape;
- Ecology: in relation to the condition and intended use of the site, the plan includes, among other things, a description of the sustainable measures for the use of materials, integration into an ecological network, integrated water management, business processes, mobility;
- Safety: in relation to the condition and intended use of the site, the plan includes, among other things, a description of the measures for optimum access for the emergency services, the establishment of Seveso companies, fire-safe construction, road safety, the prevention of criminal activities, the prevention of illegal dumping. It is submitted to the competent services for an opinion;
- Aesthetic quality: in relation to the condition and intended use of the site, the plan includes a coherent set of architectural and town-planning measures affecting the private and public lots of the industrial estate.

The design plan shows that various design and development variants have been examined within the quality requirements imposed on the site.

Criteria requirements

v	The design plan contains at least the above components and is updated for each phase of the project.

1.1.2 c Design Brief

Max. Score
mandatory

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

The Design Brief is an important steering instrument for the design team. It serves not only as a guide for all parties involved, but also as a tool for preparing the cost estimate and for quality control in the various phases of the design.

It is a technical document that defines the levels of ambition and framework conditions for the further development of the project. It forms a technical addendum to the design plan, the strategic business plan and the sustainability meter.

After each process step, the Design Brief is updated and refined as appropriate. The Design Brief is validated in each case.

[1] Decree of the Flemish Government of 24 May 2013 concerning grants for industrial estates (Belgian Official Gazette, 10 July 2013), Article 23.

Explanation of the measure

The Design Brief is a rationalised document that sets out the construction programme and the specific requirements. It contains all the criteria that must be met by the design:

Use of space

The volumes, heights, typologies, aesthetic qualities and framework conditions.

Intended uses

Principal intended uses according to intended segmentation and/or clustering (see criterion 2.1.a), any other intended uses, specific fluxes, framework conditions.

Mobility aspects

Universal accessibility, space for pedestrians, cyclists, public transport, motorised private transport, fixed goods streams, variable deliveries, etc.

Technical Design Brief

Technical vision of environment, energy, heat and cold demand, rainwater, waste streams, goods streams, green, etc.

Infrastructure

Technical requirements on public domain and collective infrastructures

Quality requirements placed on these

Implementation (implementation note)

For each measure, the following elements are specified:

- Who? Persons responsible for monitoring.
- What comes next? Further steps and when to take them.
- What effects? Integration in design plan, strategic business plan, phasing, etc.
- How to implement this? Possibilities for legal anchoring in issuance plan, zoning plan, permit policy, etc.

Criteria requirements

v	Meet the following requirements: • Adapt the Design Brief in each phase and adjust where necessary. • The project team is involved in preparing the Design Brief. • Reporting by means of a detailed report for each phase.

1.1.2 d Strategic business plan

Max. Score
mandatory

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

The strategic business plan specifies the financial, economic, organisational and legal aspects.

Explanation of the measure

This is a note describing the economic vision for the site and putting forward the business case. To this end the business vision, the appropriate legal structures and the short- and long-term economic feasibility are examined.

The economic vision describes the global vision and situates it in a macro approach. The opportunities for clustering and economic partnerships are examined. The economic long-term model is defined, so that investment and management costs can be plotted.

The organisational forms of partnership must be examined and described. The appropriate legal structures are examined according to the objectives in the design plan and the business plan. The central issue here is what legal vehicle is best suited to support the various objectives for the investment and operational phases.

Short-term economic feasibility examines the investment costs, return on investment periods and financing.

It also studies the financial feasibility by examining the project costs in relation to the financing. Not just at the time the costs are incurred, but also continuously over time, by critically examining the return effect of various measures, as well as the critical parameters for this, via a sensitivity test. For this, refer to 1.5.

Especially if cross-financing is used, the many uncertainties, and the sensitivity of the project to these, should be looked at very closely.

Besides considering the business aspect, the legal aspect certainly also needs to be borne in mind. The business part is assessed taking into consideration the investment cost, financing and cash flow.

Components of the strategic business plan

- section on economic vision, mission and objective, market analysis and business case
- section on organisational forms, tax aspects and legal structure
- financial feasibility:
    - Life Cycle Cost Analysis
    - financing plan
    - sensitivity study

Criteria requirements

v	Meet the following requirements: • The business plan defines the economic vision, the organisation and the financial feasibility. • Updating, reporting and assessment of the strategic business plan at each assessment phase.

1.1.2 e Project plan

Max. Score		1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5
mandatory									

Purpose of the measure

A project plan must be drawn up to coordinate the various partners' input and ensure optimum integration.

Explanation of the measure

The project plan is drawn up by the project manager (see 1.1.1 a) and includes a time path for the entire project process, specifying the following details:

- Project phases
- Milestones, deadlines
- Times for input of sub-studies
- Times for approval procedures
- Moments for consultation (internal, external) and recourse to experts
- Bottlenecks to achieving the sustainability objectives

- Phasing of issuance policy (site level)
- Town-planning pathways
- Preliminary design (sub-project)
- Final design (sub-project)
- Town-planning permit (sub-project)
- Implementation file (sub-project)
- Provisional acceptance (sub-project)
- etc.

The project plan forms a dynamic document with sufficient flexibility to allow a response to a changing context during implementation of the project. The stakeholders referred to in 1.1.1 b (the project team) commit to the project plan.

Criteria requirements

v	Meet the following requirements: • Draw up a project plan. • Reporting and assessment by means of project plan and key documents.

1.1.2 f Issuance plan and process

Max. Score
mandatory

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

In a dynamic environment such as an economic site it is vital to develop a clear strategy regarding the issuance of parts of the site. Zoning, time perspective and framework conditions must be discussed thoroughly in advance and clearly communicated, so that the site's ambitions and objectives in terms of energy, materials, water, mobility and socio-economic aspects can be translated when property rights or other rights associated with the site change.

Together with the zoning plans and the permit policy (see 1.1.2 g), the issuance policy or land policy forms a key point for the legal anchoring of the ambitions, objectives and visions. The Design Brief includes an implementation note that indicates how a measure is best defined contractually at the time of issuance.

The issuance plan explicitly shows how the formulated ambitions from the Strategic Plan (1.1.2 a) and the Design Plan (1.1.2 b) are materialised, both spatially and procedurally.

Explanation of the measure

The issuance plan contains at least[2]:

- The onerous measures relating to the plots with a view to rational and efficient use of space according to the companies' activities and with consideration for the siting of the buildings;
- The evaluation criteria for candidate investors;
- The evaluation criteria relating to the authorisation of Seveso companies and other problematic space users;
- A requirement to build within a maximum period of four years from execution of the deed of issuance;
- A requirement to begin operations within a maximum period of five years from execution of the deed of issuance;

[2] Decree of the Flemish Government of 24 May 2013 concerning grants for industrial estates (Belgian Official Gazette, 10 July 2013), Article 25.

- The conditions for supervision and management;
- The town-planning requirements;
- The aspects of the (re)design plan affecting the issuance of the plots;
- The onerous measures relating to the plots with a view to CO_2 neutrality of the site (CO_2 neutrality sub-plan, see chapter 7 for a full description).

From a sustainability point of view, it is advisable to also include the following elements in the issuance plan:

Issuance-zoning plan

Indicates the spatial layout of the site, the parts that are eligible for issuance and shows, where appropriate, the intended (spatial) clustering of activities. The clustering method is also substantiated in terms of sustainability.

Phasing plan

The time perspective of the issuance policy must provide an answer to the dynamic aspect of an economic site. Certain zones may be held in reserve temporarily or for longer periods. Likewise, flexibility should be incorporated into the site. The phasing plan also addresses the (future) management of the site (management is also introduced in phases in the case of phased implementation).

Project definition for sub-projects

The framework conditions at the time of issuance must go beyond the financial aspect. On acquiring user rights to the site, which may or may not be temporary, a legally sound undertaking should also be included in the communal sustainability measures and the rules of procedure.

The quantitative and qualitative framework conditions are distilled from the design plan for each project, as a starting note for the development of the sub-project.

Legal instruments on issue

A brief description of how the conditions set out in the issuance plan are anchored and (can be) enforced during the implementation and management phase. For example, additional conditions in a long-lease contract, a guarantee system or the possibility of terminating the (purchase) contract in the event of non-compliance. The issuance method (long lease, sale) is also underpinned for the specific situation of the economic site.

Further development of this is requested in the Implementation Note under Design Brief (1.1.2 c).

Screening criteria for businesses

The purpose of the screening criteria is to attract the right businesses to the economic site. They form the basis for excluding certain companies from establishing themselves on the site and for defining an order of preference among candidate companies.

The screening criteria translate the vision and ambitions for the economic site (see 1.1.2 a) and can therefore, besides the economic activities of the company, relate to the various aspects of sustainability. It is important that this link with the vision and ambitions is explicitly made to the companies.

Aspects that could appear in the vision and ambitions of an industrial estate and for which a screening criterion can be developed, include, but are not limited to, the following:

- Description of the company's activity and the way this fits into the economic vision;
- Motivation / grounds for the candidacy, with explicit reference to the ambitions formulated for the area;
- Financial framework conditions, such as a description of the investments by the company in the area;
- Social framework conditions, including employment and corporate social responsibility (CSR);

- Energy: (forecast) consumption data and opportunities for rational energy use for buildings and processes - here an energy audit by Enterprise Flanders is recommended[3];
- Willingness of the company to participate in partnerships at site level, such as participation in inter-company collaborations, participation in a collective project to generate renewable energy, the exchange of material flows if possible, etc.
- Nuisance: degree of nuisance and planned measures to prevent nuisance
- etc.

Aspects of the vision and ambitions that cannot be/are not translated into screening criteria could still be included during the **issuance process**, e.g. by encouraging them (admittedly on a more informal basis) among the companies.

Criteria requirements

v	Draw up an issuance plan containing the elements described above.

1.1.2 g Zoning plans and permit policy

Max. Score
mandatory

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

The town-planning pathway is a long process that must be properly structured. Urban development plans are instruments that can anchor levels of ambition and framework conditions for further elaboration. It is therefore essential that the framework conditions are known and recorded when creating these documents.

A number of measures with an impact on urban development can also be anchored in zoning plans (RUPs, allotment plans, etc.). The Design Brief includes an implementation note that provides an insight into the measures you may wish to anchor in the zoning plans.

In terms of mobility and environmental aspects, conditions can be defined in operating permits.

Criteria requirements

v	Meet the following requirements: • Integrate the conditions from the design plan and the implementation note (Design Brief) into the zoning plan. • Integrate the conditions from the design plan and the implementation note (Design Brief) into the operating permits.

1.1.3. MONITORING AND UPDATING

The 5 basic documents (strategic plan, design plan, design brief, strategic business plan and project plan) are dynamic working documents. During the design and implementation process they are developed and queried, making regular updates necessary.

It is vital that the initiator(s) prepare themselves for this and ensure that changes and refinements can be incorporated into these 5 essential reference documents. Otherwise the overview may gradually get lost and the integrated approach is undermined.

[3] For further information on the energy audit of Enterprise Flanders, see: www.agentschapondernemen.be. First-line scans are free (situation as of autumn 2013); this concerns the energy scan and the eco-efficiency scan (water, waste, transport, energy, innovation, environmental care). Here opportunities are mapped out and specific referrals are made to subsidies/investment support and service providers. Excluded are non-profit organisations, agricultural and horticultural companies and major international enterprises.

1.1.3 a Document management

Max. Score
mandatory

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

Ensure efficient communication between the project partners. It is important that a number of documents are accessible to all and are arranged logically. This is the project team's responsibility. A digital project platform with specific access rights is a must in this regard.

Criteria requirements

v	Meet the following requirements: • Use unique serial number management for the different project documents, including version management. • Draw up an inventory of all documents that have an input into the project and indicate where they can be consulted. • Create a digital platform through which the project partners can at all times consult and update the documents. • Reporting and assessment by means of a note and the actual implementation of the project documents.

1.1.3 b Updating basic documents

Max. Score
2

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

Determine a procedure for changes to the design plan and the business plan.

Explanation of the measure

A design plan and business plan are not static items. Once approved, they provide guidance for the development of further sub-projects. However, both guideline documents are influenced by various factors, meaning that they must be updated on a regular basis.

It is essential that the initiator(s) of the economic sites prepare themselves for this and ensure that spatial and business changes can be evaluated and oriented in the overall picture.

Economic sites, in particular, are highly dynamic and need to respond to changing demands and context. The management must be ready for this, so that the initial intended quality is not undermined by ad hoc decisions.

Criteria requirements

1	Meet the following requirements: • All the basic documents of the design plan and the business plan are available in digitally editable format and may be used for further development. • Establish a procedure on applying for, processing and approving changes after the basic version has been approved. • Determine who to turn to for this as designer or author. • Reporting and assessment by means of starting note and implementation in business plan.
1	Schedule at least one annual evaluation of the design plan and the business plan, together with subsequent updating of the basic documents.

1.1.4. FINANCIAL FEASIBILITY

In addition to a good project approach, the economic feasibility of the project should also be examined as early as possible.

1.1.4 a Examination of financial feasibility

Max. Score
6

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

To enable decisions based on a clear picture of the financial impact in the short and long term.

Explanation of the measure

Sustainable economic developments entail a number of investments that are linked to return effects such as cleaner energy, more efficient public transport, reduced water consumption, easier maintenance, less renovation, better management, etc.

By mapping out these financial benefits in the design phase, a more accurate picture is created of the financial profitability of the project in the longer term.

In addition, the investing partners and beneficiaries are linked together, which can lead to possibilities for cross-financing.

When examining financial feasibility, a cost-benefit analysis of the project must be carried out. If the project costs are much higher than the project revenues, the design must be adjusted.

An overall financial picture is established first, after which a specific LCCA is requested for a number of sub-aspects.

Overall financial feasibility

- Costs
  - Costs of acquiring land, buildings
  - Study costs (designers, engineers, experts, etc.)
  - Clean-up costs for demolition, soil, asbestos, etc.
  - Construction costs (costs for infrastructure, public domain, buildings, etc.)
  - Development costs (notary, development, project management, temporary accommodation, relocation, etc.)
  - Financing costs (extra costs from loans)
  - Management costs (energy, maintenance)
- Revenues
  - Subsidies, public financing
  - Co-financing
  - Private financing: public-private partnership (PPP)
  - Own funds
  - Operating revenues
- Indirect costs and revenues
  - What (hidden) costs or revenues arise during development
  - Who is involved (public bodies, other parties, etc.)
  - Are there opportunities for cross-financing?

Life Cycle Cost Analysis (LCCA)

A Life Cycle Cost Analysis (LCCA)[4] is a financial evaluation technique in which the operational costs and the end-of-life costs are mapped out, together with the investment costs. It allows informed choices to be made in the long-term perspective.

The LCCA highlights the following costs:

- Initial investment cost
- Operational costs
- Maintenance costs (servicing, repairs, replacements, management costs, etc.
- End of life

The LCCA includes a study period of 25 to 30 years (average) and of 60 years (long term) with fixed and evolving (forecast) price levels.

The LCCA is produced for at least the following aspects at site level:

- Energy aspects
- Mobility and transport
- Water management

The LCCA is produced for at least the following aspects for the collective sub-projects:

- Surfacing of road infrastructure
- Organisation of public domain
- Pipes and installations

Criteria requirements

2	Examine the overall financial feasibility: • Plot project costs and revenues. • Investigate whether indirect costs or revenues are generated. • The results of the financial feasibility are included in the strategic business plan.
4	An LCCA analysis has been performed on the designated areas from phase 1.2.

1.1.4 b Robustness of financial plan

Max. Score
2

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

The "system" sensitivity of the strategic business plan is assessed in a risk analysis.

Explanation of the measure

A risk assessment and sensitivity test are carried out in the investment and operational phases.

Investment phase

This risk assessment indicates the possible consequences (level of ambition, programme changes, timing, etc.) of variations in assumptions (e.g. major end users dropping out, impact of clean-up costs, residual capacity on access roads, trends in property prices, etc.). The aim is to examine whether variations in assumptions provide a different picture in terms of financial feasibility and if the implementation of the economic development is extended.

[4] See BREEAM Europe Commercial man 12 Life Cycle Cost Analysis

Operational phase

This involves examining the potential effects of one or more economic activities leaving the site. Other potential operational risks that could threaten the business plan are listed and included in a sensitivity test.

Criteria requirements

2	Investment phase: • List the critical success factors for starting the project. • Carry out a risk analysis for each of the critical success factors. • Examine how the risk can be reduced. • What are the fall-back options? Operational phase: • List the operational business risks. • Perform the sensitivity test. • What are the fall-back options?

1.1.5. PROJECT MANAGEMENT OF PUBLIC DOMAIN AND SHARED INFRASTRUCTURE

In implementation of the design plan, sub-assignments are defined that in turn undergo a design process. A number of design documents are essential reference documents in this regard. This concerns the public domain (e.g. roads) on the one hand, and the possible collective private infrastructure such as e.g. a communal extinguishing basin, on the other hand.

The design and implementation process of the Public Domain and infrastructure generally forms a second cycle in the development of the economic site, after the outlines have been sketched in the design plan. Other interlocutors and designers then frequently join the design team. The various process steps and instruments are mapped out here.

The linking/feedback between the design process of the sub-projects and therefore in any case from the communal space to the design plan and business plan must be ensured at all times.

1.1.5 a Vision and ambition of public domain and shared infrastructure

Max. Score
2

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

Make sure that the vision developed in the design plan and the business plan is passed on smoothly to the design team and other stakeholders when implementing the public domain and infrastructure.

A quality chamber is established that monitors:

- A good project definition with a clear description of the quality objectives
- A good selection procedure for appointing designers
- The design
- The connection with the town-planning, historical and landscape context.
- Public accessibility
- Communication with and involvement of residents
- Sustainability

The role of the quality chamber lies in supporting the prime contractor and designer. To this end the quality chamber formulates recommendations to improve quality. For this, see also 1.1.2 a, b, c and d (strategic plan, design plan, design brief, strategic business plan).

The conditions applicable to the quality chamber are described in 1.3 b.

Criteria requirements

1	Meet the following requirements: • A draft starting memorandum summarises the assignment that emerges from the design plan and business plan. This summary project definition serves to define main features and make the outlines of the project communicable. • Draw up a Design Brief (DB), and update this at each process step. The design brief starts from the DB design plan.
1	The quality chamber is consulted during each phase.

1.1.5 b Project management of public domain and shared infrastructure

Max. Score
2

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

Good document management, clear reporting and approval procedures and a clear picture of the project planning are necessary to ensure an integrated project process.

Explanation of the measure

Documents and document management

- Use unique serial number management for the different project documents, including version management.
- Draw up an inventory of all documents that have an input into the project and indicate where they can be consulted.
- Create a digital platform through which the project partners can at all times consult and update the documents.

Reporting and approvals

- Prepare minutes of each meeting, specify to whom they are distributed and who is responsible for what action.
- Draw up a protocol of the approval procedure for the various project documents.

Project plan

The project plan includes a time framework for the entire project process, specifying the following details:

- Project phases
- Milestones, deadlines
- Moments for consultation (internal, external) and recourse to experts
- Times for input of sub-studies
- Times for approval procedures
- Bottlenecks to achieving the sustainability objectives
- Feedback to the design plan and business plan

Criteria requirements

2	Meet the following requirements: • Documents and document management • Reporting and approvals • Project planning • Reporting and assessment by means of starting memorandum and implementation in the process

1.1.5 c Basic documents for public domain and shared infrastructure

Max. Score
mandatory

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

For the public domain and any shared infrastructure, the necessary basic documents are produced in the course of the design process. The link is established with the strategic plan (see 1.1.2 a), the design plan (see 1.1.2 b), the design brief (see 1.1.2 c) and the zoning plans (see 1.1.2 g).

Explanation of the measure

Sketch design

- Updated summary project definition and design brief
- Design plans at an appropriate scale
- Incorporation into the basic plan for the site
- Presentation drawings incorporated into the basics from the design plan

Preliminary design

- Updated summary project definition and design brief
- Design plans at appropriate scale
- Incorporation into in the basic plan for the site
- Presentation drawings incorporated into the basics from the design plan

Implementation design

- Updated summary project definition and design brief
- Design plans at appropriate scale
- Incorporation into the basic plan for the site
- Presentation drawings incorporated into the basics from the design plan

Permit applications

Specifications

As-built plan

- Updated summary project definition and design brief
- Design plans at appropriate scale
- Incorporation into the basic plan for the site
- Presentation drawings incorporated into the basics from the design plan

Management plan

The management plan contains at least[5]:

- Measures for sustainable maintenance of both the public and private domain.
- The aspects of the design plan that affect management.

The management of the public domain requires clarification in the area of public roads (this is done by the Roads, Bridges and Waterways Department), hydraulic management (implementation by TMVW) and public green spaces. The latter is usually carried out by the Parks and Public Gardens Department if it is part of a greater green infrastructure. If green spaces are managed by, for example, the parks management of a site, the Parks and Public Gardens Department can act as advisor. See also 4.4 e.

Private domains are managed privately; this may be collectively contracted out to e.g. the parks management (if present).

It is advisable to specifically name those stakeholders responsible for maintenance in the management plan. The plan must be operational by the time the first plot is allocated.

Criteria requirements

v	Meet the following requirements, depending on the phase: • Sketch design • Preliminary design • Implementation design • Permit applications • Specifications • As-built plan • Management plan

1.1.5.d Maintenance test for public domain and shared infrastructure

Max. Score
2

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

A maintenance assessment highlights the bottlenecks of a design in relation to maintenance, allowing timely adjustments to be made, leading to more efficient management. Maintenance is a key factor in the production of a design. By ensuring sufficient consultation on maintenance during the design phase, the design can be refined where necessary. The maintenance assessment addresses at least the management of public roads, hydraulic management and the management of public green spaces (see also 1.1.5 c).

Criteria requirements

2	Plan consultations between designers, the Roads, Bridges and Waterways Department and the Parks and Public Gardens Department to assess the maintenance of the design in terms of: • Accessibility of underground utility pipes • Maintenance friendliness of the public domain: need to limit maintenance, accessibility by maintenance agents, etc.

[5] Decree of the Flemish Government of 24 May 2013 concerning grants for industrial estates (Belgian Official Gazette, 10 July 2013), Article 26.

	• Limit repairs to the public domain: robustness, repairability, etc. • Green maintenance: pesticide-free, limit green waste (closed green cycle), etc. Reporting and assessment by means of starting memorandum and reports.

1.2. PARTICIPATION

The degree of participation is a measure of the quality of the decision-making processes. The concept of participation covers the interaction between the various stakeholders during the decision-making process: directors, civil servants, experts, owners, residents, users, institutions and other stakeholders.

1.2 a Defining a participation model

Max. Score
10

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

Definition of an appropriate participation model.

Explanation of the measure

Participation is custom work according to the design of the project, the existing social fabric, the stakeholders directly involved, the local policy context etc.

The participation model must meet the following objectives[6]:

- The planning of the participation must be in accordance with the project planning, so that the contribution can be effective in the various phases
- The model must be inclusive, open and free from manipulation. It must try and reach a broad cross-section of the population and organisations.
- In the first place, the model must question participants about communal interests
- The model must be interactive and create room for debate.
- It must be efficient, effective and relevant. Confidence in the process is vital for the commitment of the participants and for success.
- Provision has been made for the necessary facilities and operating costs.
- An independent trained facilitator has been appointed to moderate the process.
- The participants check the agenda.

The participation model is justified and described in a protocol.

The participation protocol addresses the following topics:

- Definition of participation model:
  - Informed choice of participation model
  - Evolution of the model during the implementation process
- Stakeholders: list of all possible stakeholders
  - Current and future users (companies)
  - Local residents
  - Residents' groups (organised)
  - Local organisations (social, cultural, economic, environmental, etc.)
  - Politicians (directors, opposition, etc.)
  - Authorities and utility companies
  - Initiators
  - Institutions (schools, health care, social facilities, etc.)

6 cf. BREEAM communities COM2

  - Experts from the project team
  - External experts
  - Other key stakeholders

- Role management framework: determine the role of the various stakeholders in the participation process:
  - Inform
  - Consult
  - Design debate
  - Participative design processes
  - During which phase?
- Accessibility of information
  - What information for whom?
  - Comprehensible information: re-translate depending on the target public
- Distribution of information:
  - Which information carriers? posters, flyers, brochures, website, presentations
  - External communication: press, local publications
  - Information sessions: presentations what, where, when and who? Frequency?
- Management of participation process
  - Which structure organises the participation process?
  - Which person manages the participation process?
  - Complete financial plan

A full participation process must include at least 4 developed components:

1. Start or kick-off: announce what is going to happen, including how the interaction with and participation of local residents will take place, and gather initial responses.
2. Information gathering: in the next phase the required information is gathered from the stakeholders concerned. This can be done through surveys, interviews, group discussions, neighbourhood walks, presence at neighbourhood parties ... The way this will be done depends on the target public and the info that is already available and which still needs to be obtained. It is very important to choose the correct method. Much information is already known, and we do not need to reconfirm known info.
3. Participation during the work process: with the information that has been gathered, work can begin based on the necessary specialist knowledge. It is, however, advisable to allow interaction on choices or feedback at certain times. Again, the choice of method is crucial to achieving the desired result.
4. Final feedback: at the end of the entire process we must provide feedback on the information gathered and conclusions drawn and justify the choices made.

In some processes, the regulations require a form of participation (e.g. public inquiry in connection with a permit). These prescribed participation sessions must be integrated into the participation process as a whole.

Criteria requirements

10	Meet the following requirements: • It is demonstrated that the participation model guarantees continuous questioning by involved stakeholders during the entire design and implementation process and at least satisfies the 4 components of the participation process. • The participation sessions prescribed by law have been integrated into the

	participation process. • A facilitator has been appointed for participation. • Organisation and resources have been integrated into the strategic business plan.

1.2 b Consultation with stakeholders

Max. Score
15

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

To stimulate a high degree of involvement.

Explanation of the measure

Different levels of involvement are defined. The way they are present is a measure of the quality of the participation process.

Core group

This is a representative group of closely involved stakeholders who closely monitor the entire design and rehabilitation process. The core group includes a representation of (future) residents, social, cultural and economic stakeholders. As a minimum, the core group functions as an informed and representative sounding board for the project team.

Inform

- The basic information includes a summary presentation depending on the general public of the project team, the design plan, the design brief, the project plan and the business plan. This information must be freely available to the general public.
- Prepare and communicate an objective report of this session.
- Clearly identify in this report the key issues of the various stakeholders and justify what action the project team wishes to take in response to these.

Consult

- The basic information is sufficiently developed so that participants feel sufficiently informed to develop a well-founded opinion or position.
- A framework for advice is present.
- The information from previous consultations is available.
- The consultations address at least:
    - The relationship with the immediate surroundings (see also 9.3 b)
    - Programme and quality aspects
    - Project management
    - Management aspects
- Justify what action the project team wishes to take in response to this

Workshops and design debate

The stakeholders are involved in workshops and the design study.

Response to participation input

- Prepare and communicate an objective report of this session.
- In this report, clearly identify the key questions of the various stakeholders and justify what action the project team intends to take in response to these.

Criteria requirements

5	Meet the following requirements:[7] • A core group of stakeholders is put together and consulted at sufficiently regular intervals and at least at key moments in the development process. • It is demonstrated that the general public is provided with freely available and comprehensible information at sufficiently regular intervals and at least at key moments in the development process. • The core group and the general public can easily react to the information provided. • The response to the participation input has been demonstrated.
5	In addition to the above, it is demonstrated that actions and changes have been implemented in response to the input from the core group.
5	In addition to the above, it is demonstrated that the participation process involved at least 3 workshops and/or design debates.

1.2 c Consultation with authorities and utility companies

Max. Score
2

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

Involving the various departments in the design in a timely fashion allows for better and more efficient implementation and above all management. The project team examines which departments are involved in the project. Their role and responsibilities in the project must be defined.

Explanation of the measure

Possibly involved services:

- European partners and funds
- Federal partners and funds: urban policy etc.
- Flemish partners and funds:
    - Urban fund
    - Department of Spatial planning, Housing Policy and Non-Movable Heritage (RWO) and agencies (Space & Heritage, VIOE)
    - Department of the Environment, Nature and Energy (LNE) and agencies (OVAM, VMM, VREG, VEA)
    - Department of Mobility and Public Works (MOW) and agencies (AWV, MDK, De Lijn, W&Z)
    - Department of Economic Affairs, Science and Innovation (EWI) and agencies (Enterprise Flanders, Participatiemaatschappij Vlaanderen)
- Provincial partners, funds, Provincial Development Company (POM)
- Intermunicipal companies
- Polders and drainage administration
- Other water managers
- TMVW
- Mayor and aldermen

[7] cf. BREEAM communities COM2

- Urban development company
- Urban Development and Spatial Planning Department
- Department of the Economy
- Mobility company
- Environmental Department
- Housing Department
- Roads, Bridges and Waterways Department
- Architecture and Preservation of Monuments Department
- Parks and Public Gardens Department
- Fire Brigade
- Police
- NMBS, Infrabel, De Lijn
- Domestic waste collection
- Telecom
- Utility companies
- ESCOS (energy service companies - if applicable)
- etc. (list to be updated beforehand depending on the project)

Criteria requirements

2	Meet the following requirements: • Draw up an inventory of the above services and determine in which phase they are involved. • Reporting by means of a note or report.

1.2 d Consultation concerning public domain and shared infrastructure

Max. Score
2

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

Ensure that all stakeholders and interested parties have a clear role in the process, and that it is monitored.

Explanation of the measure

Team members to be involved

- Mandated project manager
- Architect
- Technical engineer for special techniques
- Stability engineer
- Building physics design agency
- Energy expert
- Property expert
- Landscape architect

- Soil expert
- Mobility expert
- Surveyor
- Quality chamber
- etc. (list to be updated beforehand depending on the project specifications)

Authorities and utility companies

See also 1.2 c:

- Mayor and aldermen
- Urban development company
- Urban Development and Spatial Planning Department
- Department of the Economy
- Mobility company
- Environmental Department
- Housing Department
- Roads, Bridges and Waterways Department
- Architecture and Preservation of Monuments Department
- Parks and Public Gardens Department
- Fire Brigade
- Police
- NMBS, Infrabel, De Lijn
- Domestic waste collection
- Telecom
- Utility companies
- ESCOs (if applicable)
- etc. (list to be updated beforehand depending on the project)

Other stakeholders within the system boundary

- Establish a specific role management framework according to the organisation of the public domain and any shared infrastructure.
- Communicate this role management framework to those concerned.
- Organise one or more meetings with these stakeholders.

Criteria requirements

2	Meet the following requirements: • Composition of project team and working group. • The designers are chosen according to a pre-defined and transparent procedure. • List those directly concerned and involve them in direct consultation. • Consultation with authorities and utility companies. • Reporting and assessment by means of a starting memorandum and implementation in the process

1.3. INTEGRITY

1.3 a Sustainability meter

Max. Score
mandatory

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

The sustainability meter is a process-oriented instrument that allows sustainability ambitions to be quantified, defined and monitored through the various process steps. It complements the Design Brief.

The use of the sustainability meter is intended to enable the social objectives around sustainable development to be weighed up in a transparent and objective manner;

Criteria requirements

v	The sustainability meter is competed in full and updated in each assessment phase. The sustainability meter indicates the references to the document that explain the measures taken.

1.3 b Quality chamber

Max. Score
15

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

To facilitate as independent a quality assessment as possible.

Explanation of the measure

A quality chamber is put together with at least 1/3 independent members. The ability of the members to assess spatial and architectural qualities is demonstrated by means of their CV. The collection of members makes the quality chamber an authoritative organ.

The quality chamber is consulted on a regular basis and ensures the spatial and architectural quality. The quality chamber at least provides advice on:

- The project definition with a clear description of the quality objectives.
- A good selection procedure for appointing designers
- The design plan
- The Design Brief
- The project planning
- The issuance plan
- The participation model

Criteria requirements

15	Meet the following requirements: • The quality chamber has been put together. • The advice of the quality chamber for the specified themes and the project team's response is known to the project team and the licensing bodies.

2. SITING, PROGRAMMING AND DESIGN

Starting from the same general definition of sustainability as this study, the Regional Zoning Plan for Flanders (RSV) and the Regional Zoning Plan for Ghent (RSG) both take, from the outset, sustainable spatial development as a basic assumption.

In both plans, two principles give sustainable spatial development its concrete form:

Spatial capacity is defined as the ability of the space, now and in the future, to accommodate human activities without the boundaries of the spatial function being exceeded. Starting from the capacity of the space implies caution in the relationship between human activity and spatial development. The sustainable use of space takes account of a maximum permissible load. Conditions are imposed on the use of space. However, capacity is bound by place, situation and sometimes time.

Spatial quality is all about the assessment of the space. Spatial quality is not determined primarily by the characteristics and capacity of the space as such. The assessment of the space is largely co-determined by the involvement of the assessor (resident, target group, community, etc.). This assessment is socio-culturally determined and therefore time-dependent.

Both principles require a qualitative implementation if a sustainable spatiality is to be achieved. At the same time, these concepts are to be implemented primarily as a function of the context.

The sustainability meter cannot measure the final spatial sustainability, because this cannot be expressed normatively, because it is a generalistic instrument and quality is highly specific.

The sustainability meter limits itself to those aspects that are measurable and capable of being monitored. Sustainable spatial development as defined above can only be the result of a well-considered design process. The sustainability meter focuses on this process, as a necessary (but inadequate) condition for spatial sustainability.

That final assessment must be made elsewhere, by, among others, competent juries and through quality monitoring.

Sustainable siting, programming and design of economic sites is specific. Economic sites are delineated because of the need for areas where economic activities can develop more easily. The fact that this is not just possible everywhere has to do with the scale of their activities, the nuisance and the necessary accessibility. The integration of economic sites with sometimes extensive use of space requires an appropriate approach that reconciles economic, social and ecological interests.

The time dimension is a particularly important factor in this approach. Companies evolve, and industrial estates must be able to cope with these dynamics through flexibility and reversibility. Also, economic sites that are only active for a limited number of (work) hours during the day apparently do not involve an intensive use of space either.

The quality of the site is a component of an attractive investment climate. After all, poorly equipped and neglected industrial estates create problems, such as an unattractive investment climate and high restructuring costs.

The aim is to create a working landscape, an area where landscape and industrial activity merge into each other. It is a landscape in which people work, but in which people also enjoy recreational activities, walk, cycle and live. In this context, buffering is only used as a last resort to create a good spatial structure.

The working landscape thus has as positive an effect as possible on quality of life and environmental effectiveness (through passability, shared use and the combination of green and blue functions and the separation of different traffic flows).

However, the proposed spatial continuity may conflict with excessive leaps in scale and nuisance brought about by the economic functions. A balance must be sought at all times between mixing functions and separating functions: separation where necessary, mixing where possible.

2.1. SITING OF MAIN ACTIVITIES AT MACRO- AND MESO-LEVEL

A suitable location is essential to achieving good sustainability. In this chapter, the site is first assessed against the existing regulations governing spatial structure. Next, a number of sustainability criteria are evaluated, such as programming, reuse of existing locations, accessibility of the site, presence of facilities, and quality of life on the site and its surroundings. These criteria are used for an initial assessment of the site according to the profile of the economic site.

2.1 a Segmentation and differentiation of economic sites

Max. Score
5

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

To profile the economic main activity/ies on the basis of categories.

To address the specific needs of industrial estates, the wide variety of requirements (in terms of both size and typology) and mutual incompatibility, all these types need to be kept on hand, in a way that takes account of the scarcity of space.

Explanation of the measure

By clearly defining the main economic activity or activities, an appropriate site can be sought that matches the profile of the category.

In a second stage, opportunities for synergy, clustering and exchange between companies may increase by grouping them according to their activity.

Categorisation forms the first project definition that will steer the siting study. During the programming of the economic site, it serves as a touchstone for the suitability of functions on the site.

Categorisation can be performed using the following table. The category can be determined according to the type of industrial activity you want to prioritise. Suitability is indicated by the number of stars.

It may sometimes be necessary to split a site into various sub-sites, depending on the category. Subsequently, a score must be determined for each sub-site and these scores are then added together to obtain the score at site level.

Criteria requirements

5	Categorise the type of economic site in a reasoned note. This concerns the main economic activity/ies of the envisaged site. A site can belong to one or more categories, which may or may not be zonally delineated.

	mixed industrial estate (traditional)	mixed industrial estate (modern)	transport & distribution	water-based industrial estates	airport-based industrial estates	science parks	office and service zones	public-oriented offices	retail zones: large-scale retail	leisure (sports stadiums, shows, events, cinema complexes, etc.)	industrial estates for agro-industry	zones for waste processing and recycling
	IA	IB	II	III	IV	V	VIA	VIB	VIIA	VIIB	VIII	IX
light production	*	**	*	*		*	*				**	*
heavy production	***			***							**	**
construction industry	*	**	*									
transport / storage / trans-shipment	*	**	***	***							*	*
service companies	**	**	**	**		*	*	*	*	*		
leisure									***	***		
wholesale		**	**	**		*	*					
retail*	cat VII	cat VII	cat VII	cat VII		cat VII	cat VII	cat VII	cat I-VII	cat I-VII		
office function*	cat III	cat III	cat III			cat I-II	cat I-II	cat I-II	cat III	cat III	cat III	cat III
knowledge institutions & research		*				***	*					
environmental class 1	**	*	**	**		?	?	?	?	?	*	**
environmental class 2	**	**	**	**		*	*	?	?	?	**	**
environmental class 3	*	*	*	*		*	*	*	*	*	*	*
Seveso	?	?	?	?								
employee-intensive	**	**	*	*/**		***	***	***	**	**	**	**
public-intensive / portal function						*	*	***	***	***		

?: not ruled out, but feasibility and compatibility must be demonstrated
*: see RSG table
Sources: WVI, RSV, RSG

2.1 b Assessment against spatial and programmatic objectives

Max. Score
5

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

To be able to handle the scarce space better and improve spatial quality, a number of policy instruments have been developed. First, the site must therefore be assessed against policy objectives and legal requirements through categorisation of the envisaged site, cf. 2.1 a

Explanation of the measure

The site must satisfy the policy objectives and legal requirements set out in the following documents:

Regional Zoning Plan for Ghent (RSG)

A Regional Zoning plan is understood to be a policy document that provides the framework for the desired spatial structure. If offers a long-term vision of the spatial development of the area in question. It is designed to provide cohesion in the preparation, making, and implementation of decisions concerning spatial planning.

Spatial Implementation Plan (RUP)

A spatial implementation plan contains all the rules associated with the spatial development of an area. An RUP is drawn up to implement the vision described in a Regional Zoning plan. Failing this, the regional plan must be assessed.

General Building Regulations of the City of Ghent

A municipality's building regulations contain all the municipal requirements placed on construction projects. They include requirements relating to buildings as well as parking facilities, planting, etc.

For this assessment, it is best to contact the Urban Development and Spatial Planning Department.

Mobility Plan

The local mobility plan reveals the city's vision in terms of mobility. As well as the vision to bring about a shift in the use of means of transport and the ways of promoting the use of bicycles and public transport, categorisation, current and available capacity, etc.

Visions relating to public transport

The various policy plans of De Lijn and the NMBS highlight the local obstacles, plans and priorities. This source can be used to examine (future) accessibility via Public Transport. Obviously it must first be assessed to what extent the proposed actions are still relevant.

Other visions

Trees Plan, Green Insight, Green Structure Plan, etc.

Criteria requirements

5	Meet the following requirements: • Organise a meeting with the town planning officer. • Assess the site against the various policy documents. • Prepare a note "Assessment against spatial and programmatic objectives of the site" and include this in the DB.

2.1 c Reuse of existing and contaminated sites

Max. Score
20

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

Instead of cutting into undeveloped land, preference is given to the redevelopment of sites in a built-up environment.

The redevelopment of polluted sites must take priority. This reduces pressure on undeveloped land. In addition, it allows the clean-up of the sites to be organised.

Explanation of the measure

For the preservation of open and green spaces, efforts must be made to make the existing built-up fabric more compact, which is why the reuse of existing sites or brownfields is encouraged.

A brownfield neglected or underused land that is affected to such an extent that apparently it can only be used or reused by means of structural measures.[8]

Here, a site is only considered a brownfield if at least 75% of the site has been developed at some point during the last 50 years [9].

A brownfield does not necessarily have polluted soil, and here the clean-up of sites with soil pollution is also encouraged. Serious soil contamination of the site and the need for clean-up is identified on the basis of a descriptive soil survey.

8 Decree of 30 March 2007 on brownfield covenants. http://www.ovam.be/jahia/Jahia/pid/1926

9 As per BREEAM Industrial

Criteria requirements

15	A brownfield is chosen for redevelopment.
5	A site with severe soil contamination (cf. descriptive soil survey) is chosen for redevelopment.

2.1 d Accessibility of the site

Max. Score
12

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

The accessibility profile of the site must potentially match the desired mobility profile of the category.

The importance of a location that matches the mobility profile cannot be underestimated in the context of sustainable development. Mobility is a key aspect of the sustainability profile of a site, and it is scarcely possible to take remedial action if fundamentally wrong decisions are taken at this point.

Explanation of the measure

For each category there is a different weighting of the accessibility profile according to the specific needs of the main activity, but also according to a broader spatial strategy, in which e.g. readily accessible sites are reserved for activities that generate a lot of traffic. Thus, for example, good accessibility by lorry is more important for a site with transport and distribution (category II) than for a science park (category V).

Criteria requirements

The category is determined in point 2.1 a Segmentation and differentiation of economic sites. Calculate the score as follows:

- Give part-scores for each mode of transport as described in table 1 below; in each case, the maximum achievable score is on the left.
- The modes of transport have different weightings for the various categories, see table 2 below. Use the weighting values as maximums and convert the part-scores as a percentage of the maximum.
- Add these converted part-scores together.
- Reduce this number to a score on a scale of 1 to 12.
- Round off to the nearest whole number.

See table 3 for an example calculation.

Table 1: The scores for each mode of transport are assigned as follows:

2	Accessibility for pedestrians: • 1 point if the site is less than 500 m actual walking distance from a public transport stop. • 1 extra point if the site is less than 200 m actual walking distance from a major public transport junction (where at least 2 main public transport lines cross).
3	Accessibility for cyclists: • 1 point if the site is 2000 m cycling distance from a public transport junction (where at least 2 main public transport lines cross). • 1 extra point if a cycle path can connect to the local cycle route network from the site. • 1 extra point if a cycle path can connect to the supralocal cycle route network from the site[10] or a junction of recreational cycle paths.

[10] See http://www.oost-vlaanderen.be/public/wonen_milieu/mobiliteit/

5	Accessibility via public transport: • 1 point if the site is not more than 500 m from a public transport stop and meets the following service frequency: weekdays 6-9 a.m. and 4-6 p.m.: 4 services/hr; weekdays 9 a.m.-4 p.m. and 6-9 p.m.: 3 services/hr; weekend 8 a.m.-11 p.m.: 2 services/hr. • 1 extra point if the site is not more than 500 m from a public transport stop and meets the following service frequency: weekdays 6-9 a.m. and 4-6 p.m.: 5 services/hr; weekdays 9 a.m.-4 p.m. and 6-9 p.m.: 4 services/hr; weekend 8 a.m.-11 p.m.: 3 services/hr. • 1 extra point if the site is not more than 200 m from a stop on a main trunk line[11] of public transport. • 2 extra points if the site is not more than 200 m from the junctions of the main trunk lines of public transport and less than 200 m walking distance from a train station.
3	Accessibility by car: • 3 points if the site is accessible from a main road or a category I primary road, or • 2 points if the site is accessible from a category II primary road, or • 1 point if the site is accessible from a secondary road.
3	Accessibility for lorries: • 3 points if the site is accessible from a main road, or • 2 points if the site is accessible from a category I primary road, or • 1 point if the site is accessible from a category II primary road, or
3	Accessibility for shipping: • 1 point if one ship can moor and load and unload at the site, or • 2 points if several ships can moor and load and unload at the site, or • 3 points if the site has a port infrastructure or allows this to be developed (quay walls and crane infrastructure).
3	Accessibility for freight trains: • 2 points if a railway can be connected to the site • 1 extra point if the site has unloading docks and transhipment facilities for shipping and lorries.

fietsbeleid/provinciaal_bovenlokaal/index.cfm

[11] See RSG

Table 2: Accessibility profiles for each category

	mixed industrial estate (traditional)	mixed industrial estate (modern)	transport & distribution	water-based industrial estates	airport-based industrial estates	science parks	office and service zones	public-oriented offices	retail zones: large-scale retail	leisure (sports stadiums, shows, events, cinema complexes, etc.)	industrial estates for agro-industry	zones for waste processing and recycling
	IA	IB	II	III	IV	V	VIA	VIB	VIIA	VIIB	VIII	IX
pedestrians	1	2	1	1		2	2	3	3	3	1	1
cyclists	1	2	1	1		2	2	3	3	3	1	1
public transport	1	2	1	1		2	2	5	5	5	1	1
cars	1	1	1	1		1	1	2	3	3	1	1
lorries	2	2	3	3		1	1	1	2	2	2	2
shipping			2	8							1	2
freight trains	2		2	3							2	2
total	8	9	11	18		8	8	14	16	16	9	10

Example for clarification: a category IA site, imagine that the part-scores are as given in the second column below.

Table 3: Illustrative calculation of scores

	Part-score (table 1) / maximum (table 1)	Converted part-score / maximum (table 2, category A)
Pedestrians	1 / 2	0.5 / 1
Cyclists	2 / 3	0.666 / 1
Public transport	2 / 5	0.4 / 1
Car	3 / 3	1 / 1
Lorry	3 / 3	2 / 2
Boat	1 / 3	0 / 0
Train	0 / 3	0 / 2
Total		4.5666 / 8

If the sum of the converted part-scores (at the bottom of the third column) is converted to a score out of 12, this gives 6.85 / 12, or rounded off a score of 7/12.

2.1 e Facilities: a healthy balance inside and outside the site

Max. Score
33

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

To optimise the use of the economic site and the immediate vicinity within the system boundary by aligning the main function (industrial activity) and other functions (housing, recreation, mobility, utilities and basic facilities) and, where appropriate, crosslinking these and/or making them more accessible e.g. through better passability or shared use.

Explanation of the measure

A test can be performed at the implantation stage of the suitability of the site and its environment (system boundary) as regards the opportunities for crosslinking functions[12]. Firstly, the relationship with the economic main function is evaluated for each of the following functions according to the site and the vicinity:

- Housing
- Catering
- Local shops
- Sport and recreation
- Public facilities
- Green structures
- Cultural facilities
- Energy supply or demand (and the alignment of their input and output)
- Utilities
- Suppliers and customers

A well-founded vision is then formed of the desired form of alignment. This can involve the crosslinking of other functions within the plan boundary of the site, but also e.g. shared use or passability according to easier accessibility. The determining factors here include the level of facilities in the neighbourhood, the added value for companies and/or employees and the critical mass. See also 1.1.2 a: the form in which alignment between the various functions is sought must tie in with the ambition(s) listed in the Strategic Note.

This vision is created on the basis of the following points.

Correct mix of functions in and around the site

Encouraging vitality on the site itself, and extrapolating between the site and the surrounding area, to avoid creating an isolated location. Establishing a monofunctional industrial estate can create a blind, monotonous spot for the neighbourhood. To avoid this, the sustainability meter encourages alignment between the economic main function and other functions that offer added value for companies and employees and which also attract other users who use the site and surroundings at other times of the day.

Active site in time

An industrial estate that transforms in a couple of hours from an extremely busy into a dead site implies a lack of efficiency, through a failure to meet other functional needs via the existing infrastructure.

This more efficient use of the site can be incorporated into the design, by improving the passability of the site and providing opportunities for shared use. The plan boundary is looked at for this aspect (as opposed to the system boundary).

Diversity in scale

Different granulations on the economic site and in the vicinity can give rise to a rich diversity of economic operators, the basis for a dynamic and sustainable economic site. Providing small and

[12] See also criterion 9.2.d Clustering of main activities

medium--sized plots on an economic site can create opportunities for starting businesses, for example. It is a component for creating a locally anchored and living business community. Some sites are reserved for industrial activity from a certain size; in that case, the transition can be made to smaller-scale functions on the periphery, for example. The system boundary is also looked at for this aspect. By making careful (design) choices as regards diversity in programmatic and spatial scale, a transition from the site to the surrounding fabric (and vice versa) can be created that is appropriate to the specific context.

Criteria requirements

18	Inventory and evaluation of the relationship between the economic main function and other functions within and around the site.
15	Development of a substantiated vision regarding the preferred form of alignment between the various functions.

2.1 f Environmental and mobility nuisance in the surrounding environment

Max. Score
5

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

The quality of life in a location is a vital aspect of a sustainable design. The site should allow a good balance between the main activity of the economic site and its surroundings. The possible negative impact of the category is assessed here as regards its surroundings and the possibility of finding sustainable solutions (buffering, accessibility, etc.).

Mobility nuisance is understood to mean potential lack of road safety, additional traffic pressure and traffic noise. Environmental nuisance is understood to mean potential nuisance from noise, smells, dust and light.

The way in which environmental and mobility nuisances are addressed is indicated in the design plan (1.1.2b). This is developed further in the thematic chapters - chapters 3, 6, 7 and 8.

Explanation of the measure

Nuisance is included in this chapter, 'Siting, programming and design', because in addition to the more quantitative development of this aspect in the thematic chapters, the so-called 'signal function' applies here. By including the environmental and mobility nuisance aspect in the (design) process at an early stage, nuisance as a result of the development can be prevented (or reduced) in a simple yet efficient way.

Environmental impact reports (e.g. an EIA plan in an RUP) provide the substantiation for this analysis.

Criteria requirements

v	Inventory and evaluation of potential environmental and mobility nuisance within and around the site, including identifying all possible receptors of nuisance within the system boundary.
5	Demonstrable implementation of (spatial-physical) solution directions in the design and development process or the substantiated ignoring of these.

2.2. DESIGN OF THE ECONOMIC SITE

To achieve sustainable spatial development, two main concepts must be properly implemented according to the Regional Zoning Plan for Flanders:

Spatial capacity

Spatial capacity is defined as the ability of the space, now and in the future, to accommodate human activities without the boundaries of the spatial function being exceeded. Sustainable use of the space therefore takes account of a maximum permissible load and conditions are imposed on the use of space.

The previous points have already examined how the main activity or category relates to the context.

Here we look at the spatial organisation of the economic site.

Spatial quality

Spatial quality points to the assessment of the site, the significance and identity associated with the location and the way various programme points are aligned with each other.

To give these two principles concrete form, a number of studies must first be carried out. These studies provide further insight for the development of a sustainable design plan. In this section a distinction is made between three types of analysis:

- Analysis of the physical spatial structure
- Analysis of the significance and identity of the location
- Analysis of networks and structures

The sustainability meter limits itself to testing methodological steps, can test a number of sub-aspects but does not comment on the final quality. These methodical steps are, however, necessary passages to achieve good spatial planning. The various spatial topics are mapped out and an inventory is drawn up of the spatial characteristics of the site, as a basis for the design.

The results of the design are incorporated into the design plan.

2.2.1. DESIGNING FROM STRUCTURES AND QUALITIES

2.2.1 a Physical system spatially structuring

Max. Score
5

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

Analysis of the site's physical system provides an insight into the genesis and current situation in and around the site.

Explanation of the measure

When analysing the physical system, the following elements are listed as a first step:

- Water
- Relief
- Soil
- Green

In a second step, based on the inventory, a vision of the future spatial structure must be developed, taking into account aspects such as density, footprint, design, etc.

Criteria requirements

2	Draw up an inventory of the physical system. The inventory consists at least of an outline of the existing situation in which an assessment is given of the various characteristics of the physical system.
3	Create a vision and a specific flowchart that clearly explains where you want to go with the physical system.

2.2.1 b Significance and identity of the location

Max. Score
5

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

Knowledge of the significance and identity of a location is important because it allows us identify the valuable elements of the site.

Explanation of the measure

When analysing the significance and identity of the location, an inventory must initially be drawn up of the qualities at site level:

- View axes and viewpoints
- Beacons and signs
- Small and large heritage
- Iconic buildings and landscape elements
- Intangible value: history, social value, usage value

In a second step, based on the inventory, an aesthetic quality plan must be produced that develops the significance and identity of the location.

Criteria requirements

2	Draw up an inventory of the qualities at site level. • Express this in a flowchart that shows and assesses the various visual and significant characteristics. • A photo reportage of the main characteristics is added.
3	Prepare an aesthetic quality plan for the site, showing the objectives of significant characteristics, view axes and beacons. This aesthetic quality plan is incorporated into the design plan.

2.2.1 c Crosslinking of networks

Max. Score
5

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

By mapping networks and structures, possible synergies can emerge between the site and its surrounding area. This analysis also forms a good basis for developing a broad site concept.

Explanation of the measure

For this analysis an inventory must first be drawn up of all networks in the vicinity:

- Green network

- Blue network (water network)
- Public transport network
- Slow road network and low-traffic roads
- Network of services and facilities
- Social recreational network and play network
- Economic network

In a second step, based on the inventory, a vision must be developed around possible synergies and partnerships between the site and these existing networks.

Criteria requirements

2	Draw up an inventory of the networks and structures in the surrounding area. Produce a flowchart that maps out and assesses the existing networks.
3	Meet the following requirements: • Establish a vision of possible synergies with these networks (provide the possibility of developing a broad site concept). Express this vision in a flowchart. • Produce a flowchart showing the spatial implications of chain-managing the business processes (see chapter 9).

2.2.1 d Connecting with the surrounding area: dealing with scale and nuisance

Max. Score
5

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

Economic sites are spatially specific zones. The transition between the economic site and its environment must be well thought-out according to connections, transitions in scale and buffering of potential nuisances.

Explanation of the measure

Here, nuisance is understood to mean: noise pollution as a result of industrial processes and/or mobility, air pollution as a result of industrial processes and/or mobility, light pollution as a result of non-natural light sources, wind nuisance. See also: 2.1 f: here an overview is provided of the possible forms of nuisance. This criterion serves as a starting point for further substantive development at measure level in chapters 3, 6, 7 and 8.

Should an RUP be required for a site, the activities for this criterion can then be used as input.

Criteria requirements

5	Evaluate how this site relates spatially to its environment. Clearly indicate where continuity can be provided and where spatial discontinuity is desirable because of nuisance, disruptions in scale, etc.

2.2.1 e Access infrastructure

For the record, see chapter 3 Mobility.

2.2.2. INTENSIVE USE OF SPACE AT SITE LEVEL

A more efficient use of space allows the scarce open space to be handled more carefully. "Efficient use of space means that economic growth is accompanied by a less than proportionate growth of the use of space, or in other words a decoupling of economic growth and use of space"

Source: "Definition of efficient use of space in the North Brabant Regional Plan", cited in *"Meer bedrijven, minder ruimte. Efficiënt ruimtegebruik voor bedrijfshuisvesting*", p. 5.

Based on the analysis of the structures and qualities of the site, a design plan is developed at site level. As with the higher levels, space must be handled sparingly here too. This is translated below into a number of sustainability criteria around an intensive use of space on the site.

2.2.2 a Reuse of buildings and historical heritage

Max. Score
10

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

To encourage the reuse of existing buildings.

To encourage the appropriate reuse of historically valuable buildings according to cultural sustainability; to safeguard existing cultural values on the site through suitable programming and restoration.

Criteria requirements

6	The reuse of buildings constitutes at least • 10% of the final developed floor area (1 point) • 20% of the final developed floor area (2 points) • 30% of the final developed floor area (4 points) • 40% of the final developed floor area (6 points)
4	The protected monuments and buildings included in the inventory of the architectural heritage on the site are appropriately designated, the valuable sections restored and valued.

2.2.2 b Density and land use

Max. Score
20

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

To restrict land use.

Explanation of the measure

Space required for buildings

Space is scarce, and in economic sites too, careful consideration needs to be given to the desired density and the use of land. Conversely, the economic functions are dynamic, and an answer must be able to be provided to changing needs. This means space is also needed for flexibility.

Within the great diversity of economic functions, there is no simple answer or target figure in this regard. It is, however, essential that the intended density and land use are carefully considered. Density can also help limit the number of movements, of people (for example, a sandwich shop can attract much more people if the industrial estate is more densely developed, i.e. is more closely situated to everything) or of goods (pipelines or conveyor belts could replace a lorry between companies on the site itself).

Multi-layer building should be applied as a general principle, but this is not feasible in highly specific functions. However, departures from the general principle should always be justified in detail.

Industrial space must also be made more compact, with volumes being bundled together.

Companies are highly dynamic activities, and land stocks can be strategic. Nevertheless, too much land is frozen in this way. Land stocks must be managed collectively. It can also be examined whether land stocks can be used on a temporary basis. By setting up temporary buildings, or by allocating strategic plots of land to start-ups, who, if successful, will have to expand and move to new premises. Land stocks linked to one plot must also be avoided, i.e. land at the rear of one company should be avoided, it should preferably be situated at the front, and possibly at the side of a building.

Prepare a note on the limited use of space by buildings.

- Investigate feasibility of multi-company buildings
- Investigate feasibility of linked buildings (2 or 3 façade buildings)
- Investigate feasibility of multi-layer building, buildings with just 1 construction layer must be justified technically.
- Investigate the feasibility of underground facilities such as storage
- Investigate activating the roof as a second ground floor and as fifth façade

Density

Define an ambitious density based on the preliminary study. The density and land use are included in requirements and in the issuance policy.

High densities should be sought in a sustainable development. A high degree of density and compactness is instrumental in easily achieving good performances in terms of energy, mobility, facilities, etc. However, there is also an upper limit to density if room is to be left for open space, for light, sun, views and air. The optimal density is context-based and can be established through design studies, by exploring environmental factors, typological and spatial studies

Density is measured using the following indicators:

- Floor/land index: the total floor area in relation to the area of the site
- Footprint/land index: the paved part of the land in relation to the area of the site
- % of façades that allow in sufficient daylight
- % of the public domain in shadow

The density study consists of the following steps:

- Determining density indicators and producing a type profile of the surrounding neighbourhood and other references.
- Scenario study into optimum density on the site
- Preparation of a note on optimum density with justification

Space required for mobility

- Space just for single-layer car parking is no longer justifiable. Cars are parked on multiple layers.
- Group together loading and unloading for lorries so that only 1 manoeuvring area is used and the loading and unloading docks can be used by different operators.
- Examine the possibilities for use of pipelines or conveyor belts between different departments and companies.

Land stocks and temporary use

- Manage land stocks collectively on the site.
- Seek the optimum place for land stocks between companies that could have most need of them.
- Seek a use for this reserve land, in functions where the technology and infrastructure quickly seem dated (e.g. certain forms of scientific research, data centres).
- Investigate the possibilities for temporary use.

Criteria requirements

15	Meet the following requirements: • Investigate the limited space required by buildings. • Define an ambitious density in the design plan. • Investigate the space required by mobility. • Define this in the issuance plan (phase 1.3).
5	Meet the following requirements: • Manage land stocks collectively on the site. • Investigate the possibilities for temporary use.

2.2.3. SPATIAL QUALITY OF DESIGN PLAN

The spatial quality as such falls outside the scope of the sustainability meter. However, a number of design principles are tested that could contribute towards high spatial quality. Central here is the notion of a working landscape, in which the focus is on dynamic economic sites that blend in as seamlessly as possible with their environment and create spatial added value.

2.2.3 a Assessing spatial quality

Max. Score
25

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

The design proposal in the design plan must be capable of being assessed for its spatial qualities. The methodological approach proposed above does not yet guarantee a high quality design plan. Each inventory includes an assessment: a hierarchy between the various topics whereby the designers have to make informed choices.

Ultimately the design must result in an organisation that makes spatial and economic objectives possible.

Both the end result and interim steps can be assessed by means of a quality chamber that monitors these.

Criteria requirements

25	Meet the following requirements: • The designer makes his choice based on a pre-determined and transparent procedure. • Use a step-by-step consultation during the design process, so that spatial quality can be tested in timely fashion. During each phase the design is presented and approved by the quality chamber. • The final quality of the design is evaluated by means of pre-determined, transparent procedures.

2.3. OPERATIONALISATION OF THE DEVELOPMENT VISION

The development vision of the economic site is articulated in the design plan, the Design Brief and the strategic business plan. This chapter indicates how operationalisation can take place.

The design of an economic site may take many years. Some economic sites will be very dynamic, with changing spatial needs, while others can be expected to be static.

In any event temporary situations will arise that need to be properly managed. Therefore, the time perspective also has spatial implications.

The issuance policy is of strategic importance in this respect. It must be designed on the one hand to implement the objectives of the design plan and business plan, but also to allow the medium and long-term management of the site. The issuance policy must adapt to the times and look far enough ahead to be able to provide an answer to changing circumstances. The rights that are ceded in the issuance policy are preferably time-bound and conditional.

2.3.1. THE ISSUANCE POLICY

2.3.1 a Design plan and time perspective

Max. Score
25

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

With economic sites, a frozen final situation can certainly not be assumed. The development process and the nature of economic sites can produce a highly dynamic picture. The design plan must be sufficiently robust to provide an answer in this regard, be sufficiently adaptable and also offer a spatial framework for temporary situations.

Key documents here are the issuance plan and the project plan (cf. chapter 1).

Explanation of the measure

The design plan will probably be implemented in stages and the site will also continue to develop after being completed. A pre-determined quality level must be guaranteed as soon as the first phases are operational.

Criteria requirements

15	Meet the following requirements: • Provide sufficient flexibility in the design plan to allow a response to changing contexts while the project is being implemented. • Ensure that a pre-determined quality level is guaranteed during the various phases of development (design, issuance and management). • Ensure that the sustainability measures remain guaranteed if certain phases are postponed or not implemented.
10	By means of a note, investigate the possibilities for temporary layout and temporary use for plots and spaces that remain unused for more than 6 months.

2.3.2. SUB-PROJECTS

The development vision is actually implemented at sub-project level.

However, the scope of the sustainability meter is limited to site-bound sub-projects, excluding buildings. Other sub-projects, such as e.g. buildings, are covered by the site-bound measures, but are the subject of specific sustainability requirements at building level.

Chapter 1 outlines a number of process steps that allow a smooth transfer of visions at site level. A number of process steps are also described that enable effective monitoring as a condition for qualitative development.

3. MOBILITY

"The conclusion and our ambition are therefore clear: over the next six years, the number of journeys by bicycle, on foot or by public transport must increase dramatically. Not only in the city centre, but throughout the entire Ghent territory."[13] [14]

Mobility is a critical factor for sustainable economic development, in which (in)accessibility, energy consumption and use of space play a major role.

Globally, mobility accounts for 13.1% of greenhouse gas emissions[15]. The pressure of the dominant car traffic is unacceptable in terms of safety, health, quality of life, autonomy of children, the elderly, etc.

Paradoxically, the increasing numbers of cars on the roads meet the needs of mobility less and less because of the increasing congestion.

The need for a thorough shift towards sustainable mobility (from a social, ecological and economic perspective) has long been recognised. The meaning of this concept can be summed up in a few rules of thumb[16]:

1. In principle, people should be able to develop as many activities as they wish, even if this involves travel. In any case, that freedom is a prerequisite for a quality life.
2. But these journeys should produce as few kilometres as possible, and certainly a minimum of motorised kilometres. Logically, being there and getting there are important. Not the journey in itself. Proximity and concentration of activities and functions are necessary for this. Proximity is the best mobility, and enables quality travel for pedestrians and cyclists within residential areas.
3. Where greater distances have to be covered, this should preferably be done collectively. Good urban and regional transport, travel by bus, tram and/or train.
4. The car if there really is no alternative.

Sustainable mobility is also often condensed into the so-called STOP principle: priority is given to pedestrians (*Stappers*), followed by cyclists (*Trappers*) and collective transport *(Openbaar vervoer*), and lastly, Private transport (car).

Various steps must be taken to achieve a sustainable mobility policy for economic sites.

In a first step, attention is paid to siting and access. A site that is difficult to access for pedestrians, cyclists or public transport should, for example, be ruled out. All aspects of sustainable siting are discussed in chapter 2.

Once a site's main use has been determined, a preliminary study must be carried out into mobility in the neighbourhood and the potential traffic impacts of the siting. This is done by preparing a mobility impact assessment, or MOBER. This document is essential for determining a sustainable mobility policy. It is important that this MOBER also takes account of other developments in the vicinity that might have an impact on, for example, the capacity of surrounding roads.

Based on the results of the MOBER, a policy plan can then be produced in a third step. In this plan a number of systems and rules are developed to achieve sustainable mobility. Such a sustainable mobility policy must be based on the STOP principle.

In addition to the STOP methodology, the sustainability meter focuses explicitly on encouraging innovations in the area of mobility (e.g. companies organising their own collective transport). This aspect is identified in 3.1 c (mobility management).

[13] "Gent gaat voor veilig en gezond verkeer", Policy Paper on Mobility 2007-2012
[14] Mobility Plan for Ghent – city centre 1997
[15] Climate Change 2007: Synthesis Report, IPCC, November 2007
[16] Willy Miermans, duurzame mobiliteit in klare taal, mobility handbook

The parking policy is the final element of the mobility policy for passenger transport. Given the traffic-generating effect of parking facilities, this is construed restrictively in a sustainable economic site.

Freight traffic can be an important and sometimes dominant transport component on an economic site. Here, the aim is to promote the use of water and rail and pursue efficiency through the collectivisation of infrastructure.

Finally, traffic during the construction phase is an issue that can set the tone for the operation of the site.

Depending on the category, other aspects can be crucial in the mobility issue. The table below gives an overview of the criteria to which different weightings are given depending on the category.

Table: mobility profile of economic sites per category

	mixed industrial estate (traditional)	mixed industrial estate (modern)	transport & distribution	water-based industrial estates	airport-based industrial estates	science parks	office and service zones	public-oriented offices	retail zones: large-scale retail	leisure (sports stadiums, shows, events, cinema complexes, etc.)	industrial estates for agro-industry	zones for waste processing and recycling
	IA	IB	II	III	IV	V	VIA	VIB	VIIA	VIIB	VIII	IX
3.2.1 a walking routes	2	5	2	2		5	5	15	15	15	2	2
3.2.1 b residential areas	2	5	2	2		5	5	15	15	15	2	2
3.2.2 a cycle routes	2	5	2	2		5	5	15	15	15	2	2
3.2.2 b bicycle sheds	2	5	2	2		5	5	15	15	15	2	2
3.2.3 a collective transport routes	2	5	2	2		5	5	15	15	15	2	2
3.2.3 b collective transport stops	2	5	2	2		5	5	15	15	15	2	2
3.2.4 a road infrastructure	5	5	10	10		5	5	5	5	5	10	10
3.3 a restrictive parking	10	15	10	10		20	20	25	25	25	10	10
3.3 b sustainable parking policy	10	15	10	10		20	20	25	25	25	10	10
3.4 a infrastructure for freight traffic	15	10	30	30		5	5	5	15	10	15	30
3.4 b trans-shipment points	15	10	30	30		5	5	5	15	10	15	30
total	67	85	102	102		85	85	155	175	165	72	102

Together, these criteria count for 90 of the 120 points in the chapter on mobility; the score for this group of criteria must therefore be converted to a score out of 90.

The remaining 30 points in this chapter can be found in criteria that are not differentiated according to category, concerning such things as MOBER, transport plan and traffic during the construction phase.

3.1. MOBILITY PLANNING AND MANAGEMENT

Achieving optimal mobility requires an adequate preliminary examination of all traffic flows and mobility effects caused by the location of the site and its access. The result of this preliminary examination is included in a mobility impact assessment (MOBER), an instrument that allows mobility to be monitored, also during the design process. This instrument is mandatory in view of the importance of mobility for an economic site.

An economic site, and in particular its mobility profile, can vary considerably, so continuous mobility management is essential. This is achieved using a transport plan and mobility management at site level.

3.1 a Mobility impact assessment (MOBER)

Max. Score	1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5
compulsory								

Purpose of the measure

The MOBER is the instrument used to evaluate mobility, and on which a vision can be built. A project MOBER also includes future developments in the evaluations of the accessibility profile. A MOBER examines whether the traffic infrastructure in the neighbourhood is able to support the new traffic flows and identifies measures that facilitate a sustainable mobility policy.

Explanation of the measure

The mobility impact assessment (MOBER) is an instrument used to map the mobility effects of planned traffic-generating activities. The regulations require a MOBER to be produced when certain thresholds are exceeded.

Siting can have far-reaching consequences, both spatially and in terms of traffic. It is important then to be able to estimate whether the development is in line with the capacity of the environment and whether measures are required to guarantee (traffic) viability and accessibility.

In the MOBER it is best to examine different scenarios and location variants, weighing up alternatives that take into account the presence of certain facilities such as opportunities for connection with public transport.

In principle, a MOBER must, in line with the project EIA, be able to lead to general and specific mobility permit conditions, to specific operating conditions, to spatial adjustments of certain traffic-generating activities or to the application of mobility plans for freight and passengers within the framework of the environmental permit.

When producing a MOBER, consideration must be given not only to the current situation, but also to policy already agreed and upcoming projects that have a similar timing. It is therefore important to group together upcoming developments in the wider context and consider these in their entirety.

The MOBER is produced by an agency specialising in mobility. The document must include the following sections.

1. Administrative data

These include such data as the place within the design process, client, etc. A general description of the objectives is also included.

2. Description of the current and projected accessibility profile

Description of how the site is currently accessible, for pedestrian, bicycle, public transport, car and freight (water, rail and road). Known other developments in the neighbourhood and evolutions in traffic pressure allow one or more scenarios to be developed in relation to future accessibility profiles. A MOBER (plan) may have been produced that examines the mobility effects for the entire area. Any further work must apply a reasoned forecast of the accessibility profile.

This involves mapping the access bottlenecks via the current traffic intensity on the connecting, collecting and access-providing roads and intersections. This allows an assessment to be made of the viability, safety, accessibility and burden on the environment in addition to the degree of saturation of the roads and public transport.

3. Mobility profile

Here the link is made to the specific use of the site (see 2.1). In fact, each activity generates varying degrees of employee, visitor and freight traffic. The mobility profile therefore includes an outline of the mobility generated by the planned (expansion of) activity.

- **Nature/objective/scope:** the nature of the activity determines to a significant extent the framework conditions and assumptions that have to be made to calculate the mobility profile, just like its target public (does the site have a 'counter' function or an 'office' function) or scope.
- **Plan alternatives:** the precise details of a plan area are not always known. This makes it difficult to provide a detailed estimate of the mobility impact. In this case, various assumptions will have to be made (via varying scenarios).
- **Level of ambition:** in addition to the level of ambition initially proposed in the accessibility profile, it is also interesting in this section to consider the desired mobility profile of the plan site. A development or location can distinguish itself from others by clearly opting for less polluting modes of transport. In this regard, the development of a site close by a public transport intersection can be organised to capitalise on this as much as possible.
- **Estimate of traffic flows:**
    - Traffic generation: a description of the traffic generated by the site indicates how much extra traffic this site will attract as a result of the developments. The representative period must be determined by distinguishing between peak and off-peak periods.
    - Choice of mode of transport: in the calculation of the choice of mode of transport, the number of journeys is spread over the different modes of transport according to reasoned assumptions, for visitors, employees and freight traffic. Use the STOP principle for this, with priority being given to pedestrians, followed by cyclists, collective transport users, and lastly, passenger transport by car. A similar reasoning is also followed for freight traffic, namely first by water, then rail and only then by road, so as to give priority to the least polluting mode of transport.
    - Route selection and allocation: based on resistance functions (to be developed e.g. by a gravitation model), the generated journeys are allocated to the route network, for the various design hours and any transfers. This is done for the walking routes, cycle routes, the various modes of collective transport (bus, tram, train, etc.) and cars.
- **Parking:** an estimate must be made of the parking needs for the development, split between the different functions, and taking into account the convergence of peaks for the various activities where possible. This need is also determined for bicycles and freight traffic.

4. Expected effects in terms of traffic

- **Alternatives:** when determining the accessibility profile, various alternatives are examined, which are established through consultation with the relevant stakeholders. It is therefore recommended that various alternative locations be studied at an early stage of the development. Ideally, this will be done during the feasibility study. Besides a number of economic factors, the feasibility study also takes account of a number of mobility effects. In a later phase, once the location has been established, possible access variants are then examined.
- **Allocation:** in the mobility profile, the total traffic production generated by a particular activity is determined. Obviously, this traffic uses the available infrastructure (shown in the accessibility profile), and is therefore allocated to part of the road network. This is done on different scales; in a project MOBER, this allocation takes place at micro- and meso-level.
- **Evaluation of traffic system:** once the allocation to the road network has been made, the various effects on the surrounding area can be determined. The starting point for this is the

division according to the mobility plan[17]. There, 5 aspects are addressed in relation to mobility: accessibility, approachability, traffic safety, viability and environment. In almost all cases, it is not enough to assess these aspects for the final operational phase, with normal use once (a phased part of) the work is complete. But it is equally necessary to do this during the site phase and for each phase of development.

- **Sensitivity assessment:** while implementing the MOBER, assumptions are made at various points regarding the number of journeys per person, the choice of mode of transport, the impact of measures on the choice of mode of transport, origin and destination of the traffic, etc. A sensitivity assessment indicates the possible consequences of variations in these assumptions (e.g. different peak/off-peak split, different distribution of traffic origin). The aim is to examine whether variations in the assumptions produce different results (network loads, different routes, etc.) and what measures are then required.

5. Mitigating measures / Sustainability assessment

If the comparison of the accessibility profile to the mobility profile shows that supply cannot cope with demand (negative effects), 'remedial measures' must be sought that act on demand and/or supply. This can involve both infrastructural interventions and more supportive measures.

Formulating solutions for identified problems is above all a creative process. It often involves reconciling conflicting interests (throughput versus safety and quality of life). A distinction is made between infrastructural and traffic-related measures on the one hand and flanking measures on the other. The first act on the available transport facilities to cope with traffic to and from the site(s) under investigation. The second primarily steer demand, the number of journeys with the different modes of transport.

Criteria requirements

v	Meet the following requirements: • Produce a mobility impact assessment for the economic site and its surrounding environment. • The MOBER contains a route selection and allocation for pedestrians, cyclists, different modes of collective transport, and cars.

3.1 b Outdoor air quality: emissions of NO_X and particulate matter by road traffic

Max. Score
3

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

To limit the exposure of population groups and ecosystems to air pollution as a result of mobility (nitrogen dioxide and particulate matter: PM_{10}) in order to limit risks to human health and damage to vegetation and ecosystems.

Explanation of the measure

See VLAREM II, section 2.5.4.

Based on a method appropriate to the situation (standard calculation method 1, 2 or wind tunnel study), it must be demonstrated that the limits of the European directive (annex 11) for dust concentration PM_{10} and NO_2 can be satisfied.

The results are used to refine the MOBER and to allow targeted actions to be initiated to improve air quality, provided this is within the project's sphere of influence.

[17] cf. Draft mobility plan for Flanders

Criteria requirements

3	The results of air quality measurements are used to fine-tune the MOBER and, where appropriate, to implement targeted actions to improve air quality.

References

Limit values and allowed number of exceedances per year according to the European directive:

Particles	Averaging period	Limit value	Allowed number of exceedances per year
PM_{10}	24 hours	50 µg/m³	< 30
PM_{10}	calendar year	40 µg/m³	< 35
NO_2	1 hour	200 µg/m³	< 12
NO_2	calendar year	40 µg/m³	< 18

3.1 c Transport plan for economic site

Max. Score
5

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

The transport plan is an action plan that allows the mobility plan to be adjusted during the operational phase of the economic site as a function of changes in mobility supply or demand, and further measures to be taken that lead to more sustainable mobility. The aim here is to increase the value of collective measures compared with individual ones.

Explanation of the measure

In consultation with the various stakeholders and users, the transport plan will start from the vision and be developed in the vision text(s) and impact assessments (EIA, MOBER, environmental permit).

The transport plan also allows the actual mobility to be monitored, thereby making it possible to respond to changes in mobility supply or demand. Mobility on a site is not static. The transport plan must therefore encourage soft modes of transport through continuous mobility surveys. To this end, specific attention must be paid to the implementation of mobility management (see 3.1 d).

In addition to the initial vision, a concrete action plan must be produced, which should be regularly updated.

The transport plan is constructed as follows:

- MOBER summary
- Annual actual mobility figures
- Changes in the mobility profile
- Changes in the mobility offer
- Action plan at site level
- Infrastructural measures
- Measures to strengthen the offer
- Measures to control demand
- Specific action plans for companies

Criteria requirements

3	Produce a transport plan based on the MOBER.
2	All companies contribute to the transport plan by exchanging information, producing company transport plans and implementing measures. Schedule an annual evaluation of the transport plan as part of the business plan.

3.1 d Mobility management

Max. Score
5

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

The mobility profile of an economic site is not static. Introducing mobility management makes it possible to respond to changing needs and to pursue a sustainable mobility policy that continues to stimulate sustainable mobility also during operation.

Explanation of the measure

Mobility must be controlled at site level. Grouping together mobility needs allows the resources available for investment and operation to be handled on a more rational basis.

The mobility policy must be aimed at permanent responsibilisation of the users.

The issue of mobility must also be able to be controlled as a whole, so that, for example, parking policy remains operationally connected and can be weighed against alternative modes of transport.

The person responsible for mobility management (a mobility manager can be appointed) will also make employees aware of the various facilities available on site (public transport, car sharing, carpooling), and highlight the optimum route for hauliers, employees and visitors. He/she will also implement company transport plans to examine their route and means of transport in greater detail through possible improvements.

Mobility management is responsible for:

- Reporting and updating the site transport plan.
- Implementing and monitoring the action items from the site transport plan.
- Dissemination of information to end users
- Proposal of measures
- Boosting innovation in the area of mobility

Criteria requirements

5	Organise mobility management on the site.

3.1 e Reuse of residual energy for mobility

Max. Score
2

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

The use of any energy surpluses (or: residual energy) for the mobility needs of the site.

Explanation of the measure

Any energy left over on an economic site, for example in the form of electricity, can be used by companies to power electric transport if this fits in with the site's mobility profile. These opportunities are addressed in mobility management.

Criteria requirements

2	Perform an analysis of the alignment of residual energy and the mobility profile of the site in which the technical, organisational and financial aspects (business case) are investigated.

3.2. STOP PRINCIPLE AS DESIGN METHODOLOGY

The accessibility of a site must be examined from the different modes of transport, and because soft modes of transport are more economically and ecologically efficient, these will be prioritised.

To reduce CO_2 emissions, travel by car should, wherever possible, be replaced by sustainable alternatives. Thus, the STOP principle proposes a hierarchy of desirable forms of mobility. 1. Pedestrians, 2. Cyclists, 3. Public transport and 4. Private transport.

There are in fact a great many benefits to walking, cycling and using public transport: they are cheaper, better for the environment and take up less space. Furthermore, cycling and walking are healthier and often quicker in the case of short journeys. Priority must therefore be given to these forms of mobility, while the site must also remain accessible by car. The harmonious and gracious co-existence of all traffic users must therefore be promoted.

The structure of each traffic system is developed according to a good coupling to the context, a good spatial integration on the site and distribution requirements. Priority must also be assigned according to the STOP principle at the design stage, with priority for the comfort and safety of pedestrians and cyclists.

3.2.1. PEDESTRIANS

3.2.1 a Walking routes

Max. Score
Var.

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

Walking is environmentally friendly, good for health and much more efficient than the car for distances of less than 2 km. A good pedestrian infrastructure encourages people to travel to the site on foot.

Explanation of the measure

The following main aspects are taken into consideration when designing the pedestrian infrastructure.

Efficient and good spatial design of the footpath network

Attractiveness and recognition

The footpaths must be attractive and recognisable. This can be achieved, for example, with street furniture, but above all through the amenity value of the route and social presence.

Good dimensioning

Footpaths are dimensioned according to the calculated allocation, in accordance with the Vademecum for Pedestrian Facilities (3.4). The minimum width of the footpaths is 1.5 m.

Avoid conflicts and bottlenecks

Conflicts and bottlenecks with mechanised traffic must be avoided. Wherever possible, footpaths should be separate from the roads for other road users. This can be achieved, for example, by using partitioning elements between the traffic lanes (bollards, flower beds, verges, differences in height, etc.).

Criteria requirements

The maximum score varies depending on the category; see the summary table at the beginning of the chapter.

Var.	Meet the following requirements: • Estimate the maximum pedestrian use according to the accessibility of and functions on the site. Use this figure in the MOBER, and particularly when selecting

	the mode of transport (cf. 3.1). • Identify the most important destinations for pedestrians (connections to wider pedestrian network, functions, collective transport stops, etc.) and design the pedestrian network in line with pedestrian flows (cf. MOBER allocation). Ensure the route is attractive (amenity value, social presence, etc.). • Prioritise pedestrian infrastructure over other modes of transport. Separate pedestrians from other road users (both cyclists and motorised transport) and resolve bottlenecks and conflicts with mechanised traffic. • Ensure the footpaths are properly dimensioned in accordance with the Vademecum for Pedestrian Facilities (minimum footpath width = 1.5 m). • Show the design vision in a flowchart.

3.2.1 b Residential areas

Max. Score
Var.

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

The pedestrian has priority and is decisive.

Explanation of the measure

In residential areas, the residential character prevails: they are special zones in the communal outdoor areas, where the pedestrian is central, focused on relaxing and lingering.

Criteria requirements

The maximum score varies depending on the category; see the summary table at the beginning of the chapter.

Var.	Meet the following requirements: • Demarcate the residential areas on the economic site. • The design of the public domain must emphasise the residential character and low-traffic nature of these areas. • Residential areas are organised as zone 30. • At the transition from the traffic area to the residential area, transfer gates must emphasise the changed character and force all drivers to adapt their behaviour. • Show the design vision in a flowchart.

3.2.2. PEDALLERS

3.2.2 a Cycle routes

Max. Score
Var.

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

The use of bicycles is non-polluting, cheap, healthy and fastest for short distances (less than 6 km). A good cycle infrastructure encourages users to visit the site by bike.

Explanation of the measure

The following main aspects are taken into consideration when designing the cycle infrastructure.

Efficient and good spatial design of the cycle route network

Attractiveness, recognition and visibility

Specific materials and colours are used to highlight the visibility of the cycle path in traffic and promote the legibility and continuity of the cycle route, e.g. red cycle path.

Good dimensioning

Cycle paths are dimensioned in accordance with the Vademecum for Cycle Facilities (3.5) and according to the calculated allocation and their status in the cycle route network.

Avoid conflicts and bottlenecks

Conflicts and bottlenecks with mechanised traffic must be avoided. In traffic areas with fast-moving traffic, parallel roads are provided for slow-moving traffic and local access roads (service roads) or free cycle paths are shielded from the main traffic (bollards, verges, paved strips). Cycle paths with bidirectional cycle traffic are also introduced on both sides of the road to limit dangerous crossings.

Criteria requirements

The maximum score varies depending on the category; see the summary table at the beginning of the chapter.

Var.	Meet the following requirements: • Estimate the maximum cycle transport according to the accessibility of and functions on the site. Use this figure in the MOBER, particularly when selecting the mode of transport (cf. 3.1). • Identify the major destinations for cyclists and design the cycle route network in line with cyclist flows (cf. MOBER distribution) and following on from the surrounding cycle route network. Ensure the route is attractive (amenity value, social presence, etc.). • Prioritise cycle routes over motorised forms of transport. Separate cyclists from motorised transport, especially in traffic areas with fast-moving traffic, and resolve bottlenecks and conflicts with motorised transport. • Ensure the cycle paths are properly dimensioned (in accordance with the Vademecum for Cycle Facilities). • Increase the recognition and visibility of the cycle paths (by using specific colours and materials). • Show the design vision in a flowchart.

3.2.2 b Bicycle sheds

Max. Score
Var.

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

The presence of a good and readily accessible bicycle shed is vital to encouraging the use of bicycles.

Explanation of the measure

The following main aspects should be considered when designing the bicycle shed.

Location of bicycle shed

It is important to choose a location where many people pass by and where surveillance from buildings is possible.

- Strategic locations at the entrance
- Safe locations

- Easily accessible locations

Dimensioning of bicycle shed

The need for bicycle sheds is determined on the basis of assumptions in the choice of mode of transport in the MOBER. Bicycle sheds must also satisfy the minimum dimensions per bicycle (1.75 m x 0.7 m).

Protection against theft and vandalism

Besides a good choice of location, there are several measures to protect bicycles against theft and vandalism:

- Ensure there is good lighting in and around the shed, so that users feel safe.
- Choose a shed system that enables users to secure the bicycle frame to the actual system.
- Make sure that the material of the shed is vandalism-proof

Criteria requirements

The maximum score varies depending on the category; see the summary table at the beginning of the chapter.

Var.	Meet the following requirements: • Ensure the bicycle sheds are evenly distributed across the site (in terms of capacity and destination flows). • Ensure the bicycle shed is properly located near the destination (easily accessible, social control). • Provide well-dimensioned bicycle sheds (1.75 m x 0.7 m per bicycle) and take measures to protect the bicycle shed against theft and vandalism. Provide additional services such as bicycle pumps, a bike wash, bicycle repair kits, etc. • Provide reserve areas for hire and/or shared bicycles. • Show the design vision in a flowchart.

3.2.3. PUBLIC TRANSPORT

3.2.3 a Collective transport routes (public and other)

Max. Score
Var.

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

Collective means of transport (bus, tram, carpoolers, car sharers, etc.) are efficient and save energy. A suitable offer and smooth connections encourage everyone to use these transport systems.

Explanation of the measure

Basic access to the site by public transport has already been discussed in chapter 2. This section focuses on changes to improve collective (private) transport. The following aspects must be taken into consideration.

Organisation for the various collective transport systems

The possibilities and capacity for public transport are mapped out according to origin and destination. If necessary, the possibility of expanding the offer is examined. The structure of the collective transport allows easy access from the stops for large groups of users.

Smooth flow

Accessibility of the stops

If the existing stop is difficult to access, consider introducing a new stop or adapting the existing route.

Criteria requirements

The maximum score varies depending on the category; see the summary table at the beginning of the chapter.

Var.	Meet the following requirements: • Estimate the maximum demand for collective transport according to destinations and origin. Use this figure in the MOBER, particularly when selecting the mode of transport (cf. 3.1). • Capacity study: test the capacity of the collective transport according to its peak loads. If necessary, examine the possibilities for expanding the offer with additional public or private collective transport. • The organisation of the collective transport systems allows easy access by large groups of users. • Ensure the smooth movement of collective transport (separate lane or calculation of speed of movement at peak times). • Show the design vision in a flowchart.

3.2.3 b Collective transport stops

Max. Score
Var.

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

After leaving the bus, tram or train it is important that the buildings can be reached safely and comfortably. This indirectly encourages the use of public transport.

Explanation of the measure

Three main aspects must be taken into consideration when designing the bus stop.

Location of the stop

The stop is strategically positioned (invitingly close).

Width of the footpath

The footpath by the stop must be wide enough to be able to cope with the flow of users.

Checklist for shelters

Shelters must satisfy the following criteria:

- Passengers have a clear view of the arriving bus or tram
- Information is available on timetable, waiting times and surrounding area
- The finish is of a high quality, the underfoot area paved and drainage provided
- The stop has at least a bench, a waste bin and a bicycle shed.

Criteria requirements

The maximum score varies depending on the category; see the summary table at the beginning of the chapter.

Var.	Meet the following requirements: • Ensure the stops are evenly distributed around the site (with sufficient capacity and

	not more than a 300 m walk from key destinations with large numbers of users (large offices, retail, leisure)). • Ensure the stop is in attractively located (invitingly close, easy access, lively spot, amenity value, etc.). • Make sure the stop can be easily accessed: no steps, wide footpaths, etc. • Design the shelters according to the criteria of the "check-list for shelters". • Show the design vision in a flowchart.

3.2.4. PRIVATE CARS

3.2.4 a Road infrastructure for motorised transport

Max. Score
Var.

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

Construct the road structure intelligently.

Explanation of the measure

Car traffic intensity

The generation of traffic for cars is determined as the last step in the choice of mode of transport according to the STOP principle.

Allocation on the road network

Car and lorry traffic is allocated to the access roads according to the destinations. This is to assess whether the main access roads are not saturated at (peak) flows.

Design of the road structure on the site and allocation

The road structure is designed according to the desired connections, destinations and taking into account an efficient hierarchy. This is done by devising a lorry route, a route for emergency transport, routes for collective transport, etc., and combining these or implementing them separately according to requirements.

The production of traffic is allocated to each road according to the different destinations (employee car parks, visitors' car parks, deliveries, etc.).

Determining the traffic status

Determining zone 30, zone 50, pedestrian area, reserved use for emergency services, etc.

Determining typical cross-sections

Criteria requirements

The maximum score varies depending on the category; see the summary table at the beginning of the chapter.

Var.	Meet the following requirements: • Estimate the motorised traffic depending on the choice of mode of transport according to the STOP principle. • Design the road infrastructure using allocation, hierarchy, traffic status and typical cross-sections. • Show the design vision in a flowchart.

3.3. A SUSTAINABLE PARKING OFFER

The parking offer is a key indicator of the effectiveness of sustainable mobility.

The alternatives can then be optimally developed, and the parking spaces provided will win out over the alternatives. In other words, the available parking generates car mobility because of the availability. But also because of the financial investment and running cost, which require "turnover" and therefore traffic.

Too many parking spaces and a parking policy that does not responsibilise end users reduces the chances of the alternatives, such as collective transport, where supply and demand must also be in balance. For example: the more people that use collective transport, the more journeys can be operated, the greater the comfort, the more attractive the alternative, etc. Developing and maintaining alternatives also requires funds, which today are often swallowed up all too quickly by cars. Here, therefore, you are still asked to weigh up the various modes of transport.

At the same time, you must also remain aware of parkers switching to neighbouring districts, which is not wanted. Systems that reserve parking for local residents can offer a solution.

This section will therefore examine how parking can be restricted and managed in a dynamic fashion.

3.3 a Restrictive parking

Max. Score
Var.

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

Restrictive parking stimulates alternative modes of transport and limits the amount of space taken up by cars.

Explanation of the measure

Parking policy starts and ends with the provision or non-provision of parking spaces. Too few parking spaces make an area inaccessible to cars, which leads to cars driving around looking for somewhere to park and wrongly parked cars if no quality alternatives are available. Too many parking spaces are a waste of valuable space and make an area unattractive to live in. It is therefore important to determine the correct number of parking spaces for a site.

Determining parking requirements is custom work

A fundamental starting point is that parking requirements always depend on the local context. Car ownership, proportion of collective transport use, existing parking capacity, expansion of available public transport services, etc. all influence parking requirements.

The most accurate way to estimate parking requirements and that also seems to take best into account the importance of parking within the mobility policy, is a calculation based on the expected function of the new activity. The following parameters must be known to be able to estimate the final parking requirement:

- Accessibility profile of the location
- Specific characteristics of the function
- Mobility characteristics of users/visitors
- The local parking policy
- Phased development of the site

Parking figures are constructed using reference figures or parking figures from the literature and data from similar economic sites. These parking figures must be viewed as a ceiling, and an effort should be made to adjust the parking spaces actually planned and constructed downwards through appropriate (and therefore more complementary) programming, choice of mode of transport or various flanking measures.

Using restrictive figures will increase the importance and feasibility of alternative modes of transport. After all, parking figures in the planning have a certain "self-fulfilling prophecy" aspect and draw investment away from alternative modes of transport.

The following sources are used here for parking figures:

- For office functions: “Parkeernormen buiten de openbare weg”, Brussels-Capital Region (hereafter BHG).
- “Parkeerkencijfers – basis voor parkeernormering, CROW publication number 182, September 2008” (hereafter CROW). Here, maximum and minimum figures are given for more than 40 functions. For restrictive parking, the minimum figures are used as a ceiling.
- If other parking figures are used, this must be adequately justified.

In both CROW and BHG, the figures are dependent on accessibility, in different ways in each case. The zones A, B and C from BHG are used here as accessibility characteristics. We associate a similar division from CROW with this.

- Zone A (CROW: centre): very well served by public transport.
- At a walking distance of not more than 500 m to an IC station (with 10 trains an hour)
    - Or at a walking distance of not more than 400 m to a tram or metro stop, from which 35 trams or trains depart each hour to an IC train station.
    - For office functions in this zone, BHG gives a parking function of not more than 0.5 cars/100 m^2 gross floor area.
- Zone B (CROW: outer or overspill area): well served by public transport
    - Or at a walking distance of not more than 400 m to a tram or metro stop, from which 15 trams or trains depart each hour to an IC train station.
    - Or at a walking distance of not more than 400 m to a train station from where 6 trains depart every hour
    - At a walking distance of not more than 900 m to an IC station (with 10 trains an hour)
    - For office functions in this zone, BHG gives a parking function of not more than 1 car/100 m^2 gross floor area.
- Zone C: the rest. For office functions in this zone, BHG gives a parking function of not more than 1.33 cars/100 m^2 gross floor area.

Providing spatial reserves for car parks can be a useful strategy to be able to work with a progressive traffic model. This means there is a fall-back option, which allows authorities and developers to set their ambitions sufficiently high from the outset when choosing modes of transport.

Theoretical parking needs on the site

Assume grouped parking management. Examine the presence and timing of the use of parking and from this calculate the theoretical parking requirement on the site. This theoretical parking requirement is validated by the Mobility Company.

Strengthen alternative modes of transport

Make a business case for alternative modes of transport in relation to car parks and connecting roads. This should also take account of the space requirements, operating costs of the car park and other direct and indirect costs of car traffic. Do this for each alternative:

- Pedestrians: attractive and safe walking routes
- Cyclists: attractive and safe cycle route, good distribution and comfort of bicycle sheds, availability of bicycles, bicycle allowances, etc.
- Collective transport: reserved routes, good distribution and comfort of the stops, attractive stops, additional service, allowances, etc.
- Car-sharing: carpooling, car sharing (e.g. Cambio)
- Information and signs

Criteria requirements

The maximum score varies depending on the category; see the summary table at the beginning of the chapter.

v	The parking offer is managed collectively and includes all the site's parking facilities.
v	The following steps are undertaken first: • Establish the parking figures for each function. • Support different parking figures. • Examine the theoretical parking requirements on the site. • Make a business case for alternative modes of transport. • Determine the restrictive parking offer to be planned.

40% Max. score	If the planned parking offer assumes not more than 90% of the validated theoretical parking requirement.

or

60% Max. score	If the planned parking offer assumes not more than 80% of the validated theoretical parking requirement.

or

80% Max. score	If the planned parking offer assumes not more than 70% of the validated theoretical parking requirement.

or

100% Max. score	If the planned parking offer assumes not more than 60% of the validated theoretical parking requirement.

3.3 b A sustainable parking policy

Max. Score
Var.

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

To limit the space used by pursuing a sustainable parking policy. This is done by aiming for a restrictive parking policy (see 3.3 a), the right car in the right place, assuming that public space is scarce and valuable, making better use of the parking space and striving for a parking policy that is organised and enforced efficiently.

Explanation of the measure

Location

Close attention should be paid to the location of parking spaces. Thus, no parking spaces are provided for each company, except for services and deliveries; all other parking spaces are preferably located at some distance from the site entrance.

Flexibility in the long term

During development phasing, and to be able to react to a changing context, a flexible and reversible parking policy must be pursued. This must incorporate financial incentives which mean that not implementing or scrapping parking facilities can be considered. This must be made possible from a town planning perspective by allowing alternative functions. From a technical building viewpoint, this can be made easier by designing in a flexible and dismantable way.

Regulation in the short term

Paying parking is one of the pillars of a sustainable parking policy, so the cost of the system is entirely or largely covered by the users themselves. The measure is best applied on a sufficiently large scale, otherwise it becomes financially and administratively impractical. Paying parking (e.g. with a subscription system) discourages long-term parking by daily visitors, who are encouraged to switch to public transport.

Special groups

- Provide at least 1 space for wheelchair users for every 16 spaces.
- Provide at least 3 spaces for Cambio or another car-sharing system.
- Provide at least 3 spaces for small, energy-efficient vehicles.
- Provide sufficient spaces for carpoolers.
- Provide charging facilities for electric cars

Criteria requirements

The maximum score varies depending on the category; see the summary table at the beginning of the chapter.

20% Max. score	Meet the following requirements: • Phase the implementation of the parking offer according to the development phasing and set well-considered fixed thresholds for the construction of a new car park, after (re-)testing the alternatives. • Allow the spatial reserves for parking to be used for other purposes.
20% Max. score	Build flexible and removable parking facilities.
20% Max. score	Retain control over the parking policy to allow for regulatory intervention.
20% Max. score	Provide free parking facilities for the above special groups.
20% Max. score	Use paying parking for other car users with not more than 1 subscription per 5 employees.

3.4. FREIGHT TRAFFIC

3.4 a Infrastructure for freight traffic

Max. Score
Var.

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

To utilise as much as possible and keep available the possibilities offered by the site and its environment for alternatives to the lorry by locating and organising the site as far as possible according to the existing and possible future line infrastructures.

Explanation of the measure

Chapter 2 deals with the alignment with the accessibility profile. Criterion 9.2 d stimulates the spatial clustering of commercial activities, enabling opportunities to be created for common freight traffic. Here we look further at the organisation of the site according to freight traffic.

Shipping

If there are possibilities for shipping in the immediate vicinity of the site, it is essential that the programming and organisation of the site are aligned to the water as a key logistical carrier. Companies that use transport by ship are sited by the waterway.

Rail

Possibilities for access by rail must be utilised as much as possible. The programming and design of the site are aligned with the railway as a key logistical carrier. Companies that use transport by rail are sited by the railway.

Freight tram

Logistical distribution to urban centres can benefit greatly from the use of existing public transport infrastructure, especially since there are few alternatives in urban centres or on the scale of the inner city to achieve a sustainable modal split for freight traffic. When laying out industrial sites, you should therefore take account of the possibilities that an adjacent tram line could offer. Carry out a feasibility study into the use of these facilities, especially if an industrial estate focuses on the city in terms of freight distribution. This is particularly true if the site involves a logistics centre or an industrial estate intended for waste processing and recycling. Also reserve a site near this tram infrastructure for collective use (e.g. communal storage site).

Pipelines and conveyor belts

The transport of liquids or goods in bulk can be made easier if these are transported by pipeline. That way they do not need to be packed, the risks of pollution are greatly reduced and costs may also fall. Utilise the possibilities for use by different companies.

When dimensioning other line infrastructure, bear in mind future developments in this area. Provide space e.g. below a railway bed, below a slope or below or alongside buildings.

Lorries

The way an industrial estate is organised for lorries depends largely on the type of site. The following aspects have to be taken into account, depending on the importance of lorry traffic to the site:

- Accessibility:
    - Concentrate companies with a large volume of freight traffic close to the site entrance.
    - Logical design: direct links, no dead-end streets
    - Closed circuits
    - Target group areas or special entrances for freight traffic
    - Sufficient room for manoeuvre

- Safety: as few conflicts as possible between different forms of transport

Transport efficiency through clustering and collaboration

Find ways to prevent transport, e.g. by combining loads, through a communal package service, etc.

Criteria requirements

The maximum score varies depending on the category; see the summary table at the beginning of the chapter.

v	A study investigates the opportunities for clustering freight traffic.
60 % Max. score	Meet the following requirements: • Identify potential alternative means of transport besides the lorry. • Develop the opportunities or retain them with a view to later foreseeable developments.
40 % Max. score	Meet the following requirements: • Investigate the necessary accessibility for lorries. Gauge road capacity, space requirement, nuisance and safety. • Produce a flowchart with the routes for freight traffic.

3.4 b Trans-shipment points for shipping, rail and lorries

Max. Score
Var.

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

Optimum siting and use of trans-shipment points

Explanation of the measure

Ship docks

- Investigate the possibility of bringing in via a temporary dock, during construction of the industrial estate, goods that otherwise would have to be transported as exceptional road cargo.
- Investigate the possibility of bringing in raw materials in bulk and of bringing in and removing waste via the water, in particular as regards the siting of a common loading and unloading quay.
- Investigate the possibilities for a dock for pellet transport (and therefore energy supply).
- Site the storage facilities of the companies as close as possible to the docks.

Rail unloading quay

- Provide a communal unloading platform, allowing for both the unloading of containers and the transport of large objects.
- Site companies' storage facilities as close as possible to the unloading platform.

Lorry unloading quays

Do not site these individually, to safeguard the possibilities of collective use.

Lorry parking spaces

Three types of lorry can cause a nuisance to the companies or in the surrounding area: long-term parking, short-term parking or waiting lorries. These can also cause social insecurity, a reduction in accessibility and traffic safety problems.

- Provide parking spaces for long-term parking, directed at the main target groups (commuters, own drivers, companies, overnighters). Facilities such as e.g. washrooms should be socially safe, in part by being adequately lit.
- Provide space for occasional visitors to the industrial estates.
- Provide parking spaces for short-term parking, to facilitate waiting for lorries. Chose the locations for this carefully to avoid creating a nuisance (traffic safety, accessibility, flow) on the public road.
- Ensure parked lorries do not obscure industrial premises, making these more vulnerable to break-in and vandalism.

Collective facilities

Criterion 9.2 e discusses collective facilities, including facilities for freight traffic such as common unloading quays, storage sites, maintenance workshops for lorries, parcel service, etc.

Criteria requirements

Var.	Meet the following requirements: • Optimum use is made of accessibility by rail and shipping through the rational siting and use of docks and unloading quays. • Preferably provide collective unloading quays for freight traffic. • Ensure that parked lorries cause as little nuisance as possible.

3.5. SIGNS AND INFORMATION

Besides offering a good traffic infrastructure, clear signs are essential for sustainable mobility. Good signs on and around the site are important to keep traffic flowing.

3.5 a Information for freight and passenger traffic

This comes under mobility management, see 3.1 d.

3.5 b Signs to and on the site

Max. Score
5

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

Clear signs on and around the site are vital to ensure the safety and movement of traffic.

Explanation of the measure

The following aspects must be taken into account when putting up effective signs.

Signage plan

A signage plan must be produced with clear information for all road users; far too often, good signs are produced for car and lorry traffic and soft road users are forgotten:

- Pedestrians: time and direction to the main destinations in the neighbourhood
- Cyclists: distance and direction to the main destinations, signs in accordance with the cycle route network
- Public transport: destinations, timetable and waiting times
- Car and lorry traffic: general signs, signs to companies, parking spaces, collective facilities, etc.

Recognition of the environment

Various means can be used to increase the recognition of the site environment and ensure that car drivers adapt their driving style when approaching the site:

- Signs indicating an economic site
- The site can take part in national or regional initiatives to link a recognisable spatial typology to the site environment.

Designation of crossings

Crossing points for pedestrians and cyclists must be clearly designated. If the crossings are not protected by a system of three-colour lights, biflashes must be installed (two bright, alternately flashing lights, left and right beneath a road sign).

Criteria requirements

5	Meet the following requirements: • Produce a signage plan for all road users. • Increase the visibility of the site environment. • Ensure that crossings are clearly indicated. • Provide information signs for internal traffic management.

3.6. TRAFFIC DURING THE CONSTRUCTION PHASE

3.6 a Traffic during the construction phase

Max. Score
10

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

Traffic during the construction phase has a considerable impact on the sustainability of a development: transport costs, environment costs, impact on the human and natural environment, etc. By organising it efficiently, its impact can be limited.

Explanation of the measure

For each contract, a mobility study is conducted showing the compulsory routes and parking areas for traffic during the construction phase, in order to safeguard the quality of life of the neighbourhood and the existing qualities (nature, heritage, etc.) on the site. In the case of water-bordering sites, the possibility of transport by water is investigated and emphasised.

Traffic during the construction phase is always investigated in a project EIA.

Criteria requirements

10	Conduct a mobility study for traffic during the construction phase and apply the measures.

4. NATURAL ENVIRONMENT

Without our consciously realising it, Western Europe is growing around us into a single metropolis. This extensive urbanisation is leading to the fragmentation of open spaces and is placing a heavy burden on the natural environment. The fragmentation and pollution of natural areas has caused biodiversity to decline sharply. In the twentieth century, Flanders still had 40,000 species of wild plants and animals. Today 7% of these have disappeared, and 28% are on the list of endangered species. [4.1] Figures from the Vereniging voor Bos in Vlaanderen (Flanders Forestry Association) also show that a forest the size of one-and-a-half football pitches is disappearing every day. A sustainable approach to the natural environment is therefore essential.

"Natural environment" is understood to cover three main areas: soil, natural green space, and water. A more sustainable approach to each of these areas must be developed.

- The **soil** has a number of vital functions that ensure a stable environment for man, animals and plants, and which are preserved where possible. A variety of regulatory mechanisms are active in that regard, such as damping (whereby the soil absorbs sound energy), purification (the soil has a water-purifying function), ecological circuits, etc. that we must treat carefully and sustainably. Major threats on economic sites include contamination, compaction, loss of organic matter, loss of biodiversity and sealing of the soil.
- **Green space** has an indirect but significant impact on the economy. Green space makes the economic environment more pleasant, attracts and creates a positive image, and thus allows for greater dynamism. Green space is an ideal spatially structuring element, which can form the basis of a sustainable economic site. Just as green space can offer added value to economic sites, economic sites can also contribute to the natural network. Green space includes, but is not limited to, green spaces such as parks, gardens, forests, etc. Thanks to the continuing subdivision of Flanders, the green structure is breaking down into a number of isolated islands. Not only must these islands be preserved, they must also be strengthened, enlarged and connected. Industrial estates generally cover quite a large area, and can therefore provide opportunities for certain species.
- All aspects relating to sustainable **water** management are addressed in chapter 5 "water".

Unlike most construction projects, which involve a loss of natural qualities and green space, the focus within the sustainability meter is on sites that have the least possible impact on nature and help strengthen and develop the remaining elements and where possible the added values. To achieve this, a 5-step plan is proposed.

1. Preliminary study of the site

In a first step, a general analysis and inventory of the area must be produced, to gather as much information as possible about the valuable natural elements and structuring processes.

2. Preservation of natural entities

Based on the preliminary study of the site, the valuable and determining natural elements must be preserved as much as possible and integrated into the new design.

3. Restriction of pollution of the natural environment

The construction project must place the smallest possible extra burden on the natural environment. All forms of pollution that could threaten nature must be mitigated or offset.

4. Nature development

A fourth step examines how new natural entities can be introduced on the site to obtain a minimal negative impact of the project and allow nature to recover and grow stronger.

5. Preparing for green space management

Depending on the chosen vegetation and the green policy, the green space demands a great deal of maintenance and causes considerable waste streams (prunings, clippings, etc.). Measures must therefore be taken with a view to optimum sustainable green space management.

4.1. PRELIMINARY STUDY AND INTEGRATED APPROACH

4.1 a Inventory and survey of the site

Max. score	1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5
mandatory								

Purpose of the measure

With a full survey and inventory of the site, knowledge is acquired about the existing natural entities. This forms the basis for a further design in which the natural properties of the site are integrated in a sustainable fashion.

Explanation of the measure

The following documents must be prepared when analysing the site:

Situation of the site in its broader context

The site is situated in relation to other open-space connections in the (immediate) vicinity. To do this, this site must be located on a number of maps:

- Landscape atlas
- Ecosystem vulnerability maps
- Biological valuation maps
- Detailed biological valuation map of Ghent
- Maps of Natura 2000 at European level
- VEN and IVON areas at Flemish level
- At provincial level, nature association areas are examined, at municipal level the green-blue network, the green structure as defined in the Green Structure Plan.

Survey plan

A survey plan is produced with the following data:

- The relief, expressed in contours
- Type of vegetation (plants, hedges, trees, grass, etc.) and paving

Inventory

The following data are included in an inventory and indicated on the survey plan:

- Soil composition
- Nature of any soil pollution
- Valuable landscape elements (with the help of the Ferraris maps)
- Large vegetation entities
- Trees according to the Tree Plan of the City of Ghent
- Forests (with exact wooded area and typology)
- All trees that do not form forests (with tree species, condition, view-enhancing character, girth at a height of 1 m)

Criteria requirements

v	Situate the site in its wider environment (location on maps).
v	Produce a survey plan of the site.

v	Produce an inventory of valuable elements on the site.

Definitions

Natura 2000 is a European network of protected natural sites. This network forms the cornerstone of the EU's policy for the preservation and restoration of biodiversity. Natura 2000 not only stands for the protection of areas (habitats), it also contributes to the protection of species.

The Flemish Ecological Network (VEN) is a selection of areas with a very high nature quality. These areas have a clear connection and sufficient contiguous surface area and together form a network of valuable nature areas in Flanders.

The **Integrated Interrelation and Support Network (IVON)** encompasses areas where nature constitutes an ancillary function, besides other functions such as agriculture, forestry, recreation, housing. The IVON consists of:

- Interconnecting nature areas: here high nature values occur alongside other functions.
- Nature association areas: these are areas that - regardless of their area - are important to the migration of plants and animals between the areas of the VEN or the nature reserves.

The **Ferraris maps** are hand-drawn and -coloured topographical maps (the entire territory of Belgium was mapped in the eighteenth century), accompanied by historical, geographical, economic and military comments. These maps can be used to read the evolution of the landscape.

The **biological valuation map** provides an inventory of elements such as land use, plant growth and small landscape elements, which are then subdivided into 4 categories from faunistically important area to biologically highly valuable. The City of Ghent has produced a more detailed biological valuation map itself.

References

Nature Report 2030

4.2. PRESERVATION OF NATURAL ENTITIES

Thanks to the inventory and survey of the site, valuable natural entities are mapped. These valuable elements must be preserved and form the basis of the further development of nature on the site. In this section, the preservation of threatened species and areas, valuable landscape elements, the green network and existing trees is stimulated. In addition, with the last measure the focus is specifically on preventing damage to the natural environment during the construction phase.

4.2 a Preservation of threatened species and areas

Max. score
6

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

The protection of existing fauna and flora to preserve biodiversity.

Explanation of the measure

Areas to be protected are:

- Biologically valuable areas (cf. biological valuation map)
- Areas that are vulnerable to the loss of ecotopes
- Important habitats according to Natura 2000, VEN and IVON
- Relic areas, linear relics and pointed relics as described in the landscape atlas
- Provincial or municipal nature areas

Criteria requirements

3	Preserve all the areas described and provide a buffer zone around them with a width according to the pressure on surrounding areas and in consultation with the Parks and Public Gardens Department.
3	Ensure that the existing fauna and flora are protected by making the area to be protected inaccessible (by means of copses, canals, etc.).

Definitions

Biodiversity, or biological diversity, is the variety of all living things: animals, plants, fungi and micro-organisms.

Biodiversity is considered on three levels:

- Species diversity is the entirety of all species: e.g. all species of butterflies, mushrooms, birds, bacteria, etc.
- Genetic diversity is the variation in genes in plants, animals, fungi and micro-organisms. For example, poodles and golden retrievers are both dogs, but thanks to genetic variation within the species of dog, they look completely different.
- Ecosystem diversity also includes all biotic communities and ecosystems that exist on earth. Think of tropical forests, deserts, coral reefs, etc. It also includes the countryside and the urban environment.

4.2 b Preservation of valuable landscape elements

Max. score
6

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

Landscape elements offer opportunities to all kinds of animals and plants as a hiding place, location, place to live, breeding ground, etc. and must be preserved.

Explanation of the measure

Landscape elements are the building blocks that together determine the structure of the landscape. They can be linear or pointed elements, including the associated vegetation, the appearance, structure or nature of which may or may not be the result of human activity and which are important to nature (e.g. verges, bushes, dikes, canals, wooded borders, hedges, copses, sunken lanes, peripheral vegetation, springs, ditches, thickets, pools, watercourses, etc.).

These valuable landscape elements must be preserved by integrating them into the green plan of the economic site.

Criteria requirements

3	Preserve valuable landscape elements.
3	Integrate these elements into the landscape design.

References

Hermy, M. (1997), Punten en lijnen in het landschap.

Subsidy for small landscape elements

4.2 c Preservation of green network - ecological connections

Max. score
8

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

The design should focus on preserving green corridors wherever possible, in order to counter fragmentation. Where corridors are lost, mitigating measures must be taken. This can be done, for example, by integrating green axes into the site design or by creating an ecoduct or ecotunnel. An ecoduct or ecoraster is a bridge which ensures that animals (amphibians, reptiles, hedgehogs, etc.) can move to other areas without becoming road traffic victims. Depending on the animal population, measures can be developed to create sufficient corridors between different living or reproduction sites.

Explanation of the measure

The fragmentation of the landscape means that nature areas are increasingly becoming islands, separate from each other. To boost biodiversity, organisms and animals must be able to move between these islands. To this end, the nature areas must be connected by stepping stones, small green areas (bushes, pools) where the species can live and reproduce.

In the landscape design, the site must be situated within the green network. The extent to which the site can play a role in preserving the green network is also examined. If existing elements already act as stepping stones, these are preserved and strengthened.

Criteria requirements

2	Consult the map of the urban blue-green network.
2	Detect living and/or reproduction sites.

2	Using the ecosystem vulnerability maps, determine the barrier effects of new and existing roads.
2	Justify the implementation or non-implementation of an ecoduct or ecoraster and submit this to the Parks and Public Gardens Department.

References

Ecosystem vulnerability maps > barrier effects

Ecosystem vulnerability maps > biotopes

4.2 d Preservation of trees

Max. score
10

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

As many as possible of the trees present on the site must be preserved because they contribute significantly to the quality of life of the site and its surrounding area. Existing trees can also have an historical value because of the time they need to grow.

Explanation of the measure

The trees and tree structures listed in 4.1 a are preserved, strengthened, supplemented or moved with good reason. This criterion concerns trees with a certain landscape or ecological value. A girth of 50 cm at a height of 100 cm is the threshold for the obligation to apply for planning permission. Trees of at least this size are always viewed as potentially valuable; the following aspects should be evaluated and weighed up against the planned design of the site:

- The species: e.g. native versus exotic
- The landscape value: e.g. is the tree view-enhancing, is the tree located in an environment with little other green space or in a park, etc.?
- The age
- The condition

Criteria requirements

4	Preserve all valuable trees (maximum 20% relocation or replacement by trees of equivalent value).
3	Offset the grubbed-up trees, preferably in kind, and plant the new trees in accordance with the Technical Vademecum for Trees.
3	In the case of a forest, the forest must be offset in kind on the site itself. If there is no forest on the site, these points are automatically assigned.

References

Tree Plan of the City of Ghent

4.2 e Protection of natural entities during the construction phase

Max. score
6

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

Little attention is sometimes paid to natural entities during the construction phase. By protecting the existing vegetation and site covering during the construction work, the natural elements can be preserved.

Explanation of the measure

To protect the natural entities during the construction phase, the site must be organised and operated in such a way as to prevent damage. For example, the natural areas need to be cordoned off and all trees need to be physically protected (fencing etc.). Trees that have to be preserved are protected in accordance with the measures of the Technical Vademecum for Trees.

Criteria requirements

2	Prepare a status report of natural entities on the site.
2	Cordon off those areas intended as green areas and make them inaccessible during the construction work (indicate the various inaccessible areas on the site plan and at the demarcation).
2	Protect trees that are not situated in these areas and which have to be preserved, in accordance with the measures of the Technical Vademecum for Trees.

References

http://www.boomverzorging.be/NL/enbouwen.html

4.3. LIMITING POLLUTION OF THE NATURAL ENVIRONMENT

This section focuses on combating the various forms of pollution that can cause damage to the natural environment and biodiversity. Four topics are addressed: light pollution, soil pollution, soil erosion and urban warming. For water pollution, see chapter 5. It is important to pay sufficient attention to the various topics before undertaking any further development of nature on the site.

4.3.1. SOIL QUALITY AND SANITATION

4.3.1 a Sustainable sanitation concept

Max. score
8

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

Ensure that the effects of the waste disposal site on the surrounding area are minimal. Use the Best Available Techniques (BAT) to clean up the ground, and carry out a risk analysis that measures the influence of the dump on the soil, air and water.

Biological sanitation techniques often make other intensive sanitation measures superfluous. They can easily be applied in built-up areas and require very little energy and maintenance. In addition, they do not cause any emissions to air or water, and there is no need to transport and process released earth. Degradation takes place in the soil. In sort, it is a sustainable, cost-effective and robust solution to any pollution present.

Explanation of the measure

The approach to soil decontamination is described in detail in the Flemish Soil Sanitation Decree. Sanitation includes the setting up and implementation of a descriptive soil investigation, if necessary followed by the setting up of a soil sanitation project, the carrying out of soil sanitation work to recover the polluted soil and any after-care that is required.

When selecting the sanitation variant, the best available techniques should be used, taking into account the energy consumption and emissions caused by:

- Earthmoving and other machinery used on the site
- Transport (polluted earth, clean replacement earth, materials, installations, etc.)
- The treatment of polluted earth
- The provision of materials to be used during sanitation
- The on-site treatment of water and air

Biological sanitation techniques in which micro-organisms convert the components to be removed into less harmful or harmless substances, are particularly environmentally friendly. Possible techniques are:

- Landfarming
- Composting techniques
- Bioreactors
- Biological extraction with water

Criteria requirements

4	Provide soil sanitation, using the best available techniques.
4	Use biological sanitation techniques.

4.3.1 b Local use of cleaned soil

Max. score
6

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

Limit the delivery and removal of earth by making optimum use of the available earth. Also use the cleaned earth as construction material.

Criteria requirements

2	Draw up a cut and fill calculation. Check how much of the demand for earth can be met by the surplus of earth cleaned on site.
2	Earth that is later sold to private individuals is not immobilised or fixed.
2	If earth is delivered, use only earth that is matched to the future green space management.

4.3.1 c Limiting soil erosion

Max. score
6

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

Soil erosion is a growing problem, and occurs not only on slopes but also apparently flat sites. Minimise soil erosion by providing natural vegetation or erosion-proof material on sensitive and therefore unprotected areas of land.

Explanation of the measure

Soil erosion is a process in which the top layer of soil particles, through the impact of raindrops and run-off water, are loosened and transported, either in layers over a large area or concentrated in gullies or ravines. This leads to a drop in soil quality and productivity, but also to significant damage by excess mud in downstream areas.

Soil erosion can be minimised by applying the following measures to steep inclines and slopes:

- Good soil structure: sensitive and therefore unprotected areas of land may not be developed or paved over.
- Certain measures must be observed for inclines from 30%.
  - From the top of the incline to 3 m from the base of the incline, they are not developed or paved over.
  - From the top of the incline to 3 m from the base of the incline, they are covered with vegetation.
  - During the construction phase, this incline is covered with a material that protects against soil erosion.
- Increase the surface roughness of the soil by providing natural vegetation.
- Cover soil with a material that protects against soil erosion (e.g. mats), preferably biodegradable.

Criteria requirements

3	Follow the municipal anti-erosion plan, if available.
3	Apply the above measures to steep inclines and slopes.

References

LNE: Soil protection

OVAM

4.3.2. WARMING AND EMISSIONS

4.3.2 a Limiting urban warming

Max. score
8

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

Developed areas warm up faster than natural environments (heat-island effect). This has repercussions not only for energy consumption (cooling demand), but also for biodiversity. Urban warming must therefore be controlled.

Explanation of the measure

The heat-island effect is the phenomenon whereby the temperature in the urban area increases compared with the surrounding area. This is caused by the large number of paved and dark surfaces, which retain heat for longer. This warming has several consequences:

- Increase in energy consumption by cooling systems
- Increase in air pollution: smog, CO_2, ozone and nitrogen dioxide
- Emergence of (new) disease epidemics
- The hay fever season lasts longer
- Heat stress: among other things, the chance of dying from cardiovascular disease increases

The following measures can be taken to limit urban warming:

- **Vegetation** (plants, trees, etc.) can be integrated into the design of the paved surfaces. This limits the heat-island effect in a direct and indirect way. In a direct way, the green space provides shade: trees intercept the sunlight before the paved area can warm up. In an indirect way, the vegetation lowers the temperature in the city through evaporation: trees and plants absorb water from the soil through their roots, most of which they lose as water vapour.
- **Bodies of water** provide evaporation, thereby lowering the outside temperature.
- By using **covering materials with a high solar reflectance index** (SRI), the sun's heat is largely reflected and therefore not absorbed by paved surfaces.

These measures can be applied when designing the surroundings (e.g. squares, parking areas) and the roofs of buildings.

Criteria requirements

4	For at least 50% of the paved surfaces of the surroundings, provide any possible combination of: • Shading from trees • Materials with a solar reflectance index (SRI) of at least 29 • Partial paving with grass blocks or reinforced grass

4	Cover at least 50% of the total roof area with green roofing.

or

4	Cover at least 75% of the total roof area with materials with an SRI of at least 29.

4.3.3. INTELLIGENT LIGHTING

Limiting light emissions reduces veils and stray light. For people, this improves visual comfort at night and the possibility of seeing the celestial sphere. It has a less disturbing effect on the nocturnal life of animals and plants.

4.3.3 a Limiting light pollution

Max. score
10

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

Minimise light pollution from the site to reduce disruptive effects on nocturnal environments (incl. fauna and flora).

Explanation of the measure

The VLAREM regulations and the Light Plan I and II of the City of Ghent form the regulatory and policy framework in relation to lighting.

A lighting plan is produced for the economic site: This includes the following elements:

- The various zones and their functions
- The luminaires according to:
  - Illuminance
  - Target area
  - Uniformity or evenness

When preparing the lighting plan, consideration is given to the following aspects to reduce light pollution:

- A light management plan indicates the zones where the light must be dimmed.
- Limitation of target area and illuminance: only light what needs to be lit. This means that the target area of the lighting must be limited to the desired object or the desired zone and that the intensity of the light sources must not be too high. VLAREM includes a number of provisions relating to the intensity of the light sources used, accent lighting and illuminated signs.
- Make sure the wavelength of the lighting is adapted to the local fauna (so as not to attract or disturb certain species, e.g. bats).
- Only light what needs to be lit. A management system with sensors can be used for this (light sensors, motion detectors), which turns the lighting off when it is not needed. This certainly applies to industrial estates where few people are present at night.
- To avoid light pollution, efficient luminaries are used with the following characteristics:
  - Good direction of the light beam: the lamps must be shielded on the top and at the sides and the light must shine downwards to avoid unnecessarily lighting the celestial sphere.
  - Even lighting to avoid glare.

Criteria requirements

1	Retrieve all information relevant to the lighting plan (Light Plan I and II of the City of Ghent, VLAREM regulations, etc.).
3	Prepare a light management plan.

2	Determine the minimum target area and the minimum light intensity.
2	Adapt the frequency to the local fauna.
2	Install efficient luminaires.

4.4. NATURE DEVELOPMENT

Green space has an indirect but significant impact on the economy. Conversely, the economy has a significant impact on green space. The green space on the site therefore has to be strengthened for the new economic development. With sustainable surroundings, the site can also contribute to the development of nature and the strengthening of the green network.

Sub-zones can be provided across the industrial estate where the natural environment is central. At these locations the layout, access and form of management are adapted compared with those areas where the green space is adapted to the presence of companies.

With a sustainable green structure, the site can contribute to the development of nature and the strengthening of the green network (4.4 a, 4.4 b, 4.4 c). When designing a green structure, the planting must be conceived in a sustainable way (4.4 d, 4.4 e, 4.4 f).

4.4 a Integration of public and private green space into blue-green networks

Max. score
10

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

The design of the economic site is integrated within a predominant blue-green network.

Explanation of the measure

The design of the site must form part of a wider network of nature and water. It ties in with existing ecological qualities on various levels. Thus, the nature development of the separate plots on the industrial estate is part of a greater whole and does not form a closed entity. It is important that this blue-green network is dominant enough so that it becomes a starting point for the development of sub-projects.

Besides the ecological principles, the usage and amenity value is a prerequisite of quality.

Criteria requirements

4	Existing (and new) watercourses are the guiding principle in developing the blue-green network on the same scale as the design plan.
3	The blue-green network is the basis of the development: it is designed first and is sufficiently predominant.
3	Link the green space to low-dynamic developments in the blue-green network, e.g. cycle paths and footpaths, soft recreation.

4.4 b Public green space

Max. score
6

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

Green space makes the living and working environment more pleasant, creates a positive image, and thus allows for greater dynamism. Create public green spaces where people can come to rest and which constitute added value for the users of the economic site.

Criteria requirements

3	Design public green spaces that offer added value to the work environment.
2	Design (public) green spaces in accordance with the principles of Harmonious Park and Green

	Space Management.
1	Show how the structure, recreational programme, layout and planting correspond with the existing valuable vegetation and the structure of the soil after clean-up and the (new) water management of the site.

4.4 c Sheltered green zone

Max. score
8

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

The sheltered green zone is a part of the site intended for preservation, protection and regeneration of the natural environment. It contributes to the formation of the landscape and forms a stepping stone in the green network.

Explanation of the measure

This part of the outdoor space is a protected zone with pure nature that is not used as a recreational area or passage. The zone contains trees, shrubs, etc. where natural development can occur freely. The relationship with this outdoor space from the buildings ensures a pleasant work environment and a connection with the natural world. The green space can also be used multifunctionally, for example in connection with water storage.

Criteria requirements

2	Provide a sheltered green zone on the site connected to the blue-green network.
2	Frame the zone within the preservation and strengthening of green corridors.
2	Use the sheltered green zone multifunctionally, for example in connection with water storage.
2	Shield the sheltered green zone from the other outdoor spaces if there is a danger of overloading.

4.4 d Planting trees

Max. score
6

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

Trees provided added value in terms of aesthetic quality and for the urban climate. The use of tall trees ensures a better developed fauna and flora, a more pleasant and greener environment, shade and less wind nuisance.

Criteria requirements

1	Consult the City's Tree Plan.
2	Plant the new trees in accordance with the Technical Vademecum for Trees in consultation with the Parks and Public Gardens Department.
2	Use tall trees.
1	The new trees fit into the landscape design of the site and its immediate surroundings.

References

Technical Vademecum for Trees

4.4 e Designing with a view to sustainable green space management - management plan

Max. score
8

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

The development of natural environment is also a development of a sustainable nature with few maintenance requirements. To this end a green space management plan is produced.

Explanation of the measure

The (re)development of an economic site creates a new, artificial landscape. From the outset, consideration must be given to managing the natural environment. To this end a green space management plan must be produced as a further extension of the management plan defined in 1.1.5 c.

Green space management is a concept that includes activities from design and layout through to replacement. The plan has an average life span of 10 years. The green space management plan works best if produced on the same scale as the entire site. A collective green space policy is nearly always more cost-effective than plot-based solutions.

Public green spaces are generally managed by the Parks and Public Gardens Department, if these are part of a larger green structure. If green spaces are managed by, for example, the parks management of a site, the Parks and Public Gardens Department can act as advisor. Private domains are always managed privately; this may be collectively contracted out to e.g. the parks management (if present). It is advisable to specifically name those stakeholders responsible for green maintenance in the green space management plan.

Starting points of the green space management plan

- Linkage to ecological qualities already present and integration of existing vegetation into the design.
- Make use of natural processes as design elements (e.g. spontaneous afforestation)
- Make use of spatial carriers (soil, landscape-ecological structure, water system)
- As large an area as possible
- As continuous a green space as possible
- As wide ecological corridors as possible
- Maintenance-friendly green space that requires little management
- Correct plant types, correct distances between plants, sufficient green space provided
- Location-appropriate (compulsory), indigenous (optional) and local (optional - better than indigenous) species
- Based on the system of Harmonious Parks and Green Space Management: this assumes a balanced relationship between human-, nature- and environment-based policy and management measures that lead to a sustainable, diverse and dynamic whole. Besides the ecological principles, the usage and amenity value for man is a prerequisite of quality. The green space is preferably designed to be multifunctional and linked to e.g. recreation and/or water management.

The above principles should also be respected when developing the site. The possible expansions of companies on the site must be factored in, so that the green space retains its core and is not fragmented at a later stage.

Criteria requirements

2	Produce a memo setting out the global level of ambition for green space management.
2	Investigate possible synergies (profitable forms of collaboration) for shared needs and wishes

	as regards green space management.
2	Produce a green space management plan in accordance with the above principles.
2	Choose a suitable management structure and formalise the joint venture.

References

Nationaal Pakket Duurzame Stedenbouw

Groeiboek DBT Economisch bekeken

Groeiboek DBT Juridisch bekeken

http://www.harmonischparkengroenbeheer.be

Technical Vademecum for Trees

Technical Vademecum for Water

Technical Vademecum for Grassland

Vademecum for Universal Accessibility

4.5. GREEN SPACE MANAGEMENT

Depending on the chosen vegetation and the green policy, the green space requires a great deal of maintenance and causes considerable waste streams (prunings, clippings, etc.) and possibly excessive noise. Measures must therefore be taken with a view to ensuring optimum green space management. Firstly, waste streams must be limited as much as possible through sustainable design; secondly, the green waste should preferably be processed on site (e.g. mulching), and thirdly, composting must be used.

4.5 a Composting area

Max. score
4

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

Green space maintenance causes large numbers of waste streams (e.g. prunings, clippings). By providing a compositing area on site, these waste streams can be managed sustainably.

Explanation of the measure

Maintenance-friendly nature development is provided based on the green space management plan. In the first instance the aim is as little green waste as possible, e.g. through intelligent species selection. The second step is to process the waste efficiently.

A composting area is provided close by the green spaces on the site. This means the waste streams need not be carried off (less transport) and they are converted into humus. Humus can then be used as fertilizer for the vegetation. This creates a closed green space balance on the site.

Criteria requirements

2	Provide a composting area for prunings and clippings on the site.
2	Make sure the landscape is designed so that the green waste can be processed on site.

4.5 b Weed control

Max. score
4

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

The occurrence of vegetation in places where it does not belong creates a less intensive demand for maintenance.

Explanation of the measure

The following aspects are important for weed control:

- Only functional paving: with too little intensive footfall and/or traffic, preference is given to grass blocks, lawns, ground covers or other planting. This also encourages the penetration of rainwater.
- Avoid good growing conditions for weeds through:
  - The right choice of materials for paving and joint filling
  - Narrow joints
  - Particular attention to the position and finishing of gutters (as these are extra-sensitive to weed growth)
- Good accessibility for maintenance by:
  - Avoiding differences in level

  - Avoiding right angles
  - As few obstacles as possible: careful finishing of obstacles

- When creating underground infrastructure, the paved surface above is finished such that later interventions cause as little disruption and subsidence as possible.

Criteria requirements

1	Only install functional paving.
1	Avoid good growing conditions for weeds.
1	Make sure that paved areas are easily accessible for maintenance.
1	When creating underground infrastructure, the paved surface above is finished such that later interventions cause as little disruption and subsidence as possible.

5. WATER

The water cycle has been severely disrupted in recent decades. Firstly, man handles water very inefficiently, despite clean water being a scarce product: of all the water on earth, only 0.003% is immediately available as drinking water. Of this, Belgians consume on average 110 litres of drinking water per person per day, of which just 3% is used for activities that actually require drinking water quality (water for cooking and drinking).

Furthermore, extensive building and the resulting increase in paved surfaces and soil compaction in Flanders leads to:

- A heavier burden on the surface water system (through faster run-off).
- A reduction in the infiltration of water into the subsoil. The latter leads to drought and reduced use of the buffering capacity of the subsoil.
- The dilution of waste water by connecting rainwater to a mixed sewer system, resulting in reduced efficiency of water treatment plants.
- Overloading of the sewer network, causing sewer overflows to be activated and thus allowing untreated waste water into the rivers.

An additional challenge of water-robust building for a changing climate. To what extent the extremes will change is hard to predict, but it is a fact that both longer dry periods and more downpours of very high intensity will occur. We must organise, lay out, design, build and manage economic sites so that they are more resistant to a changing climate.

Finally, human activities, such as intensive fertilisation and use of pesticides, cause high levels of pollution in surface water and groundwater. Moreover, the waste water from some buildings is not yet connected to a sewer network, and enters canals and rivers without being adequately treated.

This water issue calls for an integrated and sustainable approach. Economic sites can also make an interested contribution to such an approach. The VLAREM regulations and the regional and urban town planning regulations impose a large number of obligations in relation to (rain) water. The sustainability meter aims to go further, for sustainable water management implies more than simply complying with statutory requirements. For this, two key aspects of water need to be addressed:

- Water as a raw material, for human use and for feeding our natural environment.
- Water as a structuring element, which is becoming increasingly scarce or overly abundant in our environment.

Within this instrument, the following approach is proposed for dealing sustainably with water on economic sites:

1. Preliminary water management study

In the first phase an insight must be gained into the various water flows to, from, and through the site (natural inflow, water supplies, drainage flows). This serves as the basis for a water study. This study focuses on an integrated approach to the water cycle.

2. Space for water

From a spatial point of view, it is vital that water is fully involved in the planning process. After all, the qualities of water largely determine the viability and sustainability of our environment. Water has a structuring effect and creates a pleasant experience of the site.

3. Restricting water consumption

Various steps must be taken to minimise the burden on finite water sources.

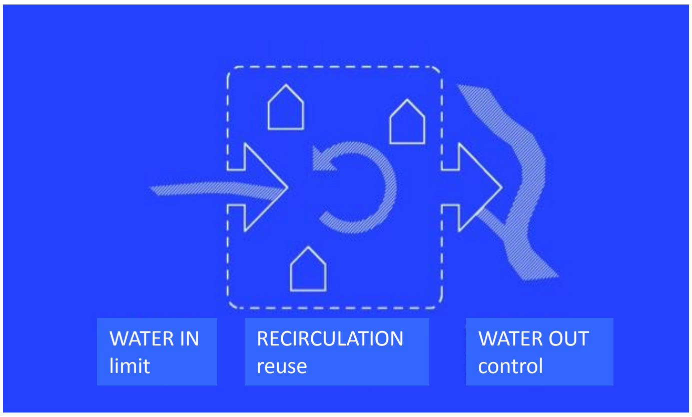
4. Alternative water sources

It is not always necessary to use mains water or groundwater. For a number of applications, rain water, process water or (treated) waste water can be used. What is essential is that the use and the type of water are matched to each other.

5. Water drainage

Water outflows are drained in a controlled way to avoid overloading the sewer network. Many water flows (e.g. rain water) do not in fact need to be processed in a treatment plant and are best drained in an alternative manner.

The last 3 points can be summarised in the following chart:



Each new initiative for which a permit is required (planning permission, an environmental permit, an EIA, etc.) and each plan or programme must be subjected to the water assessment prior to approval. If the water assessment shows that the initiative could cause significant damage, alternatives or compensatory measures must be sought.

The Regional Urban Development Regulations of 5 July 2013 on rain water tanks, infiltration, buffering and the separate discharge of waste water and rain water and the General Building Regulations of the City of Ghent are a key starting point for the source-based approach to water quantity aspects. The Code of Good Practice (2012 version) is a good guide for thorough sustainable water management.

A number of the following measures have been enshrined in law but not yet dimensioned in a climate-robust way. We assume a perspective for the future that is more sustainable than the norm.

References

WWF, water for tomorrow, http://www.wwf.be

Flemish Environment Agency (VMM), Water Guide for Building and Renovation

Regional Urban Development Regulations of 5 July 2013 on rain water tanks, infiltration, buffering and the separate discharge of waste water and rain water

General Building Regulations of the City of Ghent, 2013 version

Code of good practice for the design, construction and maintenance of sewer systems, 2012 version

5.1. PRELIMINARY WATER MANAGEMENT STUDY

5.1 a Inventory of water-related data

Max. score	1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5
compulsory								

Purpose of the measure

With a full inventory of the site, knowledge is acquired about the existing natural water entities. This forms the basis for further design in which the natural properties of the site are integrated in a sustainable fashion.

Explanation of the measure

During this study phase, the following steps must be undertaken:

Gathering of water-related data

To gain knowledge of the water cycle on the site, the following data are gathered:

- Infiltration map of the area (http://www.gent.be/infiltratiekaart)
- Soil composition (http://geo-vlaanderen.gisvlaanderen.be/geo-vlaanderen/bodemkaart/)
- The degree of contamination of the soil
- The permeability factor of the soil (k-value) to estimate infiltration opportunities. This must be measured in situ; the infiltration map can provide an initial indication (http://www.gent.be/infiltratiekaart).
- The groundwater level and groundwater flow (see Databank Ondergrond Vlaanderen (Flanders Subsoil Database): http://dov.vlaanderen.be)
- Check is the site is located within a protected drinking water zone. This is a zone where groundwater is collected for the production of drinking water; within these zones, strict measures apply to the quality of the groundwater, and infiltration of rain water is generally not permitted. The demarcation of the protection zones can be found in the “Vlaamse Hydrografische Atlas” (Flemish Hydrographical Atlas) geoportal (http://www.agiv.be).
- The water quality (groundwater and surface water)
- The water assessment and the flood map (see geoportal water test: http://www.agiv.be)
- The hydrological situation (presence of watercourses and canals) and classification of the watercourses
- The flow rate of the watercourses and canals and of the groundwater
- Municipal zoning plan: the zoning plans indicate the zones where the waste water sewer is connected to a collective water treatment plant. A distinction is made between 4 types of zone: central area, collective optimised rural area, collective rural area to be optimised, and individual rural area to be optimised. Sites situated in the individual rural area to be optimised do not have a connection to a collective water treatment plant; the waste water must be treated in an individual wastewater treatment plant (IBA).

Definition of the level of ambition

A memo is prepared on the intended ambition for water management on the site. This memo also describes measures to achieve this level of ambition. The future management of the water-related parts of the site forms part of this ambition memo.

Criteria requirements

v	Gather water-related data about the site.
v	Prepare a memo setting out the global level of ambition for water management.

5.1 b Water study

Max. score
8

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

The water study plays an important role in the quest for a water-robust site. An analysis of the various water flows forms the basis for an overall vision of water management on the site.

Explanation of the measure

A global overview and justification of the different water sources and water flows:

- Water supplies and availability (mains water, rain water, process water, surface water, ground water and waste water)
- Estimate of water consumption
- Waste water flows (rain water, waste water and drainage water)
- Water treatments (water purification, wadi, infiltration opportunities, decantation basins, etc.)
- The management of the water-related parts of the site. Water management in the public domain is the responsibility of TMVW. From a safety point of view, the management is never assigned to third parties. See also criterion1.1.5 c. The management of individual or collective private water supplies is the responsibility of the companies.

The following order of preference applies to rain water:

1. For certain applications, rain water can be **reused**. It must be examined which rain water flows on the site are eligible for reuse (see 4.4 Alternative water sources).
2. Flooding can be prevented by allowing as much water as possible to **infiltrate**. Infiltration can occur in different ways, e.g. through permeable surfaces or through infiltration canals or basins (see 5.5.2 Infiltration of rain water).
3. If infiltration is not possible, rain water must be **buffered with delayed drainage**.
    - Buffer basins ensure that the collected rain water can run off slowly, preferably into surface water, thus preventing flooding on the site (see 5.5.2 c Buffering with delayed rain water drainage).
    - Where the creation of buffer basins is not possible, it may be considered to use certain parts of the infrastructure, e.g. car parks, as emergency buffer areas. This means that temporary water is tolerated in certain locations, which is then drained off slowly.
    - Green roofs retain water longer on site, immediately slowing down the run-off of rain water (see 5.5.2 a Rain water buffering with green roofs).
    - It is best to recirculate the buffered water throughout the entire site, thereby ensuring constant renewal (and purification where applicable). The water can then infiltrate further and green areas will not dry out. Recirculation allows for optimum use of the buffer and infiltration capacity of the site and increases its amenity value.
4. Only if the above drainage methods are not possible can the rain water be **discharged**, preferably into surface water. Where this is not possible, it can be drained off through the rain water sewer pipe (RWA), if a separate sewer system is present. If this is not possible, the rain water is discharged into a mixed sewer.

These steps must be integrated into the site's design plan, and any requirements arising out of these measures are also imposed at plot level and in the public domain.

Criteria requirements

8	Produce a water study for the site.

5.2. SPACE FOR WATER

More than is now currently the case, water can be developed as a carrier for a more pleasant and more sustainable living and working environment. Attention must also be paid to preserving existing watercourses and the perception of water on economic sites.

5.2 a Preservation, integration and development of existing watercourses

Max. score
5

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

The existing watercourses are necessary for good water management, and form carriers for the spatial structure of the site.

Explanation of the measure

First of all, the preservation of all existing valuable watercourses must be stimulated. By integrating these watercourses into the design of the public domain, they can become a spatial carrier for the site.

The focus is also on nature-friendly watercourses. These watercourses are organised so that the flora and fauna have a good chance of growing. Thus, gradually sloping banks promote species diversity: plants can easily grow on the edges, while the part below water offers a good spawning ground for fish.

A number of data on watercourses can be retrieved via the Flemish Hydrographical Atlas: location, category, location in a polder, and watering. These data can be used to identify the persons to be addressed for questions and consultation. It is advisable to consult the provincial Integrated Water Policy service in good time.

Criteria requirements

1	Consultation with the relevant services.
2	Preserve all existing watercourses and integrate them into the design of the public domain.
1	75% of the banks of the watercourses on the site are nature-friendly.
1	Provide drainage for rain water and/or treated waste water that makes it possible to top up the water network,

References

General Building Regulations of the City of Ghent, article 10

Guidelines for an integrated sewer policy in Flanders

Vademecum for Watercourses

Standard Specifications for Nature-Friendly Banks

http://www.gisoost.be/vha/

5.2 b Perception of water on the site

Max. score
1

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

A living or working environment with water is perceived as more pleasant by residents and visitors.

Criteria requirements

1	Link the processing of rain water to informal spaces by means of e.g. wadis or horizontal drains where users can come into contact with the water.

5.3. RESTRICTING WATER CONSUMPTION

On an economic site, one of the targets is the optimum use of water. This means focusing on the complementary use and discharge of water on a collective level, bearing in mind that different uses of water also require different types of water. See also section 5.4. At building level, the possibility of limiting drinking water demand and restricting the quantity of waste water is also examined.

5.3 a Water-efficient industrial estate

Max. score
5

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

We are aiming for a water-efficient industrial estate where the water profiles of the companies are complementary. In addition, the individual companies are aiming for an operation that is as water-efficient as possible and that uses alternative water sources wherever possible.

Explanation of the measure

It is important that the various companies on an industrial estate jointly aim for a zero balance. For example, we can limit the inflow of drinking water, and as much water as possible can be reused on the industrial estate. After carrying out a water audit of the various companies, the most complementary companies are sited close to each other.

After working on the scale of the industrial estate, the companies must be examined individually. The water study (see 5.1 b) provides the framework for dealing with water at company level.

The purpose of the water audit is to save water and optimise the consumption of water in the various business processes. The water audit begins with a water balance being produced for consumption, pollution and discharge. Water consumption and costs are then minimised. The last step is to develop proposals for savings.

BAT or Best Available Techniques are techniques which, compared with all similar techniques, score highest in terms of the environment and are affordable and technically feasible. A knowledge centre for Best Available Techniques has been established on behalf of the Flemish Government at VITO (the Flemish Institute for Technological Research). The BAT knowledge centre supports the Flemish Government in gathering and disseminating information on BAT. The knowledge centre also reviews information relating to environmentally-friendly techniques, evaluates the BAT for each branch of activity and translates this into possible permit conditions and rules for ecological support. This results in BAT studies for each branch of activity.

Criteria requirements

2	Have a water audit carried out when the businesses are starting out and match the businesses that are sited on the industrial estate to each other.
2	Draw up a plan for implementing the measures proposed in the water audit and implement this plan.
1	Install BAT.

5.3 b Water-saving buildings

Max. score
3

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

Reducing water consumption in buildings helps reduce the scarcity of drinking water and limit waste water flows on the site.

Criteria requirements

1	Install taps with a flow rate of not more than 6 litres a minute or another technology (e.g. sensor taps) that demonstrably has the same effect.
1	Install showers that do not use more than 7 litres of water per minute.
1	Install efficient toilets that do not use more than 6 litres per flush and are fitted with a half-flush option.

5.4. ALTERNATIVE WATER SOURCES

The use of water must be matched to the required quality and purity and the available water sources. It is not always necessary to use mains water. For a number of applications, use can be made of (in order of preference) treated grey water or process water, rain water or surface water. The use of groundwater is strictly regulated and should be avoided, unless other water sources are not satisfactory. This is because groundwater reserves in Flanders are under pressure.

5.4 a Reuse of grey water and process water

Max. score
5

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

By treating and reusing grey water and/or process water, less drinking water is consumed and less waste water discharged into the sewer system.

Explanation of the measure

Almost every company uses process water: as a coolant, solvent, flushing agent or means of transport. The quantities can sometimes be significant (e.g. laundry). Depending on the process and the desired reuse, treatment may be required. Grey water is slightly contaminated waste water from the bath/shower, tap or washing machine. On average, the proportion of grey water on an industrial estate is relatively small. After being treated, grey water can be reused for flushing toilets, washing machines and the maintenance of green spaces.

Criteria requirements

2	Investigate whether process water or grey water can be reused.
2	Provide 50% of the companies that produce process water or grey water with individual or collective installations for grey and/or process water treatment and reuse.
1	Wherever possible, connect installations and appliances in the buildings (e.g. toilet, washing machine, outside tap, collective car wash, etc.) to treated grey water and/or treated process water.

5.4 b Reuse of rain water

Max. score
mandatory

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

By reusing collected rainwater, no mains water or groundwater has to be used for installations and appliances (toilet, service taps, process water, etc.).

Explanation of the measure

It is required by law to provide all buildings with a rain water tank with a view to reusing rain water, unless a green roof is installed. For the design of the rain water tank, reference is made to the General Building Regulations of the City of Ghent. The basic rule is a minimum volume of 50 litres per m^2 of connected roof area. In addition, maximum utilisation must be ensured by connecting the rain water tank to e.g. service taps, toilets, car washes, process water, etc.

Criteria requirements

v	Provide all buildings without a green roof with individual or collective rain water tanks that meet the minimum volumes specified in the General Building Regulations of the City of Ghent.
v	Wherever possible, connect installations and appliances in these buildings to rain water.

References

General Building Regulations of the City of Ghent, article 13

Flemish Environment Agency (VMM), Water Guide for Building and Renovation

Regional Urban Development Regulations of 5 July 2013 on rain water

5.4 c Rain water for fire extinguishing

Max. score
2

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

To reduce the use of drinking water by using rain water in case of fire.

Explanation of the measure

The extinguishing basin must form part of an integrated rain water system.

Criteria requirements

2	In consultation with the fire service, determine how much extinguishing water is needed for the entire site and provide an extinguishing basin with rain water. The extinguishing basin is included in the integrated water system.

5.4 d Use of surface water, mains water and groundwater

Max. score
3

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

When establishing the water needs of an economic site, the possible use of grey and process water, the reuse of rain water and the application of rain water for extinguishing purposes are examined first. The last step is to assess the correct use of the surface or mains water. The use of groundwater lies outside the scope of the sustainability meter, as this is already very strictly organised in the regulations.

Explanation of the measure

For some applications it will not be possible to use treated grey or process water or rain water. In that case it should be examined what the appropriate water source is, bearing in mind the required quality and purity and the available water sources. The use of surface water is preferred to the use of mains water. The use of groundwater is strictly regulated and should be limited to applications for which other water sources are not satisfactory. This is because groundwater reserves in Flanders are under pressure. The Flemish Environment Agency therefore usually gives a (binding) negative opinion on permit applications for the use of groundwater, unless it genuinely involves high-quality use and other water sources are not eligible for use.

Criteria requirements

3	Show that the various possibilities have been studied when selecting the water sources, taking into account the required quality and purity, the availability of water sources and the order of preference surface water > mains water > groundwater.

5.5. WATER DRAINAGE

When (re)developing industrial estates, the City of Ghent produces a water management study in collaboration with TMVW. This study defines how waste water should be drained and treated and how rain water should be disconnected.

However, to limit overloading of the sewer network, the drainage of waste water and rain water should be limited to the greatest possible extent.

One problem specific to economic sites is the risk of thermal pollution. Cooling water is always a few degrees warmer than the ecosystem into which it is discharged. This water is not chemically polluted, and so can best be reused first on the site.

5.5.1. PROCESSING WASTE WATER

5.5.1 a Separate waste water drainage

Max. score
3

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

Separating water drainage flows reduces the overload on treatment plants and the dilution of the waste water.

Explanation of the measure

In accordance with the Regional Urban Development Regulations on rain water, separate drainage pipes for rain water and waste water must be provided in buildings. Within the sustainability meter it is recommended to this one step further and (where possible and tailored to the specific operation of the companies) to further split up the drainage of waste water, so that certain flows can be treated locally and reused, now or in the future. For offices, for example, this may involve separating drainage pipes for grey water (see 5.4 a) and black water. Black water is waste water from toilets; depending on the zoning plan (see http://geoloket.vmm.be/zonering/) it must be connected to a mixed sewer, to the DWA of a separate sewer, to an individual treatment plant for waste water (IBA) or to a septic tank. A different split of waste water flows may be more relevant for other companies.

Criteria requirements

3	Provide all buildings on the site with a separate water drainage system with a separate drainage pipe for rainwater (this is a legal requirement) and at least two drainage pipes for different waste water flows, in accordance with the specific operation of the companies.

References

General Building Regulations of the City of Ghent, articles 9 and 13

Guidelines for an integrated sewer policy in Flanders

Flemish Environment Agency (VMM), Water Guide for Building and Renovation

5.5.1 b Treatment and discharge of waste water

Max. score
4

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

On-site treatment of the industrial waste water allows the buildings to be disconnected from the sewer system.

Explanation of the measure

The industrial waste water may be so polluted that it has to be treated prior to being discharged (see VLAREM). It may be (financially) interesting to install a collective industrial wastewater treatment unit on economic sites.

After treatment, the water can be discharged into the surrounding watercourses or reused in a number of processes. In this way, a completely closed water cycle is obtained.

Criteria requirements

v	Provide suitable treatment for industrial waste water.
4	Meet the following requirements: • Investigate the possibility of placing companies that can collaborate on the collective treatment of industrial waste water close together on the site. • Provide collective waste water treatment on the site for industrial waste water.

5.5.1 c Heat recovery from cooling water

Max. score
3

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

To limit the heat difference from the ecosystem on discharge and to use residual energy.

Explanation of the measure

In many industrial processes, heat is released that has to be removed. The heat is generally removed using heat exchangers with water as coolant. This cooling water can normally be reused without being treated.

Although cooling water often does not cause chemical contamination, it does cause thermal pollution. It is a few degrees warmer than the ecosystem into which it is discharged. This leads to a reduction in the solubility of oxygen in the water. It also means that organisms breathe faster. Many organisms die in this way through oxygen deprivation or are more susceptible to disease. Furthermore, heating of the surface water can lead to excessive algae growth, the growth of blue-green algae and the occurrence of botulism. In hot and dry periods situations can arise in which electricity can no longer take place without disruption without exceeding cooling water standards. Partly due to climate change, the problems of thermal pollution are expected to increase, because the rivers will carry less water in the summer.

Cooling water can still be a useful source of heat for the company itself or for companies or other functions in the surrounding area (system boundary), e.g. for space heating or in industrial processes (see also 7.3 a). Following heat recovery, the cooling water also has a lower temperature on discharge, which ensures that the difference in temperature from the recipient ecosystem and the impact on it will be smaller.

Criteria requirements

3	Use the residual heat from cooling water within companies or in the environment (system boundary).

5.5.2. RAIN WATER DRAINAGE

The rain water should be kept on site as long as possible and removed through the collective sewers as little as possible. This avoids peak flow rates that would otherwise overload the waste water treatment plants and watercourse system, possibly leading to flooding.

On the one hand, the collected rain water can be reused for applications that do not require drinking water, and on the other the rain water gradually infiltrates the ground or is buffered and drained away slowly.

In MIRA 2030, the VMM studied within what bandwidth the climate in Flanders can change by the end of this century (2071-2100): "More exceptional events are possibly subject to more severe changes than average ones. It appears, for example, that days with an amount of precipitation that is so large that it only occurs once every ten years will experience an amount of precipitation that is up to a factor of 2.5 times higher than in the reference period."

In the absence of short-term data for Belgium, we can look to our northern neighbours: in the Netherlands, when estimating the consequences of climate change, the scenarios proposed by the KNMI in 2006 are assumed (van den Hurk et al., 2006). By 2050, they expect an increase of up to +27% in the number of days of precipitation with a 10-year frequency. According to the KMI's current calculations, this corresponds to rainfall with a return period of 50 years.

The design of economic sites must therefore be climate-robust. Water-robust design is defined by complete buffering of the 50-year downpour and a discharge flow rate that does not exceed the capacity of the recipient water system.

References

MIRA 2030, VITO (various studies)

BIM, Practical guide for the sustainable construction and renovation of small buildings, practical recommendation “WAT01 - Het hemelwater op het perceel beheren” ("Managing rain water on the plot")

5.5.2 a Rain water buffering using green roofs

Max. score
2

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

Creating green roofs buffers the rain water and drains it away more slowly, thus avoiding peak flow rates.

Explanation of the measure

A green roof reacts like a buffer between the precipitation and the drainage system. A large amount of the rain water (30-50%) is filtered and absorbed by the vegetable covering, the substrate and the drainage layer. Green roofs also have the following benefits for the water system:

- Some of the water is returned to the atmosphere by evaporation and evapotranspiration of vegetation and thus regulates the moisture content of the air.
- The restored rain water is cleaned (of CO_2, benzene, dust, etc.) and the acidity is reduced thanks to the mineral salts in the substrate.

We distinguish 2 types of green roof:

- Extensive green roofs: consist of light vegetation (mosses, succulents and herbs). Their weight is limited by the thin layer of substrate. They are mainly suited to flat roofs, but with certain techniques they can also be used for sloping roofs.
- Intensive green roofs: consist of grasses, shrubs and even trees. The storage of rain water is greater than with extensive green roofs, but they often require a modified roof construction, as well as a reinforced building structure. In dry periods the vegetation also has to be sprayed with water, for which scarce drinking water is sometimes used.

Green roofs are an interesting solution for roof areas where the rain water runoff cannot be reused. They form an equivalent alternative to a rain water tank if they have a storage capacity of at least 50 mm (see calculation method described in the “Waterwegwijzer bouwen en verbouwen” ("Water guide for building and renovation") of the Flemish Environment Agency VMM). The General Building Regulations of the City of Ghent require a storage capacity of at least 35 mm.

Criteria requirements

2	Provide a green roof with a water storage capacity of at least 50 mm on all roof areas not used

	for the recovery of rain water.

References

Flemish Environment Agency (VMM), Water Guide for Building and Renovation

General Building Regulations of the City of Ghent, article 13bis

5.5.2 b Infiltration of rain water

Max. score
5

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

Through the infiltration of rain water on the site, the rain water is collected close to the source, the groundwater reserves are replenished and drought is countered.

Explanation of the measure

Before using infiltration, the site must be assessed against the policy framework: in protection zones for drinking water type I or II (see http://www.agiv.be)[18] the construction of an infiltration facility is prohibited.

It is also important that the groundwater level is sufficiently low and the ground reasonably permeable. If the infiltration facility is below groundwater level, it will drain rather than infiltrate, and if the ground is not sufficiently permeable, the facility will occasionally overflow. The amount of surface that is paved also plays a role in this.

When designing the necessary buffer volumes, a requirement must be taken into account that is stricter than the current norm (250 m^3/ha paved area). A climate-robust policy assumes the buffering of a downpour with a return period of 2 years. Assuming this return period (2 years) and the infiltration capacity (to be investigated locally), the required volume of the infiltration facility must be calculated using the Code of Good Practice[19] or more recent information.

Various techniques are available for allowing the infiltration of rain water on the site.

Direct infiltration through vegetation

Direct infiltration through vegetation is the most natural way of draining away rain water. Infiltration can therefore be promoted by limiting paved areas. This must be anchored in the design plan (in this regard, see 1.1.1 b).

Infiltration alongside or in paving

Various options are possible for the paving that is required (the first two are equivalent, the third is less preferable):

- The rain water that falls onto the paving can be drained into a permeable unpaved peripheral zone. There are various systems of infiltration through unpaved surfaces:
    - Infiltration pond/infiltration field: unpaved land where rain water can infiltrate. The infiltration pond consists of a humus-bearing layer of topsoil covered with grass, plants or bushes.
    - Wadi: A wadi is an infiltration pond with filter bed material (gravel, expanded clay aggregate) to break a less permeable layer or provide extra water storage. The term wadi stands for 'Water Afvoer door Drainage en Infiltratie' ('water removal by drainage and infiltration').

[18] There are no protection zones for type I and II drinking water in Ghent.
[19] Code of good practice for the design, construction and maintenance of sewer systems, August 2012/2014, Coördinatiecommissie Integraal Waterbeleid (Coordination Committee for Integrated Water Policy)

- Infiltration through permeable paving with permeable foundation: hardcore pavements, grass blocks and porous concrete paving blocks can be used here. For dolomite, only a coarse particle size (5/15 or 5/20) with no added cement and which is not driven on is viewed as possibly sufficiently permeable. Cobbles with wide, unfilled joints and non-porous concrete paving blocks do not constitute permeable paving. The foundation also has to be permeable, e.g. with crushed rubble or road metal[20].
- Infiltration through an underground facility: the rain water is carried to an underground facility via a pipe. The rain water infiltrates into the ground through the underside and/or the side. The disadvantage of such a system is that it does not contribute to the biodiversity and amenity value of the site. Underground systems are also difficult to access for maintenance and inspection. Possible systems are:
  - Infiltration tank: vertical tank with perforated or porous walls. The water infiltrates into the ground through the underside and the bottom section of the side walls. This system requires little space, but can only be used with low groundwater levels.
  - Infiltration chamber: vertical well with a sump made from a porous, perforated or slotted tube, wrapped in geotextile. Besides infiltration, the chamber also has a collecting function.
  - Infiltration tube: perforated tube, sometimes encased in gravel and geotextile. This system is better if the groundwater level is high.
  - Infiltration blocks: synthetic blocks with permeable walls encased in geotextile. The blocks can be stacked both on top of and alongside each other.

Criteria requirements

2	Limit paved areas.
3	For paving, choose natural infiltration in a permeable unpaved peripheral zone or a permeable paving with permeable foundation.

References

BIM Information Sheets on Eco-Building: WAT01, Managing rain water on the plot

OCW: design of permeable surfaces (http://www.ocw.be)

Flemish Environment Agency (VMM), Water Guide for Building and Renovation

5.5.2 c Buffering with delayed rain water drainage

Max. score
4

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

With buffering, rain water is temporarily held in a reservoir and then drained off slowly, preventing the water system from becoming overloaded during heavy rain.

Explanation of the measure

Buffering with delayed rain water drainage can only be used if infiltration is impossible (limited infiltration capacity of the ground and/or high groundwater level). Buffer basins can take the form of a pond with an impermeable base (film or layer of clay) or a concrete or brick basin. The contents of the buffer facility are slowly drained off by means of a flow rate limiter (pinch pipe, vortex valve or pump).

The overflow through which the rain water can pass if the buffer volume is full is preferably connected to surface water or, where not possible, to the rain water drainage pipe of the sewer. The overflow from the site must not be connected to the mixed public sewer.

[20] Code of good practice for the design, construction and maintenance of sewer systems, August 2012/2014, Coördinatiecommissie Integraal Waterbeleid (Coordination Committee for Integrated Water Policy)

When designing the necessary buffer volumes, a requirement must be taken into account that is stricter than the current norm (250 or 350 m^3/ha according to the connected paved area and/or roof area). A climate-robust policy assumes the buffering of 1 hour's rainfall that occurs every 50 years in the current models. The rate required by law or imposed by the water manager is imposed as the emptying flow rate. Assuming the return period of 50 years and the emptying flow rate, the required volume of the buffer facility must be calculated using the Code of Good Practice or more recent information.

Criteria requirements

3	Provide buffer facilities with connection to the surface water (buffering is calculated and underpinned with a return period of 50 years).

or

2	Provide buffer facilities with connection to the rain water drainage pipe (buffering is calculated and underpinned with a return period of 50 years).

1	An infiltrating buffer is used (buffer with a permeable base so that minimal infiltration is possible).

References

BIM Information Sheets on Eco-Building: WAT01, Managing rain water on the plot

Flemish Environment Agency (VMM), Waterwegwijzer bouwen en verbouwen (Water Guide for Building and Renovation)

Code of good practice for the design, construction and maintenance of sewer systems, August 2012, Coördinatiecommissie Integraal Waterbeleid (Coordination Committee for Integrated Water Policy)

5.6. CONSTRUCTION PHASE

The construction phase of a project forms a relatively short, defined period, but irreparable damage can be caused to the environment, both above and below ground, during this phase. This damage is often preventable, provided a broad investigation is carried out prior to construction.

5.6 a Surface water pollution

Max. score
2

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

To avoid surface water contamination during the construction phase.

Explanation of the measure

Various precautions can be taken to counter surface water contamination during the construction site and usage phase.

- Wet and dry materials must be protected against rain and wind to prevent run-off contamination.
- Spilled liquids must always be disposed of correctly and immediately.
    - Impenetrable surfaces: never rinse with water, use dry cleaning methods.
    - Penetrable surfaces: excavate and correctly dispose of contaminated soil and materials.
- Materials, vehicles, temporary constructions (sanitary facilities, prefab offices, etc.) must be checked for leaks.
- Frequently used routes for site transport are best made from gravel to ensure safe and stable site access.
- Concrete mixers must be washed and maintained. It is best not to bring vehicles onto the site.
- Waste materials containing cement are never buried but are removed as waste and processed accordingly.
- Paints:
    - Water-based paints: cleaning of brushes, rinse in basins with drainage into sanitary waste water.
    - Oil-based paints: cleaning of brushes, filtering and reuse of thinners and solvents.

Criteria requirements

2	Take adequate steps to prevent surface water contamination, paying particular attention to the above points.

5.6 b Dewatering

Max. score
5

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

To prevent serious groundwater extraction during the construction phase, prevent the spread of soil contamination and prevent irreparable damage to above-ground and underground ecological structures.

Explanation of the measure

Source dewatering that is technically necessary for construction work or the installation of utilities cannot be avoided. However, sufficient consideration should be given to underground water flows, groundwater level and other water-related aspects of the soil (both biotic and abiotic).

To ensure that the potential harmful effects of groundwater extraction are carefully examined, a study is carried out that addresses at least the following aspects:

- Existing condition in relation to groundwater level and flows.
- Justification of the duration, depth and flow rate of the dewatering.
- Where water is discharged: return dewatering where possible, and preference for discharge into surface water above discharge into sewers. The discharge of the pumped-up groundwater must not cause any flooding.
- Is there pollution on the plot itself or in the immediate vicinity? If dewatering is carried out in that case, the pumped-up groundwater may be contaminated or the contamination can spread. The latter should obviously be avoided.
- The self-restoring capacity of the groundwater (level), relevant for possible damage to buildings or infrastructure (e.g. with wooden piles).
- Attention to valuable abiotic structures and the related fauna and flora in the immediate vicinity that could be affected by the dewatering. In that case, return dewatering is recommended.

Criteria requirements

v	Produce a report showing that the above aspects of groundwater extraction have been carefully examined.
5	Demonstrable measures have been taken to prevent or sufficiently limit possible negative effects of dewatering.

6. RAW MATERIALS AND WASTE

The use of raw materials is part of a global cycle: the raw materials cycle. Every project requires material input (raw materials) and also produces material output (emissions, waste, etc.). For this cycle to be managed sustainably, both the input (choice of materials) and output (waste management) must should therefore be sustainable.

However, current production and consumption patterns do not take into account the complete raw materials cycle. When a product is purchased the product cost is passed on, but the environmental impact or environmental costs rarely are. Life Cycle Analysis (LCA) methods are used to investigate the total environmental impact and influence of a product throughout the entire cycle. This involves examining all material and energy-related inputs and outputs, such as the necessary raw materials, production, transport, use and waste processing, over the entire life cycle of the product.

The 'Cradle to Cradle' principle provides a concept for the entire problem: waste is food. After their life in one product, all the materials used should be able to be usefully employed in another product, thereby creating a closed raw materials cycle.

To obtain a closed raw materials cycle and hence achieve material neutrality, the following approach is proposed within the sustainability meter:

1. Preliminary study and integrated approach

As in the other chapters, the first step is a preliminary study of the site. This step involves taking an inventory of the materials already present and material flows on the site. In a second step, an integrated materials policy for the economic site must be produced.

2. Intelligent material inflow

This section focuses on material inflows. A number of measures are proposed to limit the consumption of materials and encourage the use of environmentally friendly materials.

3. Intelligent material throughput

Exchanging raw materials and products on the site itself could also be envisaged. Reuse of materials and waste also plays a major role in efforts to reduce the material burden and limit the ecological footprint.

4. Limiting waste outflow

A third section examines material outflows. This covers all aspects of sustainable waste processing.

5. Preparing for materials management

The management of materials during the usage phase also merits special attention. Repairs and maintenance prolong the life of the building components.

6.1. PRELIMINARY STUDY AND INTEGRATED APPROACH

6.1 a Inventory of materials present and material flows

Max. score
mandatory

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

To gain an insight into the materials present and material flows on the site with a view to sustainable materials management.

Explanation of the measure

An inventory of the following elements is taken:

Materials present

Before using new materials for the project, an overview must be made of the materials already present on the site, so that these can be reused wherever possible. This inventory includes the following elements:

- The nature of the material
- The quantity of material
- The condition (for reuse, hazardous, etc.)

Material flows

Industrial activities generate significant material flows. Mapping these material flows allows possible collaborations and exchanges between companies to be identified. The following information must be collected for each company:

- Raw materials used
- End products
- Waste flows

Criteria requirements

v	Take an inventory of the materials present on the site.
v	Take an inventory of the material flows generated by the industrial activities on the site.

6.1 b Integrated materials management

Max. score
5

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

An integrated materials management plan is responsible for sustainable management throughout the site.

Explanation of the measure

An integrated materials management plan and waste management provides an insight into opportunities for a collective approach. This integrated materials plan sets out the main measures in two phases: first the design phase, then the management phase.

- Design phase: choice of materials for building materials, paving, street furniture, etc.
- Management phase:
    - Exchange of materials between companies (exchange of end and waste products)

- Waste management on the site (reuse and sorting of waste)

Criteria requirements

2	Prepare a materials plan for the design.
3	Prepare a materials plan for management, in which the profiles of the various companies in relation to materials cycles are matched to each other as closely as possible.

6.2. INTELLIGENT MATERIAL INFLOW

To limit the inflow of materials, an attempt is first made to limit the consumption of raw materials through an intelligent, material-efficient and well-dimensioned design. In a second step, when selecting the materials, sustainable materials are used wherever possible.

6.2.1. LIMITING THE USE OF MATERIALS

The use of building materials can be reduced by a good concept with correct dimensioning of the various structural components. In addition to the building materials, land use on the site must also be limited by focusing on a balanced cut and fill.

6.2.1 a Correct dimensioning

Max. score
3

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

The use of materials can be limited through the correct dimensioning of the building components.

Explanation of the measure

During dimensioning and detailing, attention must be paid to logical and material-efficient supporting structures, and over-dimensioning of building components must be avoided. A large amount of material can be saved by looking for the right size (height, width, thickness) in terms of ergonomics, function and use.

Criteria requirements

2	Limit the use of materials to a minimum by conducting a study into the correct dimensioning of paved surfaces, sewers, technical infrastructures, etc. Proof through a study of the dimension-specifying elements (e.g. dimensions and turning circle of lorries, decisive for designing the roads).
1	Show that the study effectively allowed the use of materials to be limited.

6.2.1 b Balanced cut and fill

Max. score
2

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

The deposit and removal of soil on the site involves both transport and environmental costs. The target should therefore be a balanced cut and fill.

Explanation of the measure

Sustainable soil management presupposes that no soil is delivered to, removed from or moved on the site, except soil that requires external treatment for soil remediation purposes or to make up for a shortage caused by removal for remediation purposes. If soil has to be stored temporarily, a suitable place on the construction site or at a nearby location must be found.

Criteria requirements

1	Ensure a balanced cut and fill.
1	Designate a suitable place for temporarily storing the soil.

6.2.2. USE OF SUSTAINABLE MATERIALS

We must use our finite resources wisely. Therefore, sustainable materials that score high in terms of quality, environmental impact and health must be used wherever possible.

6.2.2 a Building materials with a good NIBE classification

Max. score
6

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

To encourage the use of sustainable building materials.

Explanation of the measure

The Dutch Institute for Building Biology and Ecology (NIBE) has evaluated the environmental impact of most building materials, based on life cycle analyses (LCA). The materials are evaluated in 4 main areas: emissions, raw materials, land use, and nuisance. Each building material is given a relative score (1a to 7c). The higher the score (1a), the better the material for the environment.

To evaluate the global impact of the construction project, an analysis is carried out of the NIBE score of the materials used based on the take-off list. The proportion (based on building costs including installation) that falls into NIBE class 3c or better determines the score.

Criteria requirements

2	Between 25% and 50% of the new building materials has an NIBE environmental class of not more than 3c.

or

4	Between 50% and 75% of the new building materials has an NIBE environmental class of not more than 3c.

or

6	More than 75% of the new building materials has an NIBE environmental class of not more than 3c.

6.2.2 b Sustainable types of wood

Max. score
5

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

To encourage the use of sustainable types of wood.

Explanation of the measure

Wood with an FSC label is obtained from sustainably managed forests in accordance with standards for the environment, social conditions and the economy. The use of this type of wood must be encouraged.

Besides this certification mark there is also the PEFC label, which also imposes a number of criteria in relation to sustainable forest management. In contrast to FSC, this certification mark is an initiative from the private sector, so that economic interests sometimes prevail over ecological interests.

To maximise the life of wood, the principle of constructive wood protection is applied in most cases. If the wood still needs to be preserved, products are used that are based on natural raw materials. Wood that has been chemically preserved with products containing copper or lead is not used.

The wood preferably comes from European forests.

Criteria requirements

3	Use FSC-certified wood.

or

2	Use PEFC-certified wood.

1	If necessary, protect the wood using natural protective products.
1	Use wood from European forests.

References

Peter Geldof, Duurzaam zonder verduurzaming.

6.2.2 c Recycled materials

Max. score
6

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

Using recycled materials means fewer new raw materials have to be used. This concerns both materials present on the site that are reused and building materials into which waste was incorporated.

The proportion of recycled materials is determined on the basis of building costs, including installation. For materials with a certain recycling content, the costs of the recycled fraction are calculated on the basis of the percentage by weight of recycled material.

Criteria requirements

2	Between 5% and 10% of the materials used are recycled.

or

4	Between 10% and 15% of the materials used are recycled.

or

6	More than 15% of the materials used are recycled.

6.2.2 d Local building materials

Max. score
2

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

By using locally (i.e. in a radius of not more than 100 km around the site) available raw materials and locally produced products, major transport steps and the resulting environmental impact are avoided.

The proportion of local building materials is determined on the basis of building costs, including installation.

Criteria requirements

1	Between 10% and 15% of the materials are produced locally.

or

2	More than 15% of the materials are produced locally.

6.2.2 e Avoid products with harmful substances

Max. score
5

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

To avoid products and materials that are harmful to human health.

Explanation of the measure

Building materials that are toxic on contact or inhalation and which contain carcinogens or toxic substances may not be used. Particular care must be taken with materials that cause emissions of volatile organic compounds (VOCs). These substances are often present in high concentrations in indoor air, and can cause respiratory problems, irritation, fatigue and headache with long-term exposure.

The following building materials merit special attention:

- Finishing materials, wall and floor coverings: VOCs can occur in significant quantities in wooden boards (wood fibre board, chipboard, etc.), resilient materials (carpets, vinyl, rubber, etc.) and laminated floorings. When choosing the finish, preference should therefore be given to materials with low VOC emissions, i.e. materials that comply with category E1 of the European emission standards. Wood fibre boards with low-formaldehyde glues are chosen.
- Paints and varnishes with solvents and VOCs are replaced by natural water-based paints. Mineral paints or water-borne acrylate dispersion paints are preferred for outdoor applications.
- Glues are used that do not contain solvents or volatile organic compounds (VOCs).
- Cement-based mortar with natural components (lime mortar) are to be preferred.

Criteria requirements

5	Do not use materials and products that contain harmful substances. Pay attention to the choice of finishing materials, paints, glues and mortar.

6.2.2 f Maintenance-friendly materials

Max. score
3

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

To use materials with a long life and little maintenance.

Criteria requirements

3	Use materials that have a long life and require little maintenance.

6.3. INTELLIGENT MATERIAL THROUGHPUT

After limiting the material inflow, the next step consists in reducing the use of materials by reusing materials and waste that are already present on the site. Once in the operational phase, this can be developed in joint ventures between the companies, creating synergistic benefits for all parties.

6.3.1. WASTE AS A RAW MATERIAL

6.3.1 a Reuse of structures and components

Max. score
3

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

Existing structures and materials should be reused as much as possible to limit the use of new raw materials.

The proportion of reused structures and components in the buildings is determined on the basis of building costs, including installation.

Criteria requirements

1	Between 5 and 10% of the building consists of reused structures and components.

or

3	More than 10% of the building consists of reused structures and components.

6.3.1 b Removable building components for the public domain and roads

Max. score
4

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

Using removable building components for the public domain and roads facilitates the reuse of structures and materials, resulting in smaller waste flows.

Criteria requirements

2	Use removable fastening systems instead of glues or putties.
2	Use removable building components and separable materials.

6.3.2. MATERIALS CYCLE WITHIN THE ECONOMIC SITE

Studies can be carried out into the reciprocal exchange of waste and end products between the various companies on the site. Some waste products can actually be used as raw materials in other industrial processes.

6.3.2 a Integrated chain management and industrial ecology

Max. score
3

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

Environmentally focused integrated chain management is the alignment and optimisation of processes, techniques and products between companies in a chain to bring about improvements in relation to the environment and production processes. Waste from one company may be a raw material for another company.

Criteria requirements

2	Identify and encourage partnerships between the companies on the site for the exchange of waste and end products.
1	Optimise the production chain of the companies on the site.

6.4. SUSTAINABLE WASTE OUTFLOW

Finally, we will look at the outflow of materials. In an ideal sustainable site, the outflow is at least equally healthy as the inflow, so that the cycle can repeat itself infinitely, with a zero or positive impact on man and environment. In the first place, the separation and transport of waste flows can be anticipated.

6.4 a Sorting construction and demolition waste

Max. score
6

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

Sorting construction waste properly on the actual building site allows for maximum recycling of waste flows.

Explanation of the measure

An easily accessible location is provided on site where waste is collected and sorted. The following raw materials must be sorted:

- Glass
- Paper and cardboard
- Metal
- Hazardous waste
- Clean debris
- Wood
- Residual fraction
- Biodegradable waste

The regular removal of the materials to a nearby licensed sorting centre is also organised (see VLAREMA). Only where on-site sorting is not possible may a specialist company be used, which will sort the waste containers at a different location.

When demolishing large non-residential buildings, a demolition inventory is required under VLAREMA.

Criteria requirements

6	Sort the construction and demolition waste on site and ensure it is regularly removed to a sorting centre.

References

Selective demolition and dismantling of buildings, see http://www.ovam.be

6.4 b Waste sorting site

Max. score
3

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

Providing a communal waste sorting point on the site stimulates the sorting and recycling of waste during the usage phase.

Explanation of the measure

There is a significant difference between household waste and industrial waste. Household waste includes all the waste created by the normal functioning of a household. All other waste is viewed as industrial waste.

VLAREMA defines a third category: waste comparable to household waste. This waste is subject to the same rules as household waste. This specifically involves street waste and litter, market waste, beach waste and paper waste.

Household waste and waste comparable to household waste is collected by the municipality. However, companies are themselves responsible for collecting and processing their industrial waste. It is advisable to examine whether different companies produce similar industrial waste and can therefore collaborate on its collection and processing. Certain industrial waste is required to be collected separately (see VLAREMA art. 4.3.2)

The communal waste sorting point may not lead to the (odour) nuisance mentioned in 2.1 f.

Criteria requirements

1	Provide sufficient containers for household waste and waste comparable to household waste on the site, with a distinction being made between PMC, paper and cardboard, glass, biodegradable waste and residual waste.
1	Seek out joint ventures between the companies on the site to collectively gather and sort industrial waste.
1	Provide a collective closed waste collection point on the site for industrial waste.

6.4 c Collective waste collection

Max. score
1

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

To organise collective waste collection for industrial waste.

Explanation of the measure

Agreements can be made between different companies to organise the collective collection of industrial waste. Transport and costs can thus be reduced.

Criteria requirements

1	Organise collective collection of industrial waste for part or all of the economic site.

6.5. PREPARING FOR MATERIALS MANAGEMENT

6.5 a Maintenance plan for the public space

Max. score
3

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

First, the design should be as maintenance-friendly as possible. Second, maintenance should be carried out as efficiently as possible. The maintenance plan brings together all the information needed for correct maintenance and repairs according to sustainable management.

Explanation of the measure

A maintenance plan is drawn up for the different parts of the shared space (paving, traffic furniture, etc.), indicating the maintenance and cleaning methods and the measures envisaged in case of repairs. Correct maintenance allows the life of the materials used to be extended significantly.

Criteria requirements

3	Draw up a maintenance plan for the public space.

7. ENERGY

The European Commission developed the 20-20-20 climate plan with the following objectives: to improve the quality of the environment, reduce imports of fossil fuels and boost competitiveness and employment through the development of new energy-efficient technologies. The actions in the climate plan include labelling of equipment, improving the fuel efficiency of cars and more efficient electricity production and distribution. For buildings, the 20-20-20 climate plan is translated into the European 'Energy Performance of Buildings' Directive, in which cost-optimal energy performance targets are imposed, and in which nearly zero energy buildings (NZEB) are emphasised as a short-term objective. Nearly zero energy buildings are defined as buildings with a high energy performance (building-related energy consumption for heating, cooling, lighting, sanitary hot water, humidification and auxiliary energy for pumps, fans and controls, excluding energy consumption for household appliances, ICT equipment, industrial equipment, etc.) for which the energy demand is largely met by renewable energy sources (generation on or near the site).

For the application of this sustainability meter to economic sites, the pattern of the existing Flemish regulations is extended to a broader area of application and/or a higher level of ambition. These regulations include:

- Feasibility study into alternative energy systems (Decree of the Flemish Government of 23 November 2007
- Energy Planning Decree (14 May 2004)
- Ministerial Decree implementing CO_2 neutrality on industrial estates (1 October 2007)

The **Trias Energetica** defines three hierarchical steps that differ in terms of life and robustness of the measures:

- Limit energy consumption by restricting demand
- Use renewable energy sources
- Use finite energy sources efficiently

In the first instance, the energy needs are minimised. Good daylighting, adjustable sun protection, good-quality insulation and airtightness of the building shell, and an appropriate ventilation strategy are the crucial factors here. Building shell measures have a very long life and are a prerequisite for the application of passive climate techniques.

Secondly, the use of renewable energy sources should be examined. At building level, thermal and photovoltaic solar energy, wind energy, biomass and cold/hot storage in the ground are the basic options. Significant gains can be achieved, especially at the level of economic sites, provided the solutions are considered integrally and are well thought out. However, it must be ensured that measures and/or installations are not counter-productive. In practice this often proves to be the case, e.g. sub-optimal combination of a collective energy supply with a number of buildings having their own supply. Chapter 1 of the sustainability meter (integrated project process) therefore requires that the ambitions and vision in relation to energy and the required expertise be defined.

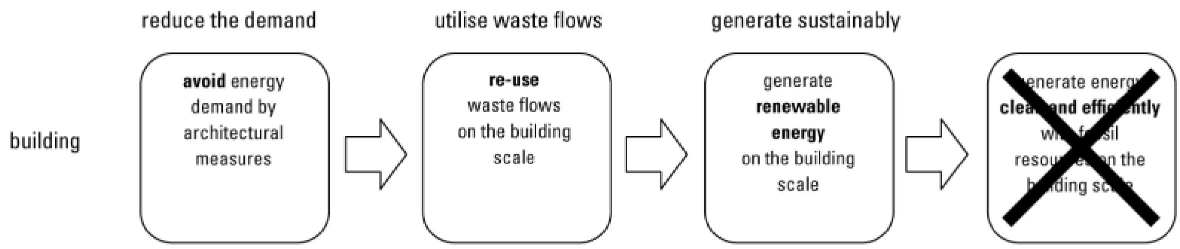
It is only in the third and final step that measures are implemented for efficient use of the finite energy sources, including:

- Energy-efficient lighting fixtures
- Low-temperature heating systems and high-temperature cooling systems
- Hybrid ventilation (combination of mechanical and natural ventilation)
- Free cooling
- Frequency control on motors, pumps, fans and the limiting of speeds in pipes and ducts to limit pressure losses, thereby minimise the consumption of auxiliary energy
- Other solutions specifically suited to the site, e.g. combined heat and power (CHP)

The solutions are always based on BAT (Best Available Techniques), i.e. the most advanced available techniques applicable to the specific site. These techniques are highly efficient and show a favourable investment picture.

REAP

Strategies on reducing energy consumption and mitigating harmful emissions are in constant flux. That is why the sustainability meter looks beyond the Trias Energetica. The reuse of residual flows at building, district and city level is often insufficiently addressed. However, by including these optimisations, the final step in the Trias Energetica, i.e. the (rational) use of fossil fuels, may well disappear entirely. For the above, the sustainability meter refers to the REAP (Rotterdam Energy Approach and Planning).

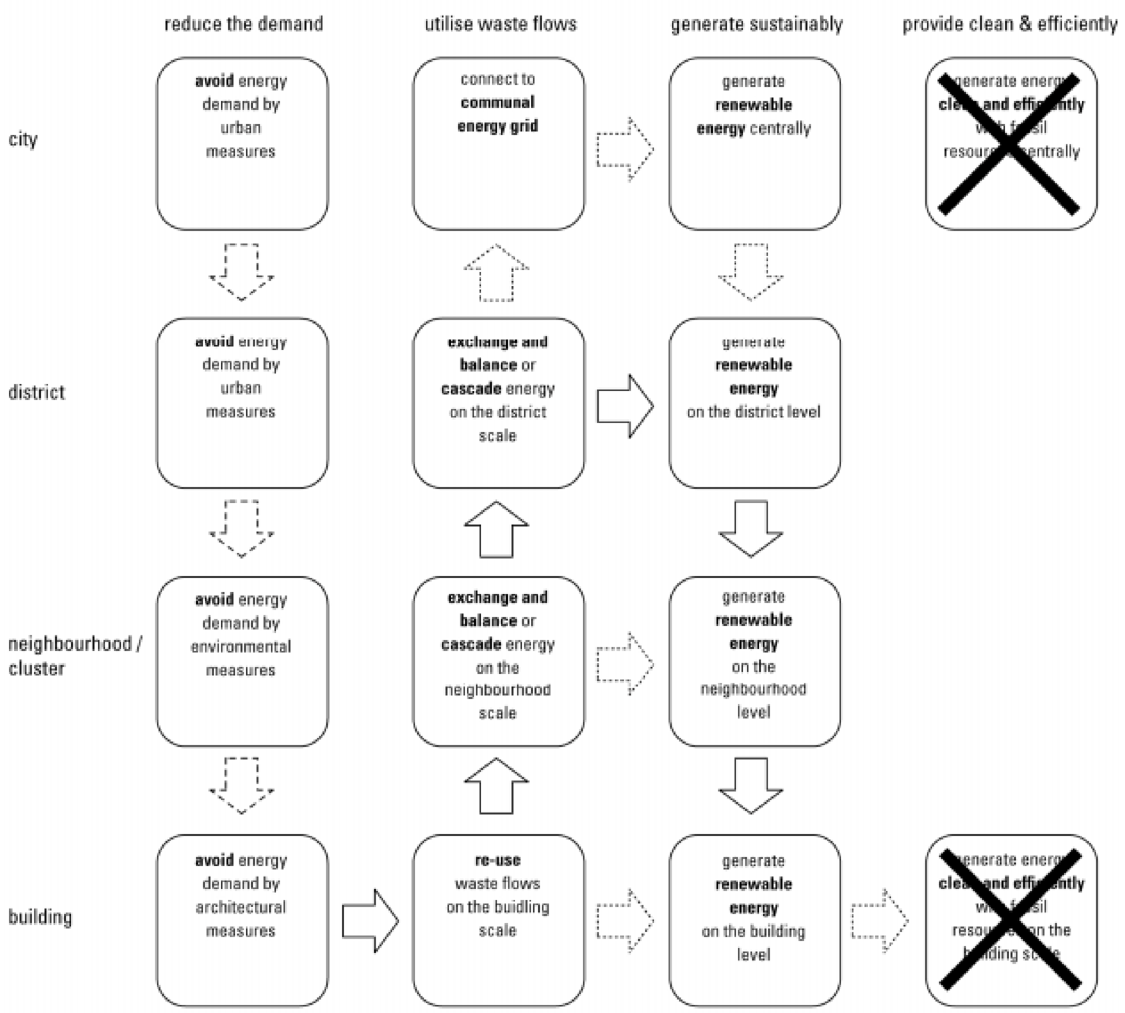


The REAP report describes a 'New Step Strategy' that adds the reuse of waste to the Trias Energetica. With the REAP method, existing buildings can be made energy-neutral by making optimal use of available energy and waste flows, such as residual heat, waste water and household and garden waste. The method assumes that homes, offices and other buildings in a district can be linked together. For example, the residual heat generated by the cooling of office buildings is used to heat homes. It is also possible to collect waste in a district for the production of biogas.

If there is residual energy on the site, the following approach is recommended:

1. Can the energy be stored at individual plot or collective level (not in environmentally harmful storage batteries, such as lead or lithium batteries)?
2. Can it be delivered to energy customers with complementary energy needs?
3. Can it be fed back into the network?

The following graphic shows how the steps in the REAP approach interact with the various levels of scale.



Source: http://www.rotterdamclimateinitiative.nl/documents/Documenten/REAP_NL_lowres.pdf

Regulated and unregulated energy consumption

A distinction is made between regulated and unregulated energy consumption. Regulated consumption refers to consumption for which there is a legally defined threshold value.

Practice shows that these norms mainly exist for energy consumption in homes and offices. However, the sustainability meter also calls for a demonstrable improvement in performance for unregulated energy consumption. In accordance with the system of BREEAM Communities v2012[21], this improvement is determined using the “baseline energy demand”. This baseline is a forecast of energy consumption based on the modelling of a standard situation (many tools are available on the market for this). The extent to which a building or process performs better in relation to this baseline determines the score for this aspect.

Just like the EPB norms, the "baseline energy demand" is dynamic. This is necessary to provide an accurate picture of efforts designed to lead to a reduction in energy consumption. The sustainability meter recommends updating at the most every four years or whenever the situation regarding the energy management of a site changes.

Existing and new sites

The methodology in this chapter can be applied to existing and planned establishments on existing or planned sites. For existing establishments, measured consumption or emission data are used, while estimates are used for planned establishments. Combinations of existing and planned establishments are possible. Obviously, it is not possible to include unplanned establishments (for which the space may well be available) in the analysis. Nevertheless, the analysis can be used to define the desired

[21] BREEAM Communities v2012, criterion RE01 Energy Strategy

profile of as yet unplanned establishments and thus allow the use of opportunities for the inclusion of additional sites.

Energy neutrality

Positive-energy companies are not specifically encouraged on an individual level. The sustainability meter aims to reward energy-neutral or positive-energy companies collectively.

References

http://www.auditconvenant.be

http://www.energiesparen.be

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

Feasibility study into alternative energy systems (Decree of the Flemish Government of 23 November 2007

Energy Planning Decree (14 May 2004)

Ministerial Decree implementing CO_2 neutrality on industrial estates (1 October 2007)

NBN EN 15459, Energy performance of buildings: economic evaluation procedure for energy systems in buildings

7.1. PRELIMINARY STUDY AND INTEGRATED APPROACH

Analysis of the energy balance and CO_2 emissions at site level allows site-related opportunities to be identified.

7.1 a Energy and CO_2 management at site level

Max. Score
mandatory

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

To formulate and implement site-related energy objectives.

Explanation of the measure

Energy management implies that:

- The establishment-related analyses and the analysis at site level are coordinated.
- The communal objectives for the site and the conversion to objectives for individual establishments are formulated, managed and updated (follow-up).

The establishment-related and site-related CO_2 plans are updated every 4 years, and the progress of the implementation of the Best Available Techniques (BAT) is evaluated every 2 years.

Criteria requirements

v	A contract with the energy manager is proposed in which at least the above terms of reference are included.

7.1 b Analysis at establishment level

Max. Score
mandatory

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

Exploratory study of the basic energy consumption data (aggregated on the basis of the data at establishment level) and possible energy-saving measures.

Explanation of the measure

In the energy study, a 'baseline energy demand' is determined for all establishments. This includes both building-related and production process-related consumption. Building-related consumption can be both regulated and unregulated, depending on whether or not the buildings are subject to EPB (see introduction). For establishments that have been in use for at least 1 year, recorded energy consumption is used. The procedure for new establishments is as follows:

- Building-related consumption:
  - For buildings that are subject to EPB, the 'baseline energy demand' is determined on the basis of the applicable EPB standard. The corresponding calculation method can be used for this.
  - For buildings not subject to EPB, this is an estimate based on, among other things, surface areas and key figures. A method equivalent to EN 13790[22] can be used.
- Production process-related consumption: an estimate is also made for this.

The energy sources used (within the system boundary), the annual primary energy consumption and an overview of CO_2 emissions are produced. The annual primary energy consumption and CO_2

[22] http://www.iso.org/iso/catalogue_detail.htm?csnumber=41974

emissions are calculated in accordance with the rules of the audit covenant on the basis of measured or estimated energy consumption per energy carrier.

For buildings that are and are not subject to EPB, an overview is provided of relevant energy-efficient and CO_2-saving building-related (basis: energy performance) or production process-related technologies (basis: audit covenant on energy efficiency in industry[23]). For these technologies the investment costs, the energy and CO_2 saving opportunities and the nature of the measures (restriction of energy demand, use of residual energy or renewable energy, energy-efficient installations) are specified.

It is recommended that this energy study be updated every four years, and whenever there are significant changes to the installations.

The transfer of information within the entire development process deserves attention: the dynamic data on baseline energy demand must be carefully managed and transferred. See also 1.1.1 b.

Criteria requirements

v	An energy study, including the baseline energy demand for the site and an overview of the building- and production process-related energy-saving technologies, has been produced.
v	BAT have demonstrably been taken into account in the possible building- and production process-related solutions and measures.

References

http://www.emis.vito.be/bbt

7.1 c Analysis at site level and CO_2 neutrality plan

Max. Score
mandatory

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

To ensure the identification of site-related communal opportunities for saving energy and reducing CO_2 emissions. This also includes the CO_2 neutrality plan for electricity.

Explanation of the measure

An integrated

- 'baseline energy demand' (see also 7.1 b) and an overview of CO_2 emissions are produced,
- An overview is produced of relevant energy-efficient and CO_2 emission-mitigating technologies that are common to at least two establishments,
- An overview is produced of residual heat or cold flows and their temperature level and any collective production of energy at site level,
- A CO_2 neutrality plan is drawn up within the meaning of the Decree of the Flemish Government of 24 May 2013 on subsidies for industrial estates (Official Belgian Gazette 10 July 2013), i.e. an overview of the measures taken for CO_2-neutral electricity consumption or compensation for the CO_2 emissions as a result of electricity consumption.

It is recommended that this analysis be updated every four years, or in case of relevant changes to the energy profile of the site.

[23] http://www.auditconvenant.be/nl/nl13_convenanten.asp

Criteria requirements

v	The energy study from criterion 7.1 b, including the primary energy balance for the site, as well as a CO_2 neutrality plan[24].
v	Inventory of energy-efficient and CO_2 emission-mitigating technologies for collective use (at least 2 establishments), this inventory is used to map site-related communal opportunities for saving energy and reducing CO_2 emissions.

[24] New sites must be 100% CO_2 neutral to be eligible to apply for subsidies. For existing sites, the CO_2 neutrality plan must specify that the objective is CO_2 neutrality.

7.2. LIMITING THE ENERGY DEMAND

The maximum score for limiting energy demand on the site is 80 points. To take sufficient account of the specific nature of each site, this maximum score is divided between points 7.2 a (M1) and 7.2 b (M2) on the basis of the ratio between production-related and building-related primary energy consumption as determined in 7.1 b-c. The sum of M1 and M2 is therefore 80.

7.2 a Production-related energy demand

Max. Score
M1

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

Limiting production-related energy demand.

Explanation of the measure

The operator of each establishment must show that the Best Available Techniques for limiting energy demand have been taken into account and used where possible.

The emphasis here is on companies' individual improvement process. This process can be supported by Enterprise Flanders (with the energy scan or planning advice) or ISO standard 50001 can be used. However, other improvement processes put in place by the individual companies are also rewarded in the sustainability meter (provided they are sufficiently justified and underpinned).

For these improvement processes, companies follow the steps set out in the Trias Energetica, supplemented with the consideration dictated by REAP of the possible reuse of residual flows at site, process and building level (see criterion 7.3).

A long-term point for consideration is that energy consumption will have to be reduced by *at least* 20% by 2030 to compensate for economic growth of 20%. See in this regard the document produced by VITO (2013), 'Stappenplan naar een CO_2-neutrale stad in 2050: ontwikkeling van een afwegingskader voor evaluatie van het CO_2-reductiepotentieel van de Stad Gent'. Study carried out for the City of Ghent.

Criteria requirements

M1	Establish the reduction in production-related primary energy demand in relation to the 'baseline energy demand' determined in 7.1 b. The score is allocated according to a linear continuous scale: x% reduction gives 2*x%*M1 points (round off to the nearest whole number). The number of points is limited to M1.

References

Best Available Techniques: http://www.emis.vito.be/bbt

7.2 b Building-related energy demand

Max. Score
M2

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

To restrict demand for energy for the spatial heating and cooling of buildings on the site.

Explanation of the measure

The emphasis here is on the individual improvement process for companies. This process can be supported by Enterprise Flanders (with the energy scan or planning advice) or ISO standard 50001 can be used. However, other improvement processes put in place by the individual companies are also rewarded in the sustainability meter (provided they are sufficiently justified and underpinned).

For these improvement processes, companies follow the steps set out in the Trias Energetica, supplemented by the consideration dictated by REAP of the possible reuse of residual flows at site, process and building level.

In a more practical sense, the sustainability meter suggests that buildings should be heated at a low temperature and cooled at a high temperature. As regards the inclusion of nodes in accordance with the energy performance regulations, choose method B[25].

The sustainability meter does not distinguish between office buildings of more or less than 800 m^3: smaller office buildings are not covered by an EPB requirement, but the same requirement is still used as for large office buildings. The score is calculated on the basis of the reduction in the net energy requirement for heating and cooling compared with the EPB requirement. The net energy requirement for heating and cooling office buildings can be calculated on the basis of methods defined in the Flemish energy performance regulations[26]. The score system is structured such that the maximum number of points can be obtained with passive office buildings.

For buildings that do not have an EPB requirement (i.e. buildings other than homes, offices or schools), the score is calculated by determining the reduction in building-related energy demand in relation to the 'baseline energy demand' of the building as determined in 7.1 b. Protected monuments and buildings included in the inventory of architectural heritage are also included in this analysis, as are buildings not subject to EPB.

The sustainability meter uses the same requirement for renovation projects as for new construction projects. Here the sustainability meter applies the principle that given the fact that the existing building stock is many times larger than the number of new construction projects, the same requirements must be placed on building renovation if a substantial improvement is to be achieved in the longer term

Criteria requirements

M2	Establish the reduction in building-related energy demand in relation to the 'baseline energy demand' determined in 7.1 b. The score is allocated according to a linear continuous scale: x% reduction gives 1.25*x%*M2 points (round off to the nearest whole number). The number of points is limited to M2.

[25] http://www.energiesparen.be/epb/prof/bouwknopen
[26] The Flemish Energy Agency (VEA) stipulates that from 2019, all new government buildings must be NEN (nearly energy neutral); from 2021 this applies to all new buildings (see http://www.energiesparen.be).

7.3. ENERGY EXCHANGE AT SITE LEVEL

7.3 a Reuse of residual heat at high or low temperature

Max. Score
20

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

To make use of opportunities for the reuse of residual heat inside and outside the site.

Explanation of the measure

The group of operators of establishments with heat demand or residual heat supply must demonstrate that the best available techniques for utilising residual heat at high or low temperature are used.

Each measure implemented that is indicated in the analysis at establishment level has 4-yearly evaluation points (and an interim evaluation after 2 years).

Criteria requirements

v	Inventory of the possible opportunities for utilising residual heat inside and outside the site (system boundary). The BAT are also demonstrably taken into account.
20	Implementation of the measures that emerged from the inventory, with 4-yearly evaluation points.

7.3 b Reuse of residual cold

Max. Score
20

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

To make use of opportunities for the reuse of residual cold inside and outside the site.

Explanation of the measure

The group of operators of establishments with cold demand or residual cold supply must demonstrate that the best available techniques for utilising residual cold are used.

Each implemented measure, indicated in the analysis at establishment level, has 4-yearly evaluation points (and an interim evaluation after 2 years).

Criteria requirements

v	Inventory of possible opportunities for reuse of cold inside and outside the site (system boundary). The BAT are also demonstrably taken into account.
20	Implementation of the measures that emerged from the inventory, with 4-yearly evaluation points.

7.3 c Reuse of energy for mobility

There is currently little interest in feeding electricity back into the network, since this is not optimal from a cost point of view. If there is an energy surplus on the site, the link should be made with the mobility profile of the site (see 3.1 e).

Other innovative applications of the storage and utilisation of residual energy can be included in the chapter on innovation.

7.4. GENERATION AND USE OF RENEWABLE ENERGY

7.4 a Generation and use of renewable energy

Max. Score
40

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

To stimulate the use of renewable energy sources (electricity, heat, cold, steam, etc.) within the system boundary.

Explanation of the measure

Because reducing the energy requirement takes precedence over using renewable energy sources, it must be demonstrated for this criterion that a well-considered choice has been made in relation to the use of renewable energy sources in accordance with the methodology described in the introduction to this chapter (Trias Energetica and REAP).

This may involve the production of renewable energy on the site itself, but also the external supply of renewable energy. For example, for the collective use of wind energy from a wind turbine (farm) outside the site, a direct contractual link with the operator must be established for this criterion. The purchase of green electricity from an external supplier, for example, is also eligible. The system boundary is therefore very broad for the purpose of this criterion, in contrast to the system boundary for aspects physically related to the site, such as noise nuisance.

Each measure implemented that is indicated in the analysis at site level has 8-yearly evaluation points (and an interim evaluation after 4 years).

Criteria requirements

v	Underpinning of the choice to generate and/or externally purchase renewable energy.
40	Establish the proportion of renewable energy sources within the system boundary in the primary energy balance as determined in 7.1 b. The score is allocated according to a linear continuous scale: x% renewable energy gives x%*40 points (round off to the nearest whole number).

8. HEALTH, QUALITY OF LIFE AND ACCESSIBILITY

This chapter focuses on man's relationship to the project. The project is for people, and this social factor should be borne in mind and included in the project process from the start. The concepts of health, quality of life and accessibility must be supported in a sustainable fashion.

The government has already developed regulations for these subjects, with which each project must comply. The sustainability meter proposes a number of measures to go above and beyond the current regulations in quite a number of areas.

This chapter is divided into three sections:

Health and nuisance

Comfortable buildings ensure the psychological and physiological well-being of the users. A lack of comfort in terms of lighting, air quality, acoustics and ambient temperature can be the cause of decreased performance at work and numerous health problems.

This parallel can be extended to the outdoor environment, where outdoor air quality and limiting noise pollution are important.

Safety

A viable working environment also means a safe environment. This is understood as involving 3 aspects: protection against burglary, fire safety and protection against falling.

Accessibility and readability

A basic condition for any person, also on an economic site, is a healthy, viable environment that is accessible to all. We are aiming for optimum accessibility of the shared space, all publicly accessible buildings on the site, and public transport. Optimum accessibility implies reachability, accessibility, usability, and readability.

Moreover, optimum physical and mental accessibility is a subject that should not be related only to people with a handicap or reduced mobility, it is a subject that concerns everyone (people with a broken leg, prams, large groups, etc.).

8.1. HEALTH

8.1.1. NOISE POLLUTION

The aim is to avoid, prevent and reduce the harmful consequences (including nuisance) of exposure to environmental noise, thereby limiting human health risks and damage to fauna. Establishment-related noise is adequately regulated by VLAREM and any additional conditions in the environmental permit, so the sustainability meter concentrates on road traffic noise.

Environmental noise is unwanted or harmful outdoor noise generated by human activities, including noise produced by means of transport, road traffic, trains, aircraft and locations of industrial activities.

European Directive 2002/49/EC relating to the assessment and management of environmental noise provides a basis for the further development of measures with their origin in the main sources of noise, in particular road and rail vehicles and infrastructure, aircraft, equipment for outdoor use and in industry and movable machines, and for the development of supplementary measures in the short, medium and long term..

In Flanders there are requirements for the environmental noise generated by classified installations (VLAREM I and VLAREM II). There are currently no laws, decrees, standards or binding directives in Flanders or Belgium relating to traffic-generated environmental noise. European Directive 2002/49/EC relating to the assessment and management of environmental noise is therefore used as a starting point for the assessment and management of environmental noise.

The noise indicators used for assessing environmental noise are L_{den} and L_{night}. L_{den} relates to the annual average noise level at a specific location. The indicator is based on an average A-weighted day, evening and night level in dB. Weightings of 5 dB and 10 dB are added to the evening and night periods respectively.

$$L_{den} = 10.log\left[\frac{1}{24}\left(12.10^{\frac{L_{day}}{10}} + 4.10^{\frac{L_{evening}+5}{10}} + 8.10^{\frac{L_{night}+10}{10}}\right)\right]$$

where

- L_{day} is the A-weighted average noise level over the long term, as defined in ISO 1996-2:1987, established over all day periods in a year
- $L_{evening}$ is the A-weighted average noise level over the long term, as defined in ISO 1996-2:1987, established over all evening periods in a year
- L_{night} is the A-weighted average noise level over the long term, as defined in ISO 1996-2:1987, established over all night periods in a year

Here, a day is deemed to be twelve hours, the evening four hours and the night eight hours.

The indicator L_{night} relates to the annual average value of the night-time noise at a specific location. The indicator is based on an average A-weighted level in the night period.

For traffic noise (road traffic noise, railway noise and aircraft noise), these indicators are determined in accordance with the calculation methods used when producing strategic noise maps in accordance with Directive 2002/49/EC. For traffic noise, the indicators L_{den} and L_{night} are available for the Ghent agglomeration as colour codes on the strategic noise maps. The calculation methods of VLAREM are used for industrial noise.

Based on the noise maps, an action plan was drawn up by the City of Ghent that indicates which measures are most appropriate for tackling the main problems in an objective and efficient way.

References

VLAREM I and II

Directive 2002/49/EC of the European Parliament and of the Council of 25 June 2002 relating to the assessment and management of environmental noise.

http://www.lne.be/themas/hinder-en-risicos/geluidshinder

Good practice guide on noise exposure and potential health effects, EEA Technical report No 11/2010

8.1.1 a Managing the noise situation

Max. Score
8

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

To formulate and implement site-related noise pollution objectives.

Explanation of the measure

A noise pollution plan is drawn up in which the common objectives for environmental noise on and around the site (limit values, noise indicators L_{den} and L_{night}) and mitigating measures are formulated, managed and discussed with the municipal authorities, in accordance with the noise action plan of the Ghent agglomeration.

On this subject, see also the following criteria:

- 8.1.1 b (traffic noise)
- 1.1.2 b (design plan) and 2.3.1 b (scale and nuisance), which deal with finding spatial solutions to noise pollution problems. Measures are proposed to prevent or limit noise pollution; this could be a buffer function created by building volumes or by siting noisy buildings or activities far from sensitive functions on or near the site.
- 2.1 f (environmental pollution)

Criteria requirements

8	A noise pollution plan is drawn up.

8.1.1 b Traffic noise

Max. Score
20

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

To avoid, prevent and reduce the harmful consequences (including nuisance) of exposure to traffic noise (road traffic, trains and aircraft) and industrial noise, thereby limiting human health risks and damage to fauna.

Explanation of the measure

In the report ‘Good practice guide on noise exposure and potential health effects’ a methodology is developed to translate European Directive 2002/49/EC into practice. In this report a link is established between L_{den} and the percentage of highly annoyed (%HA). This sustainability meter encourages a situation with a minimum number of highly annoyed in residential functions or other noise-sensitive functions (schools, nurseries, etc.) in the area of influence around the site (system boundary).

The number of highly annoyed refers to a reference situation that is similar to the situation before the start of the project or to the existing situation. The additional traffic movements are derived from the mobility impact assessment. The sphere of influence is set by default at a zone of 500 m around the site (system boundary), but can be enlarged or reduced by the municipal authorities on a project-specific basis.

This methodology cannot be applied meaningfully in areas free of human occupation. In sensitive areas (areas of the Flemish Ecological Network (VEN), Habitats Directive areas and Birds Directive areas) within the sphere of influence, an absolute limit for L_{den} is therefore used. To limit the disruption to sensitive fauna, efforts must be made in these areas not to exceed the noise threshold of L_{den} 55 dB. The municipal authorities can adjust this threshold on a project-specific basis.

The municipal authorities provide the reference value of the noise indicators L_{den} for the reference situation (traffic noise and industrial noise) via the strategic noise map of the Ghent agglomeration, supplemented, where appropriate, with a site-specific measurement of the reference situation. The furnishing of proof in relation to the criteria requirements is based on long-term measurements. For sites not yet established, proof is furnished on the basis of modelling calculations.

Criteria requirements

10	The number of highly annoyed in the zone of influence remains the same or falls in relation to the reference situation.
10	In sensitive areas (areas of the Flemish Ecological Network (VEN), Habitats Directive areas and Birds Directive areas) within the sphere of influence, L_{den} is less than 55 dB(A). If there are no sensitive areas within the system boundary, these points are awarded automatically.

8.1.2. AIR POLLUTION

The exposure of population groups and ecosystems to air pollution (nitrogen dioxide and nitrogen oxides, suspended particulates PM_{10} and $PM_{2.5}$) must be limited to minimise human health risks and damage to vegetation and ecosystems.

Air pollution from sulphur dioxide, heavy metals and carbon monoxide are not included in the assessment, because measurements by the Flemish Environment Agency show that the European limit and target values are not exceeded in Ghent. If, however, there are specific VLAREM requirements for these or other parameters in connection with environmental permits, then these are taken into account.

The ozone problem is also not included because little can be done about it at site level. There are measures taken at Flemish level in this regard. Pollutants such as NO_x and VOCs (volatile organic compounds) are, however, ozone precursors. Measures to limit NO_x and VOC emissions will therefore have a positive effect on ozone concentrations.

For the time being, odour pollution is also not included in the analysis.

The government wants to reduce pollution of the outdoor air to levels at which the harmful consequences for human health, particularly for sensitive population groups, and for the environment as a whole are as small as possible. In the sustainability meter it is assumed that establishment-related emissions into the air are adequately regulated by VLAREM and any additional conditions in the environmental permit. The sustainability meter therefore concentrates on emissions of NO_x and fine particulates by road traffic. There is more on this subject in chapter 3 (mobility); there is the leverage there to do something about it.

By pursuing a local air quality policy, the City of Ghent wants to achieve the following objectives:

- To reduce the contribution of local traffic to the total air pollution and in so doing also have a positive effect on urban background concentrations.
- To improve fine particulate and NO_x concentrations at known problem locations.
- To prevent new problem locations.
- To continue to guarantee urban development and economic growth, with the air quality aspect being extended and embedded through measures to prevent air pollution in other policy areas such as mobility, spatial planning and permit policy.

The ‘Local Air Quality Plan for Ghent 2010-2015’ includes 50 actions to bring about an improvement in air quality.

The NO_x and particulate concentration in a specific place is made of up a regional background (Flanders, Wallonia, abroad and other sources), an urban background and a local (traffic) contribution. The contributions of the regional and urban background are derived by the Flemish government (Department of the Environment, Nature and Energy) from belEUROS model simulations.

The local traffic contribution can be determined in three ways:

- Difference between the concentrations measured at a monitoring station and the modelled background concentration (regional and urban contribution)
- Calculated with a suitable calculation model
- Determined from wind tunnel research

The development of economic sites leads on the one hand to emissions from the establishments themselves (spot sources), but also to extra traffic movements (linear sources). The local traffic contribution of the additional traffic on and around the site must be limited if the air quality standards are expected to be exceeded. The additional traffic movements are derived from the mobility effects report. Various models are available for calculating the local traffic contribution. Calculations or wind tunnel simulations are the only options for predicting future situations.

References

Local Air Quality Plan for Ghent 2010-2015 - 50 actions for cleaner air, June 2010 (http://www.gent.be/docs/Lokaal%20Luchtkwaliteitsplan%202010-2015.pdf)

Directive 2008/50/EC of the European Parliament and the Council of 20 May 2008 on ambient air quality and cleaner air for Europe (*inter alia* Annex XI Limit values for the protection of human health)

MIRA (2007) Flanders Environment Report, background document 2007, Verspreiding van zwevend stof (Spread of suspended particulates), Torfs R., Deutsch F., Schrooten L., Broekx S., J. Vankerkom, Matheeussen C.,Roekens E., Fierens F., Dumont G. & Bossuyt M.,Flemish Environment Agency, http://www.milieurapport.be

8.1.2 a Managing outdoor air quality

Max. Score
8

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

To formulate and implement site-related air pollution objectives.

Explanation of the measure

An air quality plan is drawn up containing the formulation and management of the common air quality objectives for the site and their conversion into points for attention and mitigating measures. The measures for the site are drawn up such that they can be implemented and monitored.

The establishment-related and site-related outdoor air quality planning is updated and evaluated every 4 years in consultation with the municipal authorities. The measurement of traffic movements on the site is updated every 4 years.

Criteria requirements

8	An air quality plan is drawn up which includes at least the above-mentioned elements.

8.1.3. LIGHT POLLUTION

8.1.3 a Limiting light pollution

Max. Score
18

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

To limit the emission of light from buildings and infrastructures and thereby minimise light veils and scattered light. For people this improves visual comfort at night-time and the possibility of seeing the celestial sphere. For fauna and flora it reduces the disturbance of night life.

Explanation of the measure

Light pollution is described as the increased brightness of the night-time environment caused by the excessive and wasteful use of artificial light. Artificial sky glow and scattered light are two key aspects of light pollution.

Sky glow is the result of radiation reflecting off gas molecules, water vapour and particulate matter in the atmosphere. There are two types of sky glow: Firstly, there is the natural veil that is caused by natural light sources such as, for example, the moon; secondly, there is artificial sky glow, caused by direct and reflected radiation from artificial light sources. The intensity of the light veil is influenced by atmospheric conditions and the level of pollution in the atmosphere. It is therefore not surprising that the largest light veils are observed above major urban centres. However, sports fields, industrial estates, greenhouses and other brightly lit objects can also be seen from afar by the artificial sky glow they cause.

Scattered light can be described as light that shines where it is not needed or wanted. Examples of scattered light are street lamps or garden lighting that penetrates the bedroom, sports lighting or greenhouse lighting that illuminates a larger than necessary area.

Light Plans I and II of the City of Ghent are used to impose requirements on façade lighting and advertising lighting. Requirements on the lighting of infrastructures are added.

Criteria for light pollution from infrastructure lighting depend on the nature of the site. For each project the government produces a plan in which the site is split into light zones according to the following table.

Light zone	Type	Example
1	Darker areas	Areas of the Flemish Ecological Network (VEN), Habitats Directive areas and Birds Directive areas
2	Zones with limited outdoor lighting	Rural setting, low-density residential area
3	Zones with moderate outdoor lighting	Urbanised setting and centres of small towns, high-density residential area, industrial or commercial areas
4	Zones with appropriate outdoor lighting	City centres with significant night-time activities

A class is assigned to each traffic route (for pedestrians, bicycles and motorised traffic) on the site by the government on the basis of EN 13201-2:2003 (classes ME/MEW 1-6, CE 05, S 1-7, A1-6, ES 1-9, EV 1-6).

Light zone	Limiting artificial sky glow	Limiting artificial sky glow	Limiting scattered light (street lighting)	Limiting scattered light (other outdoor lighting and indoor lighting of buildings)	Limiting glare
	Minimum downwards fraction of the stream of light from the luminaires installed on the site[27]	Maximum mean brightness of façades as a result of specific architectural lighting (cd/m^2)	Vertical lighting intensity on windows due to street lighting E_v (lux)	Horizontal or vertical lighting intensity on positions outside the plot in question $E_{h/v}$ (lux)	Maximum lighting intensity of each artificial light source excluding street lighting[28] (cd)

[27] Some lighting strategies require a deliberate use of upwards shining luminaires (luminaires built into the ground, low-positioned floodlights for lighting buildings, party lighting) that cannot meet this requirement. If these lighting strategies are used responsibly, this requirement can be reduced to light zone 3 or 4.
[28] This requirement applies to each direction of observation from a point outside the area to be lit. If necessary, an exception can be made to this requirement for low-positioned sports lighting.

	(.N4 to CIE 52) (%)								
		day[29]	night	day	night	day	night	day	night
1	100%	0	0	2	1	2	0.1	2500	0
2	97.5%	5	0	5	1	5	1	7500	500
3	95.0%	10	0	10	2	10	2	10000	1000
4	85.0%	25	25	25	5	25	5	25000	2500

The luminaires (of categories A, B, C and D) must meet the requirements in the General Standard Specifications 005 version 2004 (Synergrid) for each category. However, the requirements of standard EN 13201-2:2003 take priority over the requirements in these specifications.

Criteria requirements

7	The façade lighting meets the following requirements: • Façade lighting occurs on buildings with a structural height of 10 m or less with projectors that can contain bulbs of not more than 70 W, and on taller buildings with projectors that can contain bulbs of not more than 150 W, which light up the façade evenly and do not flicker. • Façade lighting takes place with metal iodide lamps (halogen lamps are not permitted). • Lighting of the edges or surface of windows by lamps that are explicitly directed outwards and towards the public domain is not permitted, with either white or coloured light. • Any indirect indoor lighting on the edges of windows that shines onto the public domain with more than 2 lux is shielded. • Lighting in private outdoor spaces (gardens, car parks, etc.) is kept limited and as sober as possible. It takes place with projectors that can contain bulbs of not more than 150 W. These projectors give an average lighting intensity of not more than 10 lux in the outdoor area. The light points (luminaires), both against buildings and on posts, are no higher than 4 m in gardens and car parks of 20 spaces or fewer and no higher than 8 m in larger car parks and on commercial premises on industrial estates. The brightness of the illuminated façade remains limited to the value in the column 'Limiting artificial sky glow: façade brightness' in the 'Light pollution' table (zone-dependent). • The scattered light is limited to the value in the column 'Limiting scattered light (other outdoor lighting and indoor lighting of buildings)' in the 'Light pollution' table (zone-dependent). The projectors used comply with the values in the column 'Glare' in the 'Light pollution' table (zone-dependent).
7	The advertising lighting meets the following requirements: • Without prejudice to the provisions of chapter 6.3 of VLAREM II, the advertising lighting is sober (not garish, flickering or dynamic), limited in size and in terms of design and colours in harmony with the building and the natural environment. • It illuminates the adjacent façades and the public domain with not more than 2 lux. • In the case of advertisements that are lit, the lighting intensity is not more than 10 lux on the advertisement.
4	The lighting of infrastructures meets the following requirements: • The projectors used comply with the values in the column 'Limiting artificial sky glow: downwards fraction' in the 'Light pollution' table (zone-dependent). • The scattered light is limited to the values in the column 'Limiting scattered light (street

[29] Day: 06:00-22:00, night: 22:00-06:00

	lighting)' in the 'Light pollution' table (zone-dependent). • Based on the class of traffic route, requirements are placed on the technical lighting parameters of the street lighting of importance to light pollution: glare (parameter TI, threshold increment), and scattered light (parameter SR, surround ratio) (EN 13201-2:2003).

References

City of Ghent, Light Plans I and II

CIE Technical Report 150:2003 “Guide on the Limitation of the effects of Obtrusive Light from Outdoor Lighting Installations”

The Institution of Lighting Engineers, Guidance notes for the reduction of obtrusive light

EN 13201-2:2003 Road lighting – Part 2: Performance requirements

CIE Report 126 Guidelines for minimizing sky glow (1997)

CIE Report 150 Guide on the limitations of the effect of obtrusive light from outdoor lighting installations (2003)

General Standard Specifications 005 version June 2004 (Synergrid)

http://www.lne.be/themas/hinder-en-risicos/lichthinder

http://www.emis.vito.be/lichthinder/

http://www.emis.vito.be/lichthinder-wegen-aanbevelingen-normen-en-reglementen

8.1.4. WIND COMFORT

8.1.4 a Limiting wind nuisance at ground level

Max. Score
10

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

To limit wind nuisance and prevent danger from wind at ground level for the users of the site and the immediate surrounding area.

Explanation of the measure

If the site contains buildings that are more than 30 m in height, carry out an analysis of wind comfort and wind danger based on standard NEN 8100 'Wind comfort and wind danger in the built-up environment'. This standard gives requirements and calculation methods for assessing the local wind climate in the built-up environment at walking or residential level for the effect of wind on pedestrians and is used when describing wind nuisance requirements, both in the global planning phase and in the final design.

For the wind nuisance aspect, the outdoor area of the site and the immediate surrounding area (up to a radius of 100 m outside the site) is divided up on the basis of the activities that can be carried on there: walking through, strolling, or sitting for long periods. For each of these three functions, a quality class good-moderate-poor is defined for the local wind climate on the basis of the CFD analysis (Computational Fluid Dynamics) or wind tunnel research.

For the wind danger aspect, the outdoor area of the site and the immediate surrounding area (up to a radius of 100 m outside the site) is divided up according to two classifications: limited risk, dangerous. This qualification can also be defined on the basis of CFD or wind tunnel research.

Criteria requirements

5	If the entire outdoor area up to a radius of 100 m outside the site achieves at least the quality class 'moderate' for wind nuisance, and for wind danger does not obtain the qualification 'dangerous' anywhere.

Or

10	If the entire outdoor area up to a radius of 100 m outside the site achieves at least the quality class 'good' for wind nuisance, and for wind danger does not obtain the qualification 'dangerous' anywhere.

References

NEN 8100 Wind comfort and wind danger in the built-up environment

8.1.5. AVAILABILITY OF DAYLIGHT AND SUN

8.1.5 a Availability of daylight and sun

Max. Score
10

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

To maximise the availability of daylight and sunlight on parts of building envelopes to allow a lively indoor environment, minimum use of artificial light and the passive or active use of solar gains.

Explanation of the measure

People expect good daylight availability in their buildings. Daylight makes the indoor space more attractive and lively, and, in combination with proper control mechanisms, limits energy consumption for artificial lighting. Passive use of solar gains can also make a significant contribution to reducing energy requirements for heating.

The organisation and layout of the outdoor environment play a vital role in the availability of daylight and sunlight on building envelope parts. New buildings can extensively limit the availability of daylight and sunlight for surrounding buildings.

For active solar systems (photovoltaic systems and thermal solar panels), minimising shadow is an essential condition for effective operation.

Maximising the availability of daylight and sunlight at ground level is also important: it determines the type of fauna and the suitability of parts of the site for specific use (terraces, playgrounds, rest areas). However, no requirements are placed on this within the sustainability meter, since the organisation of the outdoor area can respond to the availability of daylight and sunlight on the site.

The requirements in this criterion only apply to buildings with no industrial production activities.

Criteria requirements

5	Demonstrate with a geometric 3D model that the siting of new buildings only partially shields all buildings (excluding industrial sheds) from direct sunlight. For each sunlit façade, calculate the area percentage of the part that is shielded from direct sunlight by surrounding buildings for three defined solar positions. Perform this analysis for both the sunlit façades of the buildings on the site and those of the surrounding buildings. For each vertical façade area, only consider shielding by surrounding buildings, not by parts of the building itself. Surfaces with an area of less than 10 m^2 may be simplified in the modelling. Perform this analysis for three sun positions: • Position 1: sun in the south at a solar angle of 38° (21 March, 12.00 solar time)

	• Position 2: sun in the south-east at a solar angle of 30° (21 March, 09.30 solar time) • Position 3: sun in the south-west at a solar angle of 30° (21 March, 14.30 solar time) For each sunlit façade, the shielded part of the façade area may not exceed 20% (position 1) or 25% (positions 2 and 3) of the total façade area.

or

10	Demonstrate by means of a numerical model that the new buildings (excluding industrial sheds) only cause limited shielding from daylight. Based on the climate data in an average climate year and a Perez modelling of the celestial sphere, calculate the sum of the annual incident daylight (lux.m².h) with and without shielding by the new buildings. Perform this analysis as the sum of hourly average values, both for all façades of the buildings on the site and for those of the surrounding buildings. For each vertical façade area, only consider shielding by surrounding buildings, not by parts of the building itself. Perform the calculation with realistic reflection factors for ground and envelope surfaces. Surfaces with an area of less than 10 m^2 may be simplified in the geometric modelling. Perform the same analysis for the surfaces of the active solar systems. In this case, however, take account of the shielding by parts of the building itself. The following requirements are simultaneously satisfied: • The annual available amount of daylight (lux.m².h) on all vertical façades of the site and the immediately surrounding façades is at least 80% of the annual available amount of daylight without shielding. • The annual available solar energy (kWh) on surfaces with active solar systems is at least 95% of the annual available amount of daylight without shielding (here, shading by parts of the building itself are taken into account).

References

R. Perez, R. Seals, J. Michalsky, All-weather model for sky luminance distribution. Solar Energy (1993), Vol. 50, pp. 235-246.

PJ Littlefair, Site layout planning for daylight and sunlight. A guide to good practice.

8.2. SAFETY

In this section the focus shifts to physical safety. This subject has considerably gained in importance in recent years. To guarantee safety on economic sites, it is especially important to develop good risk management. In addition, the focus is on 2 aspects of safety: fire safety and protection against burglary.

8.2 a Risk study and management

Max. Score
8

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

To increase safety on industrial estates by applying good risk management.

Explanation of the measure

Before being able to manage risks, you first have to gain a clear insight into all parameters: what dangers, the chance of these occurring, the possible damage they could cause, etc.

The following risks are relevant for industrial estates:

- Criminal risks (theft, burglary, vandalism, fire, etc.)
- Risks associated with natural forces (lightning strike, water damage, etc.)
- Technical risks (gas leak, power cut, fire, etc.)
- Human error
- External safety and group risk: this is covered by the regulations on Seveso establishments

Based on this risk analysis, strategic choices must be made and measures taken to improve safety on the site.

Criteria requirements

3	Carry out a risk analysis for the site, including the individual businesses.
5	Based on this, perform a risk assessment and take justified measures.

8.2 b Fire safety

Max. Score
6

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

To protect users of the site against fire.

Explanation of the measure

The following measures should be taken at site level to improve fire safety:

- Adequate fire water reserves should be provided on the site: This can be achieved, for example, by installing a number of buffer tanks for rain water storage (see also criterion 5.4 c).
- Assembly points: in case of fire, users must be able to assemble in a safe place. The assembly points are consistent for the entire site and clearly signposted so as to facilitate the work of the emergency services.
- The buildings on the site must be readily accessible to the fire service. A sufficiently wide (minimum 4 m) and not too steep access road is provided.

Criteria requirements

3	Consult with the fire service when designing the site.
3	Take measures at site level to increase fire safety (fire water supply, assembly points in case of fire, access for the fire service).

8.2 c Protection against burglary and vandalism

Max. Score
6

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

To prevent burglary and vandalism.

Explanation of the measure

Because of a number of specific characteristics, businesses on industrial estates are extra-sensitive to crime:

- High concentration of goods
- Ease of access of industrial estates also means quick "escape routes"
- Lack of social control due to isolated location

Economic sites are often empty in the evenings and at weekends. The design of the site can encompass preventive measures against burglary and vandalism:

Conceptual measures

- As a preference, one central entrance is provided to limit the number of entrances and exits. This entrance must be given adequate social control, for example by:
  - Locating communal facilities by the entrance
  - Using low bushes and tall trees that do not obstruct the view
- Uniform lighting is provided on all circulation routes.
- Depending on the activities on the site, you may choose to completely enclose the site with a fence. This must be sufficiently high and not be able to be climbed (at least 1.8 m) and can consist of vegetation (e.g. firethorn as natural barbed wire).
- To avoid vandalism, all outside benches and litter bins are anchored to the ground.

Electronic measures

Various electronic systems can be installed: alarm, detection lighting, cameras, electronic ID control, etc. These measures are fairly expensive compared with the conceptual measures.

Criteria requirements

2	Seek advice from the police's prevention officer.
4	Take preventive measures against burglary and vandalism (conceptual and/or electronic measures).

8.3. ACCESSIBILITY AND READABILITY

A universally accessible living environment and services, physical and mental, are basic rights and form the key to proper social integration and participation for all. Universal accessibility of the living environment means that all facilities, buildings, open spaces and services are actually reachable, comprehensible, accessible and usable for all.

8.3 a Universal accessibility of the shared space

Max. Score
13

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

Application of the Universal Design design approach, which focuses on universal and inclusive accessibility and usability for all.

Explanation of the measure

The starting point of universal accessibility is that our living environment should be available, accessible and usable for all, in an independent (i.e. without help) and equivalent manner. From a fundamental respect for every citizen, designers, authorities and service providers must pay close attention to how an environment, public building, means of transport and service can be as comfortable, safe and user-friendly as possible for all users. The accessibility of the shared space can be assessed via an accessibility impact assessment.

By taking universal accessibility into account as early as possible in the design, unattractive and subsequently added facilities exclusively intended for specific target groups are avoided. To achieve this, attention must be paid to the following aspects:

Room to move

To guarantee access to the shared space to all, the walking area must be sufficiently wide and tall and a wheelchair user must have the room required to turn:

- The clear passage width is at least 150 cm.
- The free space to be able to turn fully round is at least 150 cm.
- The clear passage height is at least 210 cm.
- Street furniture and green facilities are placed outside the walking area and grouped along one side.

Level, non-slip walking surface

The walking surface must not present an obstacle: it must be level and smooth, with few unevennesses (<5 mm), and the transverse slope of the walking area may not exceed 1:50.

Height differences

Height differences must be avoided or be spanned as comfortably as possible:

- A threshold on a walking route is not more than 20 mm tall.
- Height differences greater than 20 mm are spanned by a slope of less than 1:25.
- The relationship between the length and height of a slope complies with the formula for optimum ratios of a slope, namely: Length=((height-0.1) x 11.1 + 10) x height

Accessibility for the blind and partially sighted

To allow blind and partially sighted people to orient themselves, guide lines (e.g. difference in floor and finishing materials) are created wherever possible. Artificial guide lines are used in acutely dangerous places or when a situation leads to total disorientation:

- Contrasting colours (yellow is suitable as a signal colour)

- Ratchet tickers at crossings with traffic lights
- Information markers in the form of rubber tiles at changes of direction or splits
- Warning markers at descending steps

Information and facilities

Information and facilities are legible, logical and positioned at the right height

Parking for wheelchair users

Parking spaces are provided for wheelchair users (see also criterion 3.3 b). The parking spaces are at least 3.5 m wide and 5 m long and located as close as possible to the entrance.

Criteria requirements

13	Ensure a universally accessible design, taking the above points into account.

8.3 b Signage plan

Max. Score
7

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

A signage plan brings together the various signage elements so that the public space is kept clear.

Explanation of the measure

The signage plan includes at least the following information:

- Luminaires
- Street signs and other place name signs
- Traffic signs and road markings
- Signs relating to public transport
- Signs relating to car parks
- Signs to the companies
- All other signs (e.g. parks, information panels, etc.)

Criteria requirements

7	Produce a signage plan for the site.

8.3 c Orientation and mental accessibility

Max. Score
6

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

A good design plan needs few signs. With natural signs, users of the site automatically know the way, thus ensuring ease of access for the emergency services.

Criteria requirements

3	Ensure a clear structure.
2	Provide landmarks for orientation purposes.
1	Give each building or block an identity, colour or material use.

9. SOCIO-ECONOMIC ASPECTS

Spatial, social, ecological and economic sustainability also have to be brought into balance in the long term within the area of economics and work. The sustainable vision of this is formulated using the 3 Ps:

- People stands for social well-being, or how a company deals with its staff and how it performs in terms of social cohesion (society in the broader sense). This involves human rights, corruption, fraud, child labour, gender relations, poverty, diversity and discrimination, co-determination and codes of conduct.
- Plant stands for ecological quality, or how a company fulfils its responsibilities in relation to polluting the environment, nature and the landscape. This includes, but is not limited to, environmental care, eco-efficiency, cleaner production, sustainable technology development.
- Profit stands for economic prosperity. This covers employment, employee participation, profit appropriation, investments in infrastructure, outsourcing and the economic effects of products and services. Finding a balance between these different aspects in consultation with the various internal and external stakeholders is the basis of the value added economy. This is a challenge for companies that prioritise the creation of social added value in their decision-making process.

This chapter therefore examines the social and economic dimension of sustainability in greater detail. The site should contribute towards good social cohesion and social well-being for the neighbourhood and the economic community. This involves good neighbourliness, diversity, codes of conduct, leadership, human rights, gender relations, etc. Aspects such as employment, effect on the economic fabric, upgrading of investments made (property, equipment), maximum use of infrastructure should also be considered.

The following key concepts are important:

- Corporate Social Responsibility (CSR) is a continuous improvement process whereby companies voluntarily and systematically incorporate economic, environmental and social considerations into all their operations in an integrated manner, with consultation with stakeholders, or interested parties, of the company forming part of this process.
- Clusters (are) defined as techno-economic networks of interdependent companies that are interlinked through their specific contributions to the creation of value in a production chain. Intelligent systems are used to find ways of remaining competitive in times of globalisation and regionalisation. Increased operational efficiency (sustainable economy) often also has an ecological and social benefit. The following table lists 15 potential benefits of clustering.
- Cradle To Cradle (C2C) is an ambitious economic philosophy that takes sustainable development, implementation, management and transformation as its starting point. C2C assumes the closure of cycles (biological, technical) without any loss. The aim is to add value: not recycling, but upcycling.

Category	Type	Scale	No.	Description
Direct benefits (short term, 1-2 yrs)	process	B	1	better control of production process
		DBT	2	exchanging resources
		DBT	3	sharing resources
		B & DBT	4	economies of scale for procurement
		B & DBT	5	innovation
	product	B	6	cheap product differentiation
		B	7	eco-design
	other	B & DBT	8	lower costs through less environmental tax & fines
		B & DBT	9	benefits of financing
Competitive advantages (medium term, 3-5 yrs)	strategic	B & DBT	10	reconsideration of strategy
		B & DBT	11	lower costs of recruiting and retaining staff
		B & DBT	12	better positioning and relationship with customers
		DBT	13	peer effects through group influence
Improved relations with stakeholders (long term)	politics	B & DBT	14	influence of innovation-promoting regulations
		B & DBT	15	good neighbourliness

Source: Van Eetvelde, Greet; Deridder, Katelijne; Delange, Eva; De Zutter, Bart; (2005). Groeiboek duurzame bedrijventerreinen. Ugent

9.1. COOPERATION BETWEEN COMPANIES

9.1 a Cooperation between companies

Max. Score
20

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

Structural cooperation between the companies on the site can be economically profitable and acts as a lever for the implementation of sustainable measures. See also 1.1.2 a, the vision note.

Explanation of the measure

Points around which the companies can establish a cooperation (not exhaustive):

- Corporate social responsibility
- Opportunities for clustering and shared use
- Management of the site: e.g. maintenance of private land, security, etc.
- Arrangements regarding the relationship with the neighbourhood

Cooperation between companies can be organised in the form of a non-profit organisation, which in turn can outsource certain tasks (e.g. management) to a park manager.

Criteria requirements

5	Organise the cooperation between the companies on the site.
10	Produce a management plan for the site.
5	Update the management plan in accordance with developments on the site.

9.2. DESIRED ECONOMIC DEVELOPMENT

Ensure that sustainable economic activities establish themselves on the site that take account of the site's profile, the requirements of corporate social responsibility and short- and long-term demand.

9.2 a Integration into the regional economy

Max. Score
10

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

Ensure that the economic functions fit in with the municipal and regional economic policy.

Criteria requirements

3	Take an inventory of the relevant policy plans at municipal and regional level.
4	In a note, assess the economic functions against the economic policy plans.
3	Integrate this into the strategic business plan.

9.2 b Integration into segmentation and diversification of economic sites

Max. Score
10

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

Economic sites acquire a clear socio-economic profile, according to the spatial possibilities and economic demands. The issuance policy must be directed at strengthening the profile of the site. Economic operators must end up where they can deliver the greatest socio-economic added value.

Criteria requirements

3	Produce a note on the socio-economic profile of the site. The profile corresponds to the categorisation of the industrial estate in chapter 2, but is more elaborate and is more specific. The note includes a classification of type companies that are desired on the site.
4	Assess potential economic operators against the profile note and associated screening criteria.
3	Integrate this into the business plan and the issuance plan.

9.2 c Socially responsible economic activities

Max. Score
10

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

Attract companies that want to play a pioneering role as regards sustainable business. Sustainable businesses are understood to mean: companies that voluntarily and systematically incorporate economic, environmental and social considerations into all their operations in an integrated manner, with consultation with stakeholders, or interested parties, of the company forming part of this process.

Ecological considerations are actions and initiatives focusing on ecological chain management, the eco-efficiency of production processes and local supply and purchase.

Social considerations are actions and initiatives integrated into the objectives of the company that are intended to provide social or societal added value. We will consider the efforts of companies to contribute to solutions to social challenges such as unemployment, poverty, ageing, diversity and equal opportunities, well-being in the workplace, social economy, fair trade, etc.

Explanation of the measure

The establishment of an economic site is an investment that should be directed at companies that subscribe to sustainable economic development and are therefore willing to fulfil their social responsibility.

Corporate Social Investment (CSI)

CSI is based on a review according to 4 criteria (cf. Ethibel):

- Internal social policy
- Environmental policy
- External social policy
- Ethico-economic policy

Ethibel also uses the term “controversial activities”, which includes armaments, gambling, nuclear energy, tobacco, hazardous chemicals, the sex industry, genetically modified organisms(GMOs) in food, alcohol and cruelty to animals.

Corporate Social Responsibility (CSR)

CSR is a continuous improvement process whereby companies voluntarily and systematically incorporate economic, environmental and social considerations into all their operations in an integrated manner, with consultation with stakeholders, or interested parties, of the company forming part of this process.

Companies can implement CSR in various ways: cooperation with NGOs, foundations and other non-profit organisations, focus on competence development, diversity, sustainable purchasing policy, sustainable customer relations, sustainable investment, employee involvement (employees devote themselves to good causes), corporate governance, employee participation, philanthropy or patronage (companies deploy (financial) resources for projects that benefit the general interest), protection of the environment, a safe and healthy working environment, etc.

Examples of targets in the area of ethical business are:

- Ecological business
    - Striving to obtain the ecolabel. The EU's 'flower' ecolabel, established in 1992, is a certification system aimed at "helping European consumers identify greener and more environmentally friendly products and services (excluding foods and medicines)".
    - EMAS (Eco-Management and Audit Scheme)
    - ISO 14001
    - Environmental charter
- Social business
    - Announcing vacancies through channels aimed specifically at disadvantage groups (Jobkanaal, Bouwbaan, learning service promoters, etc.)
    - Announcing vacancies through the VDAB (the Flemish Employment and Training Service), so that they reach as broad a group of potential employees as possible
    - Integrating social considerations into the organisation's HR policy (see SOKRATEST self-evaluation or equivalent, the production of a strategic plan and action plan to improve the HR policy, etc.)
    - Participation in initiatives relating to supervision in the workplace (whereby during the initial period of their employment, new employees are supervised by an external job coach who works towards sustainable integration in the workplace)
    - Offering employees training opportunities, possibly in collaboration with the sector's training fund

- Training people from disadvantaged groups as part of placements or postings during an employment path of learning service promoters
- Cooperation with educational institutions: e.g. site visits by schools, placements and training for pupils and teachers from vocational and technical education, etc.
- Stimulating social employment (social and sheltered workplaces)
- Developing a Flemish subsidised diversity plan
- Pursuing and obtaining a label such as Investors in People, Belgisch Sociaal Label, SA 8000, SA 1000 or equivalent
- Investing in quality of life in the neighbourhood
- The use and promotion of products with a Fairtrade label

Criteria requirements

3	A corporate social investment evaluation is carried out using transparent criteria. The Ethibel evaluation method could be used here, for example.
4	Encourage all businesses that establish themselves on the site to subscribe jointly to a charter that contains the above aspects of sustainable business and formulates global objectives. This also stipulates that medium-sized and large businesses perform Corporate Social Responsibility reporting each year.
3	Integrate the quest for corporate social investment and responsibility into the business plan and the issuance policy.

9.2 d Clustering of main activities

Max. Score
20

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

To bring together cooperating companies on the site.

The opportunities for the clustering of main activities is a basic fact of the strategic economic vision. This involves bringing together those economic activities in which the business processes are intertwined. The aim here is to limit the inflow as much as possible and make the outflow as high-quality as possible.

Explanation of the measure

Clustering provides major economic, social, spatial and ecological benefits. Companies no longer accidentally find themselves on the same site, but are chosen because they can offer each other added value.

Clustering is a complex process in which companies partially put themselves in an interdependent position vis-à-vis each other. Cluster companies and industrial estates must gain a genuine (sustainable) benefit from collaboration projects, to increase their competitiveness. High quality activity flourishes especially when companies cluster and jointly address activities that have a collective added value and when there is an accepted (economic) review framework for these. This creates sustainable industrial estates in the broadest sense of the word. They actually contribute to achieving the sustainability concept on a site and over time generate a win situation for all those concerned on a spatial, economic, legal, technical and social level.

Chain management can be integrated into the cluster model, whereby as few waste products as possible leave the site and the products are distributed as efficiently as possible. Reference can here also be made to the Cradle To Cradle model.

The study "Groeiboek duurzame bedrijventerreinen" (Van Eetvelde, Greet; Deridder, Katelijne; Delange, Eva; De Zutter, Bart; (2005). Groeiboek duurzame bedrijventerreinen. Ugent) highlights a number of interest models for clustering:

- Ex nihilo: starting up a new industrial estate that is designed to be sustainable from the outset.
- Anchor tenant model: constructing a sustainable industrial estate around a core company that acts as anchor; a network of suppliers and follow-up suppliers is localised around the central company.
- Business model: attracting interesting companies for the development of a specific area; links are generally sought to involve the companies in a network.
- Stream model: stimulating networks for substance flows by analysing the streams of water, energy and materials on an existing industrial estate. Typical examples are chain and cascade management models.
- Business-stream model: the organisation of networking between established companies through a business analysis that can be incorporated into the system; this essentially involves a combination of the above models.
- Redeveloping model: the rethinking of an industrial estate by also focusing on improved reciprocal communication in addition to water, energy and materials streams and seeking other forms of cooperation with a view to quality assurance, limiting nuisance and a strong involvement of the various companies.

An input-output table is a matrix that shows the values of goods and services streams in an economy. This is used to produce a picture of interregional and intraregional relations based on the input and output components of goods and services on a regional scale. Thus, the interrelationship between economic sectors is made visible. It can also be a sort of gauge for the economic impact of a city or region (Allaert, Georges (2005). Wegwijs in de ruimtelijke economie. Academia Press).

This input-output table shows what interactions there are between companies and sectors and can therefore help in the search for useful clusters. Applied at a lower scale level (the materials streams generated by the companies on the site), an input-output table can also be used to create collective facilities or to connect energy, water, materials or transport streams. The results in the table are directly related to the strategic note (see criterion 1.1.2 a), the strategic business plan (see criterion 1.1.2 d) and the issuance plan (criterion 1.1.2 f).

Criteria requirements

3	Produce the input-output table at site level for the various streams present. For new industrial estates, this will be an estimate.
5	In a strategic note, show where key economic, social and/or ecological added value can be achieved by clustering certain economic activities on the site.
4	In a chart, indicate what the associated spatial consequences are.
5	Specify how the clustering can be made operational. This varies considerably between a new site and an existing site.
3	Integrate the opportunities for clustering into a strategic note, the business plan and the issuance plan.

9.2 e Clustering of facilities

Max. Score
20

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

Companies can collaborate usefully not only in terms of their core activities, but also in terms of facilities. This can provide economic benefits, allows facilities to be developed further (e.g. for starters), increases the interaction between companies and their employees, and is often spatially efficient.

Explanation of the measure

Companies can collaborate in the following areas:

- Meeting facilities
- Reception
- Archiving
- Communication
- Restaurant service
- Childcare facilities
- Ironing services
- Shopping service
- Sports facilities
- Staff matters
- A personnel database
- A joint job database
- The organisation of a job fair
- Catering
- Prevention services
- Maintenance of green spaces
- etc.

This criterion is related to the opportunities mapped out in criterion 2.1 e for diversity and clustering on the site.

Criteria requirements

3	In a note, show where significant added value can be achieved by implementing certain facility activities on the site.
10	Produce a business case for these collaborations.
4	In a chart, indicate what the associated spatial consequences are.
3	Integrate this into the business plan and the issuance plan.

9.3. SOCIO-ECONOMIC IMPACT

9.3 a Socio-economic impact at supra-local level

Max. Score
15

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

Economic programming on a site should not go at the expense of the socio-economic situation (such as employment) at a higher scale level than that of the site itself. Shifts in employment without a net increase at a higher scale level should be avoided.

Explanation of the measure

A new development generates new employment. In the new situation, employment must be prevented from being lost in the surrounding area. If, however, a shift does take place, particular attention must be paid to a healthy and balanced transition to the new situation.

The impact of the economic development at municipal and regional level is therefore investigated in a socio-economic study. This contains at least the following components:

- Description of the economic development
- The market coverage of the economic development
- Inventory of the relevant economic policy
- Analysis of market areas
- Impact in terms of employment and economic fabric

Criteria requirements

15	Produce a socio-economic study.

9.3 b Socio-economic impact on the immediate environment

Max. Score
15

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

The economic site fits in with the immediate surrounding area. The development can have an impact on the neighbourhood in terms of e.g. the commercial fabric or the level of facilities. Problems and opportunities in the relationship between the industrial estate and the surrounding area must be identified and addressed.

Explanation of the measure

An economic site can have a major impact on the immediate surrounding area of the site (system boundary), including on a social and economic level. It is therefore important to investigate the relationship with the immediate surrounding area, detect problem areas and examine how the development of the economic site can positively contribute to its immediate surroundings.

The following steps are important in this regard:

Assessment framework

This involves determining the context and objectives. The assessment framework refers to targets at a higher level than the site itself. This at least concerns the Regional Zoning Plan for Ghent, the SIF Policy Plan for Ghent, the Spatial Implementation Plans (RUP), the Strategic Plan for the Region of Ghent...The assessment framework can respond to the need to restore the momentum of disadvantaged districts: e.g. unemployment, creation of the shared space, condition of property, good spread of facilities, etc.

Scope

The physical demarcation of the system boundary is defined. The relevant spatial scale levels are determined according to the functional and morphological structures in the city part, involving contiguity in a socio-economic sense.

It is also determined what aspects are relevant in the context of the industrial estate and its environment. The following aspects may be relevant (not exhaustive):

- Economy
- Mobility (see also the MOBER)
- Property
- Environment
- Facilities
- Participation, communication and stakeholder management (in relation to the identified problems)
- Social and demographic parameters
- Amenity value

Analysis

The relevant aspects identified in the previous step are investigated. Input for this may be obtained from the SWOT analyses at district level of the City of Ghent. Other sources and/or consultation with stakeholders in the vicinity of the site may also be recommendable.

Tackling problems and opportunities in consultation with the neighbourhood

Problems and opportunities that can be influenced on or from the industrial estate are examined. To do this, a dialogue is initiated with the immediate surrounding area. This can form part of the broader participation process (see 1.2 a).

Criteria requirements

5	Analyse the relationship between the industrial estate and the neighbourhood from a socio-economic perspective according to the above approach.
10	Show that you are working to solve problems and utilise opportunities in collaboration with the relevant stakeholders from the neighbourhood.

10. INNOVATION

Within this chapter, the design team is given the chance to earn more points for extra performances in relation to sustainability on top of the measures described. If a particular measure contributes to effective sustainability, extra points are awarded. This also allows aspects to be rewarded that were not addressed within this instrument.

This chapter is not part of the overall points weighting. Also, no minimum score is imposed on this section. The points obtained therefore count as a surplus, with which the total score can be increased by up to 10 percentage points.

Initiatives can be taken in various areas to improve and highlight sustainability, making the site a genuine example project. There are 3 different sections:

Innovation in the design

New concepts and technologies should not be ignored, and the sustainability meter must encourage their use. In this section, designers can therefore highlight their own innovative proposals.

Certification

Various national and international bodies certify buildings and sites as sustainable according to a score system. There are rewards for having the site or buildings certified.

Education on sustainability

If the sustainable measures on the site are emphasised and communicated to the public, more people will become aware of the project.

10.1. INNOVATION IN THE DESIGN

10.1 a Innovation in the design

Max. Score
43

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

To stimulate innovative designs that promote sustainability.

Explanation of the measure

For each chapter, perspectives are provided with a sustainable design as the ultimate objective. Of course, there are procedures that were not cited, but which can still contribute in an innovative manner to the sustainability of an economic site. These elements are also rewarded here.

Examples:

- Part of the site is developed to be completely car-free.
- The road surface is paved with air-cleaning materials.
- A separate water treatment system is installed.
- Universal accessibility and integration of people with a disability are dealt with in an innovative way.
- Specific energy-saving equipment is used.
- etc.

The innovative measures must fit in with the main strategic objectives of the City of Ghent. They are described in a report that discusses the objective, expected savings or results, (technical) development, and management. The report is sent to the Environmental Department, which will review it for eligibility.

Criteria requirements

40	Show that the criteria requirements of the previous chapters are applied and where appropriate linked in an innovative way. 10 points are awarded for each innovative application, with a maximum of 40 points.
3	Produce a report on the innovative measures and submit it to the Environmental Department.

10.2. EXEMPLARY FUNCTION

10.2 a Certification of the design

Max. Score
15

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

An official recognition of the sustainability of the economic site or the buildings.

Explanation of the measure

Certification possibilities at site level:

- BREEAM
- LEED

Certification possibilities at building level:

- BREEAM
- LEED
- VALIDEO
- Passive house platform
- Greencalc

Other certificates must be approved by the Environmental Department.

Criteria requirements

15	Have the economic site certified.

or

7	Have at least 20% of the building units certified.

10.2 b Communication regarding the sustainability meter

Max. Score
15

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

Permanent communication based on the themes of the sustainability meter ensures that the reputation of and attention to the sustainability meter are increased.

Explanation of the measure

By taking sustainability as a starting point, the design is directly steered in a more sustainable direction. The 10 subjects investigated in the context of the design should be communicated more broadly, with all partners being called on to take part. Communicating on the link between the design process and the sustainability meter encourages more and more of those involved to adopt sustainability.

Criteria requirements

8	Convene team meetings during the design process, communicating on the 10 themes of the sustainability meter, and produce a report.
7	Publish both the interim and final results of the sustainability measurement.

10.3. EDUCATION IN RELATION TO SUSTAINABILITY

The sustainable measures taken on the economic site can be communicated to users and the general public in many different ways. Here, three aspects are discussed: education through experience of reality, the use of information panels and a website. Naturally alternatives are also possible, such as organising lectures, involving surrounding districts, etc.

10.3 a Education through experience of reality

Max. Score
9

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

To raise awareness among the users of the measures applied through experience of reality.

Explanation of the measure

The sustainable actions applied can be visibly developed or put in the spotlight. In this way they also contribute as an educational product. Users of the site and visitors become witnesses to the processes associated with sustainability in their own environment.

The objectives for sustainability and education are developed.as well as the architectural implications.

Criteria requirements

9	Produce a document on the educational measures with the above-mentioned elements.

10.3 b Education via information panels

Max. Score
9

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

To raise awareness among users by communicating the sustainable measures applied using information panels.

Explanation of the measure

It is useful if the efforts made for a sustainable site are communicated to users in an accessible way. Not only does this have educational value, it also encourages a sustainable approach to the living environment.

Possible subjects for information boards are:

- Sustainable concepts and techniques:
  - (Rain) water management on the site
  - The energy concept of the site
  - Collective facilities
- Dealing sustainably with the site:
  - Mobility: encouraging the use of soft means of transport, information about public transport and car-sharing
  - Waste processing: waste prevention, sorting
  - Safety: social control, closing doors, etc.

Criteria requirements

5	Put up information boards on the sustainable concepts and techniques applied.
4	Put up information boards on a sustainable approach to the site.

10.3 c Education via website

Max. Score
9

1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5

Purpose of the measure

To raise awareness in the outside world of the sustainability of the site by communicating the sustainable measures applied via a website.

Explanation of the measure

It can be useful not just for users but also for the general public to communicate about a sustainable economic site. A website lets you provide and cross-reference more extensive information. Thus, the site can function as a stimulating example for other projects.

Possible elements for a website on sustainability on the economic site:

- The total concept of the site and the vision of integrated sustainability
- The energy concept of the site
- Collective facilities
- etc.

Criteria requirements

9	Produce a website (or a chapter within the existing website) for the general public with a description of sustainability on the economic site.